Article

It is time for a more integrated bio-psycho-social approach to ADHD

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Abstract

The role of psychosocial factors in perpetuating and predisposing towards the development of attention deficit hyperactivity disorder (ADHD) symptoms has been neglected within the field of child mental health. Clinicians, when told that a child had a diagnosis of ADHD, have been found to underestimate the presence of psychosocial factors, and are less likely to ask about the possibility of neglect or abuse. This article details the considerable research showing links between ADHD symptoms and parental mental illness, child maltreatment, post-traumatic stress disorder (PTSD), attachment disorders and other environmental factors. Recent neuro-biological findings showing the impact on brain development of early abuse and attachment concerns are cited. The implications of these findings both for clinicians, and at policy level, are discussed, and the reasons underlying the need for a more integrated Bio-Psycho-Social approach to ADHD are outlined.

Keywords

ADHD, attachment, maltreatment, psychosocial, PTSD

ADHD – a global phenomenon

The past 10–20 years has seen a significant change in how children's difficult or troubling behaviour is framed, explained and managed globally. In the past, such children and adolescents would often be viewed in educational circles as coming under the umbrella term of 'emotional and behavioural disorders', or under the medical model, as 'oppositional defiant disorder or conduct disordered', for which more psychosocial explanations predominated, with the attendant risk of a parental blame culture. More latterly, the pendulum has shifted to prioritize biological aetiologies, with the danger of now neglecting psychosocial factors that may be contributing to children's behaviour. A significant contributory factor to this shift has been the emergence of attention deficit hyperactivity disorder (ADHD) as a global phenomenon, and the rapid associated rise in psychotropic medication use for children and adolescents. Accentuating this has been a tendency

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to oversimplify the inter-relationship between ADHD and conduct disorder, where traditionally conduct disorder has been perceived as more psychosocial and attachment-related, and ADHD as more biological. This, however, belies the complexity inherent in the debates historically as to the validity or not of conduct disorder and hyperkinetic disorder existing as separate disorders, so complex is their inter-relationship and so often have they been found to co-occur (e.g. McArdle, O'Brien, & Kolvin, 1995; Taylor, Everitt, Thorley, Schachar, & Wieselberg, 1986).

Psychosocial factors underestimated in clinicians aware of a hyperkinetic diagnosis

A study of 21 hyperkinetic and 26 conduct disordered children showed that whilst blind raters found a similar frequency of psychosocial adversities in both groups, clinical raters who knew the diagnosis of the children rated adverse psychosocial situations as much lower in hyperkinetic children than in children with conduct disorder. This effect was particularly pronounced in the area of abnormal intrafamilial relationships: lack of warmth in parent–child relationship; hostility or scapegoating of child and intrafamilial discord among adults. Blind raters routinely asked about physical abuse, but clinical raters did not (Overmeyer, Taylor, Blanz, & Schmidt, 1999).

Essentially, being told that a child had a diagnosis of ADHD made clinicians less likely to notice psychosocial issues and family factors impacting on that child, and even to ask about physical abuse. The purpose of this article is to consider why this might be the case, and what might be the potential risks of this approach for children, families and indeed society and policy makers.

There is considerable research available showing links between ADHD symptoms and environmental factors, including attachment disorders, parental mental illness, abuse and PTSD. This correlation is particular evident in those young people with a co-morbid diagnosis of ADHD and conduct disorder. Exploring such complex and interrelating factors may help to understand why there is such a high prevalence of ADHD (and other disorders) amongst groups of looked-after children with recorded rates of 5–7 times that seen in private household children (Meltzer, Gatward, Corbin, Goodman, & Ford, 2002) – a group we know to have experienced high rates of abuse, trauma, losses, attachment deficits and anxiety. Equally, up to 70% of young people attending schools for emotional and behaviourally disturbed children and adolescents have been shown to have ADHD (Cassidy, James, & Wiggs, 2001; Place, Wilson, Martin, & Hulsmeier, 2000). Again this is a group we know to have multi-complex difficulties including their home circumstances, unsettled relationships, difficulties with siblings, experience of traumatic events, substance abuse, sometimes criminal involvement; and chronic emotional challenges where perhaps 25% of pupils in EBD special schools have been, or are, looked after (Cole, Selman, Daniels, & Visser, 2002).

In spite of this, these psycho-social contributory factors to ADHD have been given insufficient attention. The resulting reductionist paradigm of ADHD/Hyperkinetic disorder, which thus predominates, creates a spotlight on a condition within a child (usually a boy), while ignoring what a floodlight would show of his emotional and social environment.

Current dominant view of ADHD

ADHD is traditionally described as a common, highly heritable neurodevelopmental disorder arising in early childhood (e.g. Asherson, Kuntsi, & Taylor, 2005). DSM IV refers to ADHD, whilst ICD10 speaks of Hyperkinetic Disorder. Although both disorders are characterized by pervasive and impairing symptoms of inattention, hyperactivity, and impulsivity that is inappropriate to the

developmental stage, the diagnostic criteria for Hyperactive Disorder (ICD10) essentially describe a group that forms a severe sub-group of the DSM-IV combined subtype of ADHD. Hyperkinetic disorder correlates with prevalence estimates around 1.5% for boys in the primary school years, whilst the prevalence estimates for ADHD in children tends to range from around 4–8% (NICE Guidelines for ADHD, 2009). As Europe has followed the USA's lead in adopting the DSMIV criteria as opposed to ICD10, the boundaries of what is to be construed as a medical disorder needing treatment have been effectively broadened.

