AN INVESTIGATION INTO THE DIFFERENTIAL DIAGNOSIS OF AUTISM SPECTRUM DISORDER AND ATTACHMENT DIFFICULTIES

by

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ABSTRACT

This study reviews the evidence for commonalities in the behavioural presentation and areas of compromised functioning in children with Autism Spectrum Disorder (ASD) and attachment difficulties. Confusing ASD and attachment difficulties has far-reaching implications in terms of access to services and interventions, family dynamics and life opportunities. A comparative analysis was conducted to evaluate current practice, assess the scale of misdiagnosis, and identify areas of differential presentation which may facilitate accurate diagnosis. Teacher-ratings of the frequency of behaviours drawn from 'The Coventry Grid: ASD vs. Attachment Problems' (Moran, 2010) were collected for two groups of primary school children matched for age, sex and school: one with recent diagnoses of ASD (n = 12) and a control group with no diagnoses (n = 12). Three children with ASD diagnoses had higher ratings for attachment difficulties than ASD, at a level approaching significance. However, a within-group analysis showed no significant difference between the median ASD and attachment difficulties ratings in the group with an ASD diagnosis. Further, a between-group comparison revealed significantly more behaviour suggestive of attachment difficulties in the ASD group than exhibited by the control. Finally, the data were used to examine the measure, based on 'The Coventry Grid' (Moran, 2010). It was found to have an acceptable level of reliability and good face and content validity. However, while the literature suggested good construct validity, analysis of dimensionality raised questions about how we construe the aetiology and mechanisms that constitute the phenomenology that informs the diagnosis of ASD and attachment difficulties. The findings have significant implications for the ASD diagnostic process, in terms of the data collected and the professionals involved.

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CHAPTER 1 INTRODUCTION

1.1   Background

In 1943, Kanner identified an innate syndrome, calling it 'inborn autistic disturbances of affective contact'. Though recognising common familial features, such as high intelligence, obsessiveness and lack of warmth, he believed that as the onset of presentation was from birth, it would be difficult to make a causal attribution. However, notwithstanding this early assertion, in 1949 Kanner put forward a different perspective in 'Problems of Nosology and Psychodynamics of Early Infantile Autism'. Perhaps influenced by trends in post-war psychiatry, Kanner's later attributions focused on the mother-child relationship. This perspective was much publicised by Bruno Bettelheim in his infamous book: 'The Empty Fortress: Infantile Autism and the Birth of the Self' (1967), in which he contended that infantile autism resulted from early, negative experiences:

> "Throughout this book I state my belief that the precipitating factor in infantile autism
> is the parent's wish that his child should not exist" (Bettelheim, 1967).

There has been a backlash against such perspectives (e.g. Rimland 1964; Dua, 2008), and there has been a move to dissociate Autism Spectrum Disorders (ASD) from parenting. However, despite the criticisms levelled at psychiatrists such as Bettelheim and the undeniable negative impact of blaming parents for their children's atypical neurodevelopment, evidence for an association between the behavioural presentation of ASD and behaviours arising from maltreatment and attachment difficulties is difficult to refute (Denis et al., 2009; Moran, 2010; Rutter, 1999). In addition, evidence from both psychological and neurological research suggests that these commonalities extend to atypical brain structures and functioning (Bernier et al., 2010; Beeghly & Cicchetti, 1994; Bos et al.,

2009; Klimes-Dougan & Kistner, 1990; Kraybill and Bell, 2012; Lemche et al., 2006; Mehta et al.'s, 2009; Sadiq et al., 2012; Tottenham et al., 2010; Vrtička et al., 2008; Webster, 2009), and risk factors (King and Bearman, 2011; Larson et al., 2005; Minnis et al., 2007; Sajaniemi et al., 2001).

Notwithstanding the shared attributes outlined above, secure, accurate diagnoses are important as, while ASD and attachment difficulties may be challenging to differentiate in childhood (Volkmar and Lord, 1998; Moran, 2010), the prognosis and appropriate treatments are considered quite distinct (Mukaddes et al., 2000; Denis et al., 2009).

1.2   Problem Statement

The behavioural presentation of ASD and attachment problems can be difficult to differentiate reliably, even for professionals involved in the diagnostic process (Moran, 2010). Perhaps as a result of time pressures, as a consequence of the Fundamental Attribution Error (Ross, 1977), or in acknowledgement of the sensitivities of parents against a background of the work of psychiatrists such as Bettelheim, accurate differential diagnosis does not always take place. These factors point to the possibility that the behaviours of a number of children being given diagnoses of ASD may be attributable to attachment difficulties, and there is some evidence to suggest that this is the case (Denis et al., 2009; Mukaddes et al., 2000). Misdiagnosis has significant implications for access to appropriate resources, interventions, outcomes and families (National Autism Centre, 2011; Prior and Glaser, 2006).

1.3   Professional Significance

While guided by bodies such as NICE (2011) and the diagnostic manuals ICD-10 (WHO, 1992) and DSM-IV (APA, 2000) towards differential diagnosis in ASD and attachment difficulties, there is a dearth of research providing an empirical basis for this practice or guidance for clinicians (Sadiq et al, 2012). The process of differential diagnosis is further confounded by shifting and ill-defined diagnostic criteria (O'Connor and Zeanah, 2003) and constructs. Thus further data relating to the aetiology, mechanisms that constitute the phenomenology and behavioural presentation that inform the diagnosis of ASD and attachment difficulties would be of significant benefit to the field.

Educational Psychologists may be involved in the ASD diagnostic process (Keenan et al, 2010), contributing to multi-disciplinary assessments of children and young people (Yates and Couteur, 2013). In addition they may be called upon by schools to offer advice regarding the appropriateness of a referral to a diagnostic team (Bagnall, 2012; Reichow and Volkmar, 2010). However, unlike Clinical Psychologists they are not commonly involved in the diagnosis of attachment disorders, which may make differential diagnosis more difficult. Further, work is often carried out over limited timescales, which do not allow for the assessment of response to interventions. Therefore, the identification of a valid and reliable tool to guide decision-making would be highly beneficial, increasing both accuracy and knowledge.

1.4   Terminology

The terminology employed in research and practice is important in all fields of enquiry. A common nomenclature facilitates the sharing of knowledge and the interpretation of findings. In psychology the terminology employed may also reflect political, ethical or attributional perspectives. Therefore, for the purpose of clarity, some discussion of terms is necessary.

1.4.1   Definition Key Terms – Autism Spectrum Disorder (ASD)

ASD describes a heterogeneous constellation of behaviours, impaired and atypical functioning with shifting boundaries and sub classifications. A year after the publication of Kanner's (1943) seminal paper describing 'inborn autistic disturbances of affective contact', Hans Asperger (1944) published 'Die "Autistischen Psychopathen" im Kindesalter'. In it he described the cases of four boys, sharing a common pattern of abilities and behaviours. These included: the ability to talk at length and in detail about their specialist interests, in which they displayed an intense absorption, difficulties forming friendships, the absence of empathy, difficulties with reciprocal conversation, and 'clumsy movements' (Asperger, 1944, translated by Frith, 1991).

Asperger contended that what he had described was a discrete syndrome, which he called 'Autistic psychopathy' (Asperger, 1944, translated by Frith, 1991). However, there are many commonalities between Asperger's syndrome and autism. Since Lorna Wing's (1981) seminal paper, 'Asperger's syndrome: a clinical account', there has been much debate about whether autism and Asperger's are separate conditions, or at differing points along a spectrum. The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM V) (APA,

2013) has removed Asperger's Syndrome as a separate condition, thus presentations that would previously been diagnosed as Autism or Asperger's Syndrome will be classified as Autism Spectrum Disorder (ASD).

To date a number of terms have been employed to describe individuals with similar presentations, consistent with the 'triad of impairments' proposed by Rutter (1978) and Wing (1988). Though distinctions have been made, they are all characterised by abnormalities in communication, 'reciprocal social interactions' and 'restricted, stereotyped, repetitive repertoire of interests and activities' (see table 2.1 for examples of associated behaviours), and include:

- Autism, Kanner's Autism (Wing, 1991);

- High Functioning Autism (Mayes & Calhoun, 2008);

- Low Functionning Autism (Ramaekers & Blau et al., 2007);

- Atypical Autism (Boelte & Hallmayer, 2011);

- Infantile Autism (Mouridsen, Rich et al. 2011);

- Childhood Autism (Croen, Grether et al., 2011);

- Autistic Tendencies (Howlin and Asgharian, 1999);

- Asperger's Syndrome (Boelte and Hallmayer, 2011);

- Autistic Spectrum Disorder(Keen and Ward, 2004);

- Autism Spectrum Disorder (Sparks, Friedman et al., 2002);

- Autism Spectrum Conditions (Boelte and Hallmayer, 2011);

- Semantic Pragmatic Disorder (Bishop, 1989); and

- Pervasive Development Disorder (Boelte & Hallmayer, 2011).

Factors influencing the terms used include time and current ideological and political trends, diagnostic criteria used (ICD-10, DSM-IV or other), assessed severity and an attempt to stratify the 'disorder' into groups which share a similar profile of strengths and difficulties.

1.4.2   Terminology Used Within This Study

The children with diagnoses of ASD included in this study were diagnosed with autism or Asperger's Syndrome in accordance with the behavioural criteria in DSM IV TR. For clarity, this paper will refer to childhood autism (ICD-10), autistic disorder (DSM IV TR) Asperger syndrome (ICD-10), and Asperger disorder (DSM IV TR) as Autism Spectrum Disorder, or ASD.

Autism Spectrum Condition has gained favour as the umbrella term with some researchers and professionals. Baron-Cohen et al. (2009) stated that they preferred the term, describing it as being less stigmatising than autism-spectrum disorder, and capturing both the disabilities and cognitive strengths associated with the diagnosis. In addition, The National Institute for Health and Clinical Excellence (NICE, 2012 in progress), now employs the term Autism Spectrum Condition (ASC).

However, ASD was retained here as the most commonly employed term. A Google Scholar search (30.12.11) found 81 600 results for the 'autism spectrum disorders' in comparison to 50 800 results for the 'autism spectrum condition'. In addition it is the term used in the new

edition of the DSM (APA, 2013). However, it is likely that this term will be superseded by Autism Spectrum Condition in the future.

1.4.3   Definition Key Terms - Attachment

Although links between parenting styles and the behaviour of children had been made much earlier (e.g. Kanner, 1949), attachment theory began to be expressed as a cogent paradigm after John Bowlby's (1958) seminal work. Drawing on theory and evidence from a diverse range of fields including evolutionary biology, psychoanalysis, ethology and cognitive psychology Bowlby sought to explain the proximity seeking behaviours of children and the development of 'internal working models' which subsequently shape future relationships.

This theory was elaborated and developed by Ainsworth, (Ainsworth and Bell, 1970; Ainsworth et al., 1978), using the Strange Situation Procedure (See Appendix I). Ainsworth (1970) identified three patterns of attachment; a fourth was later identified as a large number of children were found not to conform to those originally described by Ainsworth (Main & Solomon, 1990).

Following Ainsworth (1970) and Schuengel (1999), attachment patterns are classified as being organised or disorganised, secure or insecure/anxious. Organised patterns of attachment refer to the existence of an organised approach to achieving proximity to an attachment figure when the attachment behaviour system has been activated. The absence of such an organised strategy is classified as disorganised attachment. The secure or insecure classifications refer to

how a person feels about the responsiveness and availability of their attachment figure. An individual with an organised attachment may feel secure or insecure. Insecure-organised patterns of attachment are categorised as being either avoidant, or resistant. Thus there are four classifications of attachment patterns: secure, insecure-avoidant, insecure-resistant and disorganised (Ainsworth, 1970; Schuengel, 1999).
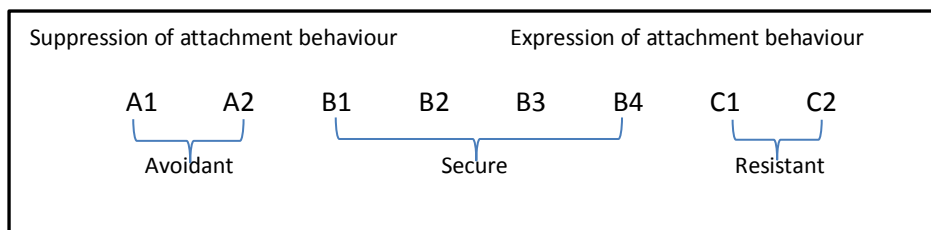
Figure 1.1. The continuum of attachment subgroups (reproduced from Prior and Glaser, 2006, P.26)

As Figure 1.1 illustrates, three of the four attachment patterns have been construed as continua, with A1 and C2 subgroups representing the more extreme ends of insecure attachment. According to this model, babies who are classified as having A type attachment show avoidance behaviours, with A1 babies being consistently avoidant whereas A2 babies display both avoidance and some approaching behaviour. While predominantly secure, those classified as B1 or B2 show some level of avoiding behaviour, with B1 babies displaying more than those classified as B2. Babies classified as having C type attachments are angry, with C1 babies displaying this openly and C2 babies communicating this through displays of helplessness. While predominantly secure in their attachments, those classified as B3 or B4 are more easily distressed by separation and display a degree of resistance at reunion, with B4 babies showing a greater degree of distress and resistance than B3 babies (Ainsworth et al., 1978).

The classification of attachment, informed by the Strange Situation Procedure has been criticised on the grounds that it refers only to the attachment of a child with his/her mother (or one individual) and that it is possible for a child to have different patterns of attachment to different people (Lamb, 1977). In addition, the degree to which attachment is culturally dependent has also been questioned (Miyake et al., 1985). However, large meta-analyses, such as that conducted by Van Ijzendoorn et al. (1999) suggest that patterns of attachment have similar distributions independent of culture.

Van Ijzendoorn et al. (1999) conducted a meta-analysis of non-clinical samples of middle-class children (n = 2 104) and those from families with low socioeconomic status (SES) (n = 586). They found the distribution of patterns of attachment in the middle-class children to be: secure attachment 62%; insecure-avoident attachment 15%; insecure-resistant attachment 9%; and disorganised attachment 15%. However the level of disorganised attachment was found to be significantly higher in the children from low SES families, at 25%.

This study may be criticised on the basis that Van Ijzendoorn et al. (1999) included all available studies in their meta-analysis, regardless of the quality of their methodologies. However, several studies report similar levels of secure attachment in different populations, at approximately 65% (Prior and Glaser, 2006), while disorganised patterns of attachment have been shown to correlate positively with maltreatment and adversity (Cyr et al., 2010).

1.4.4 Attachment Difficulties

Clinical practice with regards to mental health associated with attachment difficulties divides into a relatively limited view, firmly grounded in attachment theory and adhering to the diagnostic criteria set out in either ICD-10 (WHO, 1992) or DSM IV TR (APA, 2000), and a broader approach (Prior & Glaser, 2006). These differences are illustrated in Table 1.1.

	Domains of functioning hypothesised to be associated with attachment security
Narrow View	Trust, confidence and harmony in relationship with parents and significant others Emotion Regulation Self-reliance (versus dependency), ego-resilience, personal efficacy Relational intimacy Interpersonal (social) competence Relationship-based developmental disorders
Broad View	The above plus: Sociability with unfamiliar adults and peers Understanding of and orientation towards others
Very broad view	The above plus: Language and cognitive competence Play competence, exploratory skill Communication style Other outcomes influenced by self-confidence and ego functioning

Table 1.1 Different views of the domains of functioning associated with attachment security (Prior & Glaser, 2006 pp.160)

As Table 1.1 illustrates, the very broad view suggests a number of commonalities between the domains of functioning affected by attachment difficulties and ASD. The broader perspective (e.g. Pederson and Moran, 1999) may be criticised on a number of fronts. First, in departing somewhat from attachment theory, it lacks rigour and theoretical underpinning. This is important as ill-defined constructs are difficult to validate or disconfirm. Further, as attachment may be construed as a continuum (Cummings, 2003), diagnosis or labelling

without recourse to sound theoretical underpinnings, or adherence to strict criteria has the inherent danger of misdiagnosis and the pathologising of those with 'normal' attachment profiles, particularly given the prevalence of attachment patterns not classified as secure. It is estimated that approximately 15% of children in low-risk situations, and 80% of children in high-risk situations have disorganised attachment (Van Ijzendoom et al., 1999) and 40% of children in the normal population are estimated to have an insecure attachment style.

However, notwithstanding this criticism, the domains of competence included in the very broad view have been cited in a number of studies with children who have experienced maltreatment or problems with attachment (Denis et al., 2009; Moran, 2010; Rutter, 1999), reviewed below. Thus the current study tends towards this perspective.

1.4.5 Attachment Terminology Used Within This Study

In this paper, the terms attachment difficulties and attachment problems will be used to refer to children with disorganised attachment patterns, and those falling in the A1 and C2 subgroups of insecure attachment patterns. When studies reported refer to children with a diagnosis of Reactive Attachment Disorder (RAD) (see below) that will be made explicit.

1.5 Diagnosis

In the UK, the diagnosis of RAD and ASD should be made according to the criteria set out in one of two diagnostic manuals: ICD-10 (WHO, 1992) or DSM-IV TR (APA, 2000) (see

Appendix II for the full criteria). The children with ASD included in this study were all diagnosed with reference to DSM-IV TR (APA, 2000).

1.5.1 Diagnosis – ASD: ICD

The current (tenth) edition of the World Health Organisation's International Classification of Diseases (ICD-10) Classification of Mental and Behavioural Disorders (WHO 1992), widely used in clinical practice in Europe (Carr, 2006), describes a number of disorders characterised by common abnormalities under the diagnostic category 'Pervasive developmental disorders'. These include:

- Childhood Autism (including; autistic disorder, infantile autism, infantile psychosis and Kanner's syndrome);

- Atypical Autism (including; atypical childhood psychosis and mental retardation with autistic features);

- Asperger's Syndrome (including; autistic psychopathy and schizoid disorder of childhood);

- Rett's Syndrome;

- Other Childhood Disintegrative Disorder;

- Overactive Disorder Associated with Mental Retardation and Stereotyped Movements;

- Other Pervasive Developmental Disorder; and

- Pervasive Developmental Disorder, Unspecified

1.5.2 ASD: DSM

The text revision of the fourth edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM IV TR TR) (APA, 2000), commonly used in clinical practice in the United States of America, lists: 'Autistic Disorder', 'Rett's Disorder', 'Childhood Disintegrative Disorder', 'Asperger's Disorder' and 'Pervasive Developmental Disorder NOS (Not Otherwise Specified) under the diagnostic category of Pervasive Developmental Disorders, also characterised by abnormalities in communication, 'reciprocal social interactions' and 'restricted, stereotyped, repetitive repertoire of interests and activities'.

Since data were collected for this research, a new, fifth edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders has been released (DSM-V) (APA, 2013). According to DSM V (APA, 2013), those who would have previously met the criteria for Pervasive Developmental Disorder not otherwise specified; Childhood Disintegrative Disorder, Asperger's Disorder or Autistic Disorder would now receive an umbrella diagnosis of ASD (APA, 2013). Further the condition of delayed language development has been dropped (Autism Research Institute, 2013). This is a further example of the shifting criteria that define the construct of ASD.

1.5.3 Attachment Difficulties: ICD

ICD-10 (WHO, 1992) identifies two categories of attachment disorder: Attachment Disorder of Childhood and Disinhibited Attachment Disorder of childhood. As with Pervasive Developmental Disorders, diagnostic criteria require the onset of both types of attachment

disorder in early childhood, before the age of five. The commonalities between the presentation of Reactive Attachment Disorder (RAD) and ASD extend beyond the age of onset and include two of the three triadic impairments: social interaction and communication (WHO, 1992).

The diagnosis should only be made if the child's presentation cannot be accounted for by Asperger's Syndrome, Disinhibited Attachment Disorder of Childhood or 'Maltreatment Syndromes giving rise to physical difficulties'. While ICD-10 acknowledges that Reactive Attachment Disorders (RAD) typically occur as a result of extremely inept or inadequate child care, it states that there is not sufficient evidence for the relationship to be a requirement for diagnosis.

Following the criteria of ICD-10, the differential diagnosis of ASD and attachment difficulties should be relatively clear. A child with ASD would show impaired reciprocal social interaction, social communication and 'restricted, repetitive, and stereotyped patterns of behaviour, interests and behaviour'. In contrast, a child with attachment difficulties would exhibit a 'normal capacity for social reciprocity' and do not display rigidity of thought, behaviour and play, such as repetitive and ritualised behaviour and a reliance on routines. However, to compound the difficulty of accurate diagnosis, features related to social reciprocity, and rigidity of thought behaviour and play have been described in a number of studies of children deemed to have difficulties with attachment (e.g. Moran, 2010; Sadiq et al., 2012; Thompson, 1999).

1.5.4 Attachment: DSM

As with ICD-10, DSM IV TR describes two types of disordered attachment: Reactive Attachment Disorder of Infancy or Early Childhood: Inhibited Type and Reactive Attachment Disorder of Infancy or Early Childhood: Disinhibited Type. Again, both are described as typically beginning before the age of five. The Inhibited Type is analogous to the reactive attachment disorder of childhood described in ICD-10, with impairments in social interaction. The diagnosis should only be made if there is evidence of pathogenic care, and the child's presentation cannot be accounted for by a developmental delay, or a pervasive developmental disorder.

According to revisions to the diagnostic categories and criteria in DSM V, the two subtypes: inhibited and disinhibited remain as distinct disorders: reactive attachment disorder and disinhibited social engagement disorder (APA, 2013).

1.5.5 The Validity and Reliability of Diagnoses

The diagnosis of 'mental disorders', such as ASD and RAD does not have recourse to confirmatory neurological or biological tests such as brain imaging or blood tests, and is reliant on observations of behaviour and, in the case of RAD, the observation or reported observation of particular adverse environmental conditions. Thus the security of diagnoses of conditions expressed only at phenotype (and not genotype) level, is subject to threats from diagnostician error, which may be divided into three areas: errors of skills, rules and knowledge (Watkins, 2009). Further, as this is a risk inherent in all decision-making (Simon,

1995), it may be assumed that it is evident in each of the professions commonly involved in the diagnosis of ASD and attachment difficulties.

One such error of rules is the Fundamental Attribution Error (Ross, 1977), whereby people overestimate the significance of internal dispositions and traits and underestimate the significance of external, environmental and situational factors when making attributions about the behaviour of others. It is possible that the Fundamental Attribution Error could lead to the diagnosis of ASD, through the minimisation of a child's environment, when making decisions based on observed behaviour.

In addition to questions regarding the reliability of clinical decision-making, the diagnostic criteria for RAD in ICD-10 (WHO, 1992) and DSM-IV TR (APA, 2000) have been criticised for a lack of precision in the language they employ, providing ill-defined descriptions of presenting behaviour, despite there being sufficient evidence to allow more clarity (O'Connor and Zeanah, 2003). As with subclinical presentations, ambiguity risks misdiagnosis and questionable reliability.

As a result of the susceptibility of the diagnostic process to error its validity may be questioned (Aboraya, 2006). However, notwithstanding the heterogenic nature of groups classified as having ASD or attachment difficulties, the lack of clarity in language employed and the error inherent in clinical decision-making, such labels provide a useful heuristic. They inform judgements made on a macro level about resources, interventions and funding by those

without clinical or psychological training. In addition, it is such classification that allow for the generalizability of research, improved communication between professionals and efficient service delivery (Dowdy et al., 2009).

1.6   Aims of This Study

This study seeks to contribute to a rising "edifice of knowledge" (Guba and Lincoln, 1994), through increasing professional understanding of ASD and attachment difficulties as constructs, and improving the accuracy of the diagnostic process, in particular with regard to their differential diagnosis. The data collected were designed to address four research questions:

- Do some of the children with ASD diagnoses exhibit behaviours more in line with attachment difficulties?

- Is the level of attachment behaviour significantly different in the ASD group than their typically developing peers?

- Are there significant differences in the frequency of behaviours rated as either ASD or attachment-related ASD population that may facilitate differential diagnosis?

- Does the measure developed for this study from 'The Coventry Grid' (Moran, 2010), have adequate reliability and Validity?

1.6.1   Overview of Thesis Structure and Content

Chapter 2 of the thesis provides a review of the relevant literature, covering: the aetiology, risk factors, brain mechanisms and structures, behavioural presentation and diagnosis of ASD and attachment difficulties. Chapter 3 provides an account of the methodology employed and

addresses ethical issues, reliability, validity, design, procedures and the measure used. Chapter 4 provides the results of the study, with descriptive and inferential statistical data, which are discussed in Chapter 5 in relation to the research questions outlined above.

