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Discrimination between attention deficit hyperactivity disorder and reactive attachment disorder in school aged children

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ABSTRACT

We aimed to determine whether it is possible to discriminate between children with attention deficit hyperactivity disorder (ADHD) and children with reactive attachment disorder (RAD) using standardized assessment tools for RAD. The study involved 107 children: 38 with a diagnosis of RAD and 30 with ADHD were recruited through community child and adolescent mental health services (CAMHS) and specialist ADHD clinics. In addition, 39 typically developing children were recruited through family practice. Clinicians were trained to use a standardized assessment package for RAD using a DVD with brief follow-up support. Discriminant function analysis was used to identify the items in the standardized assessment package that best discriminated between children with ADHD and children with RAD. Clinicians' ratings of RAD symptoms were reliable, particularly when focusing on eight core DSM-IV symptoms of RAD. Certain parent-report symptoms were highly discriminatory between children with ADHD and children with RAD. These symptoms included "cuddliness with strangers" and "comfort-seeking with strangers". A semi-structured interview with parents, observation of the child in the waiting room and teacher report of RAD symptoms aided diagnostic discrimination between the groups. Clinical diagnosis of RAD can be made reliably by clinicians, especially when focusing on eight core RAD symptoms. Clear discrimination can be made between children with RAD and children with ADHD.

1. Introduction

Attention deficit hyperactivity disorder (ADHD) is a multifactorial disorder that can be associated with significant disability (Ford, Fowler, Langley, Whittinger, & Thapar, 2008). Although ADHD is more common in children who have experienced environmental adversity, it is not thought to be caused by maltreatment in most instances (Kreppner, O'Connor, & Rutter, 2001) but has strong heritability (Langley et al., 2009). However, it shares some symptoms with reactive attachment disorder (RAD) – a syndrome thought to be caused by maltreatment (AACAP, 2005). It is essential that clinicians

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can discriminate between these syndromes so that children with ADHD are not falsely assumed to have been maltreated, and because treatment approaches may differ considerably.

We aimed to determine whether it is possible to discriminate between ADHD and RAD in school aged children. We consider it particularly important to make a clear differential diagnosis for maltreated children, because ADHD has effective and well evidence treatments (Barkley et al., 2002; MTA Cooperative Group, 1999) whereas RAD, as yet, does not. Certain symptoms of RAD are difficult to discriminate from other disorders, especially those which lie in the domain of ADHD. For example, social disinhibition, inattention and over activity have been described in both RAD and ADHD (American Psychiatric Association, 2000). Early neglect and multiple care experiences can be associated with both diagnoses (Cicchetti & Toth, 1995; Kreppner et al., 2001; Teicher et al., 2003).

As would be expected with a disorder that has been relatively newly described in the literature, the emphasis of research in RAD has been on the cause, effect and course (Minnis, Reekie, & Young, 2007; Rutter, Colvert, & Kreppner, 2007). There is little research on the relationship between RAD and other psychiatric disorders of childhood, however the question of comorbidity and symptom crossover is important for clinicians in practice as it can be challenging making a diagnosis of RAD or ADHD when working with children presenting with similar sets of clinical problems and environmental circumstances (Byrne, 2003; Hill & Cameron, 1999). It is important that clinicians have the necessary tools for this purpose.

ICD-10 and DSM-IV both have categories to classify RAD and have described two subtypes associated with maltreatment, neglect or abuse: an inhibited type in which children are withdrawn and fearful, and a disinhibited type in which children are indiscriminately friendly (American Psychiatric Association, 2000; World Health Organisation, 2007). The disinhibited type may attract the new name in DSM-V (Disinhibited Social Engagement Disorder) to reflect the realization that RAD may not, in fact, be a disorder of attachment but may be a neurodevelopmental disorder associated with problems in social relatedness (Green, 2003).