Recognition and appropriate treatment of ADHD is deemed of considerable importance, because when untreated and unrecognized, severe hyperactivity, impulsiveness and inattentiveness is said to be predictive of negative outcomes across a range of dimensions including poor self-esteem, academic achievement and occupational status, peer relationships and family functioning and increased rates of accidents, disruptive and anti-social behaviour, mood and anxiety disorders (e.g. Coghill, 2005). Hyperactivity is described as highly heritable with heritability estimates ranging from 0.39 to 0.91 for reported symptoms of ADHD (Thapar, Holmes, Poulton, & Harrington, 1999). Although ADHD is diagnosed using operational criteria to define diagnostic categories, twin studies are said to support the conceptualization of ADHD measures as the extreme of a continuously distributed trait, with genetic risk distributed throughout the population (Asherson et al., 2005; Levy, Hay, McStephen, Wood, & Waldman, 1997).

Current aetiological models have tended to focus largely on biological factors both in terms of genetics, but also the cited environmental influences. Prenatal and perinatal events such as prematurity, low birth weight, pregnancy and/or birth complications and the mother's use of alcohol or tobacco during the pregnancy are acknowledged risk factors; as are neurobiological risks such as closed head trauma and exposure to lead. Dietary factors have also been cited.

From a psychosocial perspective, ADHD has been shown to be a consequence of severe early neglect and institutional rearing (Roy, Rutter, & Pickles, 2000; Rutter, Kreppner, O'Connor, & the English and Romanian Adoptees (ERA) Study Team, 2001). Parenting and family factors such as critical expressed emotion versus expressed warmth, and inconsistent parenting are also recognized as impacting on the course of ADHD and potential risk factors for the development of co-morbid oppositional and conduct disorder (e.g. Taylor, 2006). However, although disruptive and discordant relationships are recognized to be common in the families of the young people with ADHD (e.g. review by Hechtman, 1996), such factors are generally perceived as arising as a consequence of the ADHD symptoms themselves. Parental hostility and criticism are said to reduce in children where ADHD symptoms are successfully treated with stimulants (NICE Guidelines, 2009). Thus whilst the role and value of parenting programmes is recognized, the focus of treatment is largely the individual child or young person.

This is particularly exemplified by the Multimodal Treatment Study of Children with ADHD (MTA): a 14-month, multisite, randomized clinical trial undertaken in the United States (1994–1998) involving 576 boys and girls (aged 7–9 years). Four treatments for ADHD were compared: behavioural treatment (BT), medical management (MM), combined BT and MM, and a community comparison control group. The results of this study were complex (e.g. Jensen, 1999; The MTA Cooperative Group, 1999a), but has essentially led to the mainstay of recommended treatment for ADHD being stimulant medication and behavioural treatment, influencing treatment regimes for ADHD globally – see, for instance, the European Clinical Guidelines for Hyperactivity Disorder (Taylor et al., 2004), and the NICE Guidelines for ADHD in the United Kingdom (2009). Multiple detailed analyses of the results (some of which are referred to subsequently) have been reported, as has the follow up findings at 36 months (Jensen et al., 2007).

Less reported though have been the critiques of the MTA study who highlight a number of important questions which become all the more pertinent when taken in combination with the research detailed subsequently. In particular, it has been postulated that the burdensome requirements of the MTA study limited enlistment to motivated families in supportive schools who were predisposed to benefit from treatment, and differed considerably from families usually referred to child mental health settings in the community (Boyle & Jahad, 1999). Leslie, Stallone, Weckerly, McDaniel and Monn (2006) illustrated this, comparing two groups from a community and private office in San Diego, with similar rates of ADHD in both settings. Socio-environmental stressors were high across the sample overall, but children in community clinics were more likely to have experienced foster care, child abuse and/or neglect, homelessness, parental drug use and witnessed domestic violence; to have at least one other family member (usually a parent) with a mental disorder; and to screen positively for oppositional/conduct disorder. Clearly this raises concern as to how generalizable therefore are the findings of the MTA study to cases attending CAMHS services particularly in those cases detailed above which have significant complex needs, and require multiagency input including, for instance, Social Care, Special Educational Resources/EBD Schooling, Youth Offending Teams and Adult Mental Health.

ADHD and psychosocial factors

1. The importance of parents receiving support in their role

Parents of children with ADHD often report feelings of isolation, incompetence and low satisfaction in their role as parents (e.g. Lange et al., 2005), and experience more stress and dysfunctional parent/child interaction styles than do parents of children without ADHD (Briscoe-Smith & Hinshaw, 2006). Observational research has also shown parents of hyperactive children to be more negative, commanding and controlling of their child's behaviour, and less responsive to good behaviour than parents of control children (e.g. Barkley et al., 1983; Cunningham & Barkley, 1979, cited by Woodward et al., 1998).

How are we to understand these factors, and what is cause and effect? The experience of living with a child who exhibits problematic behaviour, can be extremely persecutory, and may leave parents feeling blamed and inadequate. This can potentially lead to parenting practices which exacerbate the situation, and result in higher levels of hyperactivity in their child (Woodward et al., 1998). A label of ADHD can help parents to recognize that their child's behaviour is, at least in part, genetically determined, and so neither their child's fault nor their own. If need be, they can access and use additional support including parenting programmes (Rogers, Cann, Cameron, Littlefield, & Lagioia, 2003). A modified parenting programme for parents of pre-school children with hyperactive symptoms which focussed on encouraging parental acceptance of, and respect for, child characteristics through a psycho-educational approach, resulted in a significant reduction in hyperactive symptoms (Sonuga Barke, Daley, Thompson, Laver-Bradbury, & Weeks, 2001, cited in Morrell & Murray, 2003).

