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ORIGINAL CONTRIBUTION

Social use of language in children with reactive attachment disorder and autism spectrum disorders

Fareeha Amber Sadiq · Louise Slator · David Skuse · James Law · Christopher Gillberg · Helen Minnis

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Abstract Children with a diagnosis of reactive attachment disorder (RAD) appear to show difficulties in social understanding. We aimed to compare the pragmatic language functioning of children with (RAD) and autism spectrum disorder (ASD). Assessments were made in three groups of children aged 5–8 years, with verbal IQ estimates in the normal range: 35 with a RAD diagnosis, 52 with an ASD diagnosis and 39 with typical development. The Children's Communication Checklist (CCC) was used to compare their pragmatic language skills, and ADI-R algorithms were used to compare autistic symptomatology, according to parent report. According to the CCC, the RAD group demonstrated significant problems in their use of context, rapport and social relationships with a degree of severity equivalent to children in the ASD comparison group. More than 60% of the group with RAD met ADI-R clinical criteria on the Use of Language and Other Social Communication Skills subscale, 46% on the Reciprocal Social Interaction subscale, and 20% had significant repetitive and stereotyped behaviours. Children with RAD appear to be at least as impaired as children with ASD in certain domains of social relatedness, particularly in their pragmatic language skills.

Keywords Reactive attachment disorder · Autism · Pragmatic language · Social communication

F. A. Sadiq · C. Gillberg · H. Minnis
Section of Psychological Medicine, Faculty of Medicine, Caledonia House, Royal Hospital for Sick Children, University of Glasgow, Glasgow G3 8SJ, UK

L. Slator · D. Skuse
Behavioural and Brain Sciences Unit, Institute of Child Health, University College London, 30 Guildford Street, London WC1N 1EH, UK

J. Law
Institute of Health and Society, School of Education, Communication and Language Sciences, University of Newcastle, Newcastle-upon-Tyne NE1 7RU, UK

H. Minnis (✉)
Psychological Medicine, College of Medicine, Veterinary and Life Sciences, Caledonia House, Yorkhill Hospital, University of Glasgow, Glasgow G3 8SJ, UK
e-mail: h.minnis@clinmed.gla.ac.uk

Introduction

Certain core behavioural features of reactive attachment disorder (RAD), such as indiscriminate friendliness, have been noted consistently in children who have been institutionalised or maltreated [13, 28, 29]. However, questions remain about the diagnostic boundaries of RAD and its overlap with other disorders. In DSM-IV, RAD is described as featuring "a markedly disturbed and developmentally inappropriate social relatedness in most contexts that begins before the age of 5 years and is associated with grossly pathological care". ICD-10 and DSM-IV describe two subtypes of RAD: an inhibited type in which children are withdrawn and fearful, and a disinhibited type in which children are indiscriminately friendly [3, 39]. In ICD-10, the disinhibited form is called disinhibited attachment disorder, but in this paper we will follow the DSM practice of using the term RAD to describe the two subtypes. The classification systems state that RAD is thought to be distinguishable from autism spectrum disorders (ASD), but yet there is no empirical evidence of this.

Most research about RAD has focussed on infancy, but questions remain about the group of children who most commonly present to Child and Adolescent Mental Health

Services (CAMHS), namely those in middle childhood and beyond [1]. Children presenting to CAMHS with a history of maltreatment and problems with social relatedness can be challenging to clinicians, but the evidence-based assessment protocols and tools for the treatment are lacking [9]. Parents who have adopted or fostered maltreated children may have discovered (e.g., on the web) inappropriately broad definitions of "RAD" and may present to CAMHS asking for help with RAD when their children may in fact be suffering from other disorders such as ADHD, ASD or conduct disorder [9]. Diagnostic clarity is important to guide treatment strategies and it is crucial that clinicians develop a better understanding of the clinical features of RAD. We have recently developed a standardised assessment package for RAD [23], but important questions still remain about its ability to discriminate between core RAD symptoms and problems associated with other disorders such as ASD.

Autism spectrum disorders are characterized by impairments in social reciprocity and in the development and use of communication skills, accompanied by the presence of rigid, repetitive and stereotyped behaviours [31, 37]. The primary impairment in social relatedness and reciprocity was once considered a particular characteristic of rare individuals in the population, but is now considered by many to be a broad dimension of individual difference that is widely distributed in the general population [25]. Impaired reciprocal social interaction in ASD is well established. However, symptoms of an autistic type are found in a wide range of disorders [11, 16, 26].

