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Social relationship difficulties in autism and reactive attachment disorder: Improving diagnostic validity through structured assessment

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ABSTRACT

Background: Autism Spectrum Disorder (ASD) versus Reactive Attachment Disorder (RAD) is a common diagnostic challenge for clinicians due to overlapping difficulties with social relationships. RAD is associated with neglect or maltreatment whereas ASD is not: accurate differential diagnosis is therefore critical. Very little research has investigated the relationship between the two, and it is unknown if standardised measures are able to discriminate between ASD and RAD. The current study aimed to address these issues.
Methods: Fifty eight children with ASD, and no history of maltreatment, were group matched on age with 67 children with RAD. Group profiles on multi-informant measures of RAD were investigated and group differences explored. Discriminant function analysis determined assessment features that best discriminated between the two groups.
Results: Although, according to parent report, children with ASD presented with significantly fewer indiscriminate friendliness behaviours compared to the RAD group ($p < 0.001$), 36 children with ASD appeared to meet core RAD criteria. However, structured observation clearly demonstrated that features were indicative of ASD and not RAD for all but 1 of these 36 children.
Conclusions: Children with RAD and children with ASD may demonstrate similar social relationship difficulties but there appears to be a difference in the social quality of the interactions between the groups. In most cases it was possible to differentiate between children with ASD and children with RAD via structured observation. Nevertheless, for a small proportion of children with ASD, particularly those whose difficulties may be more subtle, our current standardised measures, including structured observation, may not be effective in differentiating RAD from ASD.

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1. Introduction

The idea to investigate potentially overlapping symptoms of children with Autism Spectrum Disorder (ASD) and children with Reactive Attachment Disorder (RAD) occurred to us because we have been struck by the intensity of clinical interest in this field. While we have observed that a clinical 'divide' has, at times, been present i.e. recognition of ASD symptoms without consideration of RAD and vice versa, we have also noted growing clinical interest in differentiating these disorders, with clinicians on both 'sides' wishing to advance their knowledge in order to make an informed holistic assessment to provide the most appropriate treatment. This seems to be best evidenced by the attendance of large numbers of Child and Adolescent Mental Health (CAMHS) professionals and educational colleagues (150+) at 2 recent national conferences, both with a focus on ASD and RAD.

ASD is a neurodevelopmental disorder defined by impaired social communication, fixated interests and repetitive behaviours (Diagnostic Statistical Manual, 5th Ed, 2013). The core deficit may be one of social imagination or social instinct i.e. ability to understand one's own role and pre-empt other's responses in social situations (Wing, Gould, & Gillberg, 2011). Children with ASD have limited social reciprocation and may have impaired skills in empathy, perspective taking and following social rules and limited awareness of personal boundaries. The aetiology of ASD is complex. ASD can run in families and in many cases there is a strong genetic component (Delorme et al., 2013). However, environmental factors also play a role. There is increased risk of ASD in children born pre-term, particularly where there is a very low birth weight (Limperopoulos, 2009). Some teratogens increase the risk of development of ASD. For example, foetal exposure to valproic acid; a common epileptic drug, also used in the treatment of bipolar disorder and schizophrenia (Moore et al., 2000; Rasalam et al., 2005; Williams et al., 2001) and in cases of alcohol exposure and Foetal Alcohol Syndrome (Aronson, Hagberg, & Gillberg, 1997; Landgren, Svensson, Strömland, & Grönlund, 2010; Harris, MacKay, & Osborn, 1995). In addition, co-occurring ASD has been found with other neurological conditions neurological conditions (Ryland, Hysing, Posserud, Gillberg, & Lundervold, 2012), including Cerebral Palsy (Bjorgaas, Elgen, Ryland, & Hysing, 2014; Kirby et al., 2011).

Other groups of children may also present with similar or overlapping core features of social relationship problems but may not necessarily have ASD. Children with Reactive Attachment Disorder (RAD), a disorder associated with early life abuse and neglect, are a particularly important example. RAD has two sub-types: (a) inhibited RAD characterised by hyper-vigilance and emotional withdrawal and (b) disinhibited RAD characterised by indiscriminate friendliness, lack of social boundaries and difficulties negotiating social relationships (DSM-IV TR[1]). The DSM-5 separates these sub-types into two separate disorders. These are Disinhibited Social Engagement Disorder (D-SED), formerly Disinhibited RAD, and Reactive Attachment Disorder, formerly Inhibited RAD (DSM-5). D-SED is primarily characterised by indiscriminate friendliness towards strangers and Reactive Attachment Disorder is characterised by minimal social/emotional responsiveness and fearful behaviour. For consistency with previous literature and because, in our samples, the great majority of children have symptoms of both inhibited and disinhibited RAD, we use the term "RAD" from now on to refer to D-SED, RAD or mixed disorder. Other symptoms of RAD may include lack of social reciprocity, empathy and poor awareness of social cues (Rutter et al., 1999; Pears, Bruce, Fisher, & Kim, 2009; Mukaddes, Bilge, Alyanak, & Kora, 2000), which are also definitive features of ASD.