The difficulty arises in more complex and severe presentations where consideration needs to be given to the adjunctive use of stimulant medication, and where over-simplifying the underlying aetiology will mean implementing a less than optimal treatment regime. In the sections that follow various potential contributory or exacerbating psychosocial factors are detailed. Of central importance, however, is that parents receive support in their role, but also in recognizing the impact on children of parental discord and loss.

A National Survey in Great Britain found that children with hyperkinetic disorders were more likely to live with single, or previously married, lone parents (38%), than with two parents (24%) (Green, McGinnity, Meltzer, Ford, & Goodman, 2004). Strohschein (2007), in a prospective study covering a six-year period, found that methylphenidate use was significantly higher among children whose parents subsequently divorced, than among those whose parents remained married. Clearly there may be many reasons for these findings, including the potential reduction, or indeed absence of, a positive paternal influence (Schmidt Neven, Anderson, & Godber, 2002b). This may also correlate with those couples whose conflict *increases* after separation (Booth & Amato, 2001). However, one could hypothesize that the combination of children struggling with understandable feelings of loss, distress and anger about a parental separation, or in relation to an absent father; coupled with their parents struggling with potentially much the same feelings regarding an absent partner or the end of a relationship, may exacerbate the situation. In addition, particularly in cases of difficult or traumatic relationships and separations, a mother's view of her ex-partner and boys may impact on the care of her sons (Murray, Woolgar, Briers, & Hipwell, 2001).

2. Parental psychopathology, environmental adversity

There is considerable research indicating an association between parental mental illness and personality disorder, and ADHD in their children. This correlation is particularly evident in those young people who have a co morbid diagnosis of both ADHD and conduct disorder, which has been found to co-occur in 30–50% of cases in both epidemiological and clinical samples (Biederman, Newcorn, & Sprich, 1991, cited in Biederman, Faraone, & Kiely, 1996). This is a group which we know prognostically to have poorer outcomes, in terms of greater risk of aggressive and delinquent behaviour, as well as school dysfunction than ADHD alone (Biederman et al., 1996).

Maternal depression in particular has been frequently linked with ADHD symptoms and co-morbid conduct disorder (e.g. Cunningham, Benness, & Siegel, 1988; Shaw, Lacourse, & Nagin, 2005). McCormick (1995) found that the incidence of major depression to be almost four-fold that generally seen in primary care outpatients. Parental antisocial personality disorder, alcoholism, and substance use have all been shown to aggregate with conduct disorder, or co-morbid oppositional defiant disorder/conduct disorder in ADHD samples (Biederman et al., 1996; Biederman, Faraone, Keenan, Knee, & Tsuang, 1990; Faraone et al., 1995; Lahey et al., 1988; Nigg & Hinshaw 1998; Stewart, De Blois, & Cummings, 1980). In a study of children of mothers with borderline personality disorder, 43% were diagnosed with ADHD, and 67% with disruptive behaviour disorder (Weiss et al., 1996).

There are several possible factors that might explain the association between ADHD and parental depression (usually reported in the mother), including maternal mental states biasing her perception, shared genetics and external factors, and children developing emotional or behavioural problems in reaction to their mother's distress or disturbances in parenting style. Depression may result in mothers being less emotionally available, or more critical and negative about their children (Hibbs et al., 1991, cited in Woodward et al., 1998). Equally, caring for a child with problematic behaviour can lead to, or exacerbate, maternal depression.

The potential sequelae of untreated maternal depression was illustrated by Johnson, Murray, Hinshaw, Pelham and Hoza (2002) in his observations of maternal–child interactions in 136 families of 7–10-year-old boys with ADHD, who were part of the MTA study described previously. Maternal responsiveness was found to be negatively rated to child conduct problems (though not ADHD symptoms), and negatively related to maternal depressive symptoms. It was hypothesized

that child conduct problems, maternal depressive symptoms and maternal responsiveness were linked in a reciprocal and transactional fashion, with each component influencing the development of each other component over time. By contrast, Modell and colleagues (2001), in their study of 24 mothers recently diagnosed with major depressive disorder, showed the benefits which followed after 1–2 months' treatment with an antidepressant in that maternal ratings of their children's behaviour significantly improved, with improved scores in conduct, learning problems, and impulsive-hyperactive sub-scales accounting for 89% of this reported behavioural change. The degree of reported improvement was highly correlated with the degree of improvement in depressive symptoms.

The impact of parental psychopathology seems to be particularly pronounced when associated with other measures of psychosocial adversity, and in those families who are relatively isolated, with limited social support systems (e.g. Cunningham et al., 1988). Biederman, Faraone and Monuteaux (2002) found that greater levels of environmental adversity including maternal psychopathology, paternal criminality, family conflict, family size and social class, were associated with a greater risk for ADHD and other co-morbidity and functioning, in a dose-dependent fashion. Scahill and colleagues (1999) found that of a sample of 449 children, those diagnosed with ADHD ($n = 89$) were more likely to have mothers with a history of psychiatric treatment, to have fathers with a history of excessive alcohol use, and to live in low income families with higher levels of family dysfunction, than those who were sub-threshold or non ADHD.

It is not surprising that such parental and psychosocial factors co-aggregate and are likely to mutually influence each other. Struggling in difficult social and financial circumstances is likely to make family life more stressful, and predispose to parental psychopathology, particularly in those families who are isolated. Children living in such troubled families may well react with increasing problematic behaviour, especially if genetically predisposed to hyperactivity. This will only serve to make such situations worse, particularly in those parents with more limited parenting skills and/or whose coping skills are already stretched by other psycho-social factors.

