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Can we distinguish the consequences of early maltreatment on child behaviour from idiopathic autism?

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Abstract

Objective: To identify clinical features that could distinguish children presenting with autistic-like features and a history of severe early maltreatment from children with idiopathic autism spectrum disorders (ASD).

Design: Matched-comparison study

Setting: Great Ormond Street Hospital, UK

Participants: 46 children with a history of early maltreatment, mean (SD) age 10.6 (3.3) years and 47 children with an ASD, mean (SD) age 10.4(2.9) years.

Main outcome measures: A range of standardized interview and observational measures that are designed to quantify autistic traits. Caregiver and teacher reports were obtained on broader aspects of behavioural and emotional adjustment.

Results: Both groups had normal range IQ and were predominantly male. On the basis of autistic traits alone, caregiver interview and structured observation concurred that over 60% of the formerly maltreated children met criteria for an ASD. Autistic symptom profiles were very similar in both groups, although children with idiopathic ASD had significantly more marked repetitive and stereotyped behaviours. Teacher and caregiver reports indicated that children from both groups had an increased, and broadly similar, prevalence of emotional and behavioural disorders.

Conclusions: Children presenting with a history of early maltreatment, who show autistic traits of behaviour, have a high risk of meeting diagnostic criteria for ASD. Their symptom profiles are virtually indistinguishable from children with idiopathic autism.

Key messages

What is already known on this topic?

- Diagnosing maltreated children with autism spectrum disorder (ASD) poses a clinical dilemma because they have similar social communication difficulties.
- Previous studies have compared the symptoms of maltreated children with and without ASD, to the symptoms of children with ASD and found subtle differences.
- The findings needed to be replicated in a larger sample of maltreated children.

What this study adds?

- Our study compared the symptoms of children who experienced early maltreatment (n=46) to children with ASD (n=47), who were closely matched for age and verbal IQ.
- Children with a history of early maltreatment, who were showing social communication difficulties were virtually indistinguishable from those with idiopathic autism in terms of their limited social reciprocity and the social use of language.
- Emotional and behavioural problems were prominent in the early maltreatment children, but were no more severe than in children with idiopathic ASD who did not have a history of maltreatment.

How this study might affect research, practice or policy

- The identification of maltreatment in childhood should not preclude autism assessment or diagnosis.
- Future research on the relative environmental and genetic contributions to the aetiology of ASD are required to understand these findings fully.

Introduction

The fact that children who have been raised in poor-quality institutions are at increased risk for a variety of adverse outcomes, including the risk of 'quasi-autistic' patterns of behaviour is well recognised(1–3). Other studies of former institutional inmates have found that it is not uncommon for them to display abnormalities in social approach, difficulties behaving appropriately in differing social contexts, poor peer relationships and attachment disorders (4–6). The mental health outcome for children who have been maltreated, but who were not institutionalised, is also known to be poor, especially in terms of social interaction skills and social cognitive competencies (7–9).

A clinical dilemma for paediatricians who are faced with assessing a child who was formerly subject to maltreatment, and who is now showing socially abnormal behaviours, concerns the potential diagnosis of an autism spectrum disorder. In this investigation, we aimed to test the hypothesis that it would be possible to identify a set of symptoms that could aid the clinician in making this differentiation (10). Its importance lies in the fact that children with 'quasi-autistic behaviours' are likely to make progress in more nurturing and stable environments, losing some of those autistic characteristics by late adolescence (11,12). In idiopathic autism, the course of symptoms can also change over time (13), but do not recede to the same degree in later childhood.

Previous studies have attempted to address this issue. For example, Davidson et al (2015)(14) emphasise the importance of making a differential diagnosis where the child's developmental history is unclear, or symptoms are subtle. Currently, there are two distinct diagnoses for the behavioural problems associated with former maltreatment: DSM-5 distinguishes between Reactive Attachment Disorder (RAD, characterised by emotional and social inhibition) and Disinhibited Social Engagement Disorder (DSED, characterised by social disinhibition and irritability). The distinction of ASD from DSED is possible because the emotional quality of interactions can be differentiated clinically(14), but it has proven difficult to differentiate RAD, and it is not known to what extent the symptom profiles of RAD