Social communication in RAD

Young children with RAD have marked deficits in social understanding and the interpretation of social cues which may, at least in some instances, be similar to those seen in ASD [13]. The nature of the social deficits in RAD is still to be fully explored, but there have been attempts to define the disorder as a disorder of "current social impairment", e.g., Green suggests that "the pervasive social impairment of the syndrome is much wider than even a 'broad'…concept of attachment could encompass – affecting all aspects of social functioning" [14]. The social impairments in RAD appear to be generalised and disruptive across settings and occur in the context of relationships with family, peers and strangers rather than being a feature of a particular relationship [1, 40]. Children with RAD appear to have problems with understanding social hierarchies and in reading social cues, although research in this area is limited [6]. RAD could, therefore, be conceptualised as a disorder of social communication, but the nature of the deficits remain to be explored.

Although DSM and ICD state that RAD must be distinguished from the other child psychiatric disorder which most profoundly affects social interaction namely ASD [3, 38], there has been very little research which guides clinicians towards achieving this. The European-Romanian Adoption studies have highlighted the existence of "quasi-autism" in children who have experienced extreme early maltreatment [27]. Quasi-autism is said to differ from autism only in the fact that symptoms appear to improve to a certain extent when children are placed with an adoptive family and that indiscriminate friendliness is a more prominent feature [29]. Data regarding the existence of this syndrome are robust, yet it is not clear whether quasi-autism is an environmentally induced phenocopy of autism or whether these are children with genetically determined autistic symptoms worsened by institutionalisation. Quasi-autism was fairly uncommon even within the extremely deprived institutionalized ERA group. The extent to which quasi-autism and RAD are related is unknown.

There is virtually no research examining the nature of social understanding associated with core symptoms of RAD such as indiscriminate friendliness. The "indiscriminate friendliness" characteristic of RAD may be a misnomer; the behaviour can be "superficial" and "shallow", rather than truly friendly [24], and our own clinical observations suggest that, rather than being truly indiscriminate, it may be directed towards certain strangers rather than others. Children with indiscriminate friendliness are not successful in making friends [30], but the reasons for their lack of success in this endeavour despite their overfriendliness is not clear. We have carried out some qualitative research in which the concepts of friendships and friendliness were explored with children who had this symptom [6]. Participating children appeared to have an overly broad understanding of what constituted a friend and included a wide range of individuals—schoolmates, family members and both child and adult strangers including the interviewer in this definition [6]. These children appeared to lack subtlety in discriminating the various ways in which one is expected to interact in various social situations and at different levels of intimacy. However, so far there has been no research investigating whether or not problems were due to broad difficulties in social understanding, or whether problems might be located more specifically in social communication. This led us to explore pragmatic language: defined as the social use of language in context [7].

Children with RAD are already known to be at risk of expressive language problems [33], but we are not aware of any previous systematic exploration of pragmatic language in RAD. Rutter [28] has described RAD as "a syndrome characterised by relative failure to develop committed intimate social relationships". We might, therefore,

anticipate that children with RAD may have problems with the social use of language in context, i.e., with pragmatic language. Because of the very different aetiology and developmental trajectories of RAD and ASD, we would expect the nature of the pragmatic language difficulties to differ in these two disorders.

To summarise, although RAD and ASD share the feature of marked impairments in social responsiveness, they appear to differ in various ways. ASD frequently occurs in adequate caregiving environments; RAD does not. In ASD, repetitive and stereotyped behaviours are seen [38], but these are not expected in RAD. However, despite the clearly different aetiological context of the two disorders, they may share features in the domain of abnormal social relatedness.

In this study, we hypothesised that children with RAD, aged between 5 and 8 years, could have pragmatic language problems as severe as children with ASD, but of a different nature. In addition, we hypothesised that children with a diagnosis of RAD could be discriminated from a comparison group of children with ASD using standardised measures for ASD. Our research questions were:

1. What is the nature of any pragmatic language deficits in RAD and do they differ from those found in ASD?
2. Are children diagnosed with RAD distinguishable from children diagnosed with an ASD using standardised measures for Autism?

Method

Participants

One hundred and twenty-six 5–8 year old children with verbal IQ estimates in the normal range were included in this study: (a) 35 (22 male, 13 female) with RAD, (b) 52 (44 male, 8 female) with ASD and (c) 39 (26 male, 13 female) with typical development (TD). Children were only excluded if their estimated or actual verbal IQ was below the normal range (see below).