It is also important to remember that parental alcohol abuse and personality disorders are also recognized risk factors for child abuse, especially where there is associated parental violence (e.g. Duncan & Reder, 2000; Drummond & Fitzpatrick, 2000; Westman, 2000). Children living in such families are at greater risk of trauma, whether to themselves, or in witnessing interparental violence, or maternal self-harm (in the case of borderline mothers). Neglect is another possibility. Emotional abuse and neglect have also been highlighted as perhaps the most relevant and problematic types of maltreatment associated with parental mental illness. In many cases, the neglect of their children's emotional needs may be unintentional, but damaging effects on children's development, still occurs (Royal College of Psychiatrists, 2002).

3. ADHD and abuse/trauma

Several studies have shown high rates of ADHD amongst children who have been maltreated (e.g. Merry, Franz, & Andrews, 1994). McCleer, Callaghan, Henry and Wallen (1994) found that ADHD was the most frequent diagnosis in their sample of sexually abused children in an inpatient sample. Cohen, Adler, Kaplan, Pelcovitz and Mandel (2002) reported that the interactional effects of parental marital disruption and having been physically abused combined to increase the risk of lifetime ADHD 15-fold (compared with non-abused adolescents from intact families).

High rates of abuse have concurrently been found amongst children with ADHD. Briscoe-Smith and Hinshaw (2006) showed that there were significantly higher rates of documented physical and sexual abuse in a sample of girls aged 6–12 years with ADHD ($n = 140$), as compared with a

matched group without ADHD (n = 88): 14.3% versus 4.5%. Co-existing oppositional/conduct disorder; as well as higher rates of externalizing behaviours and peer rejection, have been shown to characterize those children with ADHD who have been abused, as opposed to those with ADHD, but no such history (Briscoe-Smith & Hinshaw 2006; Ford et al., 1999).

Ouyang, Fang, Mercy, Perou and Grosse (2008), in a population-based study, found there to be a significant association between self-reported childhood ADHD symptoms, and a history of maltreatment. The inattentive type of ADHD was associated with substantially increased risks of supervision neglect, physical neglect, physical abuse and contact sexual abuse; whilst hyperactivity/impulsivity type was associated only with supervision neglect and physical abuse. Combined-type ADHD, was associated with substantially elevated risks of physical neglect and contact sexual abuse.

The impact of domestic violence is being increasingly recognized within adult mental health (e.g. Rose et al., 2011) and primary care (Hegarty, Taft, & Feder, 2008); but also in its profound abusive effects on children (Buckley, Holt, & Whelan, 2007; Holt, Buckley, & Whelan, 2008) especially when combined with other experiences of violence (Leventhal, 2007). Exposure to domestic violence, particularly when combined with physical abuse, has also been associated with higher rates of a lifetime diagnosis of ADHD (Pelcovitz, Kaplan, De Rosa, Mandel, & Salzinger, 2000). It is of considerable concern therefore how little research there has been in this area in relation to ADHD symptoms. This is particularly so given the findings of Chiodo, Leschied, Whitehead and Hurley (2008) regarding the impact of family violence on children seen in a children's aid society. Three groups of maltreated children were compared for differing child outcomes. Prevalence rates of ADHD were found to be, respectively: 11.7% in those exposed to domestic violence against women (n = 128); 25% in those physically abused (n = 44); and 33% in those who experienced both (n = 18) – thus virtually a third of the group of children who had both witnessed domestic violence and experienced physical abuse were deemed diagnosable as ADHD.

The overlapping cognitive, behavioural and emotional symptomatology between childhood PTSD and ADHD has also been frequently highlighted (Blecker-Blease, Freyd, & Pears, 2004; Cuffe, McCullough, & Pumariega, 1994; Hagele 2005; Weinstein, Staffelbach, & Biaggio, 2000). Traumatized children frequently are agitated and inattentive, so may present with ADHD-like behaviours (Wozniak et al., 2010). McLeer et al. (1994) and Famularo, Kinscherff, and Fenton (1992), found considerable co-morbidity between PTSD, ADHD and oppositional defiant disorder in their studies of maltreated children. They questioned whether the symptoms, which resulted in the diagnosis of ADHD and oppositional disorder, reflected anxiety symptoms associated with PTSD secondary to their maltreatment, which had implications for the appropriateness of treatment with stimulant medication, as opposed to focussing on the consequences of the trauma.

4. ADHD and abuse/trauma-associations with recent development in field of neurobiology

Several studies have found that children with ADHD differ from control groups in total brain size and in frontal, temporal and parietal cortical regions, basal ganglia (striatum), callosal areas and cerebellum (Taylor, 2006). Such findings have often been quoted to support the biological underpinnings of ADHD as a disorder. There appears to have been scant consideration though, within the general field of child mental health, to what degree these changes may in some cases have been caused or exacerbated by environmental factors. This is despite the fact that research within the field of neurobiology has shown that children who have had experiences of neglect and/or abuse leading to PTSD symptoms show changes in several of these areas of the brain.

Perry and Pollard (1997) found that MRI scans from 11 of 17 (64.7%) children with global neglect, and from 3 of 26 (11.5%) with chaotic neglect, were interpreted by neurologists as abnormal. The majority of the readings were 'enlarged ventricles or cortical atrophy'.

Maltreated children with PTSD have been found to have reduced cerebral volume (prefrontal white matter, right temporal lobe and midsection of the corpus callosum) and associated enlargement of the ventricular system (De Bellis et al., 1999, 2002, cited in De Bellis & Keshavan, 2003); smaller right, left and total cerebellar volumes (De Bellis & Kuchibhatia 2006), and larger prefrontal lobe CSF volumes and smaller midsagittal areas of the corpus callosum subregion 7 (splenium) (De Bellis & Keshavan, 2003).