and ASD overlap. An investigation by Mayes et al (2017)(15) compared (checklist) symptoms in children diagnosed with ASD with a small sample previously diagnosed with RAD/DSED and a history of severe early maltreatment. Some children met criteria for both conditions, but there were also symptoms peculiar to ASD. These included hand flapping and spinning; hyperactivity; distress in crowds; fascination with repetitive movements; picky eating habits; unusual fears. Atypical speech patterns and stereotypies were much more common in those with autism, but both groups had noticeable social difficulties. There is clearly a need for a better controlled study of the distinction between the range of autistic-like traits, commonly found in maltreated children with attachment disorders. We aimed to use identical standardised clinical diagnostic tools to assess traits of autism and associated behavioural and emotional problems, in both children who had been subject to early maltreatment and those with idiopathic ASD. In this respect, our study used a unique design characteristic.

Methods

Participants

The 'Maltreatment Group' of children comprised sequential referrals to a national Attachment and Trauma Clinic at Great Ormond St Hospital (GOSH). They presented with a constellation of emotional and behavioural difficulties and, in all cases, there had been a specific concern about the presence of suspected autistic traits. Referrers were community paediatricians or mental health professionals in Child and Adolescent Mental Health Services (CAMHS). All children had a background of severe abuse and neglect leading to disruption of early care. 18 out of 21 for whom information was available had been in adoptive placements or in foster care. The mean number of placement changes was 2 (SD=0.8, range 1-4). The length of exposure of abuse was 24.8 months (SD=26.5; available on 16 participants; Table 1).

This index case group was matched on verbal IQ and age to 50 children who had been previously assessed in the GOSH Social Communication Disorder service, which specialised in the evaluation of

suspected high-functioning autism; all had received a diagnosis of ASD. Participants in the ASD comparison group attended mainstream schools and had fluent language skills; all were living with their birth families. No child was included in the ASD sample if there was evidence of prior abuse or neglect.

Measures and procedures

We assessed cognitive skills in both groups. Intelligence quotient (IQ) was assessed using the Wechsler Intelligence Scales for Children (WISC-IV, Wechsler 2003) from which scores for performance IQ, and verbal IQ were derived.

Assessment of autistic traits was based on a combination of parental interview and observation of the child's behaviour. The Developmental, Dimensional and Diagnostic Interview (3Di) is a validated parent report interview designed for the assessment of ASD and related psychopathology(16). It covers developmental history and a range of past and current symptoms. A subset of 122 questions is used to provide dimensional scores for social reciprocity, social communication and repetitive, stereotyped behaviour that emulate algorithms used by the Autism Diagnostic Interview-Revised(17). The test-retest and interrater reliability of the 3Di's ASD algorithm is strong, with all intraclass correlations in the psychometric evaluation study exceeding 0.85(16). In terms of criterion validity, the 3Di shows excellent agreement with clinician ASD diagnosis (sensitivity=1; specificity=0.97). ASD diagnosis was based on information from the 3Di, plus structured reports from the child's school or nursery and direct observation of the child in clinic, which was performed using the Autism Diagnostic Observation Schedule (ADOS) (18). The Autism Diagnostic Observation Schedule (ADOS) was administered by trained psychologists and allied health specialists working as part of the SCDC team. The ADOS is a semi-structured instrument that measures the observed behaviour of children for possible ASD, and two currently available and validated versions were used (ADOS and ADOS-2). The assessment uses four modules that look at the domains of play, imagination, social interaction and communication. There are four modules that can be used based on a child's level and each takes approximately 30 minutes to

complete (18). There is a total score at the completion of the modules, and these are based on the individual scores of the social and communication domains, and the sum of the play and imagination domains. There are two thresholds, one for significant autism traits (autism spectrum), and a higher threshold for an autism diagnosis.

We obtained information about associated emotional and behavioural problems from the Strengths and Difficulties Questionnaire (SDQ). The SDQ comprises 25 items in five subscales: conduct problems, emotional problems, hyperactivity, peer problems and prosocial behaviour (19). Rated by parents and by teachers, it has acceptable reliability and validity when assessing adaptation and psychopathology in children and adolescents both as a screening instrument (20) and as a dimensional measure for quantifying the degree of an individual's strengths and difficulties (21). The SDQ provides a valid measure of psychopathology in autistic populations (22). The SDQ emotional problems scale comprises items measuring anxiety, low mood and somatising. The SDQ hyperactivity scale measures ADHD symptomatology, comprising items on inattention, hyperactivity and impulsivity.