RAD group

Data on participants in the RAD were gathered as part of a study examining the association between RAD and attachment narratives [23]. The sampling strategy for that study aimed to produce two groups, one with participants who were clinically identified with RAD behaviours and a comparison group of participants at low risk of RAD, sampled from the general population. Child mental health clinicians and social workers were asked to refer children to the study according to the ICD-10 symptoms of RAD. Forty-seven children with presumptive RAD were referred to the research team. Thirty-eight were considered to be affected from RAD after clinical assessment and 35 had complete data on the measures used in this study [23]. All had symptoms of the disinhibited subtype of RAD and many also had symptoms of the inhibited subtype; we have not, therefore, attempted to separate the subtypes in this paper. All diagnoses made using our protocol were checked by a panel of experts and there was 99% agreement [24]. Approximately, 1/3 of the sample was living with birth families and 2/3 with foster or adoptive parents. Those in substitute care were in stable placements and carers knew the children well.

Children were assessed by a multidisciplinary team with psychiatry, psychology and nursing input, using a newly-developed standardised assessment protocol for RAD [23]. This comprised a semi-structured interview for parents about RAD symptoms, a structured observation of the child's behaviour in the waiting room [20] and a questionnaire for teachers, and diagnoses were made according to ICD-10 criteria. Because there was no pre-existing gold standard against which to compare the new diagnostic package, diagnoses were ratified by a panel of experts who independently reviewed output from each measure including videos of the child with their caregiver (see Minnis et al.'s [23] web appendix for details of this process). Receptive vocabulary was measured using the British Picture Vocabulary Scale (BPVS) [5]. Children were assessed for potential co-morbid diagnoses, including ADHD, conduct disorder and oppositional defiant disorder, using modules of the Child and Adolescent Psychiatric Assessment (CAPA) [4] and for ASD using the developmental, dimensional and diagnostic interview (3Di) [32]. This diagnostic appraisal in the ASD comparison group was supplemented in all cases by assessment of the child with the Autism Diagnostic Observation Schedules [18]. The final diagnostic appraisal was derived from an appraisal of parental interview, structured observation and a structured report from the child's school.

ASD group

Participants in the ASD group had attended the social communication disorders (SCD) clinic at Great Ormond Street Hospital (GOSH). The SCD clinic at GOSH is a Tier 4 NHS service and receives referrals from across the UK, where all referrals are made by either tier 2 or tier 3 local services. The SCD clinic was established to assist with clarification of diagnostic difficulties in children who had not been firmly diagnosed by their local services. Children must be between the ages of 3 and 16 years at the point of referral, however, because the assessment procedures used are dependent on the child having achieved reasonable language skills, it is

rare for children to be offered an appointment before their 4th birthday. The clinic would normally only accept children who attended mainstream schools or nurseries and who were regarded as having no generalised learning difficulties. Referrals are usually of complex cases where there is some debate about the nature of the child's problems, for two main reasons. First, because most of the children are high functioning, they do not appear classically autistic to clinicians who are relatively inexperienced in this field. Second, because of their generally good development of formal language skills and lack of learning difficulties, they have been 'missed' by paediatric or psychiatric services until middle childhood and a transfer to secondary education is pending. This is the modal period of referral, 29% of all cases are between their 9th and 12th birthdays (although this clinical sample comprised younger children). Assessment practices have changed and now all children attending the clinic have a full-scale IQ assessment, but this was not always the case in the past. As this is a historical clinical cohort, some IQ data are missing (see below).

Children assessed at the SCD clinic are diagnosed according to DSM-IV-TR criteria by a multidisciplinary team of experienced clinicians with both psychiatry and psychology input, following the administration of standardized autism assessments. These include the developmental, dimensional and diagnostic interview yielding ADI-R algorithm scores [32] and Autism Diagnostic Observation Schedule (ADOS-G) [17]. Screening for comorbidity is undertaken on all children using standardized scales. The prevalence of ADHD and other comorbidities is almost identical to that of population-identified samples of autism [31]. No child has been included in this clinical sample where there was evidence of severe neglect or abuse that could have contributed to the clinical picture of autistic traits.