CHAPTER 2 LITERATURE REVIEW

A review of the literature on Autism Spectrum Disorders (ASD) and attachment difficulties was conducted in order to identify the commonalities and differences in their aetiologies, associated risk factors, impaired functioning and behavioural presentation, with a view to identifying salient information to aid the process of differential diagnosis. Several databases were searched for relevant publications. See Appendix III for further information regarding key words, databases and strategies.

2.1   Aetiology

Both ASD and attachment difficulties are behavioural disorders, present from infancy. Historically they were thought to have similar, psychodynamic aetiologies, as recently as the 1980s the diagnostic manual DSM-III (APA, 1980), the first DSM to describe autism as a separate disorder to childhood schizophrenia, described autism as being a failure to develop normal attachment behaviour. Current evidence suggests that behaviours associated with ASD represent a manifestation of cognitive and neural dysfunctions and abnormalities (Baron Cohen, 2008; Herbert et al., 2004; Rubenstein and Merzenich, 2003; Pelphrey et al., 2007), with both genetic (Muhle et al., 2004) and non-genetic causes (Freitag, 2006). In contrast, most research suggests that the behaviours associated with attachment difficulties, though very similar, reflect neural and cognitive abnormalities and dysfunction (Kraybill and Bell., 2012; Pears and Fisher, 2005; Tottenham et al., 2010) arising from environmental factors (Cyr et al., 2010; Hughes et al, 2005), such as pathological care. However a few studies have suggested a degree of heritability (Minnis et al., 2007).

2.1.1 Aetiology of ASD

In the first few decades after Kanner (1943) identified the first case of 'Early Infantile Autism', there was debate, largely within the field of psychiatry as to the aetiology of what has become labelled ASD. The question was principally focused on identifying the cause: nature or nurture. However, largely as a reaction to the perceived blame culture, whereby psychiatry attributed the causes of conditions such as ASD on parenting, and in particular the qualities of care provided by mothers (Bettelheim, 1967), but also as a result of twins studies (Ronald and Hoekstra, 2011), the nature nurture debate was considered to have been largely resolved in favour of nature (Freitag, 2006; Muhle, 2004). Notable exceptions to this position are France and Switzerland, where ASD continues to be treated as a psychiatric disorder (Sakuse et al., 2011).

However, the aetiology or aetiologies of autism are not clear. Despite the considerable quantity of research in the field, conclusions are confounded by considerable inconsistencies across studies, casting doubt on which factors are truly associated with an increased risk of a diagnosis of autism (Kolevzon et al., 2007). To date, ASD has been reported to be associated with genetic, prenatal, perinatal, postnatal, social and economic factors. It is generally acknowledged to be heterogeneous disorder with different aetiologies (Happe and Ronald, 2008), with the exclusion of maltreatment. It is interesting to note that whereas a range of factors are accepted as aetiologies for the same disorder, characterised by behavioural presentation, when maltreatment is identified as the causal factor these same behaviours are given a different label 'quasi-autism'.

2.1.2 Aetiology of Attachment Difficulties

An evolutionary theory, attachment theory was first put forward by John Bowlby and was greatly influenced by the work of Mary Ainsworth. Attachment theory contends that 'internal working models' of the self and others develop through early experiences with carers, from which individuals make predictions about how others will respond to their attachment needs. In this way an 'attachment behavioural system', differing behaviours by which the proximity of a caregiver can be regulated, develops. Though subject to revision, internal working models, and the 'attachment behavioural system' do not keep pace with changes in the environment and modifications are frequently incomplete, or do not occur at all (Bowlby, 1969, Crittenden, 1990). Thus these early experiences with care givers furnish us with the prototypes for all subsequent relationships (Collins and Read, 1994).

According to attachment theory, a child's emotional and social development is reliant on the availability of a secure attachment with an adult carer, with attachment disorders arising from the failure to develop such an attachment. Thus it is theorised that behaviours associated with attachment difficulties arise from an inability to develop secure attachment patterns in infancy. This position finds support in evidence from studies with both animals (Harlow and Harlow, 1972; Rosenblum and Paully, 1984) and humans (Cyr et al., 2010; Rutter et al., 1999).

However, the aetiology of attachment behaviour is not unequivocal. The genes OXTR and AVPR1A have been linked to social attachment behaviour in humans (Chakrabarti et al., 2009) Further, Minnis et al. (2007) performed a factor analysis and behavioural genetic

model-fitting analysis on the answers to a questionnaire from 13 472 twins looking at a range of behavioural difficulties, including attachment disorder, to determine the degree to which results were influence by their genes and/or their environment. Comparing the answers from monozygotic and dizygotic twins, Minnis et al.'s (2007) findings pointed to a strong genetic link.

2.2   Risk Factors for ASD and Attachment Difficulties

As a part of the diagnostic process for ASD, professionals frequently ask questions to identify the presence of a sibling with a diagnosis, a known risk factor (Minnis et al., 2007). The literature suggests that there is evidence for a number of other risk factors, which were examined for commonalities and differences between ASD and attachment difficulties, to inform the diagnostic process.

2.2.1   Perinatal Risk Factors

Research into perinatal risk factors for ASD and attachment difficulties, occurring between the 20th and 28th week of gestation and the 1st and 4th weeks following birth, is scant, but there is some evidence to suggest a link for both.

Mangelsdorf et al. (1996) studied the impact of very low birth weights (VLBW) on attachment security. They found that by 19 months, infants with VLBW (n = 34) were less securely attached than full-term infants (n = 40) according to the Strange Situation Procedure and the Attachment Q-set. These findings were supported by the work of Sajaniemi et al.

(2001). Looking at the impact of interventions for extremely low birth weight children, they revealed higher than normal levels of atypical attachment patterns, as measured by the Preschool Assessment of Attachment, in those not receiving the intervention.

Evidence for a link between perinatal factors and ASD comes from studies such as Burd et al. (1999) and Larsson et al. (2005). Burd et al. (1999) studied 78 subjects with a diagnosis of autism, and 390 controls, matched for sex, month and year of birth all born in North Dakota. Computerised health department records were analysed for risk factors and used to develop a predictive model of risk for autism. They identified three perinatal variables associated with an autism diagnosis: low birth weight, low apgar score at 1 minute, and low apgar score at 5 minutes. Larsson et al. (2005) used a large data set of children at risk of ASD diagnosis from Danish national registries. Each of the 698 children with a diagnosis of ASD was matched by age and gender to 25 controls. They found an increased risk for ASD associated with: low Apgar scores at 5 minutes, breech presentation, and gestational age at birth. Similar findings were also reported by Eaton et al. (2001).

2.2.2 Sex

It has been widely reported that being male increases the risk of being diagnosed with ASD. King and Bearman's (2011) study of the diagnostic records of children born in California found that males were four times more likely to attract a diagnosis of autism than females. Similar findings were also reported by Rutter (1978) who found that the sex ratio of males to females with autism diagnoses was 4:1.

Though less evidence exists to support a link between attachment difficulties and sex, some research suggests that as in ASD, being male is associated with increased risk. Minnis et al.'s twins study (2007) (described above) found that being male increased the degree of heritability.

2.2.3   Socioeconomic Status (SES)

Socioeconomic status has been shown to influence the risk of both ASD diagnosis and attachment difficulties. However, the relationship with SES is very different. Looking at ASD, King and Bearman (2011) conducted a large study investigating factors associated with the increase in diagnosis in California. They found a link with the receipt of Medi-Cal (the Medicaid welfare programme in California, and therefore a proxy for socioeconomic status).

Children born between 1993 and 1995, with a family in receipt of Medi-Cal, were approximately 20 to 40 percent less likely to be diagnosed with autism. However, by the 2000 birth group, the positive socioeconomic gradient had declined, with an odds ratio for Medi-Cal of .97 (.90, 1.03) (King and Bearman, 2011). Further, children living in wealthy neighbourhoods, whose birth was paid for by Medi-Cal between 1999 and 2000 was, on average, almost 250% more likely to be diagnosed with autism than a child whose birth was paid for by Medi-Cal residing in a poorer area. Thus, while the prevalence rates in children from more affluent families in better off neighbourhoods seems to have reached a ceiling at approximately 40 per 10,000, diagnosis of autism in children residing in the same, wealthier areas but whose birth was paid for by Medi-Cal increased from 20 per 10,000 in 1992, to 46 per 10,000 by 2000 (King and Bearman, 2011). These findings suggest that children from low

SES families living in areas of higher SES are most at risk, with children from lower SES families having a slightly higher risk.

In Canada a similar link with lower SES has been suggested by studies such as Brian et al. (2008). Their study looked at data from three groups of children: siblings of children with ASD who also had ASD (n=23), siblings of children with ASD who do not have ASD (n=63) and a control group of typically developing children without a sibling with ASD (n=55). Though their study focus was the diagnosis of infants, their data showed that of their three groups, the controls came from families with significantly higher SES.

Coming from a low SES home has been shown to increase the risk of attachment difficulties. Cyr et al. (2010) conducted a meta-analysis including 59 samples of high-risk children who had not been maltreated and 10 samples with children who had been maltreated. They examined the impact of socioeconomic risk factors and maltreatment on attachment patterns. They found that those living in high-risk environments and those who had been maltreated exhibited more disorganised and fewer secure attachment patterns than children living in low-risk families. Children who had been maltreated exhibited more disorganised and fewer secure patterns of attachment than other high-risk children. Further those who had been maltreated were no more likely to exhibit disorganised patterns of attachment than those who had been exposed to five socioeconomic risks.

These findings may indicate a role for SES in the development of ASD and attachment difficulties, or the way that SES impacts on the attributions made by professionals involved in the diagnostic process.

2.2.4 Maternal Age

Increased maternal age has been associated with an increased risk for ASD. King et al. (2009) calculated the risk of attracting a diagnosis of autism associated with increased maternal and paternal age by linking birth and diagnostic records of children born in California between 1992 and 2000. They found that the risk associated with increased maternal age ranged from 1.27 to 1.84 (95% confidence interval). However they contended that the association with paternal age was much less than had been previously reported, having been impacted upon by the process of pooling data. In contrast, Reichenberg et al. (2010) argued that studies have taken the effects of pooled data into consideration in their analyses. Grether et al.(2009) conducted a study using data from the same Californian births and autism diagnosis records as King et al. (2009) and did not find that the effect of paternal-age was inflated by the pooling of data. They found that both increased paternal and maternal age increased the odds ratio for an autism diagnosis. With every 10 years of added paternal age they found a 1.22 odds ratio with pooled data (95% confidence interval), with lower odds ratios in 7 of the 14 years, and higher odds ratios in 6 of the individual years. The findings, of increased risk associated with parental age are supported by evidence from several other studies (e.g. (Durkin et al., 2008; Lauritsen et al., 2005; Larsson et al., 2005; Croen et al., 2007 & Reichenberg et al., 2006).

In contrast, there appears to be no link between increased maternal age and attachment difficulties (Burd et al., 1999). In fact, there is some evidence to suggest that this may be a protective factor (Fergusson and Woodward, 1999).

2.2.5   Parental Education

King and Bearman's (2011) large study investigating factors associated with the increase in diagnosis in California, described above, suggests a role for parental education. They found that children born to parents with a higher level of education than their neighbours was linked to an increased risk of being diagnosed with autism. However the evidence to support this is far from unequivocal, with some studies reporting lower levers of education as a risk factor (Burd et al., 1999). No such link with increased levels of education is evident in the research into attachment difficulties (e.g. Heiervang et al., 2007).

2.2.6   Proximity of another Child with ASD

Lui et al. (2010) looked at the effect of proximity to a child with a diagnosis of autism on the chance of a subsequent autism diagnosis through a process of social diffusion. They looked at data from 304 310 children between 2000 and 2005, resident in California. The effects of increasing prevalence, sex, socioeconomic status, 'urbanicity', access to healthcare resources 'neighbourhood-level resources' and maternal age were controlled for.   They found that children living between 1 and 250 meters from a child diagnosed with autism had a 42% greater chance, and children living between 251 − 500 meters from a child diagnosed with autism had a 22% greater chance of being diagnosed with autism over the following year than children living between 501 meters and 1 km away.

In addition, Lui et al. (2010) found a significantly stronger proximity effect on the diagnosis of high-functioning autism than severe autism. While the effects of proximity and clustered distributions have commonalities with viral (bacteria, protozoa etc.) contagion, this was discounted as unlikely due to the effect being greater where autism is less severe. Further, the examination of data from children moving in and out of areas allowed causation from shared toxicological, environmental factors to be discounted.

Lui et al. (2010) propose that this finding may be accounted for by a process of social influence taking place within school districts. This is supported by further findings; that living while children living within 501 meters of a child with a diagnosis of autism in the same school district have an increased chance of a diagnosis during the following year, there is no increased risk for children living in similar proximity in a different school district.

2.2.7 Maltreatment

There are strong links between maltreatment and attachment difficulties, with the presence of pathological care is included in the diagnostic criteria for RAD (APA, 2000; WHO, 1992). This association is supported by meta-analytical studies (see above) (Cyr et al., 2010).

The question of maltreatment being a risk factor for ASD is somewhat complicated by the identification of 'quasi-autism' (Rutter et al., 1999). It is clear from evidence form studies into children who have experienced extremes of maltreatment, adopted from orphanages in Eastern Europe, that this can give rise to behavioural presentations analogous to ASD (Rutter

et al., 1999). However this appears to be a separate condition, capable of some level - and in some cases, complete remediation.

2.2.8 Summary of Commonalities and Differences in Risk Factors

The evidence outlined above suggests that perinatal factors commonly associated with poorer outcomes such as very low birth weights, being male and coming from a family with low SES are risk factors for both an ASD diagnosis and attachment difficulties. Parental age is differently associated with ASD and attachment, as is the level of education, however the evidence for both is weak and thus of little assistance for diagnosis. While maltreatment is a strong risk factor for attachment difficulties, and at the extremes 'quasi-autism', it is not implicated in autism in the literature. However, it would be dangerous to assume that maltreatment and ASD do not co-occur, or conclude that when maltreatment is known, behaviours should be assumed to be attachment-related. It is important to note that links with social factors such as SES may reflect the way in which it impacts on attributions as opposed to the way in which the factors have influenced a child's behaviour and development.

Finally the risks associated with the proximity of another child with an ASD diagnosis (Lui et al. 2010) raise issues about the diagnostic process, and may reflect the part schools and parents have in the diagnostic process. However the findings should be considered with caution, as while the study benefits from a large sample size, the generalizability of findings is limited by the geographical constraints of the research. It is possible that factors exclusively related to the diagnostic process in California may account for the reported proximity effect.

2.3   Brain Mechanisms and Structure

Over the course of the last three decades, there has been a wealth of research focused on both defining the presenting behavioural features of ASD and identifying concurrent biological markers. Empirical evidence revealing a difference with the typically developing population has been drawn from disciplines such as psychology, neuroscience, and biology. These include; an impaired recognition of complex emotions (Baron-Cohen et al., 1997; Blair, 2003), linked to a mentalizing impairment (Golan et al., 1996; Charman et al., 1997), or poor Theory of Mind (Baron-Cohen, 2000; Tager-Flusberg, 2001), impaired functioning of the amygdala (Baron-Cohen et al., 2000; Pelphrey et al., 2007) and executive dysfunction (Baron Cohen, 2008).

There is notably less research focused on defining the behavioural features and biological markers of attachment difficulties, with the majority of research concentrating on the impact of different environmental factors and interventions. However, there is evidence from psychological, biological and neuroscientific studies suggesting a link between attachment difficulties and poor Theory of Mind (Klimes-Dougan & Kistner, 1990), executive dysfunction (Bos et al., 2009) and impaired functioning of the amygdala (Lemche et al., 2006; Mehta et al.'s, 2009; Tottenham et al., 2010; Vrtička et al., 2008)

2.3.1   Amygdala

The amygdala develops at a gestational age of 30 to 50 days; however its differentiation, into 13 separate nuclei occurs postnatally. It has been shown to influence both drive-related behaviours, through moderating the hypothalamus, and emotions, such as fear (Baron-Cohen

et al., 2000). The amygdala shows activation in response to social information such as expression recognition (Morris et al., 1996; Whalen et al, 2013) and gaze (Kawashima et al., 1999). The amygdala theory of autism (Baron-Cohen et al., 2000) posits that amygdala dysfunction may underlie the impairments in social functioning associated with ASD.

Animal studies suggest that damage to the amygdala results in deficits in social behaviour (Kling and Brothers, 1992; Wang et al., 2013) and research with both animals and humans links bilateral damage to the amygdala with reduced social and emotional processing ability (Adolphs, 2003; Adolphs, 2010) and results from research with humans report similar findings. Bachevalier et al. (2001) found that monkeys with lesions in their amygdalae can display behaviours associated with autism in humans, such as stereotyped behaviours, reduced eye contact, lack of facial expression, avoidance of social interaction, an absence of typical play behaviour, and higher levels of self-directed behaviour (Bachevalier et al. 2001). These behavioural difficulties, associated with impaired amygdala function, are common to both the presentations of ASD and attachment difficulties (Pelphrey, 2007; Tottenham et al., 2010), and there is evidence from a range of studies to suggest this may be attributable to amygdala dysfunction.

In ASD, post-mortem studies have revealed abnormalities in the amygdala of autistic humans (Bauman and Kemper, 1985). More recently, research employing structural MRI have revealed abnormalities in the size of the amygdala in individuals with ASD, however results vary according to both age and diagnosis (autism or Asperger's Syndrome) (Toal et al., 2009). Comparative functional imaging studies have shown that autistic subjects display lower levels

of activation in the amygdala in response to stimuli such as emotional expressions on faces (Critchley et al., 2000), inferring the mental state of an individual from their eyes (Baron-Cohen et al., 1999) and dynamic emotional expression (Pelphrey, 2007).

However, there continue to be questions surrounding the amygdala theory of autism. Dziobek et al. (2006) conducted a comparative analysis of amygdala volume, social cognition, emotion recognition and Asperger's syndrome symptomology. They found that while there was a positive relationship between the volume of the amygdala and social cognition and emotion recognition in the control group, this was not the case in those with Asperger's syndrome. However they did find that smaller amygdalae in the Asperger's group were associated with increased levels of restricted and repetitive behaviour.

In common with the atypical amygdala volume and functioning found in individuals with ASD, similar dysfunction and abnormalities has been found in children who have experienced extremes of deprivation and attachment difficulties (Lemche et al., 2006; Mehta et al.'s, 2009; Tottenham et al., 2010; Vrtička et al., 2008).

Evidence from research with adults points to a relationship between attachment and amygdala response. Lemche et al. (2006) conducted an experiment using simultaneous event-related functional magnetic resonance imaging (fMRI) and skin conductance levels and a proxy measure of attachment security (a semantic conceptual priming task). They found that the

level of activity recorded within the bilateral amygdalae was positively associated with attachment insecurity.

Vrtička et al. (2008) investigated the modulating effects of attachment styles on brain activation in circuits associated with behaviour and social processing, including the amygdala in adults. They found a correlation between higher scores on the anxious axis and increased amygdala response to punishment and reproach.

Using MRI, a clinical interview, the Child Behaviour Checklist and the Screen for Child Anxiety Related Emotional Disorders Tottenham et al. (2010) compared the brain volume (including the amygdala), emotional regulation, anxiety and internalising behaviours of 78 children who had experienced care in an orphanage with those of 40 children who had not. They found an association between later adoption ages and larger amygdala volumes, higher levels of anxiety and poorer emotion regulation. These results reflect earlier findings from Mehta et al.'s (2009), research with Romanian adoptees.

2.3.2 Executive Function (EF)

According to ICD-10 (WHO, 1992), Executive function (EF) should be a useful indicator to differentiate between children with RAD, and those with ASD, suggesting that children whose difficulties are attributable to attachment difficulties do not experience impaired EF. However, there appears to be little evidence to support this position, with several studies suggesting compromised EF is common to both groups.

Executive function is a relatively ill-defined construct, linked with the medial and ventral prefrontal cortex (Zelazo and Müller, 2010). It is broadly defined as goal-oriented behaviour, such as: impulse control, planning, organised search (Welsh et al., 2009), working memory, response inhibition and set shifting (Garon et al., 2008), sequencing difficulties, concrete thinking, poor self-monitoring, impaired ability to initiate (Struchen et al., 2008).

As regards ASD, the executive dysfunction theory states that individuals with ASD have difficulties with controlling their actions in comparison to neuro-typicals due to impaired executive function. Actions are defined as physical movements, thoughts and attention. It attempts to account for presenting features such as:

- hand flapping;

- dyspraxia;

- stereotypy;

- restricted diets;

- the desire for routines and rituals;

- taking pleasure in repetition;

- fits of temper over other's points of view, or change;

- rigidity of behaviour;

- difficulties predicting the impact of their actions on the feelings of others;

- problems with turn taking and the propensity for monologue;

- poor planning;

- monotropism (displayed in literality, difficulties with change, generalisation, prediction, timing, sequencing and the 'accommodation of 'Other'' (Lawson, 2010); and

- difficulties with multitasking and shifting attention (Baron-Cohen, 2008).

Some evidence to support this theory comes from the work of psychologists using tests of aspects of executive function. The Tower of London (or Hanoi) is designed to assess planning ability, and evidence suggests that individuals with ASD take longer to complete them (Bennetto et al., 1996; Ozonoff & Jensen, 1999). As Baron Cohen (2008) points out, many people with Asperger's have been shown to perform well on this task, and difficulties with performance have been recorded in a number of other clinical groups. However, impaired planning has been shown in studies using different tasks (Prior and Hoffmann, 1990) Additional evidence comes from work on verbal fluency, in which individuals with ASD are able to name fewer words, grouped by initial letter, in a fixed period than neuro-typicals.

The Wisconsin Card Sorting Task is used to assess set-shifting ability. Subjects are required to sort cards according to an un-spoken rule (either by colour, shape or number), then change to sorting the cards according an alternative rule. Evidence from studies employing this measure show that people with autism struggle to shift to using the second rule; continuing to employ the first (Liss et al., 2001; Ozonoff & Jensen, 1999).

Inhibition is commonly measured with the Stroop task, in which the interference of one input is assessed via performance on another. Studies suggest that individuals with autism show the same levels of interference as control groups (Ozonoff & Jensen, 1999). However, on the Windows Task, in which subjects can win a chocolate, or a marble, by pointing at an empty window, individuals with autism display a reduced ability to inhibit their response (Russell et al., 2003).

In common with ASD, children with attachment difficulties have been shown to exhibit behaviours related to executive dysfunction. These include: rigidity of thought, behaviour and play (Moran, 2010), the element of the triad of impairments thought not to be associated with RAD (WHO, 1992). However, there is evidence to suggest that, as with children with ASD, those who have attachment difficulties display executive dysfunction (Bernier et al., 2010; Bos et al., 2009; Kraybill and Bell, 2012; Sadiq et al., 2012; Webster, 2009).

This is highlighted by the work of the Family Futures Consortium, an adoption and adoption support agency (Lansdown et al., 2007). A social enterprise, the Family Futures Consortium offers multi-disciplinary support to families of adopted and fostered children, professional training and consultations based on attachment and trauma theory. They report that of 86 children with attachment difficulties aged between six and 18, all of them were rated as having difficulties in EF in the 'clinically worrying range' according to the Executive Functions screening questionnaire (BRIEF). It assesses competence in a number of associated domains:

- inhibition of impulse;

- shifting between situations or tasks;

- emotional control;

- initiating tasks ;

- working memory;

- planning and organisational skills; and

- ability to self-monitor their own work (Landsdown et al., 2007).

Bos et al. (2009) conducted a study into the impact of early institutional care, known to impact negatively on attachment, on EF and memory. Their subjects were drawn from the Bucharest Early Intervention Project and included those currently experiencing, or with a history of experience of institutionalised care and 'community children' in Romania. The Cambridge Neuropsychological Test and Automated Battery, used to assess both EF and memory, was administered when the children were 8 years old. Those who had experienced institutionalised care showed weaker EF and memory than those with no such experience. There was no impact of subsequent experience of foster care on memory scores, however it was shown to have had a significant impact on one of the measures of EF.

Further evidence to support executive dysfunction in children with attachment difficulties comes from psychological experiments. Bernier et al. (2010) assessed the parenting of 80 mothers with children of 12 to 15 months. The EF of their children was assessed at 18 and 26 months. Several measures were employed to assess maternal parenting, over 3 home visits, including the Maternal Behaviour Q-sort (Pederson & Moran, 1995). Measures used to assess

the EF of the children differed from T1 to T2 to account for development, and included Spin the Pots (Hughes and Ensor, 2005) and Stroop tasks. Bernier et al. (2010) found a relationship between all three of the identified parenting dimensions: mindmindedness, sensitivity and autonomy-support and the EF of the children. At both 18 and 26 months the dimension autonomy-support was found to be the strongest predicator of EF. These findings suggest a link between parenting styles known to negatively impact on attachment and executive function.

