

What do we understand about Girls and Attention Deficit Hyperactivity Disorder (ADHD)?

An academic literature review reporting current research findings on:

- (A) Symptom Presentation (sequela)*
- (B) Comorbidity*
- (C) Long Term Outcomes*
- (D) The Relevance of the DSM-IV Diagnostic Criteria for Girls*

What do we understand about Girls and Attention Deficit Hyperactivity Disorder (ADHD)?

Scope of Academic Literature Review

This academic literature review will draw from current research findings to specifically report on the: symptom presentation (sequela), comorbidity, long term outcomes and relevance of DSM IV diagnostic criteria for girls with ADHD.

To facilitate with quick referencing key information has been underlined and where appropriate explanatory notes have been inserted.

Starting Premise

Despite its reputation as the most comprehensively studied childhood mental disorder (Arnold, 1996; & Barkley, 1989) relatively little is known about how girls with ADHD compare with boys with the disorder (Gaub & Carlson, 1997). It was just over a decade ago that Gaub and Carlson carried out the first meta analysis which attempted to summarise the gender differences in ADHD. Paradoxically their most important finding lay in their stark conclusion that the dearth of “ current literature leaves largely unanswered many of the most critical questions regarding the nature of ADHD in girls”. (Gaub & Carlson, 1997, p 1044).

Background

Defining and diagnosing ADHD

ADHD is a complex developmental disorder, which is often further complicated by the presence of co-morbid difficulties. Diagnosis depends solely upon observable patterns of behaviour and draws upon the input of a wide range of individuals including parents, teachers, psychologists and a variety of medical practitioners.

The current diagnostic criteria for ADHD is *DSM-IV* (American Psychiatric Association, 1994). The heterogeneous nature of the disorder is reflected in the fact that it contains three distinct more homogeneous subtypes. These are:

- (1) *Attention-deficit/hyperactivity disorder, combined type* (ADHD-CT). This diagnosis is used if six or more symptoms of inattention and six or more of hyperactivity have persisted for six months or longer.
- (2) *Attention-deficit hyperactivity disorder, predominantly inattentive type* (ADHD-I) with six or more inattention symptoms and fewer than six hyperactivity – impulsivity symptoms. Numerous studies have demonstrated that girls cluster more in this group (Gaub & Carlson, 1997; Biederman et al. 1999; American Psychiatric Association, 2000).
- (3) *Attention-deficit/hyperactivity disorder, predominantly hyperactive-impulsive type* (ADHD-HI) with the pattern of symptoms the reverse of (2).

Prevalence Rates

*Estimates of prevalence rates vary considerably:

1. The Education and Library Boards In Northern Ireland have conservative estimates of between 1% and 3% of the population (ADHD Working Group, 2004).
2. Current estimates place the prevalence rate in the UK at between 3% and 5% for school aged children (NICE, 2000, Barkley, 1998).
3. Prevalence rates in the US from The American Psychiatric Association (2000) place the figure between 3% and 7% percent of school aged children. This figure accords with the UK prevalence rates.
4. However other clinicians and researchers (Rowan et al, 2001) argue that the prevalence rate is considerably higher lying between 9% and 15% .

**Explanatory Notes*

The wide variation in reported prevalence studies is probably due to a variety of factors including: (1). Differences in the populations studied (community versus clinical).

(2). Different interpretations placed on the criteria in *DSM-IV* and *ICD-10*

(3). Use of different study designs.

Gender Divide and Longevity

Although there is disagreement concerning prevalence rates what has generally been widely established and accepted is that ADHD is considered to occur primarily in males (Arnold, 1996; Gaub & Carlson, 1997; Arcia & Conners, 1998; Graetz, Sawyer & Baghurst, 2005; Beiderman et al. 2006; Bauermeister et al. 2007). The most common cited gender ratio (for community samples) appears to be 3:1 males to females (Tannock, 1998).

Although considered for many years a disorder restricted to childhood, it is now believed, by researchers and clinicians, to be carried forward into adulthood by between 30% and 70% of those people who present with the symptoms in childhood (Weiss & Hechtman, 1993; Hinshaw, 1994).

(A) ADHD Symptom Presentation (sequela) in Girls.

“Girls’ ADHD symptoms bear little resemblance to boys’” (Nadeau, Littman, & Quinn, 2003, p28).