Children with RAD may also have difficulties with the use of social language, or "pragmatic language." Pragmatic language difficulties are a feature previously believed to be characteristic of ASD. In one study children with RAD ($n = 35$) performed even more poorly than a group with ASD and "normal IQ" ($n = 52$) when using language in social context, in social relationships or establishing rapport. However, in contrast, the ASD group showed more stereotyped behaviours (Sadiq et al., 2012).

In our clinical experience, concerns about differential diagnosis are particularly likely in cases where the child's developmental history is unclear or symptoms are subtle. However, the question of differential diagnosis may arise for paediatricians and all health professionals in CAMHS teams as well as Looked After and Accommodated Children's teams (LAAC) because in both RAD and ASD, additional problems such as aggression, anxiety, hyperactivity, behavioural problems or social relationships difficulties may be more likely to result in a referral to CAMHS than symptoms of the core disorder itself (Byrne, 2003; Kantzer, Fernell, Gillberg, & Miniscalco, 2013).

Although there is very little intervention research on RAD (O'Connor & Zeanah, 2003), compared to ASD, early work suggests that treatment and management may also differ. One study (on a small sample) has suggested that children with RAD may respond better to a psycho-educational approach compared to children with ASD (Mukaddes, Kaynak, Kinali, Besikci, & Issever, 2004) and there is now pilot research suggesting that children with RAD may respond better to interventions focusing on reciprocal dyadic interactions between child and caregiver than children with ASD (Becker-Weidman, 2006). However, the major clinical concern relating to differential diagnosis may arise as RAD is a disorder associated with severe childhood maltreatment or neglect (AACAP, 2005). Both psychiatric classification systems (ICD 10 and DSM-IV/DSM-5) state that the diagnosis of RAD should *only* be made if there is history of serious early childhood maltreatment or neglect. Giving the diagnosis of RAD therefore implies that maltreatment has occurred and, if the child is

[1] Although we have continued to use DSM-IV terminology, the core features of these disorders remain similar; despite the new terminology. D-SED is still primarily characterised by indiscriminate friendliness towards strangers and Reactive Attachment Disorder is characterised by minimal social/emotional responsiveness and fearful behaviour. See Appendix 1 for further information.

still living in the same family circumstances, may have important child protection implications. It has been reported that the recent adverse media regarding the field of child protection has increased even senior medical practitioners caution regarding such cases (Dyer, 2010).

ASD, in contrast, is thought *not* to be associated with adverse psychosocial circumstances or maltreatment. The English-Romanian Adoption Studies investigated the possibility of links between environmental adversity and autism. In this severely deprived-institutionalised population ($n = 111$) just 3% ($n = 3$) were diagnosed as having autism; 1 of which was born pre-term, a high risk factor associated with ASD. Although an additional group of children were described as "Quasi-autism," in this group features eventually differed in important ways from classical autism. For example, the majority of the group demonstrated improvements in cognitive functioning and use of spontaneous language to communicate and no longer met criteria for autism on the ADI-R when re-assessed at 6 years old. However, social relationship difficulties persisted. These included indiscriminate friendliness, lack of awareness of social boundaries and poor understanding of social cues; features that increasingly resembled Disinhibited RAD (Rutter et al., 2007, 2010). The potential overlap of symptoms of ASD in a maltreated sample was also investigated by one study in the UK (Sadiq et al., 2012). Thirty-five children (ages 5–8 years), were referred with features of indiscriminate friendliness. Symptoms were verified using a multi-informant standardised assessment battery for RAD (Minnis et al., 2009) by the multi-disciplinary research team. Forty percent ($n = 14$) of children with RAD presented with features indicative of ASD on ADI-R algorithms, again demonstrating symptom overlap.

Although the association between attachment *patterns* and ASD has been investigated (Rutgers, Bakermans-Kranenburg, Ijzendoorn, & Berckelaer-Onnes, 2004) no other published studies were found investigating (a) the overlap between RAD and ASD or (b) if the problem of differential diagnosis between RAD and ASD could arise with regards to children with ASD who have not been maltreated. CAMHS clinicians in Coventry produced the Coventry Grid which describes differences in the 'emotional feel' of the therapeutic relationship when working with children with ASD versus children with attachment problems. The Coventry Grid describes a more 'matter of fact' relationship with children with ASD and difficulties building rapport. Children with attachment disorders seemed to have some skill in building relationships; yet were, on occasions, inappropriate and challenged personal boundaries (Moran, 2010). These observations are consistent with literature on indiscriminate friendliness in RAD and suggest a different social quality in the interactions of the two groups.