Neurological studies also suggest strong links between the mother-child relationships known to impact on attachment behaviours and executive function. (Kraybill and Bell, 2012). They studied the associations between electrical activity in the frontal brain of infants, EF and maternal behaviours in 56 mother-child dyads. Brain activity was measured using electroencephalogram at 10 months; EF was assessed in a laboratory setting at 4 years, and via parental report after the child's first year of school. Maternal behaviour was assessed through observation when the children were 10 months. Their results showed that both the mother's level of positive affect and the electrical activity of the infant's frontal brain predicted the children's EF at both times.

Webster et al. (2009) conducted an exploratory study into the relationship between maltreatment, attachment and cognitive functioning. Data was collected via parent ratings on 38 adolescents with a history of maltreatment. They found that those with 'unresolved states of mind in regard to attachment' gained significantly lower scores on measures working memory, attention and efficiency, processes associated with executive function.

Thus there is evidence to suggest that, in common with children with ASD, children with attachment difficulties may experience executive dysfunction and the associated behavioural difficulties.

2.3.3   Theory of Mind (ToM)

Theory of Mind (ToM) refers to our ability to infer the mental states of others, and then predict and explain the behaviour of others. It can be stratified into first and second-order ToM. First-order ToM involves inferring the mental state of one other person (Baron-Cohen, 2001). Second-order ToM competence involves being able to consider what one person thinks about another. Within psychology it is commonly assessed through responses to the false-belief task, first developed by Wimmer and Perner (1983).

The best known version of the false-belief task is the Sally-Anne task, in which children are told a story about two characters (dolls), one with a box (Anne) and one with a basket and a marble (Sally). Sally puts the marble in the basket and leaves. While she is gone, Anne removes the marble from the basket and puts it in the box. On Sally's return, the child is asked where she is going to look for the marble. If they answer the basket, they have shown first-order theory of mind, knowledge that another's mental representations are different from theirs, and an ability to predict behaviour on that basis. Evidence of difficulties with more involved, second-order, mindreading comes from the Sally-Anne task, described above, but with a twist, such as Anne observing Sally move the marble through the key-hole.

Research shows that most typically developing children can pass first-order Theory of Mind tests from four years of age (Wimmer & Perner, 1983), and understanding second-order tests is achieved by most typically developing 6 year olds (Baron-Cohen, 2008) . However there is evidence that children with ASD struggle with first-order ToM tasks, differentiating between what someone else knows or thinks and what they know or think themselves (Baron-Cohen, Leslie & Frith, 1985; Baron-Cohen, Leslie & Frith, 1986; Leekam & Perner, 1991; Reed & Peterson, 1990; Swettenham, 1996; Swettenham, Baron-Cohen, Gomez & Walsh, 1996) and the development of second-order ToM is delayed in individuals with ASD (Baron-Cohen, 2008). There are some indications that children who have suffered maltreatment, and or have attachment difficulties have an impaired ToM, which may underpin some of the associated limitations in functioning listed above, such as: social and communication difficulties, controlling behaviour, understanding of and orientation towards others, trust, relational intimacy, self-reliance (Prior and Glaser, 2006) and lack of empathy (Hughes et al., 2005). The development of a Theory of mind is somewhat dependent on EF (Korkmaz, 2011), thus given the evidence suggesting impaired EF in children with attachment difficulties and ASD, poor ToM may be expected in both.

The theory of mind hypothesis in ASD, suggests that the development of a theory of mind is delayed in children with ASD, resulting in a level of mindblindess. Mindblindness, or an impaired ToM attempts to account for a number of the presenting features of ASD, including; social and communication difficulties, fits of temper over other points of view or change, literality, protodeclarative pointing delay, echolalia, difficulties with pragmatics and pronouns, delayed display of joint attention, egotistical behaviour, a preference for the company of adults, controlling behaviour, poor self-awareness, solitude, difficulties predicting

the impact of their actions on the feelings of others, insistence on rules, lack of pretend play, poor eye contact, problems recognising and reading emotions, poor perspective taking, problems with turn taking and the propensity for monologue, proximity issues and poor reciprocity (Baron-Cohen, 2008).

Additional evidence for this theory comes from tests of the ability to identify how someone is feeling from their eyes. Research using the Reading the Mind in the Eyes test shows that both children and adults with ASD score below average where as a typically developing nine year old is able to make such interpretations (Baron-Cohen, 2008).

Hughes et al. (2005) conducted a longitudinal study looking at the ToM of 1 116 twin pairs. They conducted a comprehensive array of tasks to assess the ToM of the twins at 60 months. Subsequent behavioural genetic modelling of the results suggested that the greatest portion of the variance was explained by environmental factors. Several studies reveal that children who have been subjected to maltreatment present with deficits of functioning that imply an impaired ToM, including: a reduced ability to display empathy towards distressed children (Klimes-Dougan & Kistner, 1990) and referring less frequently to internal states (Beeghly & Cicchetti, 1994).

Research conducted by Pears and Fisher (2005) looked at the emotion understanding and ToM of 60 children aged between 3 and 5 years, in foster care, and 31 children of the same age living with their low-income, biological families with no history of abuse. They found

that being in foster care was significantly associated with both poorer ToM and emotion understanding. These findings reflect those of Yagmurlu et al. (2005).

Yagmurlu et al. (2005) compared the development of ToM in Turkish children raised in low and middle income homes, with those raised in a boarding house. Three false belief and one deception task were employed to assess ToM, and language and non-verbal intelligence were controlled for. They found that those raised at home performed significantly better in ToM tasks than those raised in the boarding house. In addition, attachment security in preschool children has been shown to be a significant predictor of performance on false-belief tasks (Fonagy et al., 1997).

Colvert et al. (2008) reported a study assessing the ToM and executive function (EF) of 165 children adopted into the UK from Romanian institutions, and 52 children adopted within the UK. Given the reported conditions of the Romanian institutions, it is a reasonable to assume that those adopted into the UK from Romania had experienced far greater deprivation than the within-UK adoptees. At 6 and 11 years The Strange Stories task was employed to assess ToM and the Stroop task to assess EF. Both ToM and EF deficits were found to be greater in the Romanian adoptees, and highest in those who had experienced institutional deprivation for longer than 6 months. Associations between both ToM and EF were shown with disinhibited attachment, 'quasi-autism' and inattention/over activity. Further, analysis suggested that EF and ToM had a mediating role in 'quasi-autism', and EF partially mediated inattention/over activity. However, neither ToM nor EF were found to mediate disinhibited attachment.

The link between ToM and attachment is not unequivocal. Meins et al. (2002) conducted a study into the relationship between children's social interaction in infancy and later theory of mind (ToM) in 57 mother-infant dyads. Free play sessions were assessed in terms of the mother's uses of appropriate and inappropriate mental-state language about their infants at 6 months. At 12 months, the Strange Situation procedure was employed to measure security of attachment. At 45 and 48 months a series of ToM tasks were assessed. They found a positive correlation between ToM and the use of appropriate mental-state language, but not inappropriate mental state language nor attachment.

2.3.4   Summary of Commonalities and Differences in Brain Mechanisms and Structure

Evidence from studies looking at atypical brain mechanisms and structures: the amygdala, EF and ToM can account for many of the difficulties described by the 'triad of impairments' (Wing 1979). Poor ToM may give rise to social communication difficulties, compromised executive function may impact on an individual's flexibility of thought, behaviour and play, and impaired amygdala reactivity may result in stereotyped behaviours, reduced eye contact, lack of facial expression, avoidance of social interaction, an absence of typical play behaviour, and higher levels of self-directed behaviour (Bachevalier et al. 2001). The evidence for commonalities in brain mechanisms and structures implicated ASD and attachment difficulties limits the future potential of diagnostic scans. Thus diagnoses are likely to continue to be based on behavioural presentations, and in the case of RAD environmental factors. However, as may be expected of groups with common underlying difficulties, their behavioural presentations are may also be expected to be similar (Moran, 2010).

2.4 Behavioural Presentation

The shared underlying impairments outlined above suggest commonalities should be expected in the behavioural profiles of children with ASD diagnoses and attachment difficulties. This is supported by evidence from diverse sources. Animal studies with primates, (Harlow and Harlow, 1972; Rosenblum and Paully, 1984) suggest a link between maternal deprivation and behaviours associated with autism. In humans, studies of children who have experienced extremes of deprivation, including separation from parents, generate similar findings (Rutter et al., 1999; Hoksbergen et al., 2005). At a less extreme end of adversity, Denis et al. (2009) provide an account of comparable ASD-like presentations. ASD-like behaviours have also been reported in children with diagnoses of RAD (Sadiq et al., 2012).

2.4.1 Triad of Impairments

In 1979 Wing and Gould suggested that the impairments and behavioural presentation of ASD were typified by a triad of impairments: impaired social interaction, impaired social communication and impaired social imagination. Since that time these have underpinned both diagnostic criteria and clinical practice. Wing et al. (2011) described the behaviours that each of the triadic impairments refers to. Table 2.1 shows the behaviours and brain mechanisms and structures associated with each area of the triad. Wing et al. (2011) note that in their view, it is the third element of the triad, impaired social imagination that is the most disabling impairment for those with ASD. However, it was not included in DSM IV TR, being replaced by 'repetitive behavioural patterns'.

Triadic Impairment	Associated Behaviours (Wing et al. (2011)	Related Brain Mechanisms and Structures
Impairment of social interaction	A marked reduction of non-verbal signs of interest in and pleasure from being with another person: • eye contact • initiating and responding to smiling initiating and responding to affectionate physical contact (hugging, kissing, greeting and waving good-bye)	Amygdala dysfunction
Impairment of social communication	A decreased ability to 'converse' non-verbally and verbally with another person: • sharing ideas and interests • negotiating in a positive friendly way • joint referencing to share an interest • spectrum also often have problems understanding what is said • literally interpretations of language	Poor Theory of Mind Executive Dysfunction
Impairment of social imagination	A decreased capacity to think about and predict the consequences of one's own actions for themselves and others.	Poor Theory of Mind Executive Dysfunction

Table 2.1 Triad of Impairments (Wing et al., 2011), Behaviours and Associated Impairments

As Moss and Howlin (2009) stated, this triadic pattern of impairments is common to a number of different syndromes and disorders. Notwithstanding the diagnostic criteria (APA, 2000; WHO, 1992) the evidence reviewed above suggests that they are present in children with attachment difficulties.

2.4.2 Extreme Deprivation and ASD

Evidence from studies into the impact of the institutional deprivation experienced by children in Romanian orphanages highlighted the possibility of behaviours associated with autism arising from environmental factors.

Rutter et al. (1999) collected data from a sample of 111 Romanian children adopted into UK families. All had experienced extreme levels of institutional neglect in orphanages in their home country. The children's emotional, behavioural and social function was assessed at ages 4 and 6 years via parental interview, questionnaires completed by parents and teachers, and a play session in which they were temporarily separated from their mothers. Autistic-like behaviours were assessed using the Autism Screening Questionnaire (ASQ). A subsection of this group were also seen for clinical evaluation and the children involved were assessed using the Autism Diagnostic Interview (ADI-R) (Lord et al., 1994).

Six percent showed autistic patterns of behaviour, and an additional 6 percent presented with milder autistic features. At age 4, the children presenting with autistic behaviours without 'severe mental retardation' had the same ADI-R (Lord et al., 1994) scores as a comparison autism group. However, in contrast with the comparison group, these behaviours had significantly reduced by age 6, though they still presented with autistic-like features. Rutter et al. (1999) offered three alternative explanations for what they termed 'quasi-autistic patterns': that they resulted from the profound absence of perceptual and social experiences available in Romanian orphanages, that they were associated with an extreme lack of active experience,

and that the pattern of behaviours arose out of a 'deviant development of attachment relationships' (Rutter et al., 1999).

Similar findings were reported by Hoksbergen et al. (2005) from their study with 80 children who were adopted out of Romanian orphanages into Dutch families. Data was collected about the children's behaviour over 3 points in time; arrival, approximately 4 years post-adoption (mean age: 6.8 years) and approximately 5.5 years post-adoption (mean age: 8 years). 16 percent had Auti-R scores within the autistic range, however the researchers a significant decrease in 'symptoms of autism' between time 1 and time 3 (Hoksbergen et al., 2005).

2.4.3   RAD and ASD

Sadiq et al. (2012) report a study using The Children's Communication Checklist (CCC) (Bishop, 1998), and ADI-R (Autism Diagnostic Interview-Revised) (Lord et al., 1994) algorithm scores, to measure the differences and commonalities in the presentation of 3 groups of 5 to 8 year olds with IQ estimates in the normal range. 39 of these children were described as typically developing, 52 had a diagnosis of ASD and 35 had a diagnosis of RAD.

Controlling for gender, the verbal IQ of the parents, CCC scores and age, Sadiq et al. (2012) found that according to the ADI-R (Lord et al., 1994), of the children with a RAD diagnosis, 46% had scores within the clinical range for 'reciprocal and social interaction', 62.9% had scores within the clinical range for 'use of language and social communication skills', 14.3% had scores within the clinical range for the 'use of gesture and non-verbal play' and 20% had

scores within the clinical range for 'repetitive and stereotyped behaviours'. According to parental reports, 40% of the children with a diagnosis of RAD met the criteria for a diagnosis of ASD. Of these, 60% were rated as displaying 'autism-like' behaviours by the 3 researchers, clinicians experienced in ASD diagnosis, on reviewing their attachment assessment videos.

2.4.4   Attachment Difficulties, Less Extreme Deprivation and ASD

Denis et al. (2009) conducted a qualitative study of children considered to have experiences commonly associated with difficulties with attachment, though none had a diagnosis of RAD. They reviewed the cases of 3 children aged between 3 and 5 presenting with symptoms of 'autistic disorder'; developmental difficulties, language difficulties, stereotyped actions and emotional withdrawal. They found that over time, and with measures such as removal from the home environment (in one case), and therapeutic intervention, all three experienced substantial improvements in their presentation. They suggest that these findings call their earlier diagnosis into question, with presentations perhaps better attributed to environmental factors.

2.5   Differential Diagnosis

Highlighting the shared aspects of aetiology, risk factors, underlying impairments and behavioural presentation raises the possibility of calling into question the validity of dividing those with ASD and attachment difficulties into two separate groups. Both groups are notoriously heterogeneous, and it may be argued that the degree of variation in presentation may not be greatly altered if they were combined, particularly in the case of 'quasi-autism'. However, that is not what is being contended here, as the evidence of the difference in long-

term prognosis does not support such a conflation. Rather, the commonalities are emphasised in order to call attention to the importance of careful differential diagnosis.

Following the now controversial work of Bettelheim (1967), many studies have sought to refute the link between attachment difficulties and ASD. The strongest evidence to support this position comes from studies which show attachment behaviours in children with ASD diagnoses. Rutgers et al. (2004) conducted a meta-analysis of 16 studies on the attachment of children with ASD and 10 on observed attachment security. They reported that most of the studies provided evidence of attachment behaviours in the children with ASD. Further, while they were not as securely attached as the non-ASD group, this difference disappeared in samples of those with less severe ASD or with higher cognitive ability. However, while acknowledging their existence as two discrete phenomena, those involved in the diagnostic process must also be aware of the shared factors which may lead to their being misidentification.

Like attachment difficulties, there is increasing recognition that ASD is a spectrum, with traits forming a continuum merging with the neuro-typical population (Frith, 1991; Baron-Cohen, 1995). Diagnosis is made on the basis of behavioural presentation, however the reliability of the process is somewhat questionable as the reported diagnostic stability of ASD varies, including suggested levels of 63% for autism or PDDNOS and 68% for autism (Turner and Stone, 2007), 80% to 90% (Seltzer et al., 2004) 74% for autism and 83% for PDD-NOS (Chawarska, 2009).

Notwithstanding the difference in reported stability, it is apparent that there is a group of children who appear to meet the diagnostic criteria, but subsequently experience a remediation in ASD related behaviours. This finding may be taken to suggest that for some, recovery is possible. However such a possibility has been criticised by some clinicians as being essentially unattainable in an organic disorder (Schopler et al.1989). An alternative explanation is that instability reflects an over-diagnosis, with children with attachment difficulties, a condition with similar behavioural presentations, known to show better remediation. This may also underpin the reported increase in prevalence.

The need to consider attachment disorders in the diagnosis of ASD is highlighted by researchers and clinical practitioners such as Volkmar and Lord (1998) and Moran (2010). Further, ICD-10 notes that for a diagnosis of Childhood Autism, the presentation should not be attributable to RAD or disinhibited attachment disorder (WHO, 1992, 1996). However, clinical practice suffers from significant time constrains, which impacts upon the ability of the diagnostic process to make accurate attributions, as the significant difference may lie in longer-term prognosis and response to intervention.

This is the position of Denis et al (2009) and Mukaddes et al. (2000). In discussing the implications of their research, Denis et al. (2009) (see above) highlight the importance of differential diagnosis in ASD and attachment difficulties, both in terms of prognosis and intervention. In addition this report highlights the difficulties of making appropriate diagnoses within the timeframes typically required in clinical practice.

Mukaddes et al. (2000) reported the results of a study into the relationship between PDD symptomology and pathological care. They found that after 3 months of their primary care givers receiving a psycho-educational programme, 15 children who had previously been diagnosed with PDD showed significant improvement in all 'symptom clusters'. They conclude that the symptoms of RAD and PDD resemble each other, and that the presence of pathological care and response to treatment are important considerations for differential diagnosis. In addition, evidence from studies into 'quasi-autism'(e.g. Rutter, 1999) also point to presentations reaching a diagnostic threshold for ASD, resulting from adverse environmental factors associated with attachment difficulties, being distinguishable from ASD only in terms of long-term prognosis.

2.6   UK Diagnostic Practice

In the UK, the diagnosis of ASD and RAD is made with reference to IDC-10 (WHO, 1992) or DSM-IV TR (APA, 2000) and should follow NICE guidance. According to the diagnostic criteria, there is a greater distinction between ASD and RAD than clinical practice and empirical evidence would suggest. DSM-IV TR (APA, 2000) indicates that the only common feature between the two conditions is impaired social interaction (see Appendices II and III), and ICD-10 indicated that there is no impairment expressed through restricted and repetitive behaviours in RAD. However, the diagnostic criteria included in DSM-IV TR (APA, 2000) and ICD-10 (WHO, 1992), are acknowledged to be insufficient to form the sole basis for diagnosis (Wing et al., 2011). Gold standard assessments such as the ADOS (Lord et al., 2000), provide useful additional information for diagnosis; however, there is some question over their capacity to allow differentiation between ASD and other disorders that share

impairments of social communication, such as attachment difficulties. As Moss and Howlin (2009) point out, they were not designed for this purpose.

Furthermore, ASD appears to be a heterogeneous disorder, with individuals varying in the degree to which they display impairments across the triad of impairments (Happé and Ronald, 2008). Such variance in presentation within those diagnosed with ASD, and commonalities with other difficulties has led some to question the validity of the current boundaries of the spectrum (e.g. Moss and Howlin, 2009).

The importance of a child receiving an appropriate diagnosis should not be underestimated. Placing children in a specific diagnostic category has implications at individual and wider strategic levels. For an individual it may determine life-long inclusion or exclusion from specific interventions, services or financial support. It may impact on self-perceptions and the way they are construed by family and their wider social network. They may experience associated difficulties in a wide range of areas including: employment, getting a driving licence and travel insurance (NAS, 2011).

For a local authority, accurate data, pertaining to need, will allow for the efficient and appropriate targeting of resources. Such data may influence decisions about early intervention packages and training for Educational Psychology Services.

In the absence of genetic, medical, or laboratory tests for ASD, its diagnosis is based on the observation of unusual patterns of behaviour. Thus clinicians might apply clinical criteria differently to derive ASD diagnoses (Yeargin-Allsopp et al., 2003).

In order to aid the diagnostic process, specifically differential diagnosis of presentations relating to attachment difficulties and those relating to ASD, Moran (2010) compiled a grid of common areas of difficulty and the different modes of presentation. This was subject to review from a number of professionals working within the field of ASD and its diagnosis. However its use is not common practice in the area this study was conducted in.

In 2010, Moran published the 'The Coventry Grid: ASD vs Attachment Problems' (see chapter 3.), the result of a collaboration of professionals drawn from the disciplines currently involved in the diagnostic process: the Coventry CAMHS neurodevelopmental team and the Coventry CAMHS attachment interest group. In her paper Moran (2010) noted that referrals into CAHMS highlighted only the central features of ASD, all common to attachment problems and that current diagnostic interviews do not facilitate differential diagnosis. Based on the diagnostic criteria of ICD-10 and DSM-IV TR, the grid sought to elaborate on the differential presentations of children with ASD and attachment problems in 'every-day life', to facilitate the diagnostic process.

2.6.1 Local Diagnostic Practice

The increase in ASD diagnosis in Noname has not been matched by an increase in available resources, funds or support. The CAHMS Needs Assessment (Street et al., 2010) states that some services provided for children with ASD within the NHS, such as the Noname University Hospital, have not received an increase in resources since 2006, with negative implications for the diagnostic process.

The report raises concerns about a 'lack of a commissioned diagnostic and assessment service and post diagnosis support, for school age children with ASD' (Street et al., 2010), and states that there are gaps in the availability of multi-disciplinary assessment and intervention for school age children. Further, as rates of diagnosis have risen, paediatricians and clinical psychologists in Noname have noted a concurrent rise in the demand for second opinions regarding ASD diagnosis. Street et al. (2010) queried a causal relationship. This highlights the need to improve the process.

In line with NICE guidelines, the diagnosis of ASD in the locality of this research is made by a multidisciplinary team including; a speech and language therapist, a paediatrician and, or child and adolescent psychiatrist and an educational and, or clinical educational psychologist. However the composition of the team changes due to availability. The mode of assessment is currently under review. However, currently the process diverges from NICE guidance in a number of areas. Those specifically related to this research include: the degree to which presentations may be accounted for by the mental or physical illness of parents or carers and a disruptive home life, physical examinations (which may reveal signs of maltreatment) the

consideration of attachment disorders and maltreatment for differential diagnosis and the consistent use of ICD-10 or DSM-IV TR criteria (NICE, 2011).

The degree of similarity of presenting features indicates that differentiation between ASD and attachment difficulties relies on a sound knowledge of the manner of presentation in both areas and the way the problems are expressed in daily functioning. However, as discussed above, gaps in the availability of multi-disciplinary assessment of ASD for school age children have been identified in Noname's CAHMS provision (Street et al., 2010). In addition, there is no requirement for professionals involved in multi-disciplinary diagnosis to have specific training in ASD or attachment problems, making thorough differential diagnosis challenging. Finally, the only routine diagnostic assessment tool employed is completed by the child's teacher, rather than a member of the diagnostic team. School staff in Noname LA have access to monthly training on ASD related issues, provided by the local Educational Psychology Service's specialist teachers and educational psychologists. The focus of this training is the provision of ASD friendly learning environments and managing ASD-related behaviours. Sessions have not covered diagnosis. Further, as attendance at the training requires release from the classroom, it is largely accessed by teaching assistants.

2.7   This Study

The evidence reviewed above suggests that ASD and attachment difficulties share many risk factors, underlying cognitive and neurological impairments and behaviours, necessitating careful differential diagnoses. However this does not appear to routinely occur. The absence of such differential diagnosis may be attributable to a hangover from earlier suggestions about

the aetiology of ASD and the timescales available to clinicians. Prognosis appears to be a key differentiating factor.

In order to ascertain the impact of the difficulties in differentiating the symptomologies on diagnosis, this study was designed to reassess the presentation of primary school aged pupils with an ASD diagnosis. Comparisons were made with the presentation of typically developing children matched for age and school attended (as a proxy for locality, socioeconomic status and culture). Presentations were assessed using a modified Coventry Grid (Moran, 2010) (see chapter 3), with teachers asked to rate the frequency of observed behaviours as either: never, occasionally, often or very frequently. This was the rationale for research question 1: 'Do some of the children with ASD diagnoses exhibit behaviours more in line with attachment difficulties?'