Patricia Quinn’s (2005) many years of research at The Center for Gender Issues and ADHD has led her to conclude that ADHD has a different sequela in girls than it has in boys. Her conclusion is supported by a growing body of evidence based practice which has consistently found that ‘symptoms in girls are significantly more likely to manifest as internalized behaviors’, in contrast to the overt disruptive behaviours commonly seen and

associated with boys who have ADHD.

Research supporting the argument that girls are less likely to externalise has come from:

1. Abikoff, Jensen and Arnold (2002) observed the classroom behaviour of 403 boys and 99 girls with ADHD. Their findings reveal that boys with ADHD engage in more rule breaking behaviour and externalizing impulsive behaviours (disruptive behaviour disorders) than did girls with ADHD.
2. Gershon (2002) completed a meta-analysis on gender differences in ADHD. He concluded that girls with ADHD manifest significantly fewer externalizing problems than boys with ADHD.
3. Additional supporting evidence for lower levels of externalizing behaviour in particular lower levels of hyperactivity and fewer conduct disorders in girls with ADHD in comparison to boys with the disorder has come from a wide range of studies (Berry, Shaywitz, & Shaywitz, 1985; Bauermeister, Canino & Bird, 1994; Wolraich, Hannah, Pinnock & Baumgaertel, 1996; Bauermeister et al. 2007; Quinn, 2005; & Nadeau, Quinn & Littman, 2006).

Research supporting the argument that girls are more likely to internalise has come from:

4. Quinn (2005) lists the more typical internalized behavioural symptoms of ADHD in girls as: forgetfulness, disorganization, low self esteem, anxiety and demoralization. She adds that hyperactivity in girls is more likely to manifest as hyper talkativeness or emotional reactivity rather than motor activity.
5. Additional research findings supporting this view that ADHD sequela in girls predominantly presents as internalized behaviours have come from a wide range of international studies (Barkley, 1998; Gaub & Carlson, 1997, Robins & Price, 1991; Zoccolillo, Pickles, Quinton & Rutter, 1992).

Neuropsychological Performance

It is widely hypothesized that cognitive deficits and in particular impairments in attention and executive function (organizing, planning, following through etc) are at the very core of ADHD (Sykes & Douglas, 1973; Barkley et al., 1992). However in their meta analytic review Gaub and Carlson (1997) drew attention to the fact that very few studies have reported on the neuropsychology of girls with ADHD. This state of affairs is in direct contrast to the large number of studies of boys with ADHD which have included both attention and executive function measures (Barkley et al., 1992).

Findings from the small number of studies exploring executive function in girls with ADHD completed since 1999 have been included here. Whilst recent studies have generally provided evidence of executive dysfunction in girls with ADHD, however the shortage of systematic reporting across each of the three ADHD subtypes is noteworthy.

1. Klorman et al. (1999) reported that girls with ADHD-CT showed clear executive function deficits whilst girls with ADHD-I did not.
2. A year later Castellaneous et al. (2000) found clear evidence of executive function deficits.
3. Similarly Hinshaw (2001) found clear executive function deficits in girls with ADHD-CT and ADHD-I, with slightly stronger degrees of executive dysfunction in the former sub group.

In summary, it appears that a clear picture of the cognitive differences and similarities between girls and boys with ADHD has not totally emerged yet. There is much research still to be conducted at the ADHD subtype level. What is clear, however is that ADHD can have a significant detrimental effect on girls' academic achievement especially if it remains unrecognized.

(B) ADHD Comorbidity in girls

The diagnosis of ADHD is often complicated because it infrequently occurs in isolation and is often accompanied by significant comorbidity. Beiderman et al. (1999) presented clear evidence that the majority of children (* data drawn from predominantly male only samples) with ADHD have at least one and sometimes more than one other additional psychiatric disorder.

However, the emergence of a clear picture of comorbidity in girls with ADHD has been considerably 'clouded' by the fact that since 1997 the majority of studies have only used clinical samples (Nolan, Volpe, Gadow & Sprafkin, 1999; Biederman et al., 2001; Hartung & Widiger, 1998; Abikoff et al., 2002).

Explanatory Notes

This has had several detrimental effects:

1. It has made generalizing findings from a clinical population to a community population tenuous.
2. By using only small numbers of girls in their clinical samples the study has compromised its ability to detect significant gender differences.
3. Finally, because it has predominantly been girls with ADHD-CT who have been referred to clinicians (Gershon, 2002) the scope or breadth of research has been artificially restricted with ADHD-I and ADHD-H subtypes essentially being neglected.