While the Coventry grid provides a starting point for clinicians, the current study aims to add to the knowledge base by rigorously investigating, via standardised measures, whether children with ASD who have no history of maltreatment, present with features similar to children with RAD. This is an important first step in supporting clinical assessment. If there is doubt regarding differential diagnosis of children with ASD with no child protection history from children with RAD then further research is warranted to ensure not only accurate and timely diagnosis, but to prevent falsely accusing parents of maltreating their child. In addition, it is necessary to understand the ways in which symptoms may overlap and vary in these diagnostically distinct groups, before exploring further the potential overlap demonstrated in maltreated samples.

In a previous study we developed standardised assessment measures for diagnosing RAD in school-age children and demonstrated that these tools could reliably differentiate children with RAD from children who did not have psychiatric disorders (Minnis et al., 2009). These tools were used in the current study. The research questions were as follows: (1) What is the profile of children with ASD on a standardized assessment package for RAD: are there similarities and differences? (2) Which measures, if any, best discriminate between the two groups?

2. Method

Ethical approval was granted by West of Scotland NHS ethics, Research Management committees and Caldecott approval was awarded. Informed consent was given by participants and all children provided verbal assent.

2.1. Participants

A total of 115 children aged 5–11 years were included in the study, 67 with RAD and 58 with ASD. The ASD group was group matched by age with the RAD group.

2.1.1. RAD group

The RAD group data were historical therefore we did not recruit any new participants. The RAD group data ($n = 67$) were collated from 3 previous studies (Kočovská et al., 2012; Minnis et al., 2009, 2013) as follows: (a) thirty-four children recruited from CAMHS teams and social workers who had been asked to refer children with symptoms of RAD (Inhibited, Disinhibited or Mixed), and a history of definite/suspected maltreatment, according to ICD-10 criteria (Minnis et al., 2009) (b) twenty children recruited through the charity Adoption UK, with a history of maltreatment and symptoms of indiscriminate friendliness and who were diagnosed with RAD (Inhibited, Disinhibited or Mixed) according to ICD-10 criteria (Kočovská et al., 2012) and (c) thirteen cases who had been recruited through mainstream primary schools during a total population study of RAD prevalence were diagnosed with RAD (Inhibited, Disinhibited or Mixed), according to ICD-10 criteria (Minnis et al., 2013). All thirteen cases had a history of maltreatment. The notes section in the post traumatic disorder assessment section of the Development and Wellbeing Assessment (Goodman, Ford, Richards, Gatward, & Meltzer, 2000) completed online by families, confirmed, in all cases where previous history was unknown, the occurrence of adverse psychosocial

events. These included abuse, (physical and sexual), emotional and physical neglect and drug/alcohol abuse and domestic violence.

All participants were assessed using either ICD-10 or DSM-IV criteria and in all studies diagnoses were made by multidisciplinary teams with psychiatry, psychology and/or nursing input using the standardised multi-informant assessment package for RAD (Minnis et al., 2009). This package, described in the measures section below, has good psychometric properties and good agreement with expert clinical judgement (Follan et al., 2011). Of the total 67 participants who met diagnostic criteria for RAD, only one case met criteria for Inhibited RAD. The remaining cases presented with Disinhibited RAD or mixed symptoms. While the attachment patterns of the children with RAD were mixed, demonstrating the presence of all 4 attachment styles (avoidant, ambivalent, disorganised and secure), all the children had a discernible attachment pattern.

2.1.2. ASD group

Sixty-four children with ASD were recruited from either, (a) the Lothian Special Needs database by the lead Consultant Paediatrician or (b) the Lanarkshire Autistic Spectrum Disorder Diagnostic Service by the lead Speech and Language Therapist. Six participants dropped out during the course of the study leaving a total sample of 58 children (52 children with ASD from Lothian and 6 children with ASD from Lanarkshire). All diagnoses had been made via joint assessment by a consultant paediatrician and speech and language therapist. Additional screening tools, including the Autism Diagnostic Observation Schedule (ADOS) (Lord et al., 2000) were also used. The first 20 case files were scrutinised and it was confirmed that all were diagnosed using Scottish Intercollegiate Guidelines Network (SIGN) guidelines (Scottish Intercollegiate Guidelines Network, 2007). Children in the ASD group attended mainstream primary or a language unit within a mainstream primary school.