It is beyond the scope of this paper to detail the many and complex potential effects on brain development of abuse. It is known though that during early brain development there are sensitive periods, during which certain experiences might have especially deleterious effects: where some experiences are essential for brain development (hence the potential impact of neglect); and other noxious experiences will cause harm to the developing brain (Glaser, 2000). It is also the case that 'traumatic events *modify* an adult's original state of organisation or homeostasis but may b*e the original organising experience* for a child, thereby determining the foundational organisation and homeostasis of key neural systems' (Perry & Pollard, 1998, p. 36, cited in Weber & Reynolds, 2004). Results from studies of brain size associated with trauma have also suggested that traumatic stress is associated with disproportionately negative consequences if it occurs in early childhood, and equally that childhood maltreatment has global and adverse influences on brain development that might be cumulative (De Bellis & Keshavan, 2003).

5. ADHD and attachment/containment in the infant

The impairment in self-regulation seen in children with Hyperkinetic Disorder/ADHD has been postulated in certain cases to have its roots in strained early caregiver–child interactions and disrupted primary attachments (e.g. Haddad & Garalda, 1992; Stiefel, 1997); or might sometimes reflect that a child is 'literally not able to be alone with their own thoughts, because they are too anxiety provoking, and that the containing processes and interactions in their life in the form of parental support might either never have taken place, or might have broken down' (Schmidt Neven, Anderson, & Godber, 2002a, p. 85).

We know that extreme early privation (Rutter et al., 2001) and institutional care in early development (Roy et al., 2000) can lead to high rates of hyperactivity and inattention. Two longitudinal studies have also shown that the parenting quality in infancy predicted subsequent hyperactivity (cited in Morrell & Murray, 2003): The Minnesota High Risk Project (Carlson, Jacobvitz, & Sroufe, 1995; Jacobvitz & Sroufe, 1987), which showed that the quality of care-giving in infancy, particularly intrusive maternal interactions, more powerfully predicted poor attention/distractibility at age 3–4, and in turn hyperactivity at age 5–6, than did early infant biological or temperamental factors (see also Sanson, Smart, Prior, & Oberklaid, 1993).

A U-shaped function has been postulated to explain these findings (Morrell & Murray, 2003, p. 501), 'with extremes of parenting at either end of the spectrum, threatening the normal development of attention through effective parental scaffolding of infant engagement in the environment (Trevarthen & Aitken, 2001; Trevarthen & Hubley, 1978)'. The neuro-biological research detailed previously, particularly regarding the brain changes associated with neglect on the developing infant, may help to explain the underlying mechanisms by which this occurs.

The need for early recognition and treatment of postnatal depression in mothers has also long been highlighted to avoid a range of associated adverse outcomes on infant development and beyond, particularly in boys; including behavioural disturbance, cognitive impairments, insecurity of attachment, hyperactive behaviour and high rates of distractibility (Murray, Sinclair, Cooper, Ducournau, & Turner, 1999). Such findings re-emphasise the fundamental importance of attention to early care-giving and attachment factors.

6. Impact of insecure attachment in the 'older child'

There are a number of striking similarities between the difficulties seen in children with ADHD and the developmental outcomes of insecure attachments. It has also been suggested that in certain circumstances, child hyperactivity may serve to evoke responsiveness in potentially unresponsive caregivers. This might explain the unexpected finding in the MTA study that, in families characterized by severe psychosocial adversity, when hyperactive symptoms were controlled by medication only, positive interactions between parents and their children were *reduced* (The MTA Cooperative Group 1999b, cited in Morrell & Murray, 2003).

Concern has also been raised that in the case of an insecurely attached young person, traditionally advocated treatment including behavioural management strategies and medication might mask underlying relational problems between the child and their parents. It has been suggested that such approaches may in fact leave children who are already frustrated and anxious over the lack of a parental bond feeling more victimized, by 'providing a Band-Aid effect on the parent-child relationship', but failing to address the underlying problem (Erdman, 1998, p. 183). This might explain in part, the lack of maintenance of effects once such treatments are discontinued, and why the follow-up results at 3 years of the MTA study was far less positive than originally envisaged.

This was notably illustrated in a study of 19 boys (aged 5–10 years), diagnosed with ADHD, 16 of whom were receiving stimulant medication, and 15 had received some form of psychological intervention typically in the form of parent training or behavioural techniques. Clarke, Ungerer and Chahoud (2002) compared the quality of attachment representations in the group with ADHD, to a group of same age normal controls, using three measures assessing internal working models of attachment and the self.

The group with ADHD tended to obtain poorer scores on all three measures, suggesting insecurity of attachment; showed more coping strategies involving retribution, hostility or hatred, with situations spiralling into disasters; were less richly developed and coherent in their self-descriptions; and were significantly more likely to provide predominantly negative descriptions of parent–child relationships – for instance portraying parents as unresponsive or unreliable. The family drawings of the children with ADHD also differed markedly from the control group, suggesting lower levels of family pride and higher levels of vulnerability, tension and anger, role reversal in parent–child relationship, bizarreness and dissociation and overall pathology. Indeed, two-thirds of the children with ADHD and only 2 controls produced drawings classified as 'disturbing'.

These vivid and rather worrying descriptions of these children's 'internal worlds', particularly how they view themselves and their parental and familial relationships, suggest that a far more sophisticated therapeutic approach is needed than that currently advocated. Parenting training may be appropriate in the case of a secure attachment, as parents may be able to focus on the current interaction and apply behavioural management skills objectively and consistently. If the quality of

the child–parent relationship is problematic, however, relationship issues may well need to be addressed directly before families can be expected to make enduring changes (Clarke et al., 2002). Adding relationship-building components are likely to enhance the generalization of treatment effects.