ADHD Sub Type Comorbidity in girls

Since 2005 the research design of studies into gender differences in ADHD have adopted some marked improvements. The findings from which have provided clear evidence of a strong comorbid association between ADHD and a range of internalizing disorders which will be considered here. However, of particular interest is the work of Graetz, Sawyer & Baghurst, (2005), Levy, Hay, Bennett & McStephen (2005) and Bauermeister et al., (2007) whose findings lend weight to the nascent possibility of there being gender

specific risks of co-morbid symptom expression associated with each of the three ADHD subtypes.

Anxiety Disorders

Levy et al. (2005) found evidence that comorbidity profiles differed among ADHD subtypes. They could report two significant findings firstly, that separation anxiety disorder was significantly greater in girls ADHD-I subtype. Secondly, that the prevalence of generalized anxiety disorder was significantly higher for girls with ADHD-CT subtype.

Explanatory Notes

1. *Separation anxiety disorder* is considered to be one of the most common childhood anxiety disorders, it is described as developmentally inappropriate and excessive anxiety on separating from an attachment figure (usually the primary caregiver i.e. mother, father etc)
- (2). *Generalized anxiety disorder* - exaggerated or uncontrollable anxiety, physiological arousal and or worry and is characterized by self consciousness, sleep disturbance, excessive reassurance seeking, worry and anxiety about performance and competence.

Further evidence of the comorbid association between ADHD and separation anxiety disorder in girls has come from Bauermeister et al. (2007) who found that girls with ADHD-I showed a much higher prevalence of 50% for separation anxiety disorder than did their male counterparts at 6.7 %.

Depression

The co-morbid association between ADHD and depression in girls is well documented (Brown et al. 1989; Huessy, 1990; Quinn & Nadeau, 1999; Beiderman et al., 2006; Hinshaw et al., 2005).

A growing body of research suggests that clinicians diagnose depression in girls without considering ADHD as a possible diagnosis. A recent nationwide survey in America by Harris International (2002) found that adolescent girls who had ADHD were almost three times more likely to have been treated with anti depressants before their ADHD treatment than were male adolescents with ADHD.

Similarly an earlier study found that among women who were ultimately diagnosed with ADHD, the single most common prior diagnosis they had received was that of depression (Quinn & Nadeau, 1999). Whilst it is important to recognize and treat depression it is imperative that the professional community remains alert to the possibility of underlying ADHD in both girls and women. Treating their depressive symptoms without treating their ADHD means that they will inevitably continue to struggle.

Self Esteem and Social Problems

An early study (Gaub & Carlson, 1997) found that girls with ADHD experience more peer rejection than do boys who have the disorder. Following from this other studies have shown that rejection from peers often starts at early as preschool (Berry, 1985) and increases with time (Brown et al, 1991).

One of the first studies to examine gender patterns of impairment on measures of social problems, schoolwork and self-esteem at ADHD subtype level was carried out by Graetz et al. (2005). The authors found that when the three ADHD subtypes were collapsed into one group girls rated higher on somatic complaints. However, when each of the three subtypes was considered individually gender patterns of impairment on measures of social problems, schoolwork and self-esteem did emerge. Girls and boys with ADHD-CT were rated as more impaired in most domains. In comparison, girls and boys with ADHD-I displayed less externalizing problems but had significantly more school and social problems. However, of particular interest was the finding that girls within the ADHD-I subgroup were generally more or equally impaired as those with ADHD-CT.

Learning Difficulties

In 1996 Levy et al. reported a strong association between ADHD and reading and speech problems in both girls and boys. More recently the same authors (2005) investigated reading problems among the three ADHD subtypes. Whilst they did not find gender differences, they could report that reading problems were significantly higher in the ADHD-I and ADHD-CT subtypes than in the ADHD-HI subtype.

An earlier study by Willcutt and Pennington (2000) investigated the association between reading disability and internalizing and externalizing psychopathologies respectively in a large sample of twins. They found a strong association between reading disability with internalizing behaviour was largely restricted to girls. The findings from Willcutt and Pennington and Levy et al. lend support to the view that reading and attention are related.

Recalling the finding that girls cluster in the ADHD-I sub group (Gaub & Carlson, 1997; Biederman et al., 1999; American Psychiatric Association, 2000). The findings from the work of Graetz et al., (2005) and Levy et al., in the same year, confirm that school is a difficult and potentially very damaging environment for girls with ADHD who remain undiagnosed and unsupported.

(C) Longer Term Outcomes For Girls With ADHD

Whilst there is now wide consensus that ADHD exists in girls and causes considerable impairment information regarding its long-term course is lacking. Considerably little information is known about continued symptomatology and impairment across the life span of females with ADHD. To date only a very small number of prospective long term follow up studies of girls with ADHD have been undertaken. The key findings and implications of which will be considered next.

