



Neuropsychiatric and Social Consequences of Attention Deficit Hyperactivity Disorder in Females

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Abstract

Attention-deficit/hyperactivity disorder (ADHD) has been under-recognised and under-diagnosed in females until recently. As a result, females often navigate years of symptoms without appropriate support, sometimes contributing to adverse outcomes for them and for those who try to support them. This perspective describes the lived experience of females with ADHD in their own words and explores and explains the challenges they face while growing up and living with ADHD. We address the potential adverse consequences they face, and their predictors, along with differences in the neurobiology between ADHD and neurotypical females. We discuss the physical and psychological comorbidity, altered cognition and coordination, and the generalised hypersensitivity that they often experience. We examine impairments in empathy and emotional connectivity associated with ADHD, and the effects of masking which is much commoner in females. We consider implications for increased self-harm, suicidality, conflict, and criminal conviction among ADHD females, offering suggestions as to how these risks may be mitigated. Whilst some of these issues also apply to males with ADHD, this narrative review specifically emphasises issues that most often affect females, as their experiences, perspectives and needs have been largely overlooked until recently.

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Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder marked by an ongoing pattern of inattention and/or hyperactivity-impulsivity that interferes with function and/ or development. ADHD affects between 5-10 % of children, but its prevalence falls to 3% in adults [1]. There is a marked male preponderance in adolescence, but the gender ratio is more even in adults [2][3]. Furthermore, under-diagnosis in females is well-recognised and relates to their more subtle presentation with less overt hyperactivity, reduced fidgeting, and lower pressure of speech, leading to a later age at diagnosis in general among females. However, anxiety, depression and emotional lability are more common among young females than males with ADHD [4][5][6]. Impulsivity and self-harm [7] are common features, and they may also fulfil criteria for emotionally unstable personality disorder [8] with a high risk of other significant mental health difficulties [5]. Indeed, the diagnosis of ADHD in females may be delayed [9][10] because of inter-personal conflict with anger, argument, and mood changes [11][12]. If these features do attract a diagnosis of personality disorder, this may in turn delay referral, diagnosis and the availability of supportive treatment at a crucial stage of their development [13]. This article explores the challenges identified by females with ADHD, initially in their own words, and then through a comprehensive review of the literature. We consider the implications for increased rates of self-harm, suicidality, conflict, and criminal conviction among ADHD females, offering some suggestions as to how these risks may be mitigated by

greater insight and awareness amongst those to whom they may turn for support.

Methods

Initially we held informal meetings with a panel of ten females with a diagnosis of ADHD and asked them to identify the issues they struggled with most. We asked them to describe their lived experiences of ADHD in their own words and distilled the most common phrases and concerns expressed by the panel. We then identified the ten most common areas of concern they expressed which we used to develop our topic headings for a focussed literature review. Finally, we explored therapeutic options and identified future priorities for clinical research and development.

Results

Lived experience

ADHD females often said that they feel that they are trying harder but with less initial success than others. They described feeling that they constantly switch between channels without having control of the remote. They perceived themselves as being weird or odd-ball, and they often feared, and ultimately experienced, both alienation and abandonment by others. They felt unable to contain and communicate their feelings accurately, despite often having otherwise excellent linguistic skills. ADHD females said they commonly relied on extensive lists and the establishment of fixed, and sometimes punitive, alternating regimes of work and exercise. Distraction by a special interest or obsession from focussing on priorities was a common issue. ADHD females reported taking longer to learn to ride a bicycle, catch a ball or to use a keyboard. ADHD females admitted finding it difficult to tolerate other people's failings, whilst being extremely sensitive to perceived criticism of themselves. Finding the correct emotional thermostat did not appear to come naturally to many ADHD women. They described rage precipitated by minor issues but feeling little emotion on learning of the death of a family member. Difficulty in responding appropriately and consistently to daily events was often reported. They might phone a friend if they misplaced keys or were given a free coffee but could forget to share the outcome of important exams or crucial interviews with family members. Generally, females with ADHD felt that they were better than males at hiding the challenges they faced. They often channelled hyperactivity into sporting activity and used this to reduce anxiety and improve connectivity with others. They also used the ability to hyperfocus on special interests to develop expertise in areas which also increased their ability to relate to others with similar interests. These approaches, when combined with masking, led to a delayed diagnosis.