Participants in the ASD group had no known history of child protection issues. The identified clinician from each service was responsible for establishing lack of child protection prior to invite, and patient information was passed to the research team on receipt of written consent. Lack of child protection concerns were established in (a) NHS Lothian via their child protection database. This is a unique multi-agency referral and information sharing system, operational 24 h a day. Child protection concerns including an alleged or confirmed history of physical, sexual and emotional abuse, and neglect as well as all episodes where these agencies are made aware of childrens' exposure to domestic violence or parental drug abuse are recorded. The Child Protection database was cross-checked against the Special Needs system to exclude children where child protection concerns existed. In (b) NHS Lanarkshire information regarding lack of child protection was gathered from multiple sources including, referral report, from CAMHS teams and the electronic health records. This sample ($n = 6$) was purposively recruited to fulfil the group matching criteria with particular emphasis on the recruitment of girls.

Our recruitment strategy is based on the methods used in the previous 'RADAR' study in which we successfully recruited a similar sample size ($n = 40$) (Minnis et al., 2009). We aimed to recruit a minimum of 50 (in each group) to allow for the skewed nature of total CAPA-RAD scores. As we retained 58 families, our study was well powered.

The RAD group had been assessed and diagnosed via the following multi-informant assessment package. Symptoms of RAD in the ASD group were also assessed using these measures. Group characteristics and the success of the group matching process are shown in Table 1. Numbers vary because members of the RAD group had different cognitive assessments (BPVS vs. WASI) or because full scale IQ, in some cases, could not be computed because of a low verbal to high performance IQ discrepancy that was too large to retain reliability (Atkinson, 1992) (Table 2). Group matching on age was successful as reasonable similarity between the groups in mean age and range was achieved. Recruitment of girls with ASD was more challenging, although not unexpected, as the ratio of M:F diagnosed with ASD is high (Baird et al., 2006).

2.2. Psychiatric behavioural measures

The Child and Adolescent Psychiatric Assessment (CAPA-RAD) (Minnis et al., 2009) is a 30 item semi structured parent interview about RAD symptoms and its format is based on the CAPA—well-validated, semi-structured parent-report interview for child psychopathology used in large epidemiological studies. For *disinhibited RAD* the key CAPA-RAD questions were:(a) seeking comfort from strangers; (b) indiscriminate friendliness; (c) demanding and attention-seeking behaviour; (d) minimal checking in unfamiliar settings; (e) cuddliness with strangers, (f) asking personal questions of strangers; (g) invading social boundaries. For *inhibited RAD* these were: (a) avoids eye contact; (b) frozen watchfulness; (c) hypervigilance; (d) unpredictable reunion responses.

Table 1
Demographics.

	Gender (%)	Mean age (standard deviation)	Age range (years)
RAD group ($n = 67$)	45M (67%) 22F (33%)	7.08 (1.42)	5–11
ASD group ($n = 58$)	46M (79%) 12F (21%)	7.97 (1.96)	5–12

1. Data based on 16 available cases; 2. Data based on 31 available cases; 3. FIQ based on 21 of 43 available cases: FIQ could not be reliably calculated for 22 ASD cases due to large discrepancies between VIQ and PIQ; 4. Data based on 43 available cases

Table 2
Characteristics of cognitive profile.

	Mean Full scale IQ (standard deviation and range)	Mean Verbal IQ (standard deviation and range)	Mean performance IQ (standard deviation and range)	Difference between VIQ and PIQ (standard deviation)	Mean BPVS Standard Score (standard deviation and range)
RAD Group	96.37 (14.07)[1]	97.69 (13.47)	95.38 (14.22)	2.31 (1.63)	98.94[2] (13.26)
ASD Group	88.78[3] (18.93)	83.73 (17.43)	97.71 (17.81)	−13.98 (3.57)	89.24[4] (13.26)

When conducting interviews with the ASD group, we made careful note of factors likely to improve discrimination from RAD. These included: talking to strangers with the purpose of engaging them in their topic of special interest or directing personal questions to their parent instead of directly asking a stranger.

Twenty percent of the CAPA-RAD interviews were audio recorded and good inter-rater reliability (>80% agreement) was achieved with an independent rater.

Although our measures are validated against DSM-IV criteria, we acknowledge the very recent change to DSM-5 terminology in which the two disorders (Disinhibited Social Engagement Disorder, formerly Disinhibited RAD and Reactive Attachment Disorder, formerly Inhibited RAD) are now considered to be separate disorders. Regardless of this change in terminology, the core features of Disinhibited Social Engagement Disorder and Reactive Attachment Disorder remain evidently similar to Disinhibited RAD and Inhibited RAD respectively.

The Teacher Relationship Problems Questionnaire (RPQ) (Minnis et al., 2007) is a 10-item questionnaire for Disinhibited RAD symptoms.