Adolescence

In 1997 researchers from the University of California, Berkley began the first major five-

year prospective follow up study of 209 girls with ADHD into adolescence. The authors Hinshaw, Owens, Nilofar, & Fargeon (2005) described their findings as ‘surprising and discouraging’ and as providing robust evidence that five years after diagnosis in childhood ADHD portends continuing psychiatric and functional impairment during adolescence. Specifically they found that girls with ADHD had a greater risk for: substance abuse, prevalence of eating disorders, emotional problems with peers and teachers, academic difficulties and depression in adolescence than had their peers who did not have ADHD.

A year later Beiderman et al. (2006) published their findings from the second major American longitudinal study which explored the long -term psychiatric outcome of girls with ADHD. Their findings lend further weight to the Berkley study (2005); the authors reported at follow up girls with ADHD (mean age 16.7 years) were at significantly greater risk than controls to manifest: disruptive behaviour, mood and defiant disorder, and substance dependence. The magnitude of increased risk was greatest for major depression in particular bi-polar depression.

Other adolescent studies have found that childhood ADHD predicts more steeply rising symptoms of anxiety and depression during early adolescence in girls than in boys (Lahey et al. 2007) and that these same symptoms become more pronounced in the former during mid adolescent (Huessey,1990).

Eating Disorders

In a separate study Beiderman (2007) evaluated the association between ADHD and eating disorders in a population of adolescent girls. He found that adolescent girls with ADHD were 2.7 times more likely to develop anorexia nervosa and 5.6 times more likely to develop bulimia than were control girls. Beiderman’s recommendations included the caveat that when clinicians treat adolescent girls for eating disorders they should fully explore the possibility of underlying ADHD.

Teen Pregnancy

Teenage girls with ADHD either through impulsivity, an attempt to find social acceptance from others or both have typically been found to engage in sexual activity earlier than girls who do not have ADHD. Not surprisingly, they have been found to be at a significantly greater risk for teen pregnancy than are their peers who do not have the disorder (Arnold, 1996).

Early Adulthood

The first study to examine the adult outcome of girls with ADHD was undertaken by Dalsgaard and his colleagues in 2002. At the end of the study the participant mean age was 31 years. The authors drew two conclusions. Firstly, that gender was the single most important predictor for a later psychiatric admission in adulthood: essentially girls with ADHD had a significantly greater risk of psychiatric admission than boys. Secondly, of those females who were admitted as adults for psychiatric support 60% also had comorbid conduct problems. The three conduct disorder symptoms identified as carrying the highest risk for later psychiatric admission were identified as: often initiates physical fights, is often truant from school and has deliberately destroyed other's property.

In summary, all of the aforementioned studies confirm that ADHD is a significant risk factor for anti-social outcomes across the life span of females with the disorder. They also affirm the urgent need for clinicians, pediatricians, educational psychologists and educators to develop a full understanding of the developmental course and outcome of the disorder in girls and women. A coherent knowledge of the sequela and the highly associated presenting co-morbid disorders occurring with ADHD would assist with making timely and accurate diagnosis, forecasting prognosis and guide the design of effective and appropriate interventions. Similarly, from a public health perspective, being more able to predict the course of ADHD in girls would help better utilize the limited stock of available resources on those girls who are at greatest risk.

(D) Are DSM-IV Relevant Diagnostic Criteria For Girls?

There is universal recognition that the vast majority of research in ADHD has been

conducted with boys. One review of ADHD research studies found that 81% of all research participants were male, with one half of all the studies including only male participants (Hartung & Widiger, 1998). Taken together with recent findings suggesting gender differences in sequela, comorbidity patterns and long term outcomes for girls and boys with ADHD the relevance of DSM-IV as a diagnostic criteria for girls is questioned here.

Are Girls Being Missed?

ADHD prevalence rates for male to female ratios vary between 9:1 and 6:1 for clinical samples and 3:1 for community samples (American Psychiatric Association, 1987). Comparing the two ratios suggests that proportionally fewer girls with ADHD are being referred to clinics than would typically be expected.

Regarding the small number of girls that are being clinically referred and subsequently diagnosed with ADHD, there is much evidence from the field of childhood psychopathology which clearly shows that clinically referred populations are not representative of the disordered population in general. Gaub and Carlson (1997) suggest that the finding that clinically referred populations tend to be the most severely affected appears to hold true for girls with ADHD. Implicit in their suggestion is the concern that using the clinical population as the 'defining or characteristic' group may lead clinicians and other health professionals to inadvertently under diagnose girls who met the diagnostic criteria for ADHD.