1.1. What do we know about the diagnostic boundaries and course of RAD?

The main focus of RAD research has centered on institutionalised children (Tizard & Hodges, 1978; Zeanah, Smyke, Koga, & Carlson, 2005) or on adopted children who have previously lived in institutions (Byrne, 2003; Lieberman, 2003; Richters & Volkmar, 1994). However, RAD is also found in other groups of children who have experienced early 'pathogenic care' (Hanson & Spratt, 2000) e.g. those maltreated as a consequence of being cared for by parents who have drug or alcohol problems, mental health problems or who have experienced multiple caregivers as a consequence of maltreatment (AACAP Official Action, 2005). Symptom stability in RAD has been observed in a number of studies (Fisher, Ames, Chisolm, & Savoie, 1997; Rutter et al., 2007; Zeanah, Smyke, & Dumitrescu, 2002) and it is now claimed that RAD is a unique identifiable disorder (Rutter, Kreppner, & Sonuga-Barke, 2009) associated with significant neurodevelopmental complexity and disability (Minnis, Green, & O'Connor, 2009).

1.2. What do we know about diagnostic boundaries and course in ADHD?

ADHD is a common disorder of childhood and adolescence characterized by poor concentration, overactivity and impulsive behaviour (World Health Organisation, 2007) with a variety of psychological, biological and environmental etiological factors (Mill & Petronis, 2008; Roy, Rutter, & Pickles, 2004). The core symptoms of ADHD have been observed in children who have experienced severe early neglect, maltreatment or multiple care experiences (Kreppner et al., 2001), and there appears to be a dose–response relationship between the degree of maltreatment and symptom severity in these very disadvantaged groups (Taylor & Warner, 2005). Compared to children with ADHD who have *not* experienced severe early maltreatment, the maltreated group may be more neuropsychologically impaired, although core symptoms of ADHD are similar (Sonuga-Barke & Rubia, 2002). While there is the possibility of recovery following severe maltreatment there is the potential for long lasting developmental abnormalities that are not necessarily associated with the severity of neglect: Ouyang et al., in an examination of the 14 322 participants in the National Longitudinal Study of Adolescent Health, found that ADHD symptoms, especially the inattentive type, were associated with self-reported child maltreatment (Ouyang, Fang, Mercy, Perou, & Grosse, 2008). Roy et al. (2004) suggest three possible explanations for the association between ADHD symptoms and early care experiences: genetically mediated parental psychopathology; a specific effect of adverse parental care, or other associated psychosocial adversities. The mechanisms through which abuse and neglect might lead to developmental deficits and dysfunction might include an inability to learn self-regulation, through hormonal changes in response to a stressful early environment, or even through changes in the anatomy of the brain (Glaser, 2000).

ADHD without co-morbid psychiatric disorders or other complicating factors is thought to be rare and comorbidity common (Biederman, Monueaux, Kendrick, Klein, & Faraore, 2005; Kadesjo & Gillberg, 2001). Recent research (Minnis et al., 2009) suggested a high degree of comorbidity between ADHD and RAD. This body of work relating to RAD, ADHD, maltreatment, comorbidity and diagnostic overlap in clinical practice led us to question whether a standardised assessment package could be used in real world clinical settings to help with diagnostic clarity in school-age children. This is the first study that we know of in which this has been done.

2. Method

Approval for the study was granted by an NHS Research Ethics Committee and Research and Development Management Committee.

2.1. Participants

The sample consisted of 3 groups of participants: two of the groups (38 children with RAD and 39 typically developing comparison children) had already been recruited from a previous study (Minnis et al., 2009). In addition 55 children and their families were approached by their CAMHS clinicians for this study; 44 children from two specialist ADHD clinics and 11 from three CAMHS clinics. Five families (11%) who were approached about the study through these clinics declined to take part. Data for 3 of the children was discarded because 2 were outwith the age-range and in the other case there was a technical difficulty with the audio file. This left a sample of 47 children.