The Observation Schedule for RAD (OSR) is a modification of the Waiting Room Observation (WRO); a structured 19-item observation of child behaviour with parents/carers and a stranger (McLaughlin, Espie, & Minnis, 2010). In that original study, children were observed in a clinic waiting room with one parent. In this current study, however, children were brought to an unfamiliar room in a school or the Edinburgh RHSC Clinical Research Facility by a teacher (or parent in the case of the Clinical Research Facility) and the moment of meeting the stranger/researcher was captured on video, along with subsequent interactions. Due to modifications to the setting and protocol, only the first 6 disinhibited items – relating to child-stranger interaction – were rated – including one (item—physical contact between stranger and researcher) that was excluded in our original study because of its poor discrimination between RAD and typically developing children but was retained here because it may have proved discriminating between RAD and ASD. All videos were independently rated and good inter-rater reliability was achieved (>80% agreement). It was impossible to blind researchers to the diagnoses of the children because the RAD data was historical but the independent rater was blind to the hypothesis of the study. Some OSR data is missing due to lack of parental permission or technical difficulties, however the samples available in each group are comparable (RAD group, $n = 50$, ASD group, $n = 52$).

2.3. Cognitive functioning

The children with RAD already had a measure of verbal IQ—the British Picture Vocabulary Scale (BPVS) (Atkinson, 1992) or the verbal subscales of the Wechsler Abbreviated Scale of Intelligence (WASI) (Wechsler, 1999). The WASI is a standardised truncated screen of IQ, consisting of 4 subtests; Vocabulary, Block Design, Similarities and Matrix Reasoning. These form two subscales, Verbal IQ and Performance IQ which together provide a full scale IQ score. The BPVS is a validated measure of child verbal comprehension which is well correlated with verbal IQ (Atkinson, 1992). The children with ASD, who were all aged 6 years+ by the time of assessment, were asked to do both the BPVS and the WASI.

2.4. Comorbid diagnoses

The children with RAD already had an assessment of comorbid diagnoses using either specific modules of the CAPA ($n = 37$) (Angold et al., 1995) or the Development and Wellbeing Assessment (DAWBA) ($n = 26$) (Goodman et al., 2000); both well validated semi-structured diagnostic measures for child psychopathology. Parents of the children with ASD were asked to complete the DAWBA online, where possible, which was achieved by 31 parents. A further 14 parents completed the DAWBA via telephone interview. DAWBA assessments were scored by experienced trainee psychiatrists, who had received specific rating training.

For any children with ASD for whom the CAPA-RAD identified possible symptoms of RAD, all data, including the video tapes (particularly the initial meeting and the unstructured "juice break" between assessments) and, where necessary, DAWBA diagnoses, were reviewed by HM and CD, according to DSM-IV diagnostic criteria. Any children whose ASD diagnosis still seemed equivocal at this stage had their data reviewed by an independent expert (JG) and/or their case notes and original ASD diagnostic process scrutinised. Although it is possible that the overall lower verbal IQ of the ASD group could have contributed to differences in behaviours between the two groups, verbal IQ was controlled in the discriminant function analysis, along with gender.

3. Results

3.1. Cognitive profiles

Table 1 demonstrates that the ASD group profiles on the WASI were substantially different to the RAD group: 19 (44%) children in the ASD group had a low verbal IQ and significantly higher performance IQ while 3 children in the ASD group had a significantly higher verbal IQ than performance IQ. No child in the RAD group demonstrated any significant VIQ-PIQ deficit, demonstrating a key difference in the cognitive profiles of the two groups.

3.2. Co-morbidity

Table 3 demonstrates that both groups, assessed using *either* the DAWBA *or* the CAPA, presented with a range of similar co-morbid disorders including anxiety disorders and ADHD. However, a larger proportion of the RAD group presented with these additional disorders and the RAD group also presented with greater numbers of conduct and behavioural problems.

3.3. RAD behaviours

The profile of children with ASD on the RAD assessment package was investigated. Thirty six (62%) children with ASD fulfilled criteria for likely RAD on the CAPA-RAD: that is 22 who had 2 or more disinhibited symptoms and 14 who had 2 or more inhibited symptoms. For 32 of these 36, observed behaviours were clearly indicative of ASD. Of the 4 who required expert review, the ASD diagnosis was clear in all but 1 case. For this one girl, who required review of both video and case notes (by AO'H), it was verified that diagnosis of ASD (based on standardised assessments, including the ADOS), was robust and that there was no history or suggestion of maltreatment. The most useful part of the assessment was the videotaped observation.