In addition, this study aimed to contribute to the understanding of the commonalities, differences and relationship between ASD and attachment with a view to improving the diagnostic process. Thus three further research questions were asked, 2.: 'Is the level of attachment behaviour significantly different in the ASD group than their typically developing peers?', 3: 'Are there significant differences in the frequency of behaviours rated as either ASD, or attachment-related in the ASD population that may facilitate differential diagnosis?', and 4: 'Does the measure developed for this study from 'The Coventry Grid' (Moran, 2010), have adequate reliability and Validity?'

CHAPTER 3 METHODOLOGY

3.1. Overview

Against a background of increasing numbers of children being diagnosed with ASD and a local review of the diagnostic process in Noname Local Authority, the aim of this study was to provide information to facilitate improved differential diagnosis of ASD and attachment difficulties. It was conducted over a two month period, ending in December 2011. A non-experimental, fixed design, with both within-subject and between subject elements was employed to address four Research Questions:

- Research Question 1: 'Do some of the children with ASD diagnoses exhibit behaviours more in line with attachment difficulties?'

- Research Questions 2: 'Is the level of attachment behaviour significantly different in the ASD group than their typically developing peers?'

- Research Question 3: 'Is the Coventry Grid able to identify significant differences in the frequency of behaviours rated as either ASD, or attachment-related in the ASD population that may facilitate differential diagnosis?'

- Research Question 4: 'Does the measure developed for this study from 'The Coventry Grid' (Moran, 2010), have adequate reliability and Validity?'

The frequency that children with and without a diagnosis of ASD display behaviours associated with ASD and attachment difficulties was rated by their teachers, using a measure derived from the Coventry Grid (Moran, 2010). The measure was created for this study, as there is no existing diagnostic tool designed to differentiate between the two groups (Moss

and Howlin, 2009; Moran, 2010). The results provided information about both the behavioural presentation of the two groups, and the reliability of the measure.

3.2 General Perspective

This study was conducted from a post-positivist ontological perspective (Philips and Burbules, 2000). Drawing on the work of Bhaskar (1978; 1998), the existence of reality is assumed, comprising three domains:

- the empirical, consisting of experiences;

- the actual, consisting of both events and experiences; and

- the real, consisting of events, experiences and the mechanisms that produce 'surface phenomena' (Bhaskar, 1978).

However, reality may only be understood imperfectly; therefore the purpose of this study is not to identify a truth, but to contribute to a closer apprehension of reality, adding to a rising "edifice of knowledge" (Guba and Lincoln, 1994). Results are not construed as a final truth, but as providing probable facts that allow generalisation to a population. The research was designed to inform the diagnostic process, having the dual purpose of being both descriptive (Research Questions 2, 3 and 4) and explanatory (Research Question 1).

An important assumption inherent in this study is that ASD and attachment difficulties are 'real' phenomena; however our ability to understand, and therefore define, them is imperfect. It is acknowledged that diagnostic categories are in part social constructions. For example, it

has been argued that the pattern of behaviour now described as Asperger's Syndrome may once have been seen as a 'normal' variant of typical behaviour (Molloy and Vasil, 2002). The construction of diagnostic categories has been highlighted by the recent controversy evoked by the development of the 5th edition of the DSM (APA, 2013) in which new diagnostic categories have been created (Houchin, 2012; Parker, 2013) and Asperger's Syndrome was reclassified as part of ASD (Giles, 2013).

In line with the post-positivist realist ontology, this research has been conducted from an objectivist epistemological perspective, underpinned by the assumption that the researcher and researched are distinct entities. It is acknowledged that all observations are affected, and therefore that perfect objectivity is not possible. See Section 3.8 for further discussion of biases and methods of limiting their impact, employed in this study.

According to the research perspective outlined above, knowledge is comprised of non-falsified hypotheses, which may be considered plausible fact. While reality may be static, human knowledge of this reality is imperfect and thus dynamic (Guba and Lincoln, 1994). The imperfection arises from human biases (discussed below) and the limitations of our ability to measure and observe reality. The dynamism results from improvements in observation and measurement tools, such as the invention of functional magnetic resonance imaging (FMRI), and the effect of pooling knowledge from different studies and fields. Efforts have been made to remove subjectivity, biases and the influence of the researcher's values. However it is acknowledged that both the creation of 'The Coventry Grid: ASD vs. Attachment Problems' (Moran, 2010), the measure created from it, for use in the current

study, the ratings of the teachers and the interpretation of the results are all open to the threat of bias; see Section 3.8.

3.3   The Research Context

The study took place in five mainstream primary schools in a town in the East of England, in 2011. One of the schools was preparing to open a specialist ASD resource unit, and therefore had a higher than usual number of pupils with a diagnosis of ASD, and a greater than typical number of staff with training in ASD. The town has a population of approximately 51 500 (Noname Borough Council, 2013). It is predominantly white (92.8%), with an unemployment rate of 6.6% in 2012, almost twice that of the rest of the United Kingdom (3.7%) (Noname Borough Council, 2013).

At the time of the study there were two strands of the diagnostic process for Autism Spectrum Disorder in the town: the Multi-Disciplinary Assessment (MDA) and the Diagnostic Forum. The MDA accepts referrals from Educational and Clinical Psychologists, General Practitioners, Paediatricians and Speech and Language Therapists. A minimum of three professionals from the above disciplines (with the exception of General Practitioners) observe and assess the child and produce a report to be submitted to the MDA. A meeting of professionals and parents, chaired by a paediatrician, discusses the findings and makes a diagnostic decision based on the available evidence. The MDA is reserved for children of five years and under and typically takes referrals from nurseries when specialist educational provision is being considered.

The Diagnostic Forum accepts referrals from ages five to sixteen. The pupils involved in this study were diagnosed through this Forum. The Forum is comprised of a consultant community paediatrician, speech and language therapist (SaLT), educational psychologist, advisory teacher (Autism), Child and Adolescent Mental Health Services (CAHMS) and a clinical psychologist. Referrals are accepted from school nurses and GPs via community paediatricians, head teachers and SENCos via educational psychologists and SaLTs, CAHMS hospital paediatricians, physiotherapists, occupational therapists and the pre-school liaison group for children about to enter school.

After referral to the Diagnostic Forum, the child's school is required to complete the Gilliam Autism Rating Scale 2 (Gilliam, 1995), a scale based on the diagnostic criteria in DSM IV TR (APA, 2000). The case is then discussed by the above professionals at a meeting. Each meeting discusses several children, so the time for consideration and discussion of each case is limited. One of two pro-formas, developed by the Forum, and based on the DSM-IV criteria for either Asperger's Syndrome or autism, is used to guide the discussion. The pro-forma for autism asks for a differential diagnosis of Rett's Disorder and Childhood Disintegrative Disorder to be considered. However contrary to NICE guidelines (NICE, 2011) RAD, maltreatment and home environment are not typically considered.

There are three possible outcomes of the Forum discussion:

- No diagnosis

- Diagnosis is uncertain, in which case further information may be asked for from an educational psychologist, Speech and Language Therapist (SaLT) or paediatrician and a diagnostic assessment such as the ADOS 2, 3Di or ADI-R (Lord et al., 1994) completed

- Diagnosis of Autism or Asperger's Syndrome

Thus it would be possible for a child to be diagnosed on the basis of a referral, and a Gilliam Rating Scale 2, completed by a teacher, never having been seen by a member of the diagnostic team. The use of teachers to complete the rating scale in this study was justified by their involvement in the 'routine' diagnostic process. It was the teachers who completed the rating scale employed in the participants' original diagnoses.

3.4   Design

This study employed a non-experimental, fixed design, containing both within-subjects and between subjects elements (Clark-Carter, 2004). There was one independent (or status) variable, diagnostic status, with two levels: 'ASD' and 'no diagnosis'. There was one dependent variable, behavioural presentation, with two levels; 'ASD' and 'attachment difficulties'. Behavioural presentation was identified as the dependent variable on the basis that it was what was being measured (Rosenthal and Rosnow, 1991), and the independent variable was identified as diagnostic status as it was assumed to be a predictor of the behavioural presentation measured (Heppner, Kivlighan et al., 1999). A quantitative, replicable methodology was employed, as the most appropriate method of gaining information that may be generalised to a population.

3.5 Measure

'The Coventry Grid: ASD vs Attachment Problems' (The Coventry Grid) (Moran, 2010) (see Appendix X) was compiled as a response to concerns highlighted by those involved in the diagnosis of ASD at Coventry CAHMS and at the West Midlands Regional Partnership, a multi-disciplinary group working to achieve consistency in the diagnosis of ASD within the area. They had noted a number of children who presented with behaviours suggestive of ASD, for whom a formal diagnostic interview would have led to a diagnosis of a PDD. However, through investigation and the relationships they formed with their clinician were found to have attachment difficulties as opposed to ASD. It was created to distinguish the difference between those with ASD and attachment difficulties and facilitate differential diagnosis (Moran, 2010).

The group involved in creating the Coventry Grid were drawn from by the Coventry CAMHS Neurodevelopmental Team and Attachment Interest Group, and included:

- psychologists;

- psychiatrists;

- social workers;

- speech and language therapists;

- occupational therapists

- art therapists; and

- mental health nurses.

They approached the task by identifying the symptoms of ASD, and how they manifest themselves in daily life, as reported by parents and carers. Next they reflected on the

presentation of these symptoms in those with attachment difficulties. The list of behaviours was then reviewed by a range of professionals involved in both the treatment and diagnosis of ASD and other conditions, and posted for discussion and feedback on Clinical Psychologists Working with Looked After and Adopted Children (CPLAAC) and Educational Psychology List (EPNET) online forums. The resulting Coventry Grid covered eight areas of functioning associated with ASD:

- flexibility of thought;

- play;

- social interaction;

- mind reading;

- communication;

- emotion regulation;

- executive function; and

- sensory integration.

It included 76 behavioural descriptors of the typical presentation in these areas of functioning in ASD and 70 behavioural descriptors of their typical presentation in attachment problems. See Appendix X for the full Coventry Grid (Moran, 2010).

The Grid was adapted for this study to provide a measure of behaviours related to ASD and attachment difficulties. Appendices XII lists the items included and excluded and, where excluded, the reason for that decision. The decisions were taken in the light of discussions with the SENCo and teacher with whom the grid had been trialled, and a meeting with a

teacher and teaching assistant who had experience of working with children with ASD. The original wording of the descriptors was retained wherever possible. However changes were made to remove words such as echolalia, which were deemed 'specialist', and to ensure consistent directionality: with higher scores on the frequency of observation ratings indicating behaviour more in line with attachment problems or ASD. In addition, the descriptors relating to ASD and attachment difficulties, which were separated in the original grid, were mixed to avoid inferences being drawn about it tapping into two separate constructs. Appendix XI shows the rating scale as presented to the teachers.

Data were gathered using a 4-point rating scale. Four point rating scales are employed in the identification of a number of disorders, including ASD (Gilliam, 1995) and ADHD (Wolraich et al., 1998). Following The Vanderbilt ADHD Teacher Rating Scale (VADTRS), (Wolraich et al., 1998) the scale employed 4-points (0 = Never, 1 = Occasionally, 2 = Often and 3 = Very frequently). However, for analysis ratings were converted to 1 = Never, 2 = Occasionally, 3 = Often and 4 = Very frequently.

3.5.1   Validity of the Measure

The validity of the measure is the extent to which it assesses what it was designed to assess. In this section, three facets of validity will be discussed in relation to the rating scale derived from the 'Coventry Grid' (Moran, 2010):

- Face validity
- Construct validity
- Content validity

3.5.1 (i)   Face Validity

Face validity is the view those involved in the research, the raters or subjects, have of the measure (Clark-Carter, 2004). With regards to the raters, this may impact upon the way in which they score the test, and with regards to the subjects, this can influence their behaviour or level of engagement with an assessment. In the development of the measure and design of the study, face validity was considered with reference to demand characteristics, observer bias, confirmation bias and choice-supportive bias. In this study, the influence of demand characteristics (Orne, 1962) on the subjects was avoided by their not being aware they were being assessed. The impact of observer, confirmation and choice-supportive biases with regards to the raters posed more of a threat to the validity of the study. This risk was moderated by partial, passive deception; whereby only part of what was being measured was disclosed, with the attachment difficulties hypothesis being withheld. This was intended to prevent the raters from providing ratings distorted by biases. See section 3.8 for further discussion of biases.

3.5.1 (ii)   Construct Validity

Construct validity is the degree to which a measure assesses theoretical constructs (Robson, 2011); in this case, ASD and attachment difficulties. In the design of the test, consideration was given to the degree to which the behaviours described conform to the literature in relation to the two constructs. It was found to be broader in scope than the DSM IV TR (APA, 2000) criteria for attachment related diagnoses and the triad of impairments (see section 2.4.1). However, the behaviours included were supported by other literature (see Appendix XIV for example studies), though the evidence for Sensory Integration was equivocal (Rogers and Ozonoff, 2005). In analysis, convergent and divergent construct validity were assessed.

Convergent construct validity was assessed through the degree to which diagnosis of ASD, and therefore the participant's scores on the Gilliam Autism Rating Scale was supported. The subject's scores on the ASD subscales was predicted by their diagnostic status, suggesting good convergent construct validity. Divergent construct validity was assessed through the comparison of the ASD and attachment difficulties subscale scores. The very similar pattern of scoring on these subscales suggests that the measure was of limited divergent construct validity.

3.5.1 (iii)   Content Validity

Content validity is the extent to which a measure taps into the full range of behaviours associated with the construct being assessed (Clark-Carter, 2004). As noted in section 3.5.1 (ii), the measure employed in this study covered a wide range of behaviours associated with ASD and attachment difficulties, many more than the diagnostic criteria in ASD IV-R (APA, 2000), or ICD-10 (WHO, 1992) (see appendix XIII). The relevance of each of the areas of functioning assessed is supported by evidence (see appendix XIV). However, the design of the research imposed limitations which impacted upon its content validity. Items included in the original 'Coventry Grid' (Moran, 2010) that were deemed not to be observable within the school context were removed.

In addition to the ASD rating scale, further data were collected designed to reveal risk factors associated with attachment problems related to: diagnostic status (ADHD/ODD/RAD) in relevant areas:

- sex;

- economic status;

- family size;

- composition of family; and

- school attendance.

The purpose of gathering this information was to give indicators of possible aetiology and to look at confounding factors. This information was asked for at the bottom of the rating scale. However, many of these sections were left incomplete by the raters, and those completed did not suggest any pattern.

3.5.1 (iv)   Predictive Validity

Predictive validity refers to the degree to which a measure is able to accurately predict a future situation or condition. The design and timescale of this study did not allow the assessment of the measure's predictive validity and this may be an appropriate area for future research.

3.5.2   Reliability

The reliability of a measure refers to the degree to which it produces consistent results (Clark-Carter, 2004). In the development of a measure, its reliability should be assessed. In this study the internal-consistency reliability of the measure developed was assessed through analysis of the data (see sections 4.5.2 and 5.3.4. Raters were given some training to refine their judgements of frequency ratings to improve the inter-rater consistency and enhance the measure's reliability (See Appendix IX).

3.6 Sample Children

Table 3.1 provides an overview of the schools the samples were drawn from, including, size, age-range, the percentage of pupils with a statement of special educational needs (SEN), or at school action plus (SA+), with English as an additional language (EAL) and eligible for free school meals (FSM). At the time of data collection, school B was developing an ASD resource base.

School	Type	Latest Ofsted Outcome	Age range	Number of Pupils	% SEN Statement / SA+	% EAL	% Eligible FSM
A	Community Infant	2 (good)	5-7	252	8.7	6.1	18.3
B	Community Junior	2 (good)	7-11	217	23.5	8.8	32.7
C	Community Primary	2 (good)	5-11	248	15.7	SUPP	8.9
D	Voluntary Controlled Primary	4 (inadequate)	3-11	351	4.3	0	6.5
E	Community Infant	2 (good)	5-8	193	20.7	3.8	33.7

Table 3.1 School demographics (from information kept on file at Noname LA)

A total of 24 children were included in this study, all of whom were being educated in one of the five mainstream primary schools listed above, all in the same town. To ensure sufficient sample sizes, given the overall number of students with diagnoses of ASD in mainstream primary schools in the town, who had been diagnosed within the preceding 6 months, it was not possible to take the children from a single year group. Schools were contacted after identification from the list produced by the Diagnostic Forum as having more than one child in the appropriate age range (5 to 11) diagnosed in the last 6 months. The period of diagnosis was selected to ensure that the sample had all been through the same process, something which had been subject to revisions in recent years. Of the eight schools contacted, six

schools agreed to take part in the study, of which five returned data. It had been anticipated that data would be collected for 38 children, however only 24 rating scales were returned.

The sample of children fell into two separate groups. One group comprised of children with a diagnosis of ASD, and the other was made up of typically developing (TD) children.

The sample children with diagnoses of ASD (n = 12, mean age = 8 years, SD = 1.76 years (2dp)) were located in five separate mainstream primary schools in the town. Each had received a diagnosis of ASD from the Diagnostic Forum within the preceding 6 months There were 11 boys and one girl.

The sample children in the control group (n = 12, mean age = 7.75 years, SD = 1.71 years (2dp)) were located in the five mainstream primary schools which the participants in the ASD group attended. Teachers were asked to identify a comparison child, by taking the next same sex child without a diagnosed condition on the register. This method of control group selection was chosen in order to minimise confounding factors such as: age and differences in teachers' interpretation of the ratings derived from the Coventry Grid (Moran, 2011) (research version). There were 11 boys and one girl.

3.7 Procedure

1. The behaviour rating scale was trialled with a teacher of a child on my caseload, and discussed with the teacher and SENCo. In this case the SENCo was also the child's grandmother, and as a result of consultations with her and the child's parents I had formulated a hypothesis that the behaviours he was displaying were related to attachment difficulties. However, subsequent to my involvement, and the data collection for this study, he was diagnosed with ASD. As a result of this discussion, some items were removed (see Appendix XII).

2. The head teachers of the eight mainstream primary schools identified were contacted by telephone and asked if they would allow their teachers and pupils to participate (see Appendix V for the script). Six agreed, five returned data.

3. Next, the teachers in the classes with recently diagnosed children were contacted by telephone to ask if they would be willing to take part (see Appendix VI for the script). All agreed. However, two did not return data.

4. The teachers were sent a letter for the parents of all pupils in their class, asking for passive consent (see Appendix VII). None of the parents asked for their child not to be included in the study.

5. A twilight session for the raters was held at each of the schools taking part in the study. The aim of this session was to outline the broad aim of the study, familiarise the teachers with the rating scale, answer questions regarding the items and provide

guidance concerning interpretation of frequency ratings (see Appendix XI). Teachers were asked to complete a written consent form (see Appendix VIII), to be returned with the completed rating scales. The rating scale was left with the school.

6. The completed rating scales were either collected by the researcher, or returned by post to the Educational Psychology and Specialist Support Service. Each returned measure was anonymised, but coded with a number indicating the teacher-pupil pair, followed by either A (ASD diagnosis), or B, (no diagnosis).

7. A summary of the research was made available to those of the school staff and professionals involved in the diagnostic process, who took part in the research. This did not discuss data relating to individual professionals, school or pupils. A copy of the full report was be submitted to Noname Educational Psychology and Specialist Support team.

3.8   Bias

As noted in Section 3.2, it is acknowledged that human observations are affected by the observer's subjectivity, and cannot therefore present a perfect rendering of reality. However, in the design of the study, and development of the measure, a number of biases were considered with a view to minimising their impact. These include:

- observer bias;

- participant bias (demand characteristics);

- fundamental attribution error (as discussed in Section 1.5.5); and

- experimenter expectancy.

3.8.1 Observer Bias

Observer bias occurs when those making observations in research, in this case the teachers completing the rating scales, are aware of the research hypothesis and this influences their observations, or ratings. This can pose a threat to validity. In order to reduce the risk of observer bias skewing the results of this research, a passive deception was employed whereby information about the nature of the research was intentionally withheld from the teachers making the ratings. This is discussed more fully in Section 3.9.3.

3.8.2 Participant Bias (demand characteristics)

Participant bias (demand characteristics) is similar to observer bias, but is related to the participants in the study; it occurs when participants change their behaviour for the duration of their participation (Orne, 1969). As with observer bias it can threaten the validity of a study. This threat to validity was avoided, as the children included were not strictly participants, being unaware of their selection. The ethics of this decision are discussed in Section 3.9.4.

3.8.3 Fundamental Attribution Error

The fundamental attribution (Ross et al., 1977) error refers to the tendency to overestimate the contribution of internal, dispositional factors and underestimate the influence of external, situational factors on behaviour. This bias is a particular concern for those involved in the differential diagnosis of attachment difficulties (determined by external factors) and ASD (determined by internal factors). The influence of the fundamental attribution error could lead to the overestimation of internal, dispositional factors and therefore an ASD diagnosis, when behaviours may arise from external factors (attachment difficulties).

In this study, the threat to validity arising from this bias was the same as in differential diagnosis. The teacher could have provided ratings confirming a biased belief that behaviours were caused by dispositional factors, ASD.

3.8.4 Experimenter Expectancy

Experimental expectancy occurs when researchers bias their findings in line with their hypotheses, and may occur unknowingly (Rosenthal and Rubin, 1980). The risk of such a bias may be minimised by reducing the contact participants have with the researcher, or through double-blind procedures whereby data is collected by third parties, not aware of the hypothesis and participants are similarly unaware of the hypothesis (Robson, 2011). This was the method adopted in this study.

3.9   Ethical Considerations

Ensuring that high ethical standards were adhered to was an important aspect of the design and implementation of this study, and Ethical approval from the University of Birmingham Ethical Review was sought and given. Ethical issues considered included:

- Consent

- Withdrawal

- The protection of subjects from being impacted upon by inclusion in the study

- Deception

- Coercion of the raters

- Anonymity and confidentiality

3.9.1 Consent

Consent for participation in this study was required from schools, teachers (raters) and the parents of selected pupils. However, this consent was not fully informed, as the attachment hypothesis was withheld. The ethics of perpetrating such deception are discussed in section 3.5.3. The pupils were not asked for consent for the following reasons:

- They will at no point be identified.

- Their names will not be discussed.

- They were not active participants.

- Discussing the behaviour and backgrounds of unnamed pupils is part of my role in these schools and does not require consent.

- Not informing the pupils is seen as protecting them from any possible stress that may be caused by an awareness of the research.

All parents of pupils in the identified classes were sent a letter explaining the study (see Appendix VII) and providing them with an opportunity (a return slip) to exclude their child from passive participation. The contact details of the researcher and supervisor were provided so that parents were afforded the opportunity to discuss related questions or concerns in more detail at any point during the course of the study.

3.9.2 Withdrawal

The right to withdraw from the research, without having to give a reason, before and during data collection, was made clear to all parents, school staff and other professionals contacted. However, as no data was to be stored against individual names, it would not be possible to withdraw from the study after that point. In line with BERA ethical guidelines (2004) requests

to withdraw from the study were to be accepted without question, and no attempts to coerce or persuade individuals to continue to participate would be made. It was made clear to all that there would be no consequences for participants or raters withdrawing before or during data collection, and that data recorded up to that point would be shredded. However, no requests for withdrawal were made.

3.9.3   Deception

The deception involved in this study was approved by the University of Birmingham Ethical Review, and was outlined in the application for approval in the following way:

> "Adult participants will be informed of the broad aims of the project. However, they will not be informed of the attachment hypothesis. This has two purposes, to avoid influencing the responses provided and to avoid influencing the perceptions of teachers regarding the pupils and their families. The attachment hypothesis will be revealed in the research summary described below." (University of Birmingham application for ethical review, 2011)

The use of deception in psychological studies has been criticised on three fronts:

- the harm caused to participants
- the harm caused to psychology as a profession by reducing public trust
- harm caused to society (Baumrind, 1985).

However, in this research, its use is defended as both necessary to reduce the impact of biases (see section 3.8), and to protect those involved. It was further justified as the potential benefits which may arise from this research, were viewed to outweigh the potential harm caused by the passive deception (Kimmel, 2003).

The perceived potential benefits which may arise through the application of the findings of this study include: improvements to the diagnostic process, treatment and support available to children and school staff within the area of research. The potential harm resulting from passive deception identified in the design of this study were reduced trust in the profession of educational psychology, and the teachers involved experiencing negative emotions arising from the feeling of having been deceived. However, the participating schools were considered to have good working relationships with the Educational Psychology Service, afforded it a great deal of trust, and were very interested in improving the diagnostic process. Concerns about the accuracy of diagnoses of ASD had been raised by many schools in the area, and the issue had been discussed at an area SENCo meeting. These factors were considered as indicating that there would be no negative impact on the school's views of the profession. Rather, it was considered likely that they would welcome such research.