Evidently central to the process of containment is the capacity of parents to tolerate their own feelings including anxiety, uncertainty and anger, in order to gradually help the infant and developing child to bear and make sense of their own feelings. To what degree a parent is able to manage this process will to a large part be determined by how their emotions and behaviour were managed and contained within their childhood and adolescence. As clinicians, much of our therapeutic work is in making sense of such links over generations, often helping parents to behave differently with their own children than was their own experience as a child. Moreover, if parents are struggling with depression, and/or are themselves feeling unsupported and uncontained, it is not surprising that they will find it hard to perform this function for their children. The work of containment cannot happen in a vacuum. The mother or parent needs to be contained by her partner, and/or family and friends, as well as a community, which values the task of parenting (Schmidt Neven et al., 2002a).

7. ADHD and a broader social perspective

Research detailed previously has shown associations between ADHD symptoms, environmental adversity and early attachment deficits. Many have commented on the importance of social factors in contributing to the rising diagnosis of ADHD in our young including the impact of rising inequity, child care issues, the effects of increasing separation and divorce rate, or closures in playgroups, youth clubs and adventure playgrounds (e.g. Kendall & Hatton, 2002; Schmidt Neven et al., 2002b; Timimi & Taylor, 2004).

Moreover, while this article has focused primarily on parental and family factors, we know that the educational system also plays a large role in influencing the course of ADHD symptoms. Individual teachers can differ in their ability to manage problematic behaviours: Schools range in their focus on pastoral care issues and availability of Special Needs resources. An ADHD-label is often seen as a way to gain appropriate support for such children. League tables, increasing focus on achievement and exam pressure within the educational system, the effects of cuts in playtimes and creative activities have also cited as potentially leading to increased diagnoses of ADHD (e.g. Anderson, 2003).

While such factors may not necessarily prevent one prescribing in individual cases, our profession does have a responsibility to be mindful of such drivers and pressures on children today and to be drawing attention to them.

Finally, any consideration of the psychosocial factors associated with ADHD would be incomplete without a reference to the escalating and widely discrepant psycho-stimulant prescription rates and pharmaceutical expenditure globally (e.g. Berbatis, Sunderland, & Bulsara, 2002; Scheffler, Hinshaw, Modrek, & Levine, 2007; Schlander 2007; Wong, Murray, Camilleri-Novak, & Stephens, 2004). The role of pharmaceutical drug industry in promoting the ADHD construct has already been widely referred to (e.g. Timimi, 2008). It is commonly accepted though that the reasons underlying the rise in psychotropic medication and differing rates are complex and multifactorial and include the role of the Managed Care Systems, Direct Consumer Marketing, and the fact that concurrent with a reduction in psychotherapy, medication use has increased (e.g. Vitiello, 2008).

How do these studies impact on our understanding of ADHD: Implications for practice

a) The interplay between genetics and the environment

> *What molecular genetics should not bring about is either biological determinism or the 'medicalisation' of either normal variation in behaviour or maladaptive responses to psychosocial stress or adversity.* (Rutter & Plomin, 1997, p. 217)

There has been awareness for some time of an association between parental psychopathology/depression/alcoholism and ADHD and co morbid conduct disorder in the child. However, there has been a tendency to focus on biological causal links with the suggestion for instance that ADHD and comorbid conduct disorder may represent a separate familial subtype, given the high rate of antisocial disorders amongst first-degree relatives of children sharing both diagnoses (Thapar et al., 1999). ADHD and depression have also been proposed to share familial vulnerabilities (e.g. Thapar et al., 1999). Psychosocial putative factors as previously described that may accompany parental psychopathology including insecure attachments have received less attention.

It may indeed be the case that genetic vulnerability to mental illness and dysfunctional behaviours might explain the multigenerational aspects of these diagnoses and behaviours. 'Families with manifestations of ADHD throughout several generations may also be systems ridden with impulsivity and behavioural dysfunction. Membership in such a family might increase the risk of child's exposure to episodes of violent impulsivity or possibly abusive behaviour' (McLeer et al., 1994, p. 318). Cuffe et al. (1994) posits the same hypothesis illustrating this with case examples. Children with ADHD may also be more at risk of being abused (Ouyang et al., 2008).

However, genetic effects are probabilistic rather than deterministic in their effects, and are thought to operate, at least in part, by creating a vulnerability to environmental risks (Rutter & Plomin, 1997). The fact that our inherited biology may determine how we react to a particular insult – for instance maltreatment (e.g. Caspi et al., 2002) – does not detract from the fact that such a child still needs protection and also recognition of the impact of what has happened to them. Another important issue is that the same psychosocial factor might differ in its impact on an individual child, depending on their age, sex, degree of exposure and inherent genetic vulnerability to exhibiting ADHD symptoms.

Findings from the studies described earlier (e.g. Carlson et al., 1995; Jacobvitz & Sroufe 1987; Roy et al., 2000; Rutter et al., 2001; Sanson et al., 1993) has led to speculation that the impact of environmental influences, relative to genetic heritability, on hyperactivity in the first year of life might be much greater than that seen in older children, where heritability estimates in middle childhood have averaged around 70% (Morrell & Murray, 2003). Early abuse has also been questioned as a possible aetiological factor in the development of ADHD symptoms. Glod and Teicher (1996) found that a group of children aged 6–12 years, with documented histories of physical and/or sexual abuse, was on average 10% more active than normal controls, with the increase in activity being primarily accounted by those with PTSD symptoms. Early onset of abuse was significantly associated with greater likelihood of the development of PTSD and hyperactivity. Citing previous research by Famularo, Fenton, Kinscherff, Ayoub and Barnum (1994), who had found a similar relationship between early age of abuse and PTSD, Glod and Teicher (1996) speculated whether the particular degree of helplessness, powerlessness and abject terror in infants and toddlers experiencing abuse, might be perceived by them as life threatening, and thus be more likely to promote traumatic sequelae.