The sampling frame was all eligible clinical cases seen at the SCD clinic where information on ADI-R algorithm scores and primary caregiver report CCC scores were available ($n = 482$). Children were selected if they were (a) aged between 5 and 8 years (age matched to the RAD and typically developing (TD) groups; (b) a verbal IQ measurement or estimate was available (c) were given a clinical diagnosis of an ASD, of autism [29], Asperger syndrome [17], or Atypical autism [6]. One child was assessed on two separate occasions and received a diagnosis of Asperger's syndrome both times. Participants were classified using ADI-R algorithmic criteria [32]. Given the difficulties of differentiating Asperger's disorder and autism using DSM criteria [21, 35], Szatmari [34] guidelines were used to distinguish them, according to whether or not a delay in the onset of language was observed. Accordingly, for a diagnosis of autism, scores above the ADI-R algorithm cut-points in reciprocal social interaction, communication and repetitive and stereotyped behaviours were required, as well as delayed development of onset of single word (>24 months) or phrase speech (>36 months), plus evidence from the ADOS of significant autistic characteristics. Asperger's syndrome was diagnosed in the presence of above-threshold 3Di scores for reciprocal social interaction, communication and repetitive and stereotyped behaviours, without the delayed development of either single-word or phrase speech. Atypical autism was diagnosed when criteria were met for reciprocal social interaction and communication impairments were met on the basis of both ADI-R algorithm and ADOS-G algorithm data, but there was insufficient impairment in the domain of stereotyped and repetitive behaviours to meet diagnostic criteria for a higher-level diagnosis [19]. Each diagnosis was assigned on the basis of clinical review of all the materials available.

Most children in the ASD comparison group had a measured verbal IQ in the normal range. The formal testing of children's IQ was usually undertaken at the clinic for cases in which no previous assessment of intellectual ability was available and this was not done only in cases where the child's IQ was very clearly in the normal range. There is, therefore, no possibility that the study includes children whose overall abilities fell within the mild or moderate learning disabilities range.

Typically developing comparison group

A group of comparison children, matched on age and gender with the RAD cases were recruited through family practice. All 217 children aged 5–8 on the case register of a moderate sized family medical practice in Glasgow were identified. We used exclusion criteria based on risk indices for RAD behaviours in previous research [22], and information packs and consent forms were sent to 178 eligible families initially in random order. The balance of age and gender in cases and comparisons was reviewed at monthly research meetings and recruitment methods adjusted accordingly [23]. This resulted in a group of 39 TD children group matched on age and gender with the RAD group. They had identical assessments to the RAD group (see above).

Measures

The primary caregivers of all 127 children completed the Children's Communication Checklist (CCC) [7] and were interviewed using the 3DI.

Children's communication checklist [7]

The CCC is a 70-item questionnaire that examines features of language impairment through seven subscales. Bishop

developed the CCC to specifically investigate the social use of language in context (pragmatic language), and the pragmatic composite is the sum of subscales C–G (see below). Other aspects of functioning were also included in the CCC to allow exploration of the relationship between pragmatic aspects of language and characteristics of other difficulties including ASD and other types of specific language impairment. These are speech (subscale A), Syntax (subscale B), non-language aspects of peer relationships (subscale H) and specific interests (subscale I) [7]. In this study, we focus on the pragmatic composite, and also present all CCC subscales so that the reader can see the profile of the three groups of children for both pragmatic language and for the other aspects of social functioning explored by the CCC (see Table 2; Fig. 2).

(A) Speech, e.g., "Seldom makes any errors in producing speech sounds".
(B) Syntax, e.g., "Speech is mostly 2 to 3 word phrases such as 'me got ball', or 'give dolly'".
(C) Inappropriate Initiation, e.g., "Talks to anyone and everyone".
(D) Coherence, e.g., "Uses terms like 'he' or 'it' without making it clear what s/he is talking about".
(E) Stereotype Language, e.g., "Makes frequent use of expressions such as 'by the way', 'actually', 'you know what', 'as a matter of fact', 'well, you know', 'of course'".
(F) Use of Context, e.g., "May say things that are tactless or socially inappropriate".
(G) Rapport, e.g., "Seldom or never starts up a conversation; does not volunteer information about what has happened".
(H) Social Relationships, e.g., "Is popular with other children".
(I) Interests, e.g., "Has one or more over-riding specific interest (e.g, computers, dinosaurs) and will prefer doing activities involving this to anything else.

Parental completion of the CCC has been shown to be a reliable method of gaining information about a child's pragmatic competence, inter-rater reliability for parental report was 0.7 [8]. Furthermore, the composite pragmatic scale formed of seven of the subscales (C–G) had an inter-rater reliability of 0.8 [7].

The 3DI

The 3DI is a validated, computerized interview for parents that assess levels of social communication difficulties in children using ICD-10 and DSM-IV diagnostic criteria. The interview emulates the ADI-R algorithm, generating dimensional scores for the autism spectrum triad [32].

The 3DI has high inter-rater and test–retest reliability [30]. Some questions from the CCC contribute to the 3DI algorithm, however, it can also be analysed separately.