The deception perpetrated in this study was considered important to protect the children involved, since the information gathered may have led teachers to make inferences about their attachments and home lives. Thus, the attachment hypothesis was not discussed with teachers to avoid influencing their perceptions of pupils and their families, and the measure was constructed in a manner which concealed the difficulty indicated by the behaviours described.

3.9.4   Anonymity and Confidentiality

It was made clear to all parents and raters that no data would be attributed to them, or their school, but would be presented collectively in a research paper (BPS ethical guidelines, 2009). However, as the data were completely anonymised and could not be reconstituted to

reveal the identity of the raters or sample children, these do not constitute personal data and are therefore exempt from the Data Protection Act (1998) (Information Commissioner, 2001).

3.10   Data Analysis

Data analysis comprised tests to answer the four research questions. As the data collected were ordinal, non-parametric tests were selected (see Tables 3.3 and 3.4). Normal distributions were not assumed.

Research Questions	Analysis Performed	Test Used
1. Do some of the children with ASD diagnoses exhibit behaviours more in line with attachment difficulties?	• Within-subjects comparison of means.	• Wilcoxon matched pairs sign ranks test
2. Is the level of attachment behaviour significantly different in the ASD group than their typically developing peers?	• Between-subjects comparison of means.	• Mann-Whitney U test
3. Is the Coventry Grid able to identify significant differences in the frequency of behaviours rated as either ASD, or attachment-related in the ASD population that may facilitate differential diagnosis?	• Correlation	• Spearman's rho
4. Does the measure developed for this study from 'The Coventry Grid' (Moran, 2010), have adequate reliability and Validity?	• Internal Consistency • Dimensionality	• Cronbach's alpha • Principal component analysis

Table 3.3 Data Analysis

3.11   Summary of Methodology

Quantitative data, frequency ratings of observed behaviours relating to presentations of attachment difficulties and ASD shown by children with (n=12) and without (n=12) a diagnosis of ASD. The ratings were provided by the children's teachers in the five schools that returned data. Chapter 4 provides an account of the results of the tests subsequently performed.

CHAPTER 4 RESULTS

Chapter four presents the results of the data analysis. Section 4.1 presents descriptive statistics, providing an overview of findings. This is followed by the results of inferential tests performed, ordered by the research question they sought to address. The implications of these findings will be addressed in Chapter 5.

4.1   Means

In order to gain a prima face overview of the results, the means of the age in years, and ratings for each of the sixteen areas of functioning was calculated. Table 4.1 presents the means of each group on each of these variables, the difference in population means is further illustrated by Figure 4.1. This suggests that the ratings for the group with an ASD diagnosis were higher across the board. Within the ASD group, there appeared to be little difference between the mean ASD and attachment difficulties ratings for each of the 16 areas of functioning. However, the standard deviation is also higher; reflecting a wider range in the ratings this group was given. The mean age of the ASD group was .25 years older than the control. However, a correlational analysis (Pearson's correlation co-efficient) revealed that there was no significant between age and any of the areas of functioning scores (all p>0.05).

Group	Control (12)		ASD(16)	
	Mean	SD	Mean	SD
Age (years)	7.75	1.71	8	1.76
Flexibility of thought and behaviour	1.21	.20	2.28	.71
Flexibility of thought and behaviour	1.64	.25	2.35	.64
Play (ASD)	1.12	.19	2.25	.57
Play (attachment)	1.12	.11	2.05	.70
Social Interaction (ASD)	1.30	.40	2.42	.76
Social Interaction (attachment)	1.18	.40	2.57	.85
Mind Reading (ASD)	1.13	.25	1.85	.59
Mind Reading (attachment)	1.05	.09	2.10	.56
Communication (ASD)	1.21	.26	2.30	.76
Communication (attachment)	1.54	.21	2.42	.58
Emotion Regulation (ASD)	1.07	.15	2.68	.62
Emotion Regulation (attachment)	1	0	2.50	.78
Executive Function (ASD)	1.07	.16	2.10	.61
Executive Function (attachment)	1.11	.28	2.60	.72
Sensory Integration (ASD)	1.25	.62	2.08	.79
Sensory Integration (attachment)	1	0	2.21	1.03

Table 4.1. The means of the control and ASD groups for each of the variables

4.2 Research Question 1.

To answer Research Question 1: 'Do some of the children with ASD diagnoses exhibit behaviours more in line with attachment difficulties?', the data from the children with ASD diagnoses was scrutinised on both an individual and group level. To test the difference between the two groups a Wilcoxon matched pairs sign ranks test, recommended to test the difference between two sample means where data is nonparametric and the subjects have been matched to reduce the impact of individual differences (Brace et al., 2012), was used.

Children with ASD	Mean ASD Rating	Mean Attachment Rating
1A	2.60	2.59
2A	2.88	2.74
3A	2.67	2.43
4A	2.62	2.31
5A	2.32	1.81
6A	2.49	2.21
7A	2.79	2.38
8A	**1.54**	**3.16**
9A	**1.46**	**3.43**
10A	**1.31**	**2.13**
11A	2.52	1.26
12A	2.02	1.74

Table 4.2 Mean ASD and Attachment Ratings for Children with ASD

It revealed that there was no significant difference between the median ASD and Attachment presentation ratings of the group with an ASD diagnosis. An alpha level of .05 was used ($z = .471$, N − Ties = 12, $p > .05$, two-tailed).

However, on an individual level, there were three children with ASD who had higher attachment difficulties scores (see Table 4.2). Therefore the test was repeated using only the median scores provided by this subgroup of three. This revealed that the difference between scores was approaching significance ($z = -.604$, N = 3, $p = .053$, one-tailed). The one-tailed significance is reported as directionality was predicted.

4.3   Research Question 2

To answer Research Question 2: 'Is the level of attachment behaviour significantly different in the ASD group than their typically developing peers?', and to develop a greater understanding of the prima facie difference in the means of the two groups (see Figure 4.1). A Mann-Whitney U test, a nonparametric test of the difference between two levels of an independent variable, used when distributions are not assumed to be normal (Clark-Carter, 2004), was used to compare the means. An alpha level of .05 was used.
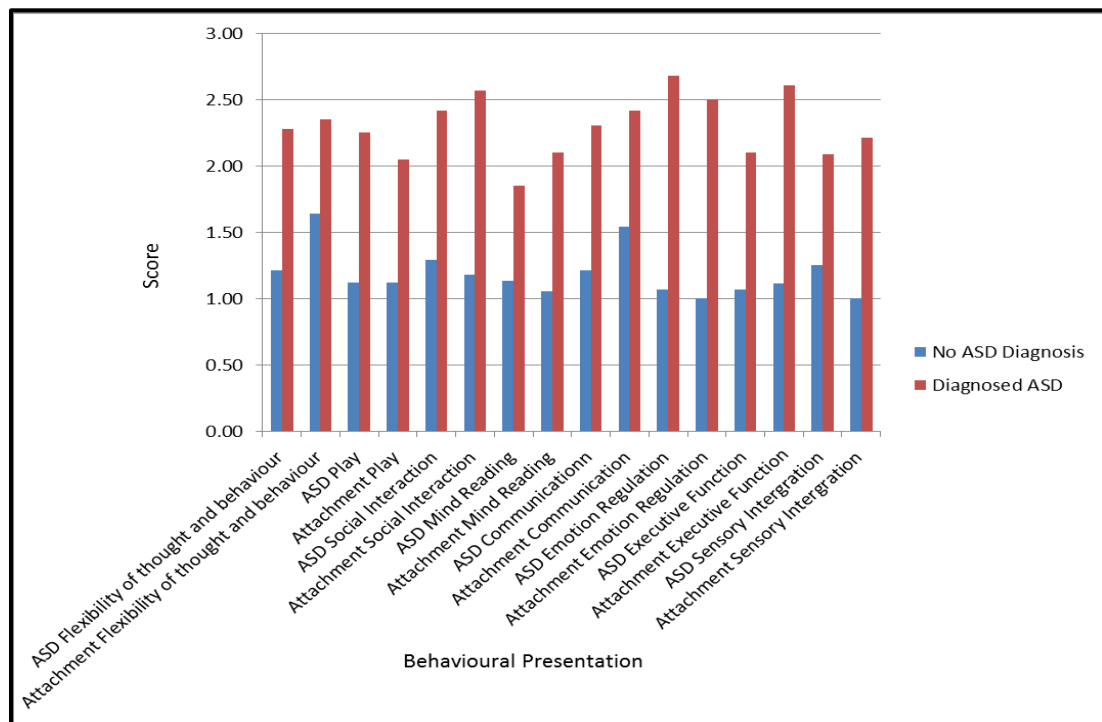
Figure 4. 1. Mean Subscale Scores for children with and without a diagnosis of ASD

The Mann-Whitney U test indicated that the mean scores of the ASD group were significantly higher than the scores the control group in all areas of ASD and attachment behaviour:

- ASD Flexibility of Thought and Behaviour (U = 9.500, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- Attachment Flexibility of Thought and Behaviour (U = 17.00, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- ASD Play (U = 2.00, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- Attachment Play (U = 11.500, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- ASD Social Interaction (U = 15.500, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- Attachment Social Interaction (U = 6.500, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- ASD Mind Reading (U = 17.500, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- Attachment Mind Reading (U = 0.00, N_1 = 12, N_2 = 12, *p* < .05, two-tailed);

- ASD Communication (U = 17.000, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- Attachment Communication (U = 14.000, N_1 = 12, N_2 = 12, p < .05, two-tailed)

- ASD Emotion Regulation (U = 1.000, N_1 = 12, N_2 = 12, p < .05, two-tailed)

- Attachment Emotion Regulation (U = 0.000000, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- ASD Executive Function (U = 3.000, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- Attachment Executive Function (U = 2.500, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- ASD Sensory Integration (U = 30.500, N_1 = 12, N_2 = 12, p < .05, two-tailed);

- Sensory Integration (U = 18.000, N_1 = 12, N_2 = 12, p < .05, two-tailed).

4.4   Research Question 3

In order to answer Research Question 3: 'Are there significant differences in the frequency of behaviours rated as either ASD or attachment-related within the ASD population that may facilitate differential diagnosis?', the relationship between ratings on the subscales was assessed. A Spearman's rho was used to calculate the level of correlation between the mean ratings on the subscales relating to areas of functioning in ASD and attachment. The test was selected as appropriate for nonparametric data (Clark-Carter, 2004), with r_s values of between .7 and 1 indicating a strong correlation, .3 to .6 a moderate correlation and 0 to .2 a weak correlation (Fernandez, 2012). An alpha level .05 was employed.

As Table 4.3 illustrates, analysis of the mean scores on each of the subscales indicated a number of significant strong and moderate positive correlations. No negative relationships were revealed.

ASD / Attachment		Flexibility of thought and behaviour	Play	Social Interaction	Mind Reading	Communi-cation	Emotion Regulation	Executive Function	Sensory Integration
Flexibility of thought and behaviour	r_s	.609	.587	.474	.338	.407	.579	.567	.412
	p	.002	.003	.019	.106	.046	.003	.004	.045
Play	r_s	.533	.580	.410	.452	.301	.696	.598	.237
	p	.007	.003	.047	.027	.152	.000	.002	.265
Social Interaction	r_s	.670	.746	.612	.470	.497	.692	.658	.445
	p	.000	.000	.001	.021	.014	.000	.000	.029
Mind Reading	r_s	.666	.748	.623	.604	.545	.820	.762	.444
	p	.000	.000	.001	.002	.006	.000	.000	.030
Communication	r_s	.651	.590	.513	.454	.526	.693	.691	.401
	p	.001	.002	.010	.026	.008	.000	.000	.052
Emotion Regulation	r_s	.711	.768	.604	.558	.497	.841	.785	.439
	p	.000	.000	.002	.005	.014	.000	.000	.032
Executive Function	r_s	.735	.772	.659	.586	.551	.769	.836	.488
	p	.000	.000	.000	.003	.005	.000	.000	.016
Sensory Integration	r_s	.693	.611	.434	.441	.393	.745	.649	.336
	p	.000	.002	.034	.031	.058	.000	.001	.108

Table 4.3. Spearman's rho and two–tailed significance for the ASD group

Strong Positive Correlations. Significant strong positive correlations were found between four of the ASD-related subscales and attachment-related subscales.

The strong correlations for **ASD Flexibility of Thought and Behaviour** were between:

- ASD Flexibility of Thought and Behaviour and Attachment Emotion Regulation (r_s (24) = .711, $p < .05$, two-tailed test); and

- ASD Flexibility of Thought and Behaviour and Attachment Executive Function (r_s(24) = .735, $p < .05$ two-tailed test).

The strong correlations with **ASD Play** were between:

- ASD Play and Attachment Social Interaction (r_s(24) = .746, $p < .05$, two-tailed test);

- ASD Play and Attachment Mind Reading (r_s(24) = .748, $p < .05$, two-tailed test);

- ASD Play and Attachment Emotion Regulation (r_s(24) = .768, $p < .05$, two-tailed); and

- ASD Play and Attachment Executive Function (r_s(24) = .772, $p < .05$, two-tailed test).

The strong correlations for **ASD Emotion Regulation** were:

- ASD Emotion Regulation and Attachment Mind Reading (r_s(24) = .820, $p < .05$, two-tailed test);

- ASD Emotion Regulation and Attachment Emotion Regulation (r_s(24) = .769, $p < .05$, two-tailed test);

- ASD Emotion Regulation and Attachment Executive Function (r_s(24) = .769, $p < .05$ two-tailed test);

- ASD Emotion Regulation and Attachment Sensory Integration (r_s(24) = .745, $p < .05$, two-tailed test).

The strong correlations for **ASD Executive Function** were:

- ASD Executive Function and Attachment Mind Reading ($r_s(24) = .762$, $p < .05$, two-tailed test);

- ASD Executive Function and Attachment Emotion Regulation ($r_s(24) = .785$, $p < .05$, two-tailed test); and

- ASD Executive Function and Attachment Executive Function ($r_s(24) = .838$, $p < .05$, two-tailed test).

Moderate Positive Correlations. Significant moderate positive correlations were indicated between seven of the ASD-related subscales and the attachment-related subscales.

The moderate positive correlations for **ASD Flexibility of Thought** were between:

- ASD Flexibility of Thought and behaviour and Attachment Flexibility of Thought and Behaviour ($r_s(24) = .609$, $p < .05$, two-tailed test);

- ASD Flexibility of Thought and behaviour and Attachment Play ($r_s(24) = .533$, $p < .05$, two-tailed test);

- ASD Flexibility of Thought and behaviour and Attachment Social Interaction ($r_s(24) = .670$, $p < .05$, two-tailed test);

- ASD Flexibility of Thought and behaviour and Attachment Mind Reading ($r_s(24) = .666$, $p < .05$, two-tailed test);

- ASD Flexibility of Thought and behaviour and Attachment Communication ($r_s(24) = .651$, $p < .05$, two-tailed test); and

- ASD Flexibility of Thought and Behaviour and Attachment Sensory Integration ($r_s(24) = .693$, $p < .05$, two-tailed test).

The moderate positive correlations for **ASD Play** were between:

- ASD Play and Attachment Flexibility of Thought and Behaviour ($r_s(24) = .587$, $p < .05$, two-tailed test);

- ASD Play and Attachment Play ($r_s(24) = .580$, $p < .05$, two-tailed test);

- ASD Play and Attachment Communication ($r_s(24) = .590$, $p < .05$, two-tailed test);

- ASD Play and Attachment Sensory Integration ($r_s(24) = .693$, $p < .05$, two-tailed test).

The moderate positive correlations for **ASD Social Interaction** were between:

- ASD Social Interaction and Attachment Social Interaction ($r_s(24) = .612$, $p < .05$, two-tailed test);

- ASD Social Interaction and Attachment Mind Reading ($r_s(24) = .623$, $p < .05$, two-tailed test);

- ASD Social Interaction and Attachment Communication ($r_s(24) = .513$, $p < .05$, two-tailed test);

- ASD Social Interaction and Attachment Emotion Regulation ($r_s(24) = .604$, $p < .05$, two-tailed test); and

- ASD Social Interaction and Attachment Executive Function ($r_s(24) = .659$, $p < .05$, two-tailed test).

The moderate positive correlations for **ASD Mind Reading** were between:

- ASD Mind Reading and Attachment Mind Reading ($r_s(24) = .604$, $p < .05$, two-tailed test);

- ASD Mind Reading and Attachment Emotion Regulation ($r_s(24) = .558$, $p < .05$, two-tailed test); and

- ASD Mind Reading and Attachment Executive Function ($r_s(24) = .586$, $p < .05$, two-tailed test).

The moderate positive correlations with **ASD Communication** were between:

- ASD Communication and Attachment Mind Reading ($r_s(24) = .545$, $p < .05$, two-tailed test);

- ASD Communication and Attachment Communication ($r_s(24) = .526$, $p < .05$, two-tailed test); and

- ASD Communication and Attachment Executive Function ($r_s(24) = .551$, $p < .05$, two-tailed test).

The moderate positive correlations for **ASD Emotion Regulation** were between:

- ASD Emotion Regulation and Attachment Flexibility of Thought and Behaviour ($r_s(24) = .579$, $p < .05$, two-tailed test);

- ASD Emotion Regulation and Attachment Play ($r_s(24) = .696$, $p < .05$, two-tailed test);

- ASD Emotion Regulation and Attachment Social Interaction ($r_s(24) = .692$, $p < .05$, two-tailed test); and

- ASD Emotion Regulation and Attachment Communication ($r_s(24) = .693$, $p < .05$, two-tailed test).

The moderate positive correlations for **ASD Executive Function** were between:

- ASD Executive Function and Attachment Flexibility of Thought and Behaviour ($r_s(24) = .567$, $p < .05$, two-tailed test);

- ASD Executive Function and Attachment Play ($r_s(24) = .598$ $p < .05$, two-tailed test);

- ASD Executive Function and Attachment Social Interaction ($r_s(24) = .658$, $p < .05$, two-tailed test);

- ASD Executive Function and Attachment Communication ($r_s(24) = .691$, $p < .05$, two-tailed test); and

- ASD Executive Function and Attachment Sensory Integration ($r_s(24) = .649$, $p < .05$, two-tailed test).

Thus ASD Flexibility of Thought and Behaviour, ASD Play, ASD Emotion Regulation and ASD Executive Function showed significant positive correlations with all areas of Attachment functioning, ranging from moderate to strong. Correlations with ASD Mind Reading, ASD Social Interaction and ASD communication were less consistent. ASD Sensory Integration showed the least correlation with any of the areas of Attachment Functioning.

4.5.1 Research Question 4

Two post hoc tests were performed to address research question 4: 'Does the measure developed for this study from 'The Coventry Grid' (Moran, 2010), have adequate reliability and Validity?'. In order to interrogate the reliability of the measure, a rating scale developed from 'The Coventry Grid: ASD vs. Attachment Problems' (Moran, 2010) (see Section 3.5), a Cronbach alpha was used. To provide further information regarding the validity of the measure, a Principal Component analysis was conducted.

4.5.2 Internal Consistency of the Measure

To assess the internal consistency of the rating scale, a Cronbach's coefficient alpha was obtained for each of the sixteen areas of functioning. The test was selected as it provides a reliability coefficient equivalent to having performed all the possible split-half correlations, with an alpha of .7 generally accepted as the minimum required for acceptable reliability for a measure (Clark-Carter, 2004). There is some debate regarding the acceptable minimum alpha requirement for measures. Nunnally (1978) suggested that .7 was a minimum requirement for preliminary research, rising to .8 for basic research measures and .9 for measures used clinically. However, others such as Streiner (2003) have argued that alphas in excess of .9 are more likely to reflect redundancy in a measure than an appropriate level of internal consistency.

The **ASD Flexibility of Thought and Behaviour** subscale appeared to have good internal consistency, $a = .901$. Eight of the 9 items appeared to be worth retaining, with the exception

of Item 9, '*Copes well with new and unfamiliar experience as no previous routine has developed*'. Deleting this item would increase alpha by .041.

The **ASD Play** subscale also appeared to have good internal consistency, $a = .916$. Nine of the items were worth retaining. However deleting Item 21, 'Sees eventually losing a game as unfair if was winning earlier in the game', would increase alpha by .003, and deleting Item 27, 'Spends play-times organising toys and arranging them in patterns (by size or colour etc.)', would increase alpha by .006.

The **ASD Social Interaction** subscale also appeared to have good internal consistency, $a = .818$. Three of the four items appeared to be worth retaining; however, deleting item 43, 'Does not manipulate others emotionally, except through angry outbursts (i.e. rarely tries to ingratiate themselves with others); however they try to manipulate behaviour so that others do what the child feels comfortable with', would increase alpha by .054.

The **ASD Mind Reading** subscale also appeared to have adequate internal consistency, $a = .789$. All of the six items appeared to be worth retaining.

The **ASD Communication** subscale appeared to have good internal consistency, $a = .923$. Ten of the eleven items appeared to be worth retaining; however, removing Item 79. '*Has

unusually good vocabulary (for age or cognitive ability, or within a specific area of interest)', would increase alpha by .011.

ASD **Emotion Regulation** also appeared to have good internal consistency, $a = .924$. Five of the six items appeared to be worth retaining; however, removing Item 93. '*Sudden mood changes in response to perceived injustice'*, would increase alpha by .007.

The **ASD Executive Function** subscale appeared to have good internal consistency, $a = .888$. All of the five items appeared to be worth retaining.

Only one item measured **ASD Sensory Integration**, therefore no test of internal consistency could be employed. The inclusion of further items related to sensory integration may improve the reliability of this subscale.

The **Attachment Flexibility of Thought and Behaviour** subscale appeared to have adequate internal consistency, $a = .783$. Eight of the items appeared to be worth retaining, however removal of Item 3. '*Copes with predictability in daily routines but usually enjoys change and celebrations'*, would increase alpha by .051, while deleting Item 11 '*Has rituals for anxiety provoking situations (e.g. says the same things in the same order when leaving for school)'*, would increase alpha by .022, and removing Item 17. '*New and different toys are appreciated'*, would increase alpha by .028.

The **Attachment Play** subscale appeared to have good internal consistency, a = .916. Nine of the ten items appeared to be worth retaining. However deleting Item 28, '*Plays games which include their own experience of traumatic life events and difficult relationships*', would increase alpha by .003.

The **Attachment Social Interaction** subscale appeared to have good internal consistency, a = .924. All of the five items appeared to be worth retaining.

The **Attachment Mind Reading** subscale also appeared to have good internal consistency, a = .848. Five of the six items appeared to be worth retaining. However deleting Item 63., '*Lies are elaborate and may be deliberately harmful to others' reputations and designed to impress an audience*', would increase alpha by .001.

The **Attachment Communication** subscale appeared to have good internal consistency, a = .821. Eight of the ten items appeared to be worth retaining. Deleting Item 71, '*Able to initiate conversation*', would increase alpha by .036, and removing item 84., '*Makes little comment about things*', would increase alpha by .028.

The **Attachment Emotion Regulation** subscale appeared to have good internal consistency, a = .930. All of the five items appeared to be worth retaining.

The **Attachment Executive Function** subscale appeared to have good internal consistency, *a* = .909. Three of the four items appeared to be worth retaining, deleting Item 103, '*Time has an emotional significance e.g. difficulties waiting*', would increase alpha by .025.

Only one item was used to assess **Attachment Sensory Integration**, therefore no measure of internal consistency was possible. As with ASD Sensory Integration, additional items may increase the reliability of this subscale.

Overall, analysis of the data using Cronbach's coefficient alpha suggested that the internal consistency of the subscales is largely good, with some areas of adequacy. The measure would benefit from either additional items in the Sensory Integration Subscales, or their deletion.

4.5.3 Construct Validity

To provide data on the construct validity of the scale, a Principal Component Analysis was selected as being an appropriate test to determine the dimensionality of the measure (Fernandez, 2012). However, due to the relatively small sample size in the study, it was necessary to conduct tests of factorability.

Factorability. The Factorability of the 16 areas of functioning was examined. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = .672), was above the recommended value of .6, and Bartlett's test of sphericity was significant (X^2 (120) = 549.04, p < .05),

suggesting an acceptable level of factorability (Fernandez, 2012). Therefore, a Principal Component Analysis was deemed appropriate.