In the USA informal reports document a growing trend whereby the percentage of female adults currently seeking treatment for ADHD is significantly higher than the percentage of girls who are treated for ADHD (Nadeau et al., 2006). Similarly a study of parents of children diagnosed with ADHD who reported symptoms of ADHD in themselves, undertaken by Walker in 1999 (cited in Nadeau et al., 2006), found that the number of mothers and fathers self reporting ADHD symptoms was equal. Walker's finding lends further evidence to the growing suspicion that earlier studies have significantly underestimated the number of girls with ADHD.

Biased Rating Scales?

Although numerous studies have demonstrated that girls cluster more in the ADHD-I subtype (Gaub & Carlson, 1997; Biederman et al., 1999; American Psychiatric Association, 2000) most of the standardized rating scales used by teachers and parents continue to emphasize hyperactivity and impulsivity over inattention. An informal item analysis (Nadeau et al. 2006) of the widely used Conners Teachers Rating Scale- Revised Long Version (Conners, 1997) revealed that out of a total of 59 items 23 pertained to externalizing type behaviours which are more commonly witnessed in boys. While only seven (less than 12 percent of all items) pertained to internalizing type behaviours, which are more commonly witnessed in girls. It is suggested here that the Conners Rating Scale may lack balance and the sensitivity required to reliably detect ADHD in girls.

Biased Schedule of Symptoms?

Questions regarding the possibility of bias in both the schedule and number of symptoms required to have the condition have been raised (Nadeau et al. 2006; Waschbusch & King, 2006). The concern is that if the criteria are not appropriate for girls, it leaves open the possibility that there is a substantial number of girls who have higher than average levels of ADHD behaviours relative to other girls but who fail to meet DSM –IV criteria. Waschbusch and King investigated the use of sex specific norms with 1,491 elementary students. They found that sex specific norms were effective at identifying girls who exhibited ADHD symptoms and who were significantly impaired relative to typically developing girls but whom did not meet DSM-IV criteria. The results from their study support the proposition that lower thresholds may be needed to identify DSM-IV symptoms in girls (Barkley, 1995; Hindshaw, 2002) and that the DSM-IV criteria count may under identify girls who have ADHD and who might benefit from further assessment and intervention.

Inappropriate Age Restriction?

For many girls with ADHD neither the presentation of symptoms or cognitive impairment manifest until puberty (Nadeau et al. 2006). This finding has called into question the *DSM-IV* criteria requirement that the age of onset should be before the age of seven. It has been recommended that this criterion should be raised to the age of 13 (Beiderman & al. 1997).

Rater Bias?

Teacher and parent ratings constitute the core informants in the diagnostic process. However there is clear evidence which shows that often teachers and parents and frequently both parents strongly disagree regarding the presence of particular symptoms (NIHM Consensus Development Conference, 1998). It has been shown that often girls who were overlooked by their teachers were identified by their parents as having ADHD symptoms. This has led to speculation that the difference in judgment emanates from the fact that both parents and teachers use different comparative groups as a baseline, parents tend to use other female siblings whilst teachers use classmates half of which are usually boys (McGee & Feehan, 1991)(cited in Nadeau et al. 2006).

Concluding Remarks

To date most of the early research into girls with ADHD has been on girls who meet *DSM-IV* diagnostic criteria and compared them with boys using the classically male based criteria of hyperactivity, impulsivity and inattentiveness. This initial research has shown itself to be an important and necessary first step in allowing clinicians, pediatricians and psychologists to start to understand ADHD in girls. However it is imperative that it is replaced with research that specifically explores gender differences and provides a true picture of what life is like for girls with ADHD. To achieve this research must broaden out to include large numbers of female participants recruited from community samples who represent all three of the ADHD subgroups. Similarly there is an urgent need for more longitudinal research that will provide normative and developmental information regarding when and how the ADHD sequela and related comorbidities manifest, interact and change with time. Of equal urgency is the need to

have appropriate standardized diagnostic tools and criteria that take subtle and internalized patterns of behaviour into account. At the very least *DSM-IV* needs to be adapted to include the sequela more common to girls with ADHD, at most it may be prudent to consider introducing sex specific norms.

The title of this document included the question, ‘ What do we understand about girls with ADHD?’ The short answer is ‘not nearly enough’.

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