Observations of Disinhibited RAD symptoms in both groups were analysed using the total score on the 6 OSR items (RAD group, $n = 50$, ASD group, n 52). A Mann Whitney test suggested significant differences between groups (median RAD 4; median ASD 0, $p < 0.0001$). As a greater total score is indicative of more indiscriminate friendliness, the findings suggest that these behaviours were significantly more apparent in the RAD group than the ASD group.

Teacher report of RAD symptoms was investigated using Teacher RPQ total scores. There was no difference between teacher report of RAD symptoms in the ASD group (Mean 6.64; SD 5.51) and the RAD group (Mean 6.09; SD 6.06); $p = 0.64$.

Parent report of RAD symptoms was investigated using the CAPA-RAD. Chi square analysis was used to investigate any significant differences between the RAD group and the ASD group scores on core symptoms of likely RAD (Table 4).

3.4. Discriminant function analysis: CAPA-RAD, OSR & teacher RPQ

A discriminant function analysis was used to investigate which assessment features best discriminated between the RAD and ASD groups. The following were entered into the analysis: CAPA-RAD core diagnostic symptoms, OSR total score, Teacher RPQ total score, gender and verbal IQ. The findings are shown in Table 5.

When we used the discriminant function analysis to predict RAD caseness, classification was correct in all but 1 case. It is clear, however, that observation best discriminated between the groups (Fig. 1). The following features were often observed in the ASD group: less likely to show interest in reciprocal interaction, conversation was, in some cases, dominated by specialist interests and the children with ASD often required extra support to maintain the interaction. When the researcher paused to allow spontaneous conversation, in some cases the interaction broke down to awkward silence. Other children continued answering the last question and their communication took on a list-like quality. Prosody is also of interest as some children with ASD presented with unusual patterns in their speech.

Table 3
Comorbid diagnosis.

	RAD group	ASD group
Anxiety disorders*	73% (19)	18% (8)
PTSD	19% (5)	2% (2)
OCD	5% (1	2% (1)
Depression	0	0
ADHD**	49% (31	29% (13)
Conduct Disorder***	27% (17)	2% (1)
Eating Disorder	0	0
Motor Tic Disorder	8% (2)	16% (7)

* Anxiety disorders include: separation anxiety, specific phobia, social phobia, agoraphobia, panic disorder and generalised anxiety disorder.

** 31 of 63 cases: 18 cases, (29%) diagnosed via DAWBA, 13 cases, (21%) diagnosed via CAPA.

*** 17 of 63 cases: 15 cases, (24%) diagnosed via DAWBA, 2 cases, (3%) diagnosed via CAPA.

Table 4
Differences between parent report symptom rates in RAD and ASD group.

	RAD	ASD	Significance level
Disinhibited symptoms			
Cuddliness with strangers	45% (29)	14% (8)	<0.001
Indiscriminate Adult Relationships	55% (36)	10%(5)	<0.001
Comfort seeking from strangers	20% (13)	0	<0.001
Personal Questions	52% (34)	16% (9)	<0.001
Minimal Checking	48% (31)	28% (16)	<0.001
Attention Seeking	76% (51)	26% (15)	<0.001
Inhibited symptoms			
Unpredictable Reunion response	18% (12)	12% (7)	0.327
Frozen watchfulness *	18% (8)	12% (7)	0.388
Hypervigilance **	39% (19%)	19% (11)	<0.05
Avoids eye contact	58% (38)	66% (38)	0.421

* Based on 44 available cases.
** Based on 49 available cases.

Table 5
Discriminant function analysis.

Discriminating feature (in rank order of best to least discriminating)	Discriminant function
1. OSR total score	0.740
2. Demanding or attention seeking behaviour (CAPA-RAD item)	0.256
3. Indiscriminate friendliness (CAPA-RAD item)	0.243
4. Hypervigilance (individual CAPA-RAD item)	0.215
5. Unpredictable reunion response (CAPA-RAD item)	0.208
6. Teacher RPQ	0.155
7. Invading physical boundaries	0.145
8. Personal questions (CAPA-RAD item)	0.129
9. Cuddliness with strangers (CAPA-RAD item)	0.126
10. Comfort seeking from strangers (CAPA-RAD item)	0.096
11. Minimal checking (CAPA-RAD item)	0.092
12. Frozen Watchfulness (CAPA-RAD item)	0.088
13. WASI Verbal IQ	−0.080
14. Avoids eye contact (CAPA-RAD item)	−0.044
15. Gender	−0.018