Extracted Components. The initial eigenvalues showed that the first component explained 64.528% of the variance and the second component explained 20.129% of the variance. The third component explained 3.559% of the variance, and the fourth component explained 2.781% of the variance. A further four components explained between 1% and 2% of the variance each, and an additional 8 components explained less than 1% of the variance each. A two component solution was decided on based on these initial eigenvalues, and the 'levelling off' of the scree plot after two components (see figure 4.2). The two components extracted explained 84.657% of the variance. All subscales were retained as they met the minimum criteria of having a primary loading component of .4.
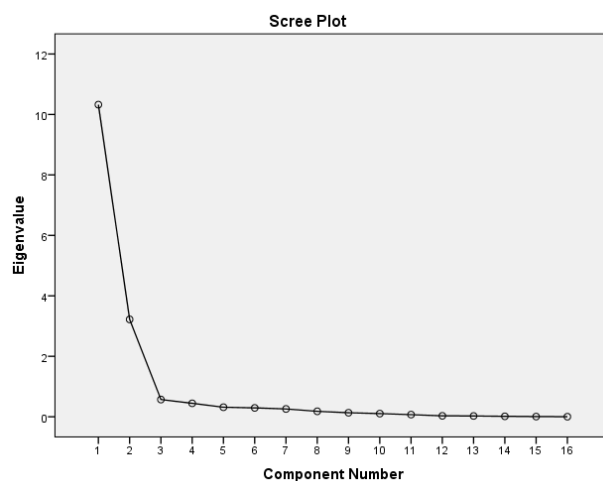

Figure 4.2. Scree Plot

Principal Component Analysis. A Principal Component Analysis and direct Oblimin with Kaiser Normalisation rotation was conducted. Principal Component Analysis was selected over factor analysis as it extracts real components as opposed to hypothetical factors (Brace, et al., 2012). Following Kline (1994), direct Oblimin rotation, was used as it allows correlation between factors. As Table 4.4 illustrates, of the 16 subscales, 14 were cross-loading, with component loadings greater than 3.2 on more than one component. The two subscales not cross-loading are shown in blue. All components had primary loadings above .6. For each of the subscales, its strongest loading has been highlighted.

	Components	
	1	**2**
Flexibility of Thought & Behaviour (ASD)	**.842**	.378
Play (ASD)	**.882**	.369
Social Interaction (ASD)	**.780**	.489
Mind Reading (ASD)	**.743**	.484
Communication (ASD)	**.749**	.577
Emotion Regulation (ASD)	**.928**	.238
Executive Function (ASD)	**.824**	.329
Sensory Integration (ASD)	**.655**	.587
Flexibility of Thought & Behaviour (attachment)	.645	**-.648**
Play (attachment)	**.782**	-.508
Social Interaction (attachment)	**.832**	-.413
Mind Reading (attachment)	**.818**	-.338
Communication (attachment)	**.846**	-.347
Emotion Regulation (attachment)	**.891**	-.392
Executive Function (attachment)	**.859**	-.246
Sensory Integration (attachment)	**.715**	-.573

Table 4.4. Factor loadings from Pattern Matrix of Principle Components Analysis with oblimin rotation for 16 (N = 24).

Component 1. All subscales had loadings of more than .6 on component 1 (see Table 3). Thus it comprised difficulties in all eight areas of functioning, presenting in line with both ASD and attachment difficulties. Thus it was labelled 'Presenting with Difficulties' (see Figure 4.3.).

Component 2. With the exceptions of ASD Emotion Regulation and Attachment Executive Function, all subscales had loadings greater than .32 on component 2. However, with the exception of Attachment Flexibility of Thought and Behaviour, they are smaller, secondary loadings. The attachment subscale loadings on component 2 were all negative, suggesting no difficulties in this area of functioning. Thus it was labelled 'No Presenting Difficulties'. Figure 4.4. shows all the subscales with loadings greater than .4 (or less than -.4).
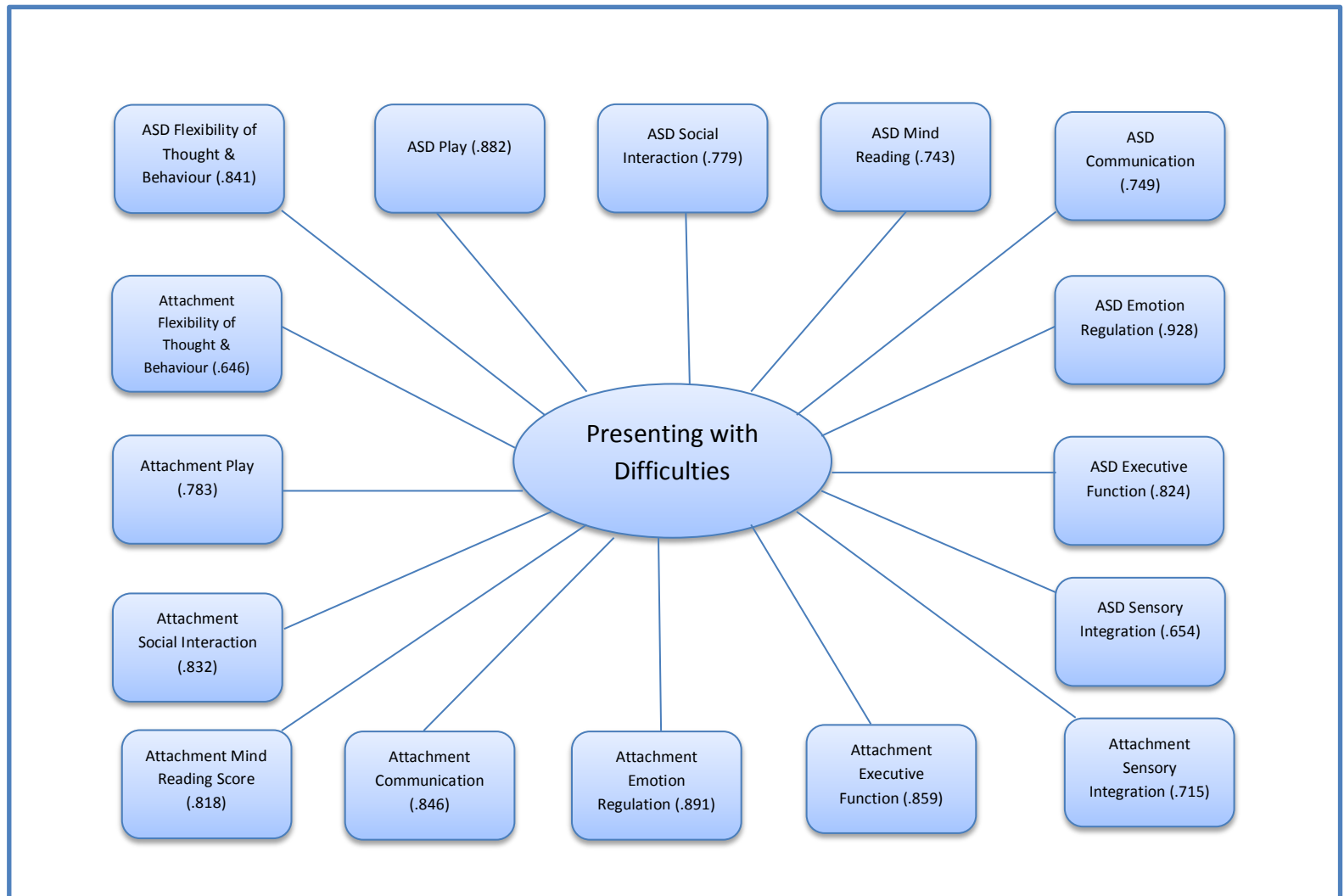
Figure 4.3. Component 1. 'Presenting with Difficulties': subscales and loadings
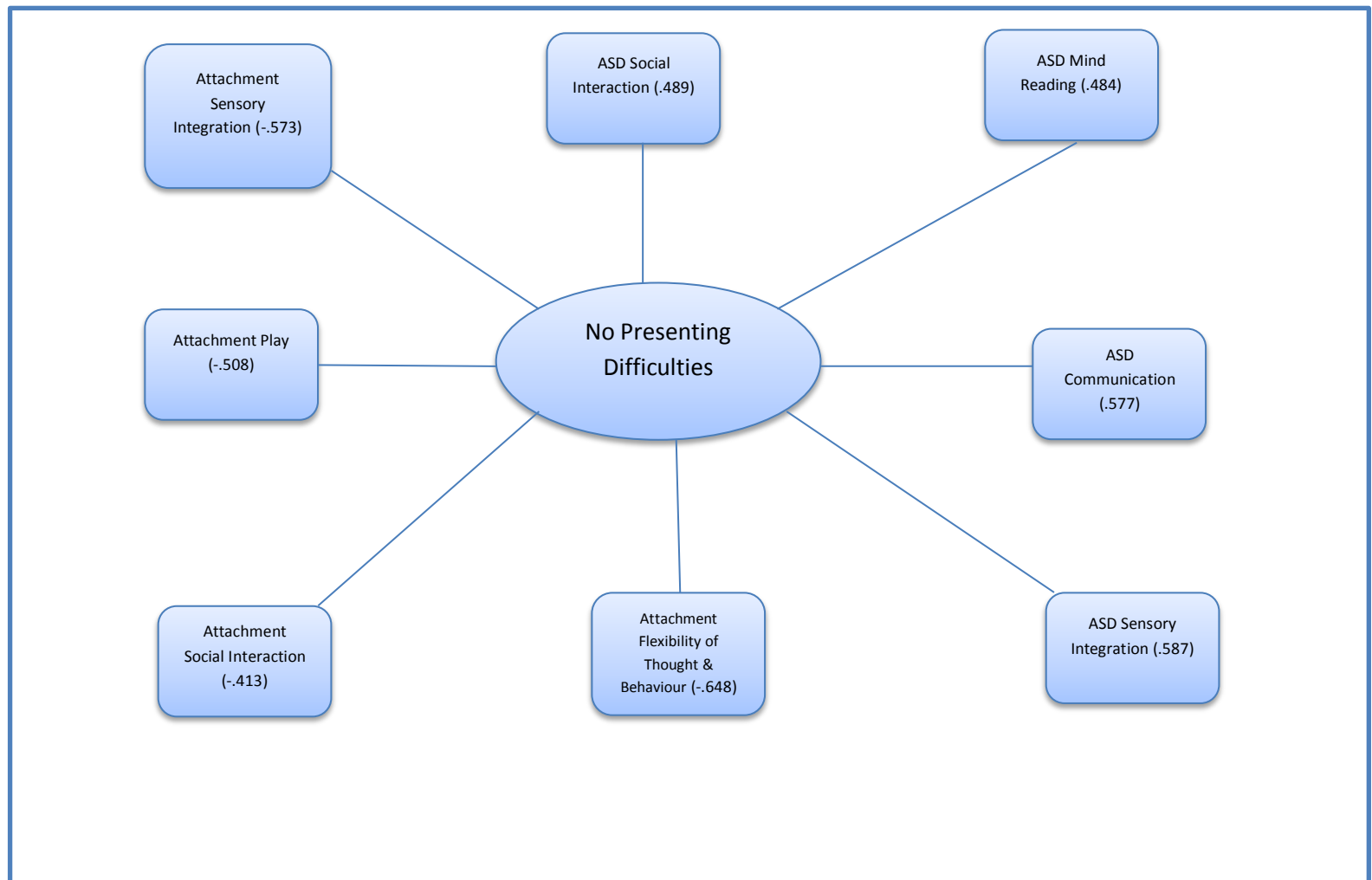
Figure 4.4. Component 2.: 'No Presenting Difficulties': subscales and loadings

4.5.4   Summary of Results

The data showed that three of the twelve children with diagnoses of ASD had ratings more in-line with attachment difficulties. However, the difference was only approaching significance. There was no significant difference between the median ASD and attachment ratings in the ASD group, who had significantly higher mean ratings for both conditions than the controls. The subscales of the measure derived from the Coventry Grid (Moran, 2010) appeared to have adequate to good internal consistency, as measured by the Cronbach's alpha. However, several strong and moderate correlations between subscales were revealed. A Principal Component Analysis suggested the measure taps into two separate dimensions, 'Presenting Difficulties' and 'No Presenting Difficulties', with 14 of the 16 subscales cross-loading.

CHAPTER 5 DISCUSSION

5.1   Introduction

This study aimed to address the problem that the behavioural presentations of ASD and attachment problems can be difficult to differentiate, even for professionals involved in the diagnostic process (Moran, 2010). As a result accurate differential diagnosis does not always take place, perhaps as a result of time pressures, or in an acknowledgement of the sensitivities of parents against a background of the work of psychiatrists such as Bettelheim (1967). These factors point to the possibility that the behaviours of a number of children given diagnoses of ASD may be attributable to attachment difficulties.

Employing a non-experimental, fixed design, with both within-subject and between subject elements (Clark-Carter, 2004), there was one independent variable, diagnostic status, with two levels - ASD and no diagnosis. There was one dependent variable, behavioural presentation, with two levels - ASD and attachment problems. The dependent variable was measured using a rating scale constructed through adaptation of The Coventry Grid: ASD vs. Attachment Problems (The Coventry Grid) (Moran, 2010), as described in Section 3.5. The study aimed to answer four research questions:

1.   Do some of the children with ASD diagnoses exhibit behaviours more in line with attachment difficulties?

2.   Is the level of attachment behaviour significantly different in the ASD group than their typically developing peers?

3.   Are there significant differences in the frequency of behaviours rated as either ASD or attachment-related ASD population that may facilitate differential diagnosis?

4.   Does the measure developed for this study from 'The Coventry Grid' (Moran, 2010), have adequate reliability and Validity?

This chapter provides a summary of the results detailed in Chapter 4 and discusses their implications for ASD diagnostic and educational psychology practice. Finally the limitations of the study and areas for future research are addressed.

5.2   Review of Results

In answering Research Question 1, three of the twelve children with ASD diagnoses were found to have higher mean attachment difficulties than ASD scores, with the difference approaching significance. It is possible that with a larger sample size, a significant difference in the scores of some of the children would be found. However, there was no significant difference between the median scores for ASD and attachment presentations, with those scoring high for ASD, scoring comparably high for attachment difficulties. This lack of significant difference is put into context below.

Research Question 2 was answered in the affirmative, in that the level of attachment behaviour was significantly different in the ASD group than in their typically developing peers, with much higher ratings for attachment difficulties in the former group.

Research Question 3 was answered in the negative, in that there were no significant differences in the frequency of behaviours rated as either ASD, or attachment-related in the ASD population that may facilitate differential diagnosis. All of the subscales showed some positive correlation with the other subscales. ASD Flexibility of Thought and Behaviour, ASD Play, ASD Emotion Regulation and ASD Executive Function showed significant positive correlations with all areas of Attachment functioning, ranging from moderate to strong. Less consistent correlations were found with ASD Social Interaction, ASD Mind Reading and ASD Communication. ASD Sensory Integration showed the least correlation of any of the areas of Attachment Functioning.

To assess the internal consistency of the rating scale, Cronbach's alpha was used. This suggested that the reliability of the scale would be improved by the deletion of 14 of the 106 items. Further, that the Sensory Integration subscales should be expanded or removed. However, of the fourteen subscales for which the test was performed, all met the minimum requirement of alphas in excess of .7. Twelve has alphas above 8, suggesting good internal consistency, with 8 having alphas greater than .9.

On reviewing the literature, 'The Coventry Grid' (Moran, 2010), and the measure developed from it was found to have good face validity, construct validity and content validity (see Section 3.5). However, to provide further data about its construct validity, it was analysed for dimensionality. A principal component analysis showed that 84.657% of the variance was explained by two components. The first, which explained 64.528% of the variance, was

comprised of all of the subscales of dysfunctional behaviour, both those ascribed to ASD and those attributed to attachment difficulties, with positive loadings greater than .6.

The second component had smaller secondary loadings on the ASD subscales. However, all of the loadings on the attachment subscales were negative, suggesting no difficulties with attachment. The presence of smaller secondary loadings on the ASD subscales in component two may be explained by the manner in which the scale was scored, whereby behaviours never seen were scored as 1 for analysis, as opposed to 0. In addition, as ASD is construed as a continuum reaching into the typically developing population, therefore some behaviours associated with ASD may be expected in children without diagnoses.

5.3   Implications of Findings

There were at least five possible explanations for these findings. First, that there is no difference in the presentation of children with attachment difficulties and ASD. Second, children with ASD commonly have concurrent attachment difficulties. Third, that the ASD sample was drawn from a population with a high frequency of attachment difficulties. Fourth, the findings may have been an artefact of the measure employed. Finally, it may be that the differences were too small to be revealed by the sample size. Taken as a whole, these findings have significant implications for ASD diagnostic, and educational psychology practice.

5.3.1 Common Phenomenology

That there is no discernible difference in the behavioural presentation of children with ASD and children with attachment difficulties, is consistent with the evidence reviewed in Section 2.4 (e.g. Denis et al., 2009; Hoksbergen et al., 2005; Rutter et al., 1999; Sadiq et al., 2012). It is possible that the conditions share a common phenomenology, albeit with different aetiologies. The results of the principal component analysis and Mann Whitney U test would be consistent with this view. However the data does not allow such conclusions to be drawn, particularly as there was no comparison with a group known to have attachment difficulties. Further, evidence relating to the different prognoses for each condition (e.g. Denis et al., 2009; Rutter, 1999) supports their separation through a reliable differential diagnostic process.

5.3.2 Concurrent Difficulties

There is some evidence to support the contention that children with ASD commonly have concurrent difficulties with attachment, not attributable to the way they were parented. Van Ijzendoorn et al. (2007) studied the relationship between ASD and attachment in a sample of toddlers (n=55), including those with 'mental retardation', language delay, ASD and a typically developing control. The sample were identified from a group of approximately 31,000 infants given pre-screening for ASD traits. Those who pre-screened positively were given further screening and assessment. The control was drawn from child-care provisions. This study included measures of parental functioning; rating scales completed during observed play sessions. At 2 years of age, 2 years before their diagnosis at age 4, the children's attachment was assessed using the Strange Situation procedure (see Appendix I), and the Emotional Availability Scale (Biringen et al., 1998) was used to rate parental sensitivity and child involvement through the observation of a free play session. The research

found that the children who went on to be diagnosed with ASD exhibited more disorganised attachment and less involvement than those who did not. However, the parents of these children were found to be equally sensitive as the parents of children who did not subsequently receive a diagnosis. Hence, later impairments in the attachment behaviours of these children could not be attributed to poorly attuned parenting.

This pattern was not found in the group without ASD, in which the sensitivity of parents positively correlated with the security of their children. In addition, the research found that the level of severity of autistic symptoms displayed in the social domain predicted attachment security, with more severe symptoms predicting less attachment security. The authors contended that these findings called attachment theory's validity into question, challenging the purported link between attachment security and parenting (Ainsworth et al., 1978). Further, they suggest that children with ASD may have a biologically limited ability to form secure attachments (Van Ijzendoorn et al., 2007). If attachment difficulties are, as this study suggests, a feature of ASD, this has implications for the diagnostic process. Differential diagnosis employing a measure designed to assess whether a child's behavioural presentation is more in line with one or the other difficulty would not be valid.

Similar findings were reported by Beurkens et al. (2013), who conducted research into the relationship between the severity of autism and the relationships and interactions children have with their parents. The sample comprised 25 child-parent dyads, and the measures employed were the Autism Diagnostic Observation Schedule (Lord, 2000), the Dyadic Coding Scales (Robinson and Eyberg, 1981) and the Parent Child Relationship Inventory

(Gerard, 1994). The authors found an inverse relationship between the severity of a child's autism and the pattern of parent–child interaction. However there appeared to be no impact of the severity of symptoms on the self-reported quality of the parent–child relationships.

Notwithstanding the evidence to suggest that, overall children with ASD have less secure attachments than their typically developing peers, this is not the favoured interpretation of the findings of this study. Concurrent attachment difficulties tend to be linked to the child's cognitive abilities and the severity of ASD, with lower cognitive abilities and/or more severe autism associated with less secure attachment with carers (Rutgers et al., 2004).

The group included in this study was drawn from mainstream schools, having been diagnosed after they started school. In Noname LA, children with the most severe ASD symptomology or greater cognitive impairments tend to be diagnosed earlier and may go to specialist provision. Thus the severity of their ASD, or cognitive impairment, is unlikely to be the explanation for their high attachment difficulty ratings.

5.3.3 Level of attachment difficulties in the population

The possibility that the high attachment difficulties ratings of the ASD group reflected a feature of the communities from which they were drawn was refuted by the findings of Research Question 2. The high attachment difficulties ratings of the ASD group cannot be explained as an artefact of attachment difficulties within the areas from which the samples

were drawn, as if that were the case, higher scores on the attachment subscales would be expected in the control group.

5.3.4 Reliability of the Measure

While the overall internal consistency reliability of the measure created for this study was slightly lower than the GAR-2, which has a total test alpha of .94 (McClintock and Fraser, 2001), it compares favourably to other ASD assessments. Lord et al. (1994) reported internal consistencies for each ADI-R domain as: verbal (.85); social (.95); communication (.84) and restricted and repetitive behaviours (.69). The internal consistency of the domains measured by the ADOS, range between .47 to .94 Lord et al. (2000).

5.3.5 Validity of the Measure - Dimensionality

As discussed in Section 5.5.1, one implication of the results of the principal components analysis is that ASD and attachment behaviours comprise overlapping phenomenology which renders problematic their conceptualisation as two discrete constructs. However, given the evidence suggesting differential prognoses, this is not the most credible explanation. Instead, it may be that the behaviours attributed to ASD and attachment difficulties are a shared subset of the dysfunction, or impairments, experienced by children with ASD and attachment difficulties.

The hypothesis that the behaviours ascribed by the scale to characterising children with ASD or attachment, are a shared subset of the dysfunction, or impairments, that are displayed by

both groups is supported by the extensive evidence, reviewed in Chapter Two. These include shared commonalities in behaviour, atypical brain structure and functioning such as poor Theory of Mind or mentalising (Baron-Cohen et al. 1996; Charman et al., 1997; Baron-Cohen, 1992; Klimes-Dougan & Kistner, 1990; Tager-Flusberg, 2001), executive dysfunction (Baron Cohen, 2008; Bos et al., 2009) and impaired functioning of the amygdala (Baron-Cohen et al., 2000; Lemche et al., 2006; Mehta et al., 2009; Pelphrey, 2007; Tottenham et al., 2010; Vrtička et al., 2008) (see Section 2.3). Therefore very similar behavioural presentations may be expected (see Section 2.4). It may be that the presentations are so similar that behavioural observation, and/or the measure employed, whose completion is informed by behavioural observation, is not a sensitive enough tool to differentiate between ASD and attachment difficulties.

The Coventry Grid (Moran, 2010), from which the measure employed was developed, and closely resembles, was developed through a collaborative and critical process, involving a wide range of professionals involved in diagnosis. If they were not able to sufficiently delineate the differences, this raises important questions as to the ability of professionals in general to differentiate between ASD and attachment difficulties through behavioural observation. Further, it makes the routine use of teachers, who have not received any ASD or diagnostic training, as the main source of such information highly questionable. This has important implications for the diagnostic process.

5.4   ASD Diagnostic Practice

According to the ICD-10 (WHO 1996), the differential diagnosis between attachment difficulties and ASD should be facilitated by the absence of difficulties with 'social reciprocity' and 'restricted, repetitive, and stereotyped patterns of behaviour, interests and activities' in children with attachment difficulties. According to DSM-IV (APA, 2000), differential diagnosis between the two groups should be supported by the lack of 'qualitative impairments in communication' and 'restricted repetitive and stereotyped patterns of behaviour, interests, and activities' in the case of attachment difficulties. See Appendices I and II, for the diagnostic criteria for DSM IV and ICD-10 respectively. However, there appears to be little empirical basis for these positions.

Sadiq et al. (2012) found that 20 per cent of children with RAD diagnoses had scores on the ADI-R (Lord et al., 1994) in the clinical range for 'repetitive and stereotyped behaviours', 46 per cent had scores within the clinical range for 'reciprocal and social interaction' and 62.9 per cent had scores within the clinical range for 'use of language and social communication skills'. Further, there is evidence to suggest commonalities in the underlying impairments that give rise to these difficulties including: amygdala dysfunction (Bachevalier et al., 2001), Executive Function (Lansdown et al., 2007) and ToM (Pears and Fisher, 2005).

The Coventry Grid (Moran, 2010) acknowledges these shared difficulties, detailed in Sections 2.3 and 2.4. It therefore attempts to describe a difference in the way they manifest in daily life. This was reflected in the measure employed in this study, which fared well in tests of reliability and validity, with the exception of dimensionality. However, notwithstanding the

three children found to have higher attachment difficulties than ASD ratings, the study did not reveal a significant difference in the attachment difficulties and ASD ratings of the children with ASD. As discussed above, there are a number of possible explanations for these findings. However, given that the mode of data collection, behavioural ratings given by teachers, closely mirrored the diagnostic process in Noname LA, the study raises important questions about its capacity to provide adequate differential diagnosis, particularly with regards the professionals involved and the data collected.