Such proposals certainly fit with the increasing awareness of the neurobiological sequelae described earlier for infants/children of neglect and/or exposure to traumatic events including witnessed domestic violence, and even exposure to verbal abuse (e.g. Glaser, 2000; Perry, Pollard, Blakley, Baker, & Vigilante, 1995; Weber & Reynolds, 2004). These findings reinforce the notion that the ability to regulate and modulate behaviour is a *developmental* process, which increases as the brain develops (Perry et al., 1995). As the growing infant/child grapples with life tasks appropriate to their age, their neurobiological systems respond to stress in an age-related fashion in tandem with these developments.

Parallel with this is the fundamental principle within attachment theory and indeed psychoanalytic psychotherapy that a baby cannot manage this process in isolation. Infants and children/young people are dependent on their caregiver's ability to provide containment and regulation of their psychophysiological states. Thus the development of self-regulatory capacities is viewed as contingent on the sensitive responsiveness of the caregiver to infant signals (Cassidy, 1994; Field, 1994, cited in Clarke et al., 2002; Music, 2011). It is important to recognize, however, that ADHD measures are the extreme of a continuously distributed trait, with genetic risk distributed throughout the population (Asherson et al., 2005; Levy et al., 1997). Thus whilst most individuals will develop hyperactivity/inattention in the face of a severe stressor-like extreme privation, some individuals because of their higher genetic loading may be more susceptible to become symptomatic in the face of trauma, and/or more subtle caregiver–infant missatunements that can for instance accompany post-natal depression or early bonding difficulties. 'Parents of good character might not be aware that they are out of touch with the child, yet in the developing child these failures, often seemingly inconsequential to adults, can lead to insecurity' (Kraemer, 2011, p. 56).

This leads to the issue how are we to understand the preponderance of males with ADHD? Does this imply some protective factors associated with the additional X chromosome that females have? Are boys more susceptible to environmental stressors? Boys are certainly known to be at increased risk of a variety of developmental disorders; and more sensitive to the impact of parental unavailability, insensitivity and depression (Kraemer, 2000). It has also been found that when boys and girls exhibiting PTSD symptoms were matched in terms of similar traumas and histories of co-morbid mental illness, behavioural problems and cognitive deficits, the boys showed more evidence of adverse brain development than their female counterparts. This was in conjunction with a trend towards reporting more PTSD Cluster C symptoms (which represent avoidant and dissociative behaviours) (De Bellis & Keshavan, 2003). Another significant argument is that the rise in diagnosis of ADHD in boys reflects a tendency to pathologise ordinary masculine developmental traits (e.g. Sciutto, Nolfi, & Bluhm, 2004; Timimi 2009)

b) A richer model incorporating genetics and environmental adaptation

> *When maladaption is viewed as a development rather than a disease, a transformed understanding results and a fundamentally different research agenda emerges. Within a developmental perspective, maladaption is viewed as evolving through the successive adaptions of persons in their environments. It is not something a person 'has' or an ineluctable expression of an endogenous pathogen. It is the complex result of a myriad of risk and protective factors operating over time.* (Sroufe, 1997, p. 1)

The other issue, which seems to have been insufficiently addressed, is that whilst genetic predisposition is a fixed variable, contributory psychosocial factors can be additive in their impacts and modulated over the course of a young person's development either positively or deleteriously. The role of neurobiology has already been discussed. Ideas which draw on a wider theoretical

framework though including psychotherapy, attachment theory, cognitive processing and also family/systemic therapy are equally helpful in understanding how early attachments and life experiences can subsequently be translated into perceptions of expected care and potentially problematic patterns of interaction as evidenced for instance in story stems (e.g. Steele et al., 2007). Family life can also vary longitudinally for a multiplicity of reasons including difficult financial and emotional/social circumstances, and with that the capacity for parents to manage their children's behaviour. Conceptualizing the aetiology of ADHD symptoms in these terms has important implications in influencing how one approaches the subsequent treatment plan.

Furthermore, the current accepted wisdom is that we need to treat ADHD medically to avoid negative sequelae. More longitudinal research is needed, however, to elucidate whether these adverse outcomes are mediated via psychosocial factors. For example, De Sanctis et al. (2008) found that in the absence of maltreatment and/or comorbid conduct disorder, children with ADHD were at no greater risk for substance use disorders than the general population.

c) Co-morbidity in ADHD

Comorbidity in ADHD – recognized to be 'the rule rather than the exception' – has led to similar questions regarding the validity of these constructs as separate disorders, and also whether different subtypes might share similar aetiologies, and/or should receive different treatments. This has already been referred to in relation to ADHD and conduct disorder, as well as PTSD and oppositional disorder. About a quarter to one third of children with ADHD are said to also meet criteria for anxiety disorder (Pliszka, 2000).

This group of children has been found to experience more stressful life-events such as divorce and separation, than those who present with ADHD alone (Pliszka, 2000). This reinforces the importance in the clinical assessment of children presenting with ADHD symptoms and co-morbid anxiety, to explore the possibility of a recent psychosocial stressor, which might respond to therapeutic input, before considering medication.

d) ADHD and abuse/trauma

Evidently there remain a number of unanswered questions in the complex area of ADHD and abuse/trauma, which merit future research. From a clinical perspective, however, it is clear that the possibility of childhood maltreatment should be considered in the assessment of all ADHD referrals, but also where a child being treated for ADHD presents with a deterioration or change in their presentation, particularly when there are co-morbid oppositional/conduct disorder symptoms. Equally, whilst medication may prove a helpful adjunct with some children who have had abusive experiences, a more integrated broadly psychotherapeutic approach will generally be needed, including attention to traumatic sequelae. Recurrent research from the attachment field, encapsulated best in the Adult Attachment Interview, has shown the value of telling ones narrative, and being able to put into words the feelings associated with ones experience in childhood, in breaking intergenerational patterns of abuse and fostering resilience (summarized in Fonagy, Steele, Steele, Higgitt, & Target, 1994).