Thirty-eight children with RAD aged 5–8 years and 39 comparison children unlikely to have RAD, group matched on age and gender, had been recruited in a previous study. For more details see Minnis et al. (2009), but in brief, 47 children with presumed RAD were referred by CAMHS clinicians or specialist social workers and 38 of these were deemed to have the diagnosis after a detailed assessment and checking of the diagnosis by a panel of experts. A comparison group of 39 children group matched on age and gender with the RAD group, was recruited through a local family practice after exclusion criteria based on factors previously shown to be associated with a diagnosis of RAD were applied (Minnis et al., 2009).

Although inhibited and disinhibited RAD are considered to be separate disorders with differing aetiology, a mixed profile is common (Minnis et al., 2009). All but one of the children in our sample fulfilled criteria for the Disinhibited form, although many of these children also had inhibited symptoms such as frozen watchfulness or hypervigilance. There is no theoretical reason why Inhibited RAD should share symptoms with ADHD, but because our sample had an overwhelmingly mixed profile of disinhibited and inhibited RAD symptoms, we did not attempted to achieve a sample of "pure" disinhibited RAD as we suspect these children would be hard to find in CAMHS practice.

2.2. Materials

In addition to their routine clinical assessment, families took part in an assessment for RAD which included a 30-item semi structured interview with parents (the CAPA-RAD), a structured Waiting Room Observation (WRO) completed by a clinician (McLaughlin, Espie, & Minnis, 2010), a Relationship Problems Questionnaire (RPQ) (a 10 item questionnaire for RAD symptoms with good validity and reliability data) completed by parents and teachers (Minnis et al., 2007). Diagnoses were made based on ICD-10 criteria.

2.3. Training and reliability

Prior to coding the clinicians' interviews, two researchers were trained in rating the CAPA-RAD by watching the DVD, comparing and then discussing their coding of 4 CAPA-RAD interviews with two expert coders (HM and MF). After training, their inter-rater reliability with the expert coders was over 90%. The two expert raters checked the researchers' rating on an approximately monthly basis to minimise drift in rating. Clinicians were trained in the use of the CAPA-RAD with a training manual, DVD and supplementary discussions with the research team if requested.

2.4. Procedure

Families of children aged 5–12 referred to the specialist ADHD and community CAMHS clinics were sent consent and information leaflets about the research prior to their first visit. They were then given the opportunity to ask questions about the study and to give verbal consent by telephone prior to their first visit. Written consent, for those who decided to participate, was obtained on arrival at the clinic.

In each of the specialist ADHD clinics, ADHD was diagnosed following a multi-disciplinary team assessment using clinical interview, school report, validated questionnaires and interview with the child. In each case the assessment for RAD was made in addition to the standard clinical interview. The WRO, a structured observation (of 5–15 min) was carried out at the family's first visit to the clinic. While in the waiting room the parent or carer was asked to complete an RPQ which provided a distraction for the parent and allowed the child to interact with the strangers in the waiting room. For 21% of families the WRO was rated independently by two observers (a clinician and a researcher) to provide data on inter-rater reliability. The CAPA-RAD was completed by the clinician in an interview with the parent or carer and each interview was audio taped so that it could be independently rated by both the clinician and the research team. Once the clinical assessment was completed, the clinicians assigned an ICD-10 code to the patient, blind to any diagnostic information from the research team. If consent was given by the family, the child's teacher was also sent an RPQ.

2.5. Statistical analysis

A priori power calculations suggested that 33 children in each group would be sufficient to detect a clinically meaningful difference of 30%, with 90% power at the 5% level, in CAPA-RAD score between the groups. Agreement between clinicians and researchers on scores for individual CAPA-RAD and WRO items and for diagnosis were calculated using Kappa statistics and for total and subscale scores using limits of agreement (Bland & Altman, 1986), to demonstrate whether or not agreement was clinically acceptable. Comparisons of numerical variables between the three groups were done using ANOVA.

Table 1
Characteristics of participants.