Measures of intelligence

As data on the children were gathered in two different sites, more than one measure was used. In the RAD and TD group, the BPVS was used as proxy measure of verbal IQ, as has been the case in a number of other studies [5]. The Wechsler Abbreviated Scale of Intelligence (WASI) [25] and the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV) [36], were used in the ASD sample. Proxy verbal IQ was taken from either BPVS scores or from the verbal IQ subscales of the WASI or WISC-IV. Verbal IQ data were available for all participants in the RAD and comparison groups, and for 58% of the ASD group. Children who did not have verbal IQ scores were not included in adjusted analyses—these analyses, therefore, involved 31 of the 52 children with ASD. Data were missing on IQ for largely administrative reasons (e.g., depending on the referring clinic. Children with ASD who had measured verbal IQ data did not differ significantly from those whose IQ was not measured in terms of key variables, including age (Mean age 6.3 vs. 6.1; $t = 0.71$; $p = 0.48$), gender (90% vs. 73% male; Chi^2 2,8; $p = 0.09$) and CCC score (120.1 vs. 121.2; $t = -.31$; $p = 0.76$).

Statistical analysis

Descriptive information for the groups was compared using one-way ANOVA and Chi-square tests. The results from the 3Di assessment were analysed for group differences using Kruskal–Wallis tests. Group differences on the CCC scores were also examined using one-way ANOVA and, post hoc, with independent t tests.

Chi-square tests were also employed to examine differences in the percentages of participants falling within the clinical range on each CCC subscale and the Pragmatic Composite score.

There were differences between the ASD, RAD and TD groups for age, gender, verbal IQ, ethnicity and socio-economic status (see Table 1). Analysis of covariance (ANCOVA) was performed to adjust for the potential confounders age, gender and verbal IQ (or verbal IQ from BPVS). Neither ethnicity (http://www.ons.gov.uk/about-statistics/classifications/archived/ethnic-interim/presenting-data/index.html) nor socio-economic status (National Statistics Classification) http://www.statistics.gov.uk/methods_quality/ns_sec/default.asp) was included as covariates in the ANCOVA: ethnicity because virtually all children had the same ethnicity and SES because its meaning in the RAD group is questionable as adopted or fostered children

are likely to have had a different SES in the birth family. Spearman's correlations were used to examine the relationship between Verbal IQ and CCC subscales, Verbal IQ and ADI-R algorithm scores as well as CCC subscales and the ADI-R algorithm scores.

Results

Descriptive statistics on all groups can be found in Table 1. Mean ages were similar between the groups, but the male–female ratio of the TD and RAD group was lower than the male–female ratio of the ASD group, which contained a greater proportion of males. The median social class was higher in the ASD group than the other groups.

Pragmatic language

Figure 1 shows primary caregiver CCC ratings for clinical groups, RAD and ASD, and TD group. Examining overall group differences in post hoc tests, significant differences were found in all CCC subscales except Speech ($F = 1.918$, $p = 0.151$) and Syntax ($F = 1.584$, $p = 0.209$).

Both clinical groups differed from the TD group on all CCC subscales except Speech, Syntax and Rapport. For Rapport, only the RAD group differed from the TD group. Furthermore, analysis demonstrated significant differences between the two clinical groups on the subtest areas of Use of Context [$t(81) = 2.886$, $p = 0.005$], Rapport [$t(83) = 4.173$, $p < 0.001$] and Social Relationships [$t(82) = 2.849$, $p = 0.006$], with the RAD group achieving

Table 1 Descriptive information

	Diagnostic group		
	Reactive attachment disorder ($n = 35$)	ASD ($n = 52$)	TD ($n = 39$)
Number of participants	35	52	39
Male/Female (%)	63/37	83/17	67/33
Median socioeconomic status[a]	6	2[b]	3
Ethnicity[a]	All white British	64.15% white British 3.78% Indian 32.07% Unknown	All white British
Mean age (SD)	6.7 (1.2)	6.4 (1.1)	6.5 (1.1)
Mean Verbal IQ (SD)	96.4 (10)	101.03 (16.8)	102.8 (9.6)

[a] Socioeconomic status (SES) (National Statistics Classification)

[b] Data available for $n = 27$ (51%)