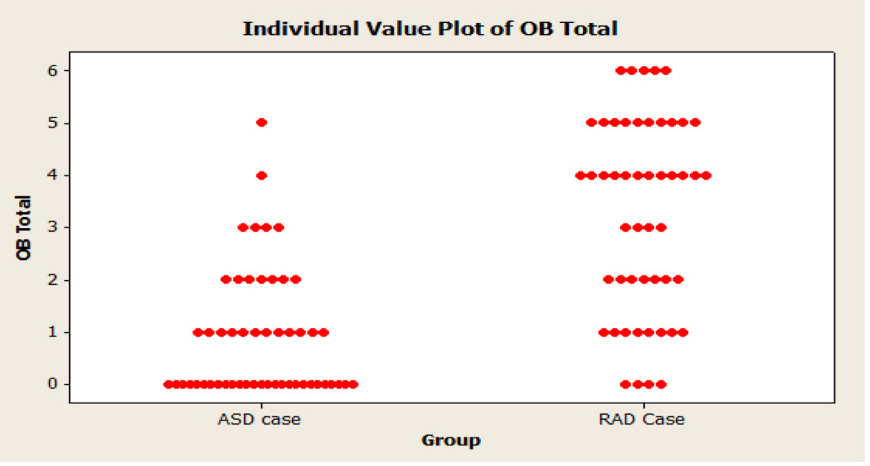

Fig. 1. Distribution of total scores on OSR. Each red dot represents an individual score: higher scores indicate more RAD behaviours. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

4. Discussion

In this group of children with a rigorous diagnosis of ASD and no history of child protection concerns, some children appeared, on parent report, to have symptoms of RAD. However, significant differences were found between the two groups on all core disinhibited symptoms on the parent-report CAPA-RAD. These findings suggest that the social relationship problems may sometimes present superficially as similar, but may actually be qualitatively different. Observation of

behaviour was the best discriminator. While some overlap in OSR total scores was present, it is clear that for the vast majority of children in the ASD group, few observational features of indiscriminate friendliness were present. Attention seeking and indiscriminate friendliness were the 2nd and 3rd best predictors respectively on the discriminant function analysis, which further suggests that indiscriminate friendliness is a feature less salient in the ASD group.

However, in the individual cases this is not entirely clear cut. For example, 46% of the ASD cases were observed not to show noticeable caution or shyness on meeting a stranger and teacher report of RAD symptoms did not discriminate between the two groups. 'Active but Odd' is a categorisation that has been used to describe children with ASD who make spontaneous interactions towards adults and peers, but who are not socially motivated in doing so; the purpose is often a repetitive or stereotyped interest (Wing & Gould, 1979).Such a description was typical of some children in our sample. From the independently rated OSR and observation during structured and *especially* unstructured activities, 35 out of the 36 cases (out of the total 58 cases of ASD) who met criteria for RAD symptoms, on parent report, clinically demonstrated very clear features that were more indicative of ASD. Although, we are not able to make qualitative comparisons with the RAD group as the RAD data is historical, we have previously reported our clinical observations that children with RAD show considerable interest in the stranger, may take an interrogative role to try to 'get to know' the person and do not struggle to maintain a conversation, even if it is not modulated in an appropriate manner (Bennett, Espie, Duncan, & Minnis, 2009). This is similar to observations made in the European-Romanian Adoption Studies (Rutter et al., 2007, 2010). The present findings also support work by Moran who reported differences in the "feel" of the therapeutic rapport when working with these two groups of children. However, where symptoms were more subtle it was not always possible to differentiate between children with ASD and children with RAD using our existing measures. Additional case note investigation was required for one case even after independent external review (out of the 36 cases with ASD who met RAD criteria): a girl. Furthermore one ASD case was misclassified by the discriminant function analysis, using our diagnostic algorithm, as a RAD case.

Multiple sources of information, which include standardised observation schedules, have been found to result in more consistent and rigorous application of diagnostic criteria (Risi et al., 2006). Our results support this to a certain extent: the OSR was the most discriminating aspect of our assessment, but our findings are limited by the fact that the OSR was performed in a different context (school) than the original Waiting Room Observation, a teacher rather than a parent accompanied the child and the OSR raters, though blind to the hypothesis of the study, could not be blind to these differing contexts. We would therefore recommend future research to further elucidate the observations required to make a confident discrimination between ASD and RAD.

The poorer discrimination between the ASD and RAD groups on symptoms of Inhibited RAD may, in part, be because Inhibited RAD is rare, therefore lack of discrimination could have been due to measurement error (because of low frequency behaviours), *or* it could have been due to the ASD group being genuinely prone to emotional withdrawal or hypervigilant behaviours. This requires investigation in future studies.

Cognitive profiles may also be useful in differential diagnosis. Children with RAD may have poor social communication skills and below average performance on cognitive assessments (Kočovská et al., 2012) but the groups markedly differed as regards VIQ < PIQ deficit, with a large deficit in the ASD group and none in the RAD group. Although low verbal IQ could account for some of the indiscriminate friendliness behaviours described in a proportion of the ASD group (36 of the total 58 kids with ASD), verbal IQ was not a feature that was significantly discriminating between the two groups. This may suggest that lower verbal IQ and, in particular, VIQ < PIQ deficit is instead a useful study finding. Nevertheless, we would caution that larger samples are required to clarify both these findings and the role of cognitive assessments in differential diagnosis.