	RAD ($n = 38$)	ADHD ($n = 30$)	Typically developing ($n = 39$)
Mean age (SD)	6.57 (1.19)	7.60 (1.92)	6.44 (1.07)
Gender (%males)	66%	90%	67%
% with risk factors (parental drug, alcohol use, mental health problems, disrupted early care or substitute care)	100%	53%	0%

Discrimination of CAPA-RAD items between children with ADHD and children with RAD was explored using chi-squared or Fisher's exact test, and discriminant function analysis. All analyses were done using SPSS (version 17).

3. Results

Characteristics of the participating children are described in Table 1. Of the 47 clinic children, 30 had a diagnosis of ADHD and more than half of these (53%) had risk factors for RAD (e.g. parental drug, alcohol use, parental mental health problems, disrupted early care or substitute care).

3.1. Reliability between clinicians and researchers-based on audio recordings of interviews with parents of all 47 clinic children

The clinicians' scoring on the total CAPA-RAD was 5.04 points higher than the researchers' scoring with limits of agreement of 3.68–6.41. This is 7.8% (5.7–10%) of the total possible score on the CAPA-RAD (total possible score 64).

Using a restricted set of items core to a DSM-IV diagnosis of Disinhibited RAD (Does s/he preferentially seek comfort from strangers over those s/he is close to? Is s/he overly friendly with strangers? If you are in a new place, does X tend to wander away from you? How cuddly is s/he with people s/he does not know well? Does s/he ask very personal questions of strangers?) – see Appendix A – the clinicians' scoring of the CAPA-RAD was approximately 0.5 points higher than the researchers' (mean difference = 0.51: 0.88–0.93). This is 0.7% of the total possible score on the CAPA-RAD (64) and 4.3% of the total possible score for Disinhibited RAD items (total possible score 12).

Using a set of items restricted to those items core to a DSM-IV diagnosis of Inhibited RAD (Does s/he often stand or sit as if frozen? Is s/he a jumpy (wary or watchful) child? When you have been separated for a while (e.g. after an overnight apart), is it difficult to tell whether s/he will be friendly or unfriendly?) the clinicians' scoring of the CAPA-RAD was the same as the researchers' (mean difference = 0.00, −0.24 to 0.24).

The clinicians' scoring of the total WRO score was almost identical to that of the researchers (.23 points lower) with limits of agreement of 0–.46.

3.2. Discrimination between RAD and ADHD

For the purposes of examining discrimination between RAD and ADHD, we initially considered two subgroups of participants: children with a primary diagnosis of RAD and no comorbid ADHD – the "pure RAD group" ($n = 20$) – and children with a primary diagnosis of ADHD who have no history of early maltreatment – the "pure ADHD" group ($n = 14$). As can be seen in Table 2, four symptoms (*cuddliness with strangers; comfort-seeking from strangers, unpredictable reunion responses and frozen watchfulness*) appeared to discriminate completely between RAD, although only *cuddliness with strangers*

Table 2
Discrimination between RAD and ADHD on core DSM-IV symptoms of RAD. Comparison of pure RAD[a] ($n = 20$) and [b]pure ADHD ($n = 13$) cases.

Item	Discriminant function	Mean score for pure RAD cases	Mean score for pure ADHD cases	t and p value
Waiting room observation total score	.568	7.67 (4.63)	3.86 (3.03)	2.66; $p = .012$
		Percentage of pure RAD cases with symptom present	Percentage of pure ADHD cases with symptom present	Chi^2 and p value
Cuddliness with strangers	.575	40	0	Fisher's exact $p = .029$
Comfort seeking with strangers	.454	30	0	Fisher's exact $p = .060$
Indiscriminate adult relationships	.371	55	17	Fisher's exact $p = .062$
Unpredictable reunion responses	.287	15	0	Fisher's exact $p = .274$
Personal questions	.178	45	36	Fisher's exact $p = .718$
Frozen watchfulness	.156	5	0	Fisher's exact $p = 1$
Minimal checking in unfamiliar setting	−.060	65	58	$Chi^2 = .142$ $p = .706$
Hypervigilance	.000	10	10	$Chi^2 = 0$ $p = 1$

[a] Pure RAD = children with a diagnosis of RAD and no diagnosis of ADHD.
[b] Pure ADHD = children with a diagnosis of ADHD and no risk factors.