Data Analysis

The Maltreatment group and ASD group characteristics and autism assessment scores were compared using independent t-tests. When the assumption of homogeneity of variance was inapplicable Welch's t-test statistics were reported. Where data was missing due to incomplete historical records, missing data was treated as missing completely at random.

Ethics

The study was approved by and was reviewed by NRES Committee East of England – Norfolk (11/EE/0372).

Results

Descriptive characteristics

In total, this study recruited 46 formerly maltreated children between 3.0 and 16.0 years of age and compared them with a matched sample of 47 children between 4.0 and 16.0 years who had been previously assessed by the National Centre for High Functioning Autism at Great Ormond Street Hospital for Children NHS Trust. Characteristics of the participants are provided in Table 1.

There was no significant difference between the formerly maltreated children and the comparisons with ASD in terms of their mean age or verbal IQ, but those with an ASD had significantly higher non-verbal IQs than the formerly maltreated group. There was a statistically significant difference in the verbal-performance IQ discrepancy between the groups; this is explained largely by the relatively lower verbal than non-verbal IQ in the sample with ASD.

In Table 1 we describe comparisons in terms of their SDQ scores, as recorded by both parents and teachers. In both samples, the Total Difficulties scores are very high in comparison to SDQ norms, which rate scores of 16-18 as high and 19-40 as very high. Scores over 16 are found in only 10% of children in the general population and scores over 19 in 5% (<https://www.sdqinfo.org/>). Strikingly, the only statistically significant differences in terms of emotional and behavioural adjustment between the groups were that symptoms of conduct disorder were more frequently reported in the Maltreatment group, and teachers reported less prosocial behaviour in the ASD group.

Clinical diagnoses of an Autism Spectrum Disorder were assigned on the basis of data gathered in the course of the structured interview and observations. Scores on the 3di and the ADOS were considered when making diagnostic decisions but were not the only factors. Overall, clinical diagnoses of an ASD were made in 69% of those presenting with a history of maltreatment. In the maltreatment group 8 out of 10 girls met criteria for ASD compared to 23 out of 36 boys. In Table 2 we summarise the scores

obtained by both groups based upon the ADI-R algorithm (17) and the ADOS. There were significant differences in terms of the degree to which each group showed autistic traits. Those with early maltreatment had overall significantly lower scores in terms of all three domains of autistic behaviour as defined by ICD-10 (23). However, it is evident from Table 2 that there is a considerable overlap between the two groups, and that the proportions above the clinically significant threshold in each were not dissimilar.

Figure 1 summarises the distributions of scores on the three key dimensions of scores generated by the diagnostic interview. There is a clear tendency for their scores in the domain of repetitive and stereotyped behaviours to be lower than in children with idiopathic ASD. By definition, to obtain a formal autism diagnosis, there should be a significant number of symptoms in this domain. In order to evaluate possible qualitative differences in the domains of reciprocal social interaction and social communication, we examined the ADOS scores in greater detail.

The results presented in Table 3 were derived from the ADOS subscale scores and are presented in this way because total scores vary according to the module of the ADOS employed. They reveal that there were subtle differences in the interaction styles of the two groups. Children who had experienced early maltreatment were significantly less impaired than those with idiopathic ASD in terms of their reciprocity and communication skills in social interaction, but they did not outperform those with idiopathic ASD in terms of creative and imaginative abilities. Repetitive and stereotyped behaviours are sometimes observed during administration of the ADOS although they do not contribute to the total score; however, they were less often recorded in the assessments of children with early maltreatment.