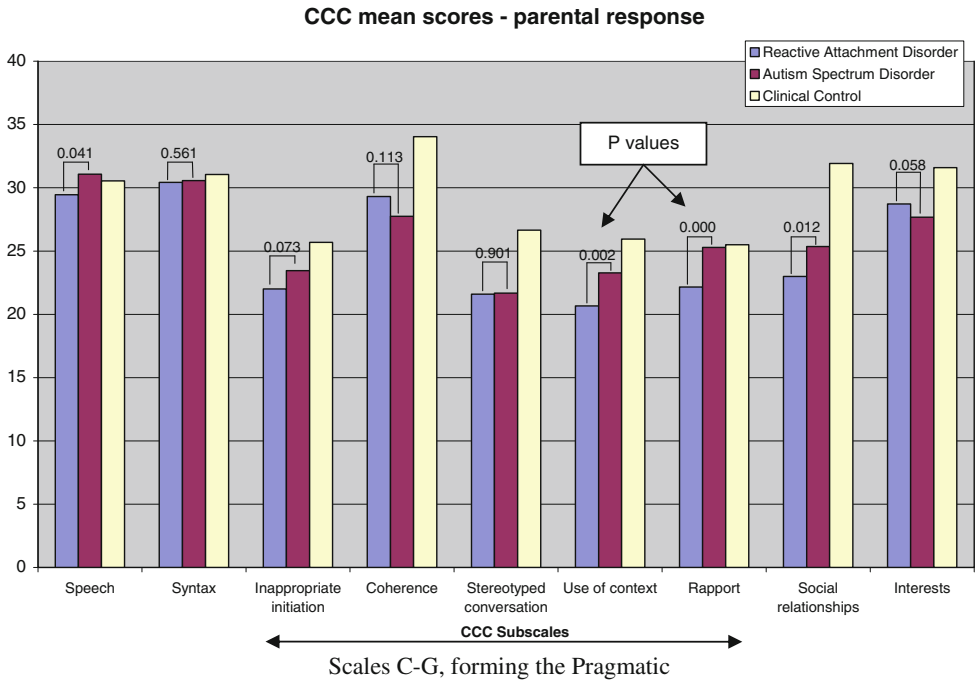

Fig. 1 Primary caregiver report ratings on subscales of the children's communication checklist: comparison between groups. Statistical significance of differences in post hoc t tests between the RAD and ASD groups are indicated above these two columns; lower scores indicate a greater degree of impairment

Scales C-G, forming the Pragmatic Composite

Table 2 Adjusted CCC primary caregiver report ratings

Scale	Diagnostic group		
	RAD ($n = 35$)	ASD ($n = 52$)	TD ($n = 39$)
Speech mean (SD)	29.5 (3.2)	31.4 (4.5)	30.6 (2.7)
% in clinical range	0	0	0
Syntax mean (SD)	30.6 (1.8)	30.6 (1.7)	31.0 (1.3)
% in clinical range	0	0	0
Inappropriate initiation mean (SD)[a]	22.1 (3.4)	23.1 (3.7)	25.7 (2.7)
% in clinical range	64	52	19
Coherence mean (SD)[a]	29.4 (4.2)	27.8 (4.3)	33.8 (2.2)
% in clinical range	0	2	0
Stereotyped language mean (SD)[a]	22.0 (3.8)	21.5 (4.3)	26.8 (3.1)
% in clinical range	65	62	14
Use of context mean (SD)[a]	20.9 (3.4)	23.3 (3.8)	25.9 (2.4)
% in clinical range	77	51	18
Rapport mean (SD)[a]	22.3 (3.0)	24.6 (3.4)	25.4 (1.9)
% in clinical range	82	50	31
Social relationships mean (SD)[a]	23.2 (3.6)	25.5 (3.7)	32.1 (3.7)
% in clinical range	56	33	3
Interests mean (SD)[a]	28.9 (2.8)	27.9 (2.7)	31.5 (2.2)
% in clinical range	42	63	8
Pragmatic Composite Score (SD)[a]	115.8 (13.4)	120.5 (13.8)	136.9 (7.6)
% in clinical range	86	76	21

High scores indicated greater problems

[a] Statistically significant difference ($p < 0.05$) when adjusted for age, gender and verbal IQ

a lower (more abnormal) mean score than the ASD group. The RAD group also had significantly more individuals with scores within the clinical range in all CCC subtest areas, with the exception of the Intelligibility and Fluency subtest where none of the participants gained scores below the clinical cut-off.

Table 2 shows the adjusted analysis, controlling for age, gender and verbal IQ of the parental CCC scores. It also shows the proportion of children achieving scores above the clinical cut-off point [7]. Significant group differences were seen in all subscales ($p < 0.001$) with the exceptions of Speech [$F(5,98) = 1.655$ $p = 0.153$] and Syntax [$F(5,97) = 2.297$ $p = 0.051$].