Table 3
Discrimination between RAD and combined ADHD on core DSM-IV symptoms of RAD. Comparison of pure RAD[a] ($n = 20$) and [b]combined ADHD ($n = 30$) cases.

Item	Discriminant function	Mean score for pure RAD cases	Mean score for combined ADHD cases	t and p value
Waiting room observation total score	.684	7.67 (4.63)	2.81 (2.10)	$p < .001$
		Percentage of pure RAD cases with symptom present	Percentage of combined ADHD cases with symptom present	Chi^2 and p value
Cuddliness with strangers	.616	40	9.5	Fisher's exact $p = .032$
Comfort seeking with strangers	.356	30	4	Fisher's exact $p = .034$
Unpredictable reunion responses	.308	15	8.7	Fisher's exact $p = .650$
Personal questions	.127	45	40	$Chi^2 = .102$ $p = .750$
Indiscriminate adult relationships	.119	55	44	$Chi^2 = .538$ $p = .460$
Hypervigilance	−.022	10	8.7	Fisher's exact $p = 1$
Frozen watchfulness	−.060	5	4	Fisher's exact $p = 1$
Minimal checking in unfamiliar setting	.000	65	65.2	$Chi^2 = 0$ $p = .990$

[a] Pure RAD = children with a diagnosis of RAD and no diagnosis of ADHD.
[b] Combined ADHD = children with a diagnosis of ADHD with or without risk factors.

Table 4
Discrimination between RAD and ADHD on waiting room observations of RAD behaviors. Comparison of pure RAD[a] ($n = 20$) and [b]combined ADHD ($n = 30$) cases.

Item	Discriminant function
Leaves carer's orbit without permission	.460
Takes or plays with object/equipment other children would know belongs to someone else	.375
Appears superficially charming	.375
Displays insatiable demand for attention	.345
Moves towards stranger(s)	.336
Initiates conversation with a stranger(s) as if previously familiar	.333
Makes spontaneous comments to carer in presence of stranger(s)	.303
Interrupts conversation between stranger(s) and carer	.233
Makes physical contact with stranger(s)	.210
Looks at stranger(s) as if to invite conversation	.184

[a] Pure RAD = children with a diagnosis of RAD and no diagnosis of ADHD.
[b] Combined ADHD = children with a diagnosis of ADHD (whether or not has risk factors).

was statistically significant. In addition the discrimination between the groups for *indiscriminate friendliness* approached significance but was not complete. When a discriminant function analysis of individual WRO and individual CAPA-RAD items was performed (not shown), the WRO items were *individually* less discriminating than any of the individual CAPA-RAD items, however when the *total* WRO score was entered into the discriminant function analysis along with individual CAPA-RAD items, it was the most discriminating aspect of the assessment. The relative discrimination of individual WRO items is presented in Table 3. When the total score on the Teacher RPQ was added to the discriminant function analysis, it appeared to play a useful role in discriminating between RAD and ADHD, however we have not presented these results as they were based on small numbers ($n = 12$) and should therefore be regarded as preliminary.

We repeated this analysis comparing "pure" RAD ($n = 20$) and the entire ADHD group, including both children with ADHD and RAD risk factors (such as history of substitute care) and those without ($n = 30$), and the results were very similar. Indiscriminate friendliness did not significantly discriminate between the groups (Table 4).

4. Discussion

There is now a recognition that there is a great deal of overlap between child psychiatric diagnostic categories (Angold & Costello, 2009). However, our findings suggest that clinicians can reliably discriminate between ADHD and RAD using our measures and we found significant differences between these groups on observed behaviors in the waiting room and parent report of cuddliness with strangers.