As discussed in section 2.4, and revealed by the findings discussed above, the behavioural presentations of ASD and attachment difficulties are very difficult to differentiate between, even when employing a carefully developed tool supported by evidence form neuroscience and psychology. In addition, as discussed in Section 1.5.5 the security of ASD diagnoses, a disorder expressed only as a phenotype, is subject to threats from errors of skills, rules and knowledge (Watkins, 2009). The teachers involved in the diagnostic process in Noname LA, have not received adequate training or supervision to negate such threats, and this study highlights the risks associated with their use as key providers of data for assessment.

In addition, the range of data from which diagnostic decisions are made is subject to significant variance, but may be as little as a referral and a Gilliam Autism Rating Scale 2 (GARS 2) (Gilliam, 1995). However the findings suggest that a single behavioural observation is not sufficient for diagnostic decisions. Throughout the literature, one feature consistently identified as differentiating between behaviours related to ASD and attachment difficulties is prognosis. Thus it may be that for diagnoses to be secure, and in the absence of

compelling converging data, such as extreme neglect and maltreatment, the diagnosis of ASD or identification of attachment difficulties, should include presentational changes over time.

5.5   Implications for Educational Psychology Practice

Educational psychologists are involved in the ASD diagnostic process in the UK (Keenan et al., 2010) and internationally (Moh and Magiati, 2012), both at the point of referral (Bagnall, 2012), and as members of multi-disciplinary assessment teams (Yates and Couteur, 2013). In addition, educational psychologists provide advice for schools and parents regarding the support required by pupils (Keenan et al., 2010), and information about diagnoses may form part of formulations (Reichow and Volkmar, 2010). Thus the contribution this study makes to the rising "edifice of knowledge" (Guba and Lincoln, 1994) apropos the presentations of children with ASD, attachment difficulties, and the diagnostic process has a number of implications for educational psychologists. The information provided by this study may be used to improve professional practice in a number of ways.

First, as with other professionals, it is important that educational psychologists involved in the diagnostic process have knowledge, and skills sufficient for the role. Second, the findings of this study support greater involvement of educational psychologists in the diagnosis of ASD. They are ideally placed to gather information from a number of sources, such as schools children and families, providing converging data, particularly regarding aetiology. As skilled users of observational assessments, there is an argument for educational psychologists, as opposed to teachers, routinely completing rating scales or other diagnostic tools. However,

where this is not viable, they may have a role in providing relevant training to school staff involved in the diagnostic process.

In addition, in times of unprecedented reductions in Local Authority budgets, EP services are increasingly identifying themselves as the service best placed to advise the Local Authority on appropriate use of scarce resources. A review of available Position Statements published by Local Authorities indicates that in all areas of the country a substantial proportion of Element Three funding (High Needs Funding Block) is spent on provision for young people with diagnoses of ASD; either as top-up funding within mainstream schools or, more significant in terms of amount spent, to secure specialist placements (DfE, 2013). If Educational Psychologists are to fill the role of advisors on cost effective and appropriate spending it is vital that their advice is informed by robust evidence.

5.6   Limitations

The results of the Cronbach's alpha suggest that while the measure employed in this research has adequate to good internal consistency, this could be improved by the deletion of items detailed in Section 4.5. Issues with internal consistency can impact on the reliability of findings. In addition, the original Coventry Grid (Moran, 2010) included behaviours not observable within the school context, which were therefore removed. That the measure developed for this study did not record home behaviour may have distorted the results.

This study relied on the ratings of the children's teachers, in line with their 'routine' use in the diagnostic process. However in this study, as with the diagnostic process, an expected lack of inter-rater reliability allows for observer error to distort the results, increasing with the number of teachers involved. In tests comparing the results of the ASD group and the group without a diagnosis, there was some control for poor inter-rater reliability because the teachers rated one comparison child for every child diagnosed with ASD. However this was not the case with the within-groups analysis.

There were a number of sample-related limitations of this study, arising from the size of the groups and the geographical area from which they were drawn. First, the generalisability of the findings derived from this research is limited by the sample size and small geographic area. The fact that all the children with ASD included in this study had received their diagnoses through the same diagnostic forum allows for the possibility that the data pertains to factors peculiar to that specific process, rather than a feature of the diagnostic process in the UK as a whole. Further it is possible that with a larger sample size, distinctions between ASD and attachment presentations may have been revealed.

5.7   Future Research

Further studies with larger sample sizes covering a variety of geographical areas with different diagnostic pathways would provide evidence regarding the generalisability of the results.

Future research including ratings of behaviour within the home may reveal important information. It is possible that the domains of home-related functioning included the original Coventry Grid (Moran, 2010), but omitted from the measure developed for this study, would reveal greater differences in the behavioural presentations of attachment difficulties. The identification of areas of observable significant difference would be a significant benefit for those involved in the diagnostic process.

A three group design, including children diagnosed with ASD, children known to have attachment problems and a control may provide important information with regards to presentation and difference between assessment profiles.

Given that stage within the developmental lifespan has been noted as a differentiating factor, with particular reference to long-term prognosis for children experiencing attachment problems and ASD, studies with teenagers or young adults who received their diagnoses as children and a comparison group may provide a robust source of information into diagnostic security. In addition, a longitudinal study providing a baseline behavioural presentation measure with subsequent measures for comparison after intervention on no intervention at Time 2 would provide informative data for diagnosis.

5.8   Summary

Notwithstanding the limitations discussed above, this study provides further evidence that differentiating between the behaviours associated with ASD and attachment difficulties may be more challenging than suggested by diagnostic manuals, even with an assessment with acceptable levels of reliability and validity. It provides some evidence that some children with diagnoses of ASD may, in fact have attachment difficulties, however, as discussed in Section 5.2, the difference in ratings was not great enough to achieve significance with the sample size.

The implication of this finding is the need for very careful differential diagnosis, based on information from a variety of sources, including family history and possibly change over time; something which is not routinely conducted in Noname Local Authority. Further, it calls into question the ability of those completing diagnostic rating scales to accurately differentiate between the two conditions. Educational psychologists are ideally placed to provide the holistic assessment and synthesis of information required, and this study supports their routine involvement.

It is clear that there is a need for further studies (see above); however the evidence reviewed and findings of this research suggest that the diagnostic process requires review and development. Further it may be that diagnosis over time is the only way to ensure the reliability and predictive validity necessary for both provision planning and for families to gain an accurate understanding of their child's needs, desirable intervention, and to support planning for the child's long-term development.

Appendix I   The Strange Situation Procedure (Ainsworth, 1970)

The parent and child are alone together in a room

A stranger joins parent and child

The parent leaves the room and the child is alone with the stranger

The parent re-enters the room and the stranger leaves

The parent leaves the room and the child is left alone

The stranger returns and is again alone with the child

The parent returns and the stranger leaves the room

During the above procedure, the child's behaviour is observed, coded as relating to either: separation anxiety, willingness to explore, stranger anxiety and reunion behaviour. The intensity of these behaviours is rated on a 7 point scale, which is used to classify the attachment pattern of the child.

Appendix II   Criteria for Assessment of ASD and RAD (DSM-IV, APA, 2000)

DSM-IV **Reactive Attachment Disorder of Infancy and Early Childhood (318.89)**	DSM-IV **Autistic disorder (299.00)**	DSM-IV **Asperger's Disorder (299.80)**
A. Markedly disturbed and developmentally inappropriate social relatedness in most contexts, beginning before age five years, as evidenced by either (1) or (2): (1)persistent failure to initiate or respond in a developmentally appropriate fashion to most social interactions, as manifested by excessively inhibited, hypervigilant, or highly ambivalent and contradictory responses (e.g., the child may respond to caregivers with a mixture of approach, avoidance, and resistance to comforting, or may exhibit frozen watchfulness) (2) diffuse attachments as manifested by indiscriminate sociability with marked inability to exhibit appropriate selective attachments (e.g., excessive familiarity with relative strangers or lack of selectivity in choice of attachment figures) B. The disturbance in Criterion A is not accounted for solely by developmental delay (as in Mental Retardation) and does not meet criteria for Pervasive Development Disorder. C. Pathogenic care as evidenced by at least one of the following; (l) persistent disregard for the child's basic emotional needs for comfort, stimulation, and affection (2) persistent disregard for the child's basic physical needs (2) repeated changes of primary care giver that prevent formation of stable attachments (e.g., frequents changes in foster care)	A. A total of six (or more) items from (1), (2), and (3), with at least two from (1), and one each from (2) and (3): (1) qualitative impairment in social interaction, as manifested by at least two of the following: (a) marked impairment in the use of multiple nonverbal 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) a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g., by a lack of showing, bringing, or pointing out objects of interest) (d) lack of social or emotional reciprocity (2) qualitative impairments in communication as manifested by at least one of the following: (a) delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime) (b) in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others (c) stereotyped and repetitive use of language or idiosyncratic language	(I) Qualitative impairment in social interaction, as manifested by at least two of the following: (A) marked impairments in the use of multiple nonverbal behaviours such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction (B) failure to develop peer relationships appropriate to developmental level (C) a lack of spontaneous seeking to share enjoyment, interest or achievements with other people, (e.g.. by a lack of showing, bringing, or pointing out objects of interest to other people) (D) lack of social or emotional reciprocity (II) Restricted repetitive & stereotyped patterns of behaviour, interests and activities, as manifested by at least one of the following: (A) encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus (B) apparently inflexible adherence to specific, non-functional routines or rituals (C) stereotyped and repetitive motor mannerisms (e.g. hand or finger flapping or twisting, or complex whole-body movements) (D) persistent preoccupation with parts of objects (III) The disturbance causes clinically significant impairments in social, occupational, or other important areas of functioning.

DSM-IV **Reactive Attachment Disorder of Infancy and Early Childhood (318.89)**	DSM-IV **Autistic disorder (299.00)**	DSM-IV **Asperger's Disorder (299.80)**
D. There is a presumption that the care in Criterion C is responsible for the behaviour in Criterion A (e.g., the disturbances in Criterion A began following the pathogenic care in Criterion C) Specify type: Inhibited Type: if Criterion Al predominates in the clinical presentation Disinhibited Type: if Criterion A2 predominates in the clinical presentation	(d) lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level (3) restricted repetitive and stereotyped patterns of behaviour, interests, and activities, as manifested by at least one of the following: (a) encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus (b) apparently inflexible adherence to specific, non-functional routines or rituals (c) stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movements) (d) persistent preoccupation with parts of objects B. Delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years: (1) social interaction, (2) language as used in social communication, or (3) symbolic or imaginative play. The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder.	(IV) There is no clinically significant general delay in language (E.G. single words used by age 2 years, communicative phrases used by age 3 years) (V) There is no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills, adaptive behaviour (other than in social interaction) and curiosity about the environment in childhood. (VI) Criteria are not met for another specific Pervasive Developmental Disorder or Schizophrenia.

Appendix III Criteria for Assessment of ASD and RAD (ICD-10, WHO, 1992)

ICD – 10 diagnostic criteria – Reactive attachment disorder of childhood (F94.1)	ICD – 10 diagnostic criteria – disinhibited attachment disorder of childhood (F94.2)	ICD -10 Childhood autism (F84.0)	ICD – 10 Asperger's Syndrome (F84.5)
Onset before the age of five years. B. Strongly contradictory or ambivalent social responses that extend across social situations (but which may show variability from relationship to relationship). C. Emotional disturbance as shown by lack of emotional responsiveness, withdrawal reactions, aggressive responses to one's own or other's distress and/or fearful hypervigilance. D. Evidence of capacity for social reciprocity and responsiveness as shown by elements of normal social relatedness in interactions with appropriately responsive non-deviant adults. E. Does not meet criteria for pervasive developmental disorders (F84).	A. Diffuse attachments as a persistent feature during the first five years of life (but not necessarily persisting into middle childhood). Diagnosis requires a relative failure to show selective social attachments manifest by (1) a normal tendency to seek comfort from others when distressed and (2) an abnormal (relative) lack of selectivity in the persons from whom comfort is sought. B. Poorly modulated social interactions with unfamiliar persons. Diagnosis requires at least one of the following: generally clinging behaviour in infancy; or attention-seeking and indiscriminately friendly behaviour in early or middle childhood. C. The general lack of situation-specificity in the above features must be clear. Diagnosis requires that A and B above are manifest across the range of social contacts experienced by the child.	A. Presence of abnormal or impaired development before the age of three years, in at least one out of the following areas: (1) receptive or expressive language as used in social communication; (2) the development of selective social attachments or of reciprocal social interaction; (3) functional or symbolic play. B. Qualitative abnormalities in reciprocal social interaction, manifest in at least one of the following areas: (1) failure adequately to use eye-to-eye gaze, facial expression, body posture and gesture to regulate social interaction; (2) failure to develop (in a manner appropriate to mental age, and despite ample opportunities) peer relationships that involve a mutual sharing of interests, activities and emotions; (3) A lack of socio-emotional reciprocity as shown by an impaired or deviant response to other people's emotions; or lack of modulation of behaviour according to social context, or a weak integration of social, emotional and communicative behaviours. C. Qualitative abnormalities in communication, manifest in at least two of the following areas: (1) a delay in, or total lack of development of spoken language that is not accompanied by an attempt to compensate through the use of gesture or mime as	A. A lack of any clinically significant general delay in spoken or receptive language or cognitive development. Diagnosis requires that single words should have developed by two years of age or earlier and that communicative phrases be used by three years of age or earlier. Self-help skills, adaptive behaviour and curiosity about the environment during the first three years should be at a level consistent with intellectual development. However, motor milestones may be somewhat delayed and motor clumsiness is usual (although not a necessary diagnostic feature). Isolated special skills, often related to abnormal preoccupations, are common, but are not required for diagnosis. B.Qualitative abnormalities in reciprocal social interaction (criteria as for autism). C.An unusually intense circumscribed interest or restrictive, repetitive, and stereotyped patterns of behaviour, interests and activities (criteria as for autism; however, it would be less usual for these to include either motor mannerisms or preoccupations with part-objects or non-functional elements of play materials).

ICD – 10 diagnostic criteria – Reactive attachment disorder of childhood (F94.1)	ICD – 10 diagnostic criteria – disinhibited attachment disorder of childhood (F94.2)	ICD -10 Childhood autism (F84.0)	ICD – 10 Asperger's Syndrome (F84.5)
		alternative modes of communication (often preceded by a lack of communicative babbling); (2) relative failure to initiate or sustain conversational interchange (at whatever level of language skills are present) in which there is reciprocal to and from responsiveness to the communications of the other person; (3) stereotyped and repetitive use of language or idiosyncratic use of words or phrases; (4) abnormalities in pitch, stress, rate, rhythm and intonation of speech; D. Restricted, repetitive, and stereotyped patterns of behaviour, interests and activities, manifest in at least two of the following areas: (1) an encompassing preoccupation with one or more stereotyped and restricted patterns of interest that are abnormal in content or focus; or one or more interests that are abnormal in their intensity and circumscribed nature although not abnormal in their content or focus. (2) apparently compulsive adherence to specific, non-functional, routines or rituals; (3) stereotyped and repetitive motor mannerisms that involve either hand or finger flapping or twisting, or complex whole body movements; (4) preoccupations with part-objects or non-functional elements of play materials (such as their odour, the feel of their surface, or the noise or vibration that they generate);	D.The disorder is not attributable to other varieties of pervasive developmental disorder; schizotypal disorder (F21); simple schizophrenia (F20.6); reactive and disinhibited attachment disorder of childhood (F94.1 and .2); obsessional personality disorder (F60.5); obsessive-compulsive disorder (F42)

ICD – 10 diagnostic criteria – Reactive attachment disorder of childhood (F94.1)	ICD – 10 diagnostic criteria – disinhibited attachment disorder of childhood (F94.2)	ICD -10 Childhood autism (F84.0)	ICD – 10 Asperger's Syndrome (F84.5)
		(5) distress over changes in small, non-functional, details of the environment. The clinical picture is not attributable to the other varieties of pervasive developmental disorder; specific developmental disorder of receptive language (F80.2) with secondary socio-emotional problems; reactive attachment disorder (F94.1) or disinhibited attachment disorder (F94.2); mental retardation (F70-F72) with some associated emotional or behavioural disorder; schizophrenia (F20) of unusually early onset; and Rett's syndrome (F84.2).	

(ICD-10, WHO, 1992)

Appendix IV Search Strategies

Several databases were searched to identify relevant publications. All abstracts of the identified publications were examined, with those found to be relevant included in the review. The reference lists of these papers were then searched for further publications, which once identified were evaluated for inclusion on the basis of their abstracts. In addition, the 'cited by' function of Google Scholar was used to search for additional publications citing key papers such as Moran (2010) and Rutter et al. (1999). The database searches conducted are outlined below:

DATABASE	SEARCH TERMS	
ERIC PUBMED PsychInfo Wiley Interscience Google Scholar	Autism + Attachment difficulties Asperger's + Attachment difficulties ASD + Attachment difficulties Autism + Attachment difficulties + Diagnosis Asperger's + Diagnosis ASD + Diagnosis RAD + ASD + differential diagnosis Asperger's + Autism + ASD + RAD + differential diagnosis Autism + Aetiology Asperger's + Aetiology ASD + Aetiology Attachment disorder + Aetiology Attachment difficulties + Aetiology Autism + risks Asperger's + risks ASD + risks Attachment disorder + risks Attachment difficulties + risks Autism + brain Asperger's + brain ASD + brain Attachment disorder + brain Attachment difficulties + brain Autism + impairment Asperger's + impairment ASD + impairment Attachment disorder + impairment Attachment difficulties + impairment Autism + behaviour Asperger's + behaviour ASD + behaviour Attachment disorder + behaviour Attachment difficulties + behaviour Autism + amygdala Asperger's + amygdala	ASD + amygdala Attachment + amygdala Autism + ToM Asperger's + ToM ASD + ToM Attachment + ToM Autism + Executive Function Asperger's + Executive Function ASD + Executive Function Attachment + Executive Function Autism + environment Asperger's + environment ASD + environment Attachment disorder + environment Attachment difficulties + environment Autism + genes Asperger's + genes ASD + genes Attachment disorder + genes Attachment difficulties + genes Autism + DSM Asperger's + DSM ASD + DSM RAD + DSM Autism + ICD Asperger's + ICD ASD + ICD RAD + ICD Validity + DSM Validity + ICD Reliability + DSM Reliability + ICD Behavioural diagnosis NICE guidance ASD Quasi-autism

Appendix V   Head Teachers Telephone Script
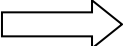
Telephone Script

For Use with Head Teachers

Hello, my name is Rowan Kendall-Jones, a trainee educational psychologist.

I am currently undertaking some research into the diagnosis of ASD in our area. This is for my qualifying doctorate (Educational Psychology), and I hope it will provide data that will inform the process. Information will also be gathered from professionals involved in the process.

If you are happy for your school to be involved in this study, some teachers will be asked to complete two anonymous questionnaires about pupils. One pupil with a diagnosis of ASD and one without (a control). The information they provide will not be attributed to them, but will be presented collectively in a research paper. No data identifying individual identities will be generated or held.

Would you be happy for your school to be included in this research?

If NO $\Longrightarrow$ Thank them for their time and end the call.

If YES $\Longrightarrow$ Thank them and continue:

Great. The next step will be for me to contact your SENCo to discuss dates and the teachers involved. I hope to complete the research in April 2012 and will send you a summary of findings in the following school term.

Thank you for your time.

Appendix VI Teachers Telephone Script
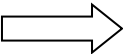
Telephone Script

For Use with Teachers

Hello, my name is Rowan Kendall-Jones, a trainee educational psychologist.

I am currently undertaking some research into the diagnosis of ASD in our area. This is for my qualifying doctorate (Educational Psychology), and I hope it will provide data that will inform the process. Information will also be gathered from professionals involved in the process.

I have spoken to your head teacher and they have given their consent to participation in this study. However, you do not have to take part and if you decide not to, you do not need to provide a reason.

If you are happy to be involved in this study, I will come to school and complete two anonymous questionnaires about pupils with you. One will be about a pupil with a diagnosis of ASD and one without (a control). The information you provide will not be attributed to you, but will be presented collectively in a research paper. No data identifying individual identities will be generated or held.

Would you be happy to be included in this research?

If NO $\Longrightarrow$ Thank them for their time and end the call.

If YES $\Longrightarrow$ Thank them and continue:

Great. I hope to complete the research in April 2012 and will send you a summary of findings in the following school term.

Thank you for your time.

Appendix VII – Letter to Parents

<div align="right">

Children's Services

Educational Psychology & Specialist Support

Tel:
Fax:

</div>

Please ask for: Rowan Kendall-Jones   My Ref: RKJ/RL
Direct Dial:

Dear Sir/Madam,

I am currently undertaking some research into the diagnosis of ASD in our area. This is for my qualifying doctorate (Educational Psychology), and I hope it will provide data that will inform the process.

Information will also be gathered from some professionals involved in the process.

All of the information gathered in this study will be anonymised, either at the point of completion (as with the professionals' questionnaire and the identity of the pupils), or by myself (as with the school / staff). No data identifying individual identities will be generated or held. Therefore it will not be possible to withdraw data from individual students after it has been collected.

Some teachers will be asked to complete an anonymous questionnaire about one pupil with a diagnosis of ASD and one without (a control). The information they provide will not be attributed to them, but will be presented collectively in a research paper.

If you would like to discuss this further, please contact me on the telephone number above. Or contact my supervisors, Julia Howe (telephone number: 0), or Huw Williams (telephone number   ).

If you are **not** happy for information to be gathered about your child, please complete the slip below and return to school.

Yours Faithfully,

Rowan Kendall – Jones (Trainee Educational Psychologist)

I do **not** wish my child _____ (name) to be included in the study into ASD

diagnosis. Signed _____Name_____

Appendix VIII   Teacher Consent

Children's Services

Educational Psychology & Specialist Support

Tel:

Please ask for: Rowan Kendall-Jones   My Ref: RKJ/RL

I am currently undertaking some research into the diagnosis of ASD in our area. This is for my qualifying doctorate (Educational Psychology), and I hope it will provide information that will help us to improve the process.

All of the information gathered in this study will be anonymised, either at the point of completion. No data identifying individual identities will be generated or held.

You will be asked to complete an anonymous questionnaire about one pupil with a diagnosis of ASD and one without (a control). The information you provide will not be attributed to you, but will be presented collectively in a research paper.

If you would like to discuss this further, please contact me on the telephone number above.

If you do/do not want to take part in this research, please indicate that below.

Participation is not required by your school and there will be no repercussions arising from this decision.

Please delete as appropriate:

I am happy / not happy to participate in the research outline above.

Appendix IX Twilight Session Notes

Check all teachers are here because they want to participate and don't feel coerced into taking part
Check all teachers are aware of the children in their class with an ASD diagnosis to be included
State:
"Each of the children with ASD identified will need a control, matched for sex and age, in the same class. I would like you to select this child by taking the next same-sex child on the register without a diagnosis of ASD. If the child with a diagnosis is near the end and this is not possible, please start from the top and take the first same-sex child."
      Check understanding.

State:
"The research is designed to provide information regarding the diagnosis of ASD, with a view to improving current practice. All data will need to be anonymised, it is important that nothing on the rating scale will allow their identification. Please label the scale for the child with a diagnosis A, and the scale for the control B."
      Check understanding.

State:
"If you look at one of the scales, it asks you to rate the frequency of the behaviours listed. Please read the behaviours with the person next to you and let me know if there are any descriptions that are not clear to you…

…So the rating scale goes from 0 to three, with 0 indicating that behaviour is never seen, 1 = indicating that the behaviour is occasionally seen, 2 indicating that that behaviour is often seen and 3 that that behaviour is very frequently seen.

… It is important that we all have the same understanding of those frequencies, so lets have a look at them. I don't think never needs any further explanation, but please take:

A rating of 1, occasionally seen as meaning once a week or less
A rating of 2, often seen as meaning twice a week
A rating of 3, very frequently seen as meaning almost daily

Any questions?"

I will come back to the school in the spring term to discuss the findings and the study in more detail. I will send a summary of the findings to the school as soon after that as possible.

Thank you for agreeing to help with this research and for attending this evening. If you have any questions you think of later, or would like to discuss individually, my contact details and those of my university supervisor are on the consent forms on top of the rating scales. Please complete them and hand them back with the scales.