There were no group differences identified in relation to verbal IQ, and in regression analysis, it was not shown to have a between groups effect. However, it should be noted that it was found that there were significant (albeit modest) correlations between verbal IQ and the subtests Syntax [$r(98) = 0.293$, $p < 0.01$], Inappropriate initiation [$r(97) = 0.228$, $p < 0.05$], Coherence [$r(97) = 0.288$, $p < 0.01$], Use of context [$r(95) = 0.205$, $p < 0.05$], Rapport [$r(98) = 0.292$, $p < 0.01$] and the Composite Pragmatic Score [$r(86) = 0.350$, $p < 0.01$], from the CCC. Verbal IQ was not correlated with any element of the algorithm scores.

Autistic symptomatology

Table 3 and Fig. 2 demonstrate the degree of autistic symptomatology in all participants according to the ADI-R algorithm scores. There were significant differences between all the groups using post hoc t tests ($p < 0.001$) with the ASD group reaching higher scores and most participants reaching scores above cut-off points for a likely ASD diagnosis on each subscale. Repetitive and stereotyped behaviour was the most discriminating domain with 80% of the ASD group having scores above the cut-off compared to only 20% of the RAD group and 0% of the TD group. Over half the RAD group (62%) had scores over cut-off on the Language and social communication domain, although the mean score for this group was significantly lower than that of the ASD group.

Within the RAD group, 40% (14 children) met criteria for an ASD according to caregiver report. Three of the authors (CG, FAS and LS), each with substantial clinical experience of diagnosing autism, reviewed the assessment videos of these children, which were focussed on attachment assessment and did not contain any structured observational assessment of ASD. Five videos were rated independently by each of the three raters. Agreement regarding the existence of autism-like behaviours was 60%.

Table 3 ADI-R algorithm scores

Scale	Diagnostic group		
	RAD ($n = 35$)	ASD ($n = 52$)	TD ($n = 39$)
Reciprocal social interaction (SD)[a]	10.12 (3.6)	14.96 (4.6)	3.62 (1.7)
% in clinical range[b]	46	84	0
Use of language and other social communication skills (SD)[a]	9.05 (2.8)	13.58 (3.9)	4.9 (2.4)
% in clinical range	62.9	90	10.3
Use of gesture and non-verbal play (SD)[a]	3.56 (2.5)	7.39 (2.9)	2.08 (1.7)
% in clinical range	14.3	58	2.6
Repetitive and stereotype behaviours (SD)[a]	1.51 (1.3)	4.49 (2.1)	0.5 (0.5)
% in clinical range	20	80	0

High scores indicated greater problems in each subscale

[a] Statistically significant ($p < 0.05$) when adjusted for age, gender and verbal IQ

[b] "in clinical range" means above cut-off on ADI-R algorithm subscale score

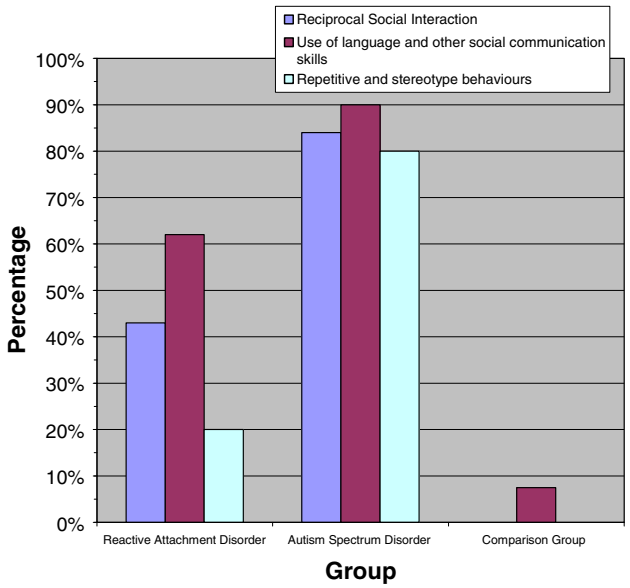

Fig. 2 ADI-R algorithm scores across three groups. This does not show scores, but the % over threshold for clinical caseness

A further nine videos were rated jointly as to whether or not ASD was present. Two of the 14 children were deemed highly unlikely to fit criteria for ASD on the basis of clinician's observations and 1/14 was deemed highly likely to fit criteria for ASD. For the remaining 11/14 children, on the evidence available, it was not possible to be certain whether or not ASD was a likely diagnosis and further structured observational assessments would have been required to make this decision with confidence.

Discussion

This is the first study to consider, from a pragmatic language perspective, the social communication difficulties that are observed in a clinical setting in school-age children with RAD.