e) Parental psychopathology

If parental mental illness, or other aspects of family dysfunction are not acknowledged, or treated, then viewing a child's ADHD symptoms as an individual problem to be treated is unlikely to be successful. A separate though connected issue is whether in certain cases treating the parents may actually have a larger effect on outcome than treating the index child. Mental health professionals

are well placed to sensitively explore symptoms suggestive of mental illness in parents and liaise with General Practitioners and Adult Mental Health Services to access appropriate support where necessary. Such families may well benefit from family therapy (Lange et al., 2005); or a therapeutic intervention addressing the parent-child relationship particularly if there are signs of an insecure attachment. Even if threshold criteria for child protection is not reached, it is likely that children living in such families will need a very different therapeutic approach that treats their symptoms within a systemic framework with multi-agency input, including social services and adult mental health services.

f) The ethical and clinical dilemmas inherent in ADHD treatment

Foreman, Foreman and Minty (2005) found that hyperkinetic children were three times more likely to have suffered removal from home than children with any other psychiatric diagnoses, independent of any psychosocial measures. The authors argued that it was important to screen and treat hyperactive children to avoid the risk of family breakdown. There is however a counter argument that in treating such children with stimulant medication one runs the risk of colluding with an external environment which needs to change, and effectively 'silencing' the mechanism a child is using to communicate that 'all is not well'. Similar clinical and ethical dilemmas can arise in relation to Looked After children where medicating a child may be considered to prevent a placement breakdown which might render the young person more at risk of rejection, or indeed within school. However, this decision has to be weighed against the risk of the professional network not giving sufficient attention to the complex psychological needs of this group of children many of whom will be struggling with the emotional impact not only of traumatic experiences, but also potentially ambivalent and confusing feelings regarding their birth parents, as well as adjusting to life in the care system. In certain cases an alternative more supportive educational setting may be more appropriate than medicating the child or indeed more support for the foster carers.

Child mental health professionals are often asked for their opinion in such situations, both in clinical practice but also in complex childcare proceedings where they may be asked to be expert witnesses. A detailed chronology incorporating multi-agency feedback as well as a child-centred individual and family assessment with attention to attachment issues will be fundamental. If clinicians are to be supported in making such difficult decisions however it is important that the available evidence base is balanced, and reflects the latest research in relation to the symptomatic and neurobiological sequelae of child maltreatment.

To summarize

There is considerable research available showing the link between ADHD symptoms, parental mental illness, child maltreatment, attachment deficits and other psycho-social stressors particularly when associated with co-morbid diagnoses including conduct disorder, PTSD and anxiety. Such factors will differ in their impact on an individual child, depending on their age, sex, degree of exposure, and inherent genetic vulnerability to exhibiting ADHD symptoms. The effects of such factors may be ameliorated or exacerbated by external influences in a transactional fashion, with each potentially mutually influencing each other over time.

In essence, 'Attention Deficit Hyperactivity Disorder' (ADHD) is a description rather than an explanation of a pervasive, persistent, disabling pattern of inattentiveness, overactivity and/or impulsiveness. The development of ADHD symptoms is best viewed from a developmental and systemic perspective, in order to formulate the optimum treatment plan.

Table 1. Factors that should be considered as part of a Bio- Psycho- Social formulation of presenting ADHD symptoms (Alone); and associated with co-morbid diagnoses Conduct Disorder and Anxiety.

Predisposing	Precipitating	Maintaining/ exacerbating	ADHD and conduct disorder	ADHD and anxiety disorder
Genetics/strong family history Prenatal and perinatal events such as prematurity, low birth weight, pregnancy and/or birth complications. Closed head injury (may also be precipitating factor) Emotional deprivation or intrusive maternal interactions in infancy Post-natal depression Physical and/or sexual abuse (risk increases with early onset of abuse and PTSD symptoms) Insecure attachment	Parental separation Severe anxiety, e.g. secondary to insecure attachment Traumatized child with PTSD History of maltreatment including physical, sexual, supervision neglect or witnessed domestic violence	Isolated families/ parent with minimal social support Low income Family conflict Paternal criminality Large family size Greater environmental adversity Insufficient support within school setting	Maternal depression Parental antisocial personality, alcoholism and substance use Child maltreatment Reduced maternal responsiveness	This group of children has been found to experience more stressful life events such as divorce and separation, than those who present with ADHD alone

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Author biography

Louise Marie-Elaine Richards is a Child and Adolescent Psychiatrist, and Named Doctor for Safeguarding Children in her Trust. Her interest in psycho-social factors associated with ADHD and the spur to investigate the academic research in this area, arose initially from having arrived as a new Consultant to face a large group of children and adolescents treated with stimulant medication. Her training in systemic, and psychodynamic thinking and practice, particularly whilst a Specialist Registrar and at the Tavistock Clinic; in combination with a range of prior voluntary experience involving Special Needs Children, proved invaluable in providing a different way of thinking about these children. ‘On scratching the surface’ it became evident that many of these young people were struggling with internal and external factors related to their family and wider environment, and in several cases there was concurrent multi-agency input. With the continuing concurrent support and input from other members of the multi-disciplinary team (and in many cases joint-working), we were able to develop alternative tools to support these children/adolescents and their families, which in several cases enabled them to manage at reduced doses or medication-free. This initial experience has proved to be the rule in her/our clinic’s ongoing clinical contact with young people presenting with ADHD symptoms.