4.1. Diagnosing RAD

As with any psychiatric disorder of childhood the need for diagnosis to be based on multiple informants is supported by our findings which suggested that the combination of parental report, teacher questionnaires and clinician observation gave the most clinically useful picture of the child. Our results support the use of semi-structured and structured assessment tools to make clinical diagnoses of RAD. We found that there was good reliability in the application of these assessment tools in clinical practice following limited training. This reliability was especially good for the eight core RAD questions (see

Appendix A). It may be possible that these are the core questions that should be used to make a diagnosis of RAD in clinical practice and this warrants further validation.

Most research on RAD has been with infants and less is known about the age-group most often seen in child and adolescent mental health clinics namely school-age children. In our study, disinhibited symptoms were the most reliable and discriminating, but this may have been a function of the fact that there was only one child in the sample with a purely inhibited profile. It is now claimed that disinhibited RAD is a recognisable psychiatric diagnosis (Rutter et al., 2009). The Inhibited symptom cluster was less discriminating and less is known about the extent to which inhibited RAD can be discriminated from other diagnoses such as Post Traumatic Stress Disorder (Prior & Glaser, 2006).

4.2. ADHD vs. RAD

As has been found in other studies (Taylor & Warner, 2005), many children referred with symptoms of ADHD in our sample had life experiences which indicated neglect, abuse or maltreatment in their early years, but their presentation could still be discriminated from that of the children with RAD.

Disinhibition is reported in diagnostic manuals as a symptom of ADHD (World Health Organisation, 2007) but the nature and function of overfriendliness may differ in each disorder. Our qualitative research suggests that indiscriminate friendliness in RAD may be an attempt by the child to win the approval of the adult they perceive to be most important or to control a situation they perceive as unpredictable (Bennet, Espie, Barbara, & Minnis, 2009). In ADHD, indiscriminate friendliness may simply be a function of impulsivity (World Health Organisation, 2007).

4.3. Limitations

Our study is limited by potential bias in the recruitment of participants who were recruited from various different clinics with varying levels of specialization. Our numbers are relatively small, particularly for subgroup analysis, and may not be representative of the general population of children with these disorders. However, the gender of our clinical samples appears to be fairly typical of those in other studies: e.g. there was a high proportion of boys in all clinical groups. This is unsurprising for the ADHD group as prevalence is known to be greater in boys, particularly in the age group we focused on in this study (Kadesjo & Gillberg, 2001). Prevalence, and gender balance, is still unknown in this age-group for RAD although we are currently conducting research to establish this. It will important, therefore, to replicate these findings with larger samples and within a general population framework.

While all RAD diagnoses in this study were made using the same standardised assessment package, our ADHD diagnoses were made using different assessment tools in the various clinics, although diagnoses were always made using observation, parent and teacher report and by an experienced multidisciplinary clinical team.

4.4. Conclusions and clinical implications

Our findings strengthen our understanding about the importance of environmental risk factors for neglect, abuse or maltreatment in ADHD. Despite this, our results suggest that it is still possible for clinicians to discriminate the core disorder of ADHD from RAD even where these factors exist. Complexity of psychiatric presentation is common and it is therefore important that clinicians are able to both identify treatable disorders and also develop a holistic understanding of the child's strengths and difficulties to inform management in a range of contexts.

We would suggest that it may be clinically useful to use the eight core questions about RAD (see Appendix A), in addition to holistic clinical assessment, to aid differential diagnosis between RAD and ADHD in clinical practice as these have proved to be both reliable and discriminating.

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Appendix A. "Core" DSM-IV items from CAPA-RAD.

N.B. Not all children with RAD will have all of these symptoms. For more information on the clinical use of the CAPA-RAD and WRO or copies of training DVD, please contact corresponding author.Disinhibited items Does s/he preferentially seek comfort from strangers over those s/he is close to? Is s/he overly friendly with strangers? If you are in a new place, does X tend to wander away from you? How cuddly is s/he with people s/he does not know well? Does s/he ask very personal questions of strangers?Inhibited items Does s/he often stand or sit as if frozen? Is s/he a jumpy child?/Is s/he wary or watchful even in the

absence of literal threat? When you have been separated for a while (e.g. after an overnight apart), is it difficult to tell whether s/he will be friendly or unfriendly?)

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