Our first hypothesis was that the RAD group might have impairments in the use of language for social communication (pragmatic language). Interestingly we found that there were distinct CCC profiles in all three (ASD, RAD and typically developing) groups with a significantly higher proportion of the RAD group scoring in the clinical range for pragmatic language difficulties as compared to the other groups on some subscales of the CCC. The CCC scores of the ASD group reflect the social communication difficulties associated with this diagnosis. However, the RAD group demonstrated even greater difficulties in use of context, rapport and social relationships than the ASD group. This supports our clinical observations that the RAD group have marked social impairments, the profile of which is different from that seen in typical autism, but that these impairments can be as severe. The presence of social communication difficulties in groups other than those with ASD has been demonstrated in conduct disorder and ADHD [10, 12] and it is increasingly recognised that neurodevelopmental problems of social relatedness may share both aetiological factors and presentation [15, 26].

Our second hypothesis was that children with a diagnosis of RAD, aged between 5 and 8 years old, would be able to be discriminated from a comparison sample of children with ASD using standardised measures for ASD. More than 60% of the group with RAD reached the clinical cut off in the Use of Language and Other Social Communication Skills scale and 46% in Reciprocal Social Interaction (SD), but only 20% in Repetitive and Stereotyped behaviours. A significant minority of the RAD group fulfilled ADI-R parental report criteria for ASD, but only one was considered by expert clinicians to have a highly likely diagnosis on the autism spectrum. It is, of course,

possible that some of this subgroup of children had co-morbid ASD.

The RAD and ASD groups appear to differ, therefore, in the profile of their symptomatology, yet important overlaps exist and these may be confusing for clinicians, particularly if (as is common in RAD) details about early development are missing. Because parental report instruments may suggest ASD in children with RAD, it will be essential that differential diagnosis is made using multidisciplinary assessment, contextual information (including from school) and observational information in addition to caregiver report.

Further research including structured observation focused on ASD will be necessary to identify the prevalence of such complex presentations and to understand how they differ from ASD. Studies of Romanian adoptees suggest that autistic symptomatology can arise in the context of maltreatment, but as these children develop this looks more like disinhibited RAD [27, 29].

The limitations in the study include the possible selection biases in recruitment of the three groups, probably resulting in the differing social class profiles of the groups. The RAD sample was recruited through community child and adolescent psychiatry clinics, whereas the ASD group was recruited through a national specialist clinical service and the samples may differ in the degree to which they represent the population of children with these disorders. For example, we do not know the extent to which the ASD sample is typical of children with ASD with normal range IQ in the population at large, and our results are not generalisable to the wider population of children with ASD, many of whom will have lower IQ. The nature of parent report (used in the 3-DI and CCC) may vary in these samples and it will be important for future research to investigate Autistic symptomatology and pragmatic language using both parent and teacher report and observational measures, e.g., newer measures of pragmatic language include video coded samples [2]. The gender balance differed significantly between the RAD/general practice groups and ASD group, but we controlled for gender in the analyses. We were unable, in a study of this size, to control for all potential confounders and it will be important to replicate these findings in larger future studies. Due to the locations where the samples were recruited, the ASD group did not have a full assessment for RAD diagnosis and the RAD group did not have a full assessment for ASD diagnosis. This would be a helpful avenue for future research. In addition, although the best available existing measures for RAD were utilised in this study and diagnostic consensus was achieved, the diagnostic boundaries of RAD are less well understood than for ASD. Finally, different diagnostic procedures were used for the ASD group and the RAD group, although the measures on which our research questions were based were identical. For example, our assessment regarding autism diagnosis in the RAD children was not based on standardised measures. It would be a useful avenue for future research to compare children with ASD and RAD using identical diagnostic procedures.

It would also be interesting in future research to investigate comorbidity and symptomatic overlap between RAD and ASD in larger samples recruited from the general population. This would allow development of a more detailed understanding of the extent to which these two disorders might share aetiological factors (genetic and environmental), developmental pathways and outcomes. It will also be important to further profile the social difficulties of children with RAD so that appropriate interventions can be developed.

Clinical implications

When clinicians wish to make a differential diagnosis between RAD and ASD, standardised parent-report measures for ASD may prove useful. Children with ASD are likely to be impaired on all domains, whereas children with RAD are likely to have sub-clinical scores for repetitive and stereotyped behaviour. Children with RAD, although a clinically distinct group, appear to be at least as impaired as children with ASD in certain domains of social relatedness, particularly in their pragmatic language. In home and school settings, children with RAD are, therefore, socially disadvantaged; accurate profiling of children's difficulties using tools such as the CCC may help parents and teachers develop a better understanding of their support needs.

Although there is little research on RAD beyond middle childhood, it is possible that ASD and RAD may have very different outcomes in adolescence and adulthood; understanding the pragmatic language profile may prove helpful both in making a diagnosis and prognosis.

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Conflict of interest None

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