Discussion

Previous research has not drawn a clear distinction between the symptom patterns of children with idiopathic autism and the 'quasi-autistic' behaviours observed in formerly maltreated children. A history of early maltreatment can lead to Disinhibited Social Engagement Disorder or Reactive Attachment

Disorder, but both conditions are exclusion criteria for ASD, according to DSM-5 criteria. Reactive Attachment Disorders are characterised by consistent patterns of social withdrawal and emotional inhibition, with lack of positive affect and episodes of fearfulness or irritability that are unexplained by current circumstances, symptoms that are similar to those of some children with idiopathic ASD. In contrast, Disinhibited Social Engagement Disorder is less likely to be confused with ASD; children are characteristically disinhibited in their social approaches to strangers, seemingly failing to differentiate them appropriately from caregivers. On the other hand, in severely neglected formerly institutionalised children, patterns of quasi-autistic behavior have been observed. It has often been assumed that the conditions of early deprivation are responsible (24), but some have claimed (25) that the maltreatment is not causally related to emerging symptoms of 'quasi-autism' because the latter are indistinguishable from idiopathic autism spectrum disorders. Consequently, they are more likely to reflect inherited characteristics. Without detailed knowledge of the mental health of the birth parents of such children, and the reasons for their abandonment or maltreatment, the possibility that an inherited predisposition exists cannot be ruled out.

Ours is the first study of formerly maltreated non-institutionalised children to have made a formal comparison with a matched sample of children with idiopathic autism. Using standardized assessment procedures, we found the symptom profiles in the two groups were remarkably similar, both in terms of autistic characteristics (with the exception of repetitive and stereotyped behaviours) and in terms of associated mental health problems, including emotional and behavioural adjustment. A strength of the methodology we used was our comparison of teacher and parent accounts of a child's current mental health status using the same instrument (SDQ). Somewhat surprisingly, this analysis showed similar patterns of abnormality in both groups. Whilst the finding of impairment in domains of behaviour unrelated directly to ASD is well recognised in formerly maltreated children, the fact that children with idiopathic ASD and normal range IQ have similar emotional and behavioural problems was not previously documented.

Our findings suggest that different aetiologies, on the one hand environmental risk (early maltreatment) and on the other genetic risk, can result in similar behavioural features, although it is important to recognise that we do not know whether those maltreated children were at genetic risk for autism. It is possible that their parents were carriers of autistic traits, but no formal evaluation was made of parental mental health in either group.

Children who had been maltreated had significantly lower non-verbal IQ than those with idiopathic autism. Current evidence suggests that maltreatment does not lead to an uneven pattern of cognitive development (26), so the clinical significance of the finding is uncertain. There is evidence that the profile of autistic symptomatology in idiopathic cases may distinguish high-functioning boys and girls. We do not know whether this is true for maltreated children with 'quasi-autism' because the low number of girls in our sample precludes firm conclusions.

Limitations include the fact that referrals in both samples were to specialist services at a national children's hospital, motivated by concerns about clinical complexity, and this must limit the generalisability of our findings. The sample of children with a history of early maltreatment was referred because there were identified problems with their social communication, and the possibility of an underlying autism spectrum disorder had been suspected. At this stage, we have not compared the two samples on individual symptom clusters, which might reveal patterns of greater differentiation. Data presented here on clinical evaluation is based on algorithms for the diagnosis of autism that are DSM-IV-TR rather than DSM-5 compatible. A strength of the study is that the early maltreatment group were consecutive referrals, assessed contemporaneously with the idiopathic ASD group, using identical measures, and matched closely on age and verbal IQ.

Conclusion

Children of normal range IQ with a history of early maltreatment, who are showing social communication difficulties of an autistic character, are virtually indistinguishable from those with idiopathic autism in terms of their limited social reciprocity and the social use of language. Repetitive and stereotyped behaviours are less severe, relative to their degree of social communication impairment. Associated emotional and behavioural problems are prominent but are no more severe than in children with idiopathic ASD who did not have a history of maltreatment.

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Contributors

DHS and MDJ conceived the project. LBW & MM acquired and interpreted the data in this study. JW and WM performed the data analysis. DHS, MDJ, LBW, MM, JW and WM assisted with study design, supervised data collection and revised the article. All authors contributed equally to the manuscript.

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Competing interests

None declared

Patient consent for publication

Not required

Data availability statement

Anonymised data are available upon reasonable request.

Ethics Approval

The study was approved by and was reviewed by NRES Committee East of England – Norfolk (11/EE/0372).