This study confirms the complex clinical presentations for both groups of children which need to be taken into account in differential clinical diagnosis. There are some important overlaps between the two disorders, but also divergent patterns. Additional diagnoses, including social anxiety disorders and ADHD, were present for some children with ASD, but ADHD and other disruptive behavioural disorders co-occurred more often in the RAD group, with 27% of the sample diagnosed with conduct disorder. These multiple diagnoses apparent in the RAD group support the notion that RAD is a complex disorder presenting a wide range of challenges (Gillberg, 2010; Kočovská et al., 2012; Pritchett, Pritchett, Marshall, Davidson, & Minnis, 2013).

4.1. Limitations

Limitations of the study include the historical nature of our RAD group. However, as ASD and RAD are both disorders with a low prevalence it is difficult to build up a sample providing enough power for statistical comparisons therefore use of historical data afforded an opportunity to conduct exploratory work into a clinically relevant area. While we compared the profile of children with ASD and children with RAD using DSM-IV diagnostic criteria, the core symptoms of Disinhibited RAD, now termed, Disinhibited Social Disengagement Disorder remain similar. The same is true for Inhibited RAD, now known as Reactive Attachment Disorder, see Appendix 1. It would have been ideal to have separated the RAD groups into Inhibited and Disinhibited, but the low prevalence of Inhibited RAD and the high prevalence of mixed disorder precluded this. In addition, our assessment battery for RAD includes the CAPA-RAD parent interview in which many of the key questions ask about core symptoms which are described in DSM-5 under the new terminology. Examples include questions regarding, indiscriminate friendliness, minimal checking with a primary care giver and poor awareness of social boundaries; core features of Disinhibited Social Engagement Disorder. Core CAPA-RAD questions that ask about lack of comfort seeking from a primary

caregiver, withdrawal and fearful behaviours including hypervigilance and frozen watchfulness are eliciting information that is diagnostic of Reactive Attachment Disorder under DSM-5.

A further potential limitation is the not unexpected slight gender imbalance between the RAD and the ASD group. However, when gender was entered into the discriminant function analysis it was not a useful discriminating feature, suggesting that despite this imbalance our results do not appear to have been biased. Within the ASD group we also have the strength of having been able to vigorously exclude known emotional abuse and neglect, along with welfare concerns such as exposure to family violence and substance abuse.

The study also contended with some missing data within two of the inhibited items on the CAPA-RAD and on the OSR in both groups. As there was a large difference in scores on the OSR between the RAD and ASD groups with no systematic bias in collection of data (missing data was simply because we developed the OSR and modified the CAPA-RAD during the course of one of our studies or because schools could not accommodate our assessments within the time frame) we suggest that this does not limit our findings.

In addition, although the previous studies from which the RAD data was collated used *either* the DAWBA *or* the CAPA to assess co-morbidity and *either* the WASI *or* the BPVS which decreased the sample available, the Verbal IQ scores and BPVS standard scores are similar in each group. Despite these limitations, enough data was collected in order that all the key analyses were fully powered. We would argue, therefore, that we are presenting important findings regarding clinician concerns about differential diagnosis and bout the clinical tools that can assist in this complex clinical field.

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Appendix 1

The key differences in symptoms described in DSM-V terminology for a) Disinhibited Social Engagement (previously Disinhibited RAD, DSM-IV) and b) Reactive Attachment Disorder, (previously Inhibited RAD, DSM-IV).

	a). Disinhibited Social Engagement Disorder	b). Reactive Attachment Disorder
Key differences in the new DSM-V terminology	Behaviours in which the child approaches and interacts with unfamiliar adults are not related to impulsivity, as in Attention-deficit/ Hyperactivity Disorder.	Emotionally withdrawn behaviours are explicitly associated with adult caregivers. Both of the following criteria should be met: 1. The child rarely/minimally seeks comfort when distressed. 2. The child rarely/minimally responds to comfort when distressed. *Questions regarding these symptoms are asked in the CAPA-RAD but both criteria are not regarded necessary. The following two symptoms described in criterion B (persistent social and emotional disturbance) are an addition: 1. Minimal social and emotional responsiveness to others. 2.Limited positive affect *the 3rd set of symptoms that are described in criterion B, episodes of unexplained irritability, sadness or fearfulness that are evident even during non threatening interactions with care givers, are similar to those asked about in the CAPA-RAD.

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