Appendix X: The Coventry Grid: Autism Spectrum vs Attachment Problems

Differences between the autism spectrum and attachment problems based upon clinical experience and observations (modified July 2010) Moran, H. (2010, pp. 51 - 59)

Children on the autism spectrum and those with attachment problems both present difficulty with flexible thinking and behaviour. Their behaviour can be demanding and ritualistic, with a strong element of control over other people and their environment. The different 'flavour' seems to be about personality style, a strongly cognitive approach to the world in the autism spectrum, and a strongly emotional approach in attachment problems. The need for predictability in attachment disorder suggests that the child is trying to have their emotional needs for security and identity met. In autism, the emphasis seems to be on trying to make the world fit with the child's needs and preferences.

Symptoms of autism	Present in both autism and attachment problems	Typical presentation in the autism spectrum	Typical presentation in attachment problems
1. Lack of flexibility of thought and behaviour	1.1 Preference for predictability in daily life Repetitive questions related to own intense interests	•Repetitive questioning re changes in routines and new experiences • Ritualised greetings • Becomes anxious if routine is removed and may seek to impose usual routine (eg wants same bedtime routine when away on holidays) • Inclined to try to repeat experiences and to interpret any repetition as routine (eg asks/demands repetition of following the same route to school) • Distressed when a routine or ritual cannot be completed (eg when cannot follow the usual route because of road works) • May cope well with new and unfamiliar experience as no previous routine has developed (eg horse riding; air travel)	Preference for ritualised caring processes (eg bedtimes, meals) • Repetitive questioning re changes in routines and new experiences • Copes better with predictability in daily routines but usually enjoys change and celebrations • Looks forward to new experiences but may not manage the emotions they provoke (eg may not cope with excitement or disappointment) • Takes time to learn new routines • Routines tend to be imposed by adults in order to contain the child's behaviour more easily

Symptoms of autism	Present in both autism and attachment problems	Typical presentation in the autism spectrum	Typical presentation in attachment problems
	1.2 Difficulties with eating	May limit foods eaten according to unusual criteria such as texture, shape, colour, make, situation, rather than what that food is (eg will eat chicken nuggets but no other chicken) • May adjust eating because of literal understanding of healthy eating messages (eg sell- by dates, avoidance of fat) • Restricted diet seems to be about maintaining sameness and the child is not easily encouraged by people the child is attached to • May eat inedible substances	Anxious about the provision of food and may over- eat (or try to) if unlimited food is available • May be unable to eat when anxious • May hoard food but not eat it • May be unable to eat much at a sitting • May 'crave' foods high in carbohydrate • Eating is transferable from situation to situation and the child can be persuaded by close adults • Children tend to have a range of eating disorders
	1.3 Repetitive use of language	Echolalia (immediate or delayed) • Repetition of 'favoured' words which are chosen for their sound or shape, rather than for their use in communication or emotional content • Children's repetitiveness is out of sync with their developmental stage • Repetitive questioning for reassurance and predictability	May seek social approval/ envy from others for possessions • May not take extra care with possessions which have been given an emotional importance • May be destructive with toys, exploring them and breaking them accidentally • New and different toys are appreciated • May lose things easily, even most treasured possessions, and may be unable to accept any responsibility for the loss • May deliberately destroy emotionally significant possessions when angry

Play is a clear problem in both groups of children, with a lack of social imagination and an inclination towards repetitiveness evident in both Autistic Spectrum Disorder and Attachment Disorder. The difference seems to lie in the way the children play: children with Autistic Spectrum Disorder are inclined to choose toys which are related to their intense interests and to play with those toys by mimicking what they have seen on DVDs and television. They may also choose play that is cognitive and characterised by collecting and ordering information, such as train- spotting or reading bus timetables, and involves little emotional contact with other people. Children with Attachment Disorder may lack play skills but their play interests tend to be more usual.

Symptoms of autism	Present in both autism and attachment problems	Typical presentation in the autism spectrum	Typical presentation in attachment problems
2. Play	2.1 Poor turn-taking and poor losing	May try to impose own rules on games • May see eventually losing a game as unfair if was winning earlier in the game • Preference for playing alone or in parallel with others	May try to impose own rules on games so that they win • May be angry or upset about losing games and blame others or the equipment for their failure (there is a sense of fragile self-esteem in the style of reaction) • Preference for playing with others who can watch them win
	2.2 Unusual play with toys	• Plays with toys as objects rather than personifying them • May spend all time organising toys and arranging in patterns (eg ordering by size, colour) • May 'play' with unusual things (eg reading the telephone book, watching water run down the drain) for long periods from a young age	Uses toys to engage the attention of other children • May play games which include own experience of traumatic life events and difficult relationships • May have poor concentration on toys and be able to play alone only for very brief periods
	2.3 Poor social Play	Dislike and avoidance of others directing play • Harder to engage in social play with parents /carers	Wants adults to provide play opportunities and/or to direct play • May prefer to play with adults (esp. carers) rather than children
	2.4 Repetitive Play	Limited range of play activities • Strong preference for the familiar and tendency to play alone on the same activity for long periods	Plays repetitively with adults much as a toddler likes to play such as hide and seek, lap games • Plays out past experiences and preferred endings repeatedly (eg escaping from danger, saving siblings)
	2.5 Poor social imaginative play	• Difficulty playing a variety of roles within games • Difficulty incorporating a range of toys into the same game (eg using both Dr Who and Spiderman toys in a game) • Preference for toys which have a mechanical rather than emotional nature (eg cars, trains, Lego) or which require logic and order (eg reviewing and organising collections of objects) or examining objects (eg watching spinning objects)	• Difficulty ending role play games • May be able to take various roles but may show a strong preference for a kind of role (eg always the baby, always the angry father)

There are key similarities in social interaction: children in both groups appear to have an egocentric style of relationship with other people and lack an understanding of the subtle variations in social interaction which are necessary to develop successful relationships with a range of other people.

Symptoms of autism	Present in both autism and attachment problems	Typical presentation in the autism spectrum	Typical presentation in attachment problems
3. Poor social interaction	3.1 Difficulties with social Interaction 3.2 More successful in interactions with adults than peers 3.3 Own needs drive interactions 3.4 Lacks awareness of risk and personal danger in interactions with adults	• Interaction is usually one- sided and appears self- centred, but can be as unaware of his/her own perspective as of others • Does not often manipulate others emotionally except through angry outbursts (i.e. would rarely ingratiate self with audience), but manipulates others' behaviour so that they do what the child feels comfortable with • May perform better in less emotional situations • Poor awareness of own role in interactions	• Seeks an emotionally expressive audience for interactions (eg seeks to provoke strong reactions in audience such as anger, sympathy, support, approval) • May make persistent attempts to interact with adults or older children rather than with age peers • May initiate interactions with others which allow them frequently to play the same role in relation to self (eg as the victim, as the bully)
	3.5 Difficulty Sharing	• Lacks awareness of the need to share and sees no value in sharing in an activity that holds no interest for him/her • May not realise the needs of others waiting for their turn	• Aware of the social need to share but anxious about sharing (especially food) and may refuse or hoard or hide possessions and food to avoid sharing • May take things which are important to others with awareness that this will be upsetting for the other person
4. Mind reading	4.1 Difficulty appreciating others' views and thoughts	Rarely refers to the views of others	• May be manipulative (or overly compliant) and ingratiate self with adults/children
	4.2 Lack of appreciation of how others may see them	• Lacks awareness of other's views of self, including lack of awareness of 'visibility' of own difficulties (eg may perform gym sequence even though very poor at gym) • Does not appreciate the information parents would like to hear about successes and enjoyment	• Inclined to blame others for own mistakes • Draws attention away from own failures towards own successes • May try to shape others' views of self by biased/exaggerated reporting
	4.3 Limited use of emotional language	• Rarely refers to the emotional states of self and others	• Hyper- vigilant with regard to particular emotions in others (eg anger, distress, approval) and often makes reference to these states • Poor emotional vocabulary
	4.4 Problems distinguishing between fact and fiction	• May not realise that cartoons, toys, animations and science fiction are not real • May not realise that fantasy play is a temporary role • May be easily influenced by fantastic claims and advertising • Lies are often easily discovered and 'immature' in style	• Tendency to see self as more powerful and able to overcome enemies, or as vulnerable and powerless to offer any challenge • May talk repeatedly of how to overcome captors/escape from imprisonment/kill enemies even when these adversaries are obviously bigger, stronger and more powerful than the child • May not be able to judge whether a threat is realistic and act as if all threats, however minor or

Symptoms of autism	Present in both autism and attachment problems	Typical presentation in the autism spectrum	Typical presentation in attachment problems
			unrealistic, need to be defended against • Lies may be elaborate and also may deliberately be harmful to others' reputations and designed to impress the audience
5. Communication	5.1 Pragmatic language Problems	• Poor awareness of the purpose of communication • Lacks awareness of needs of audience • Does not repair communication break down • Poor eye contact (may be fleeting, staring, is not synchronised with verbal communication) • Proximity does not signal intimacy or desire for contact • Often does not start conversation by addressing the person • Conversation is stilted • The burden of communication lies with the listener/adult • Poor understanding of communicative gestures • Assumes prior knowledge of listener	• Lack of attention to the needs of the listener through poor attention to communication (due to poor modelling) • Eye contact affected by emotional state • Proximity is an emotional signal/communication • Better able to initiate conversation • May be overly sensitive to voice tone (hyper- vigilant to potential emotional rejection)
	5.2 Poor understanding of inferred meaning, jokes, sarcasm and gentle teasing	Poor understanding of idiomatic language	• Gentle teasing may provoke extreme distress (self- esteem seems to be too fragile to cope) – internalise/assume it is about them
	5.3 Use of noise instead of speech	• Makes noises for personal pleasure (as with favourite words) eg barking	• Attention- seeking sounds (eg screams/ screeches/whines under stress) to signal emotional needs and wishes
	5.4 Vocabulary	May have word- finding problems • Often have unusually good vocabulary (for age, or cognitive ability, or within specific interest areas) • Less use of vocabulary	• Often poor vocabulary range for age and ability • May use more emotive vocabulary (to get needs met)
	5.5 Commenting	• Provides detail in pedantic fashion and gives excessive information	• Reduced amount of commenting behaviour
6. Emotional regulation	6.1 Difficulties managing own emotions and appreciating how other people manage theirs	• Extremes of emotion may provoke anxiety and repetitive questioning and behaviour • Does not easily learn management of emotions from modelling (also likely to need an explanation) • Poor recognition of own and others' emotions • Lacks emotional control because of lack of awareness and emotional understanding • Different contexts and settings trigger outbursts	• Difficulty coping with extremes of emotion and recovering from them (eg excitement, fear, anger, sadness) • May provoke extreme emotional reactions in others which tend to cast others in roles which are familiar from their own past experience of less healthy relationships • May be able to learn more easily from a non- verbal example than from talking • Shows emotional displays to

Symptoms of autism	Present in both autism and attachment problems	Typical presentation in the autism spectrum	Typical presentation in attachment problems
			people child does not know (indiscriminate) and tends to carry on longer (eg temper tantrums occur anywhere and at any time)
	6.2 Unusual mood patterns	Sudden mood changes in response to perceived injustice	• Sudden mood changes related to internal states and perceived demands
	6.3 Inclined to panic	• Panics about change in routines and rituals and about unexpected experiences	• Panic related to not having perceived needs met (especially food, drink, comfort, attention)
7. Problems with Executive Function	7.1 Unusual memory	• Poor working memory unless well motivated • Very unusual long- term memory with recall of excessive detail • Difficulties in planning and sequencing actions	• Fixated on certain events • Recall may be confused • Selective recall
	7.2 Difficulty with concept of time –limited intuitive sense of time	• Rigid reliance on using precise times (eg uses watch and unable to guess time • Waiting irritates child because it affects routine and because unable to judge time or mark time	• Time has emotional significance (eg waiting a long time for dinner is quickly associated with feelings of emotional neglect and rejection)
8. Sensory integration problems	8.1 Difficulty integrating information from senses (eg lack of awareness of heat, cold, pain, thirst, hunger, need to urinate/defecate)	• May be passive and quiet in acceptance of discomfort or may be distressed but does not communicate the source of distress • May be hyper or hypo sensitive to some sensations	• Physical discomfort may be accompanied by a strong emotional reaction towards carer (eg anger and blame of carer for the discomfort)
	8.2 Unusual physical proximity	• Physical distance is unrelated to intimacy	• Shows awareness that physical closeness is related to emotional reactions (eg increases distance to signify rejection; seeks excessive closeness when anticipating separation)

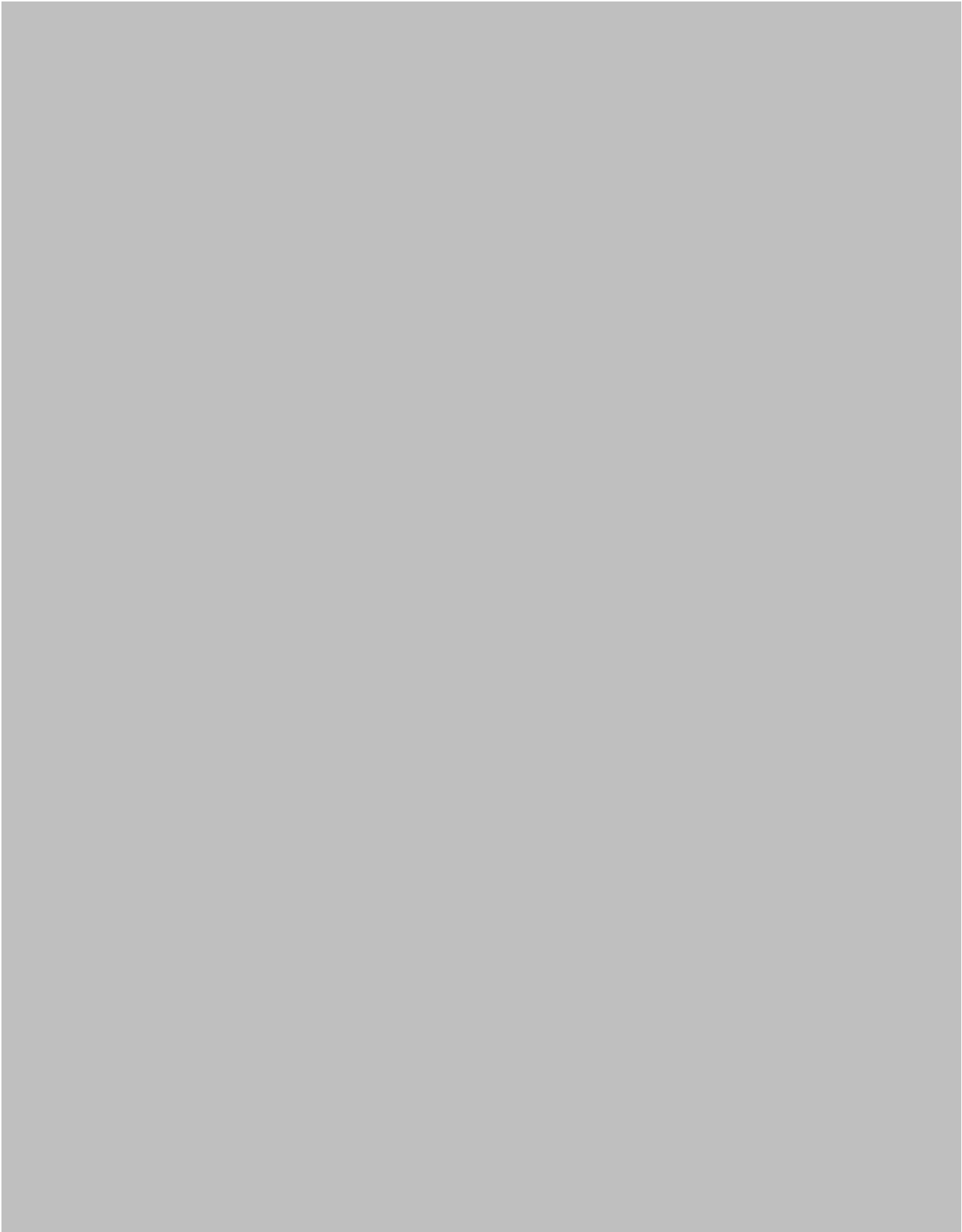**Appendix XI Rating Scale Derived From 'Coventry Grid (Moran, 2010)**

APPENDIX XII   **Items from The Coventry Grid (Moran, 2010) Included/Excluded**
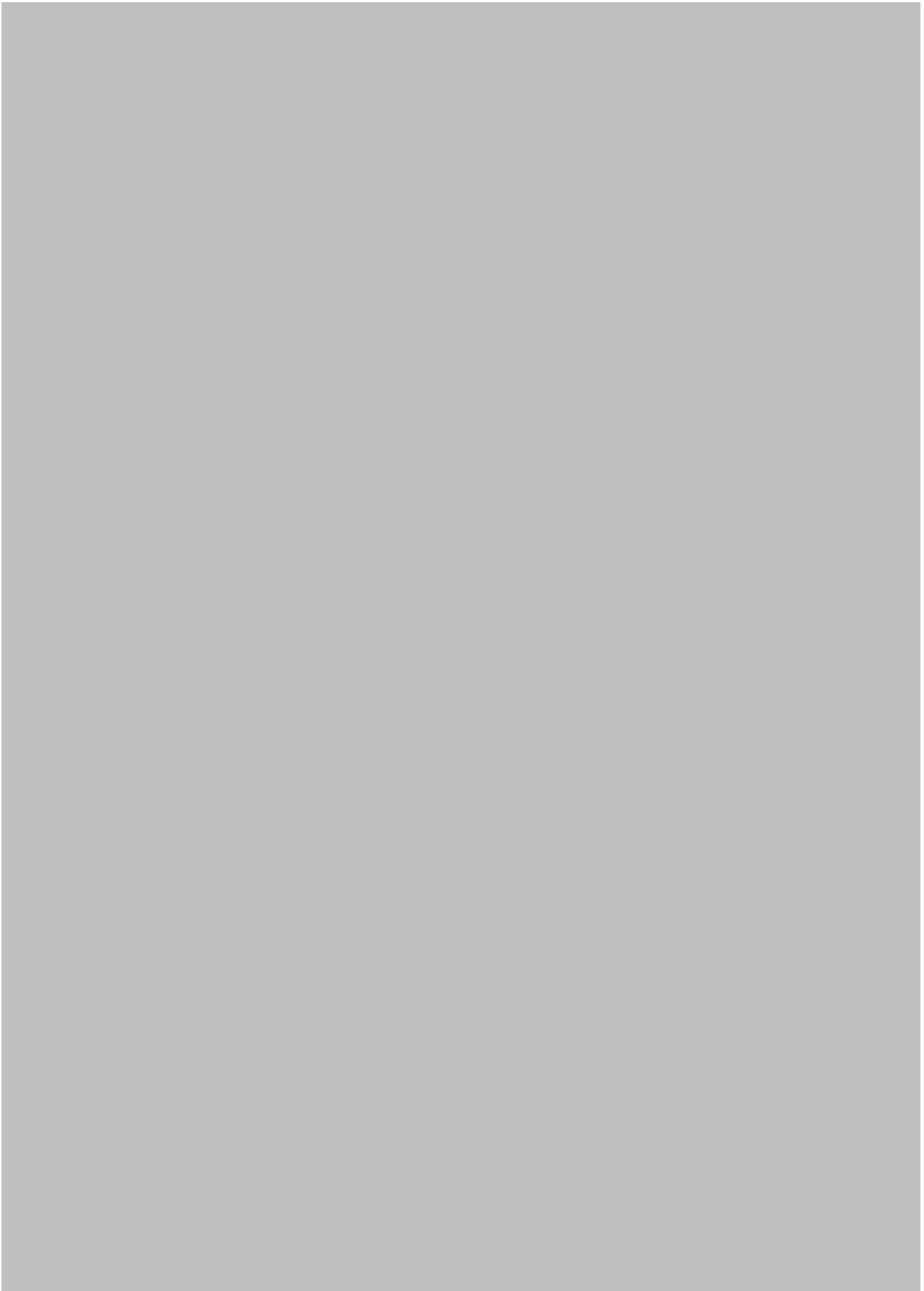
Appendix XIII   **Comparison of Areas of Functioning in Assessment**

Coventry Grid	GCARS-2	ADOS-G(Lord et al. 2000)	ADI-R (Lord et al., 1994)
Flexibility of thought and behaviour Play Social Interaction Mind reading Communication Emotional Regulation Executive function Sensory Integration	Stereotyped Behaviours Communication Social Interaction	Communication Social Interaction, Play/Creativity Restricted/Repetitive Behaviours or Interests	Language/ Communication Reciprocal Social Interactions Restricted, Repetitive, and Stereotyped Behaviours and Interests

Appendix XIV   **Evidence for Validity of Measure**
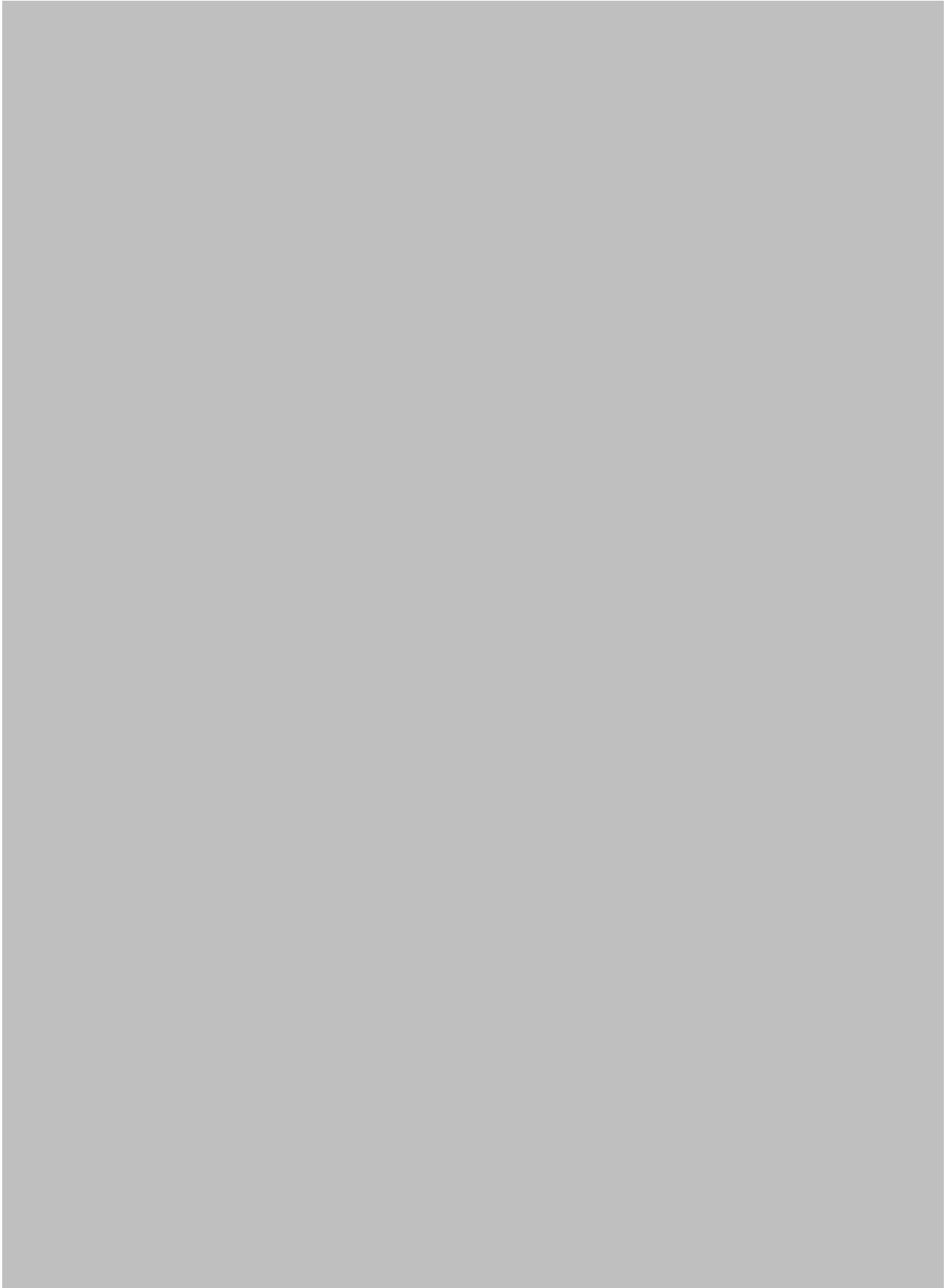
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