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Tables

Table 1

Comparison of demographics, maltreatment history and assessment outcomes between maltreated children and children with idiopathic Autism Spectrum Disorders

¹n=18, ²n=13, ³n=35, ⁴n=12

Variable	Maltreatment (n=46)	ASD (n=47)	Significance
Maltreatment			
Physical and/or emotional neglect	88.90% ¹		
History of emotional abuse	38.5% ²		
History of physical abuse	22.9% ³		
History of sexual abuse	71.4% ³		
Domestic violence	58.3% ⁴		
Demographics			
	(n=46)	(n=47)	
Sex (% males)	78.30%	91.50%	.07
Age in years, Mean (SD)	10.6 (3.3)	10.4 (2.9)	.33
Age (range)	3.0-16.0	4.3-15.9	
IQ			
	(n=44)	(n=45)	
WISC Verbal IQ, Mean (SD)	92.0 (15.7)	91.6 (17.1)	.92
WISC Performance IQ, Mean (SD)	87.6 (15.4)	98.5 (19.9)	.005
Parent SDQ			
	(n=33)	(n=41)	

Total Difficulties Score	23.9 (6.7)	22.3 (7.5)	.34
Emotional	5.4 (2.6)	5.2(2.5)	.74
Conduct	5.9 (2.4)	3.8 (2.8)	.001
Hyperactivity	7.4 (2.2)	7.0(2.8)	.45
Peer relations	5.1(3.0)	5.1(2.1)	.95
Prosocial	4.8(2.3)	5.2(2.3)	.52
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Teacher SDQ	(n=32)	(n=43)	
<hr/>			
Total Difficulties Score	9.2 (7.1)	19.0(7.3)	.48
Emotional	3.6(2.8)	3.8(2.4)	.84
Conduct	4.3(2.4)	3.7(2.9)	.3
Hyperactivity	71.(2.4)	6.3(2.8)	.17
Peer relations	4.7(2.7)	4.7(2.6)	.92
Prosocial	4.7(2.3)	3.4(2.5)	.03
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Table 2

Comparison of autism traits based on caregiver report and direct observations

	Threshold for clinical significance	Maltreatment group	ASD group	Cohen's d	Significance
		n=43	N=46		
ADI algorithm scores (interviews)					
Social Reciprocity	12				
Mean		12.3	15.4	.70	.001
SD		4.9	4.0		
Range		3.0 to 23.3	7.5 to 23.0		
Proportion above clinical threshold		65.1%	91.3%		.002
Social Communication	8				
Mean		11.3	13.5	.55	.012
SD		4.2	3.6		
Range		2.5 to 18.0	5.7 to 19.8		
Proportion above clinical threshold		74.4%	93.5%		.014

Repetitive and Stereotyped Behaviour	3				
Mean		2.4	4.8	1.06	p<.001
SD		2.0	2.4		
Range		0 to 9.5	0 to 10.4		
Proportion above clinical threshold		27.9%	74.5%		p<.001
ADOS scores (observation)					
Total social and communication score					
Mean		8.7	10.8	.45	.04
SD		5.0	4.1		
Range		0 to 20	3 to 21		
Repetitive and Stereotyped Behaviour score					
Mean		1.3	2.0	.43	.04
SD		1.5	1.7		
Range		0 to 5	0 to 6		
% reaching threshold for ASD		60%	83%		
% reaching threshold for ASD spectrum		8.9%	6.4%		

Table 3

Autism Observation Schedule scores, comparison between children with history of maltreatment and Autism Spectrum Disorder: % total possible score on subscales

n=45

ADOS subscale	ASD	Maltreatment	p	Effect size
	N=47	N=46		Cohen's d
	M(SD)	M(SD)		
Communication	38.4 (22.0)	31.4 (21.2) #	.12	.32
Reciprocal social interaction	54.9 (19.4)	43.9 (25.4)	.02	.48
Social affect	48.8 (18.8)	39.4 (22.7)	.03	.45
Imagination	43.3 (33.0) #	35.6 (36.3) #	.29	.22
Repetitive and Stereotyped Behaviour	25.0 (21.6)	15.8 (19.0) #	.03	.45
Total	42.6 (14.8)	33.2 (19.0)	.01	.55