Literature Review

Emotions and empathy

ADHD females typically feel intense emotions but often struggle to understand and verbalise them. Many have features of alexithymia [14] which reflects difficulty in understanding and sharing emotions [15]. This may lead friends and family to interpret their difficulties with expressing empathy as disinterest or disengagement. This is often not the case, but the ADHD female may find that fear of abandonment causes difficulty in making or maintaining healthy relationships [16][17][18][19][20][21][22]. Alexithymia is strongly associated both with the lack of reciprocal relationships and the presence of manipulative behaviour and sadism [23]. The perceived reduction in empathy appears to be a function of alexithymia which applies to both cognitive and emotional empathy [24]. A reduction in interoceptive awareness has also been attributed to alexithymia and it is hardly surprising that if one struggles to understand one's own physical and emotional experiences, this has an adverse effect on overall well-being as well as on relationships with others [25]

If emotions become internalised, this process may be associated with self-harm [26][27]. However, some females with ADHD try to develop a 'protective shell' and can subsequently be perceived as negative, manipulative and narcissistic [14][15]. Alternatively, they may externalise their feelings and project them onto others in the form of argument, anger and aggression [28]. In the absence of insight, this can lead to major issues, both for these women and for those that support them. There is a dearth of research into the factors that precipitate such dysfunctional outcomes which may be a consequence of disordered resilience [29] through lack of appropriate support and understanding. This is an area which we are presently investigating in greater detail as it is important to diagnose ADHD in females earlier than we have previously so that intervention might help mitigate the unwanted consequences. Increasing awareness of possible presenting features of ADHD in females among teachers, parents and the police might aid in this aim.

Growing up

Puberty is a very challenging time for ADHD females, and they may struggle to understand complex social and emotional interactions or to resolve interpersonal conflict. Teenage ADHD females more often report feeling bullied [16] and victimised [17] compared to peers. Teenagers with ADHD describe difficulty making and maintaining friendships and they may feel rejected [18] with connectivity issues among both friends and family [19] persisting into adulthood [20]. Internalisation of feelings and dysfunctional coping [21][22][23] can precipitate self-harming behaviours [26], substance abuse and eating disorders, most commonly binge eating with bulimia or avoidant restrictive food intake disorder (ARFID) [27]. Throughout puberty and early adulthood, risk taking behaviour is increased and is likely related to hyperactivity and impulsivity [28]. ADHD females are often sexually active earlier and report more sexual partners than their peers, making them vulnerable to increased risks of teenage pregnancy and sexually acquired disease [29]. Unsatisfactory romantic experiences are common [30] among ADHD females and can further reduce self-esteem [31]. Psychosexual concerns are frequently expressed by ADHD females, which along with features arising from difficulties coping, often combine to produce a sense of negativity and pessimism [28][29][30][31].

Early adulthood

Some ADHD females might compensate in early adult life through maladaptive coping strategies such as acting out or

behaving in ways that are perceived as socially inappropriate [28]. Over-compensating or camouflaging their challenges may allow them to maintain superficial friendships, keep focus and disguise distress. However, such behaviour hides and internalises their difficulties and they may rely on alcohol or drugs to facilitate social contact. They may feel forced to choose between avoiding people and problems on one hand, or risking forming difficult friendships and dangerous liaisons with individuals who may facilitate unsafe practices or encourage criminal activity on the other [28][29]. This may put them at risk of exploitation and can embed the concept of vulnerability and victimhood in their psyche. Such a sequence of adverse outcomes appears to be more likely if ADHD females also report prior experience of early childhood trauma [32], especially emotional invalidation from parents [28][32]. If ADHD in females does increase the risk of evolving behaviours producing presentations which could subsequently be diagnosed as a personality disorder [29][33], it seems plausible that early identification of those at greatest risk might reduce the later development of these complications [33].

Risk of adverse outcomes, conflict and crime

Difficulties resulting from maladaptive behaviours often extend into adult life and may impede personal and professional progress if educational, familial, financial or criminal problems develop [20][34][35]. Lifetime hazard ratios (HR) are much greater in ADHD females for being diagnosed with anti-social disorders (HR 7.2), mood disorders (HR 6.3), eating disorders (HR 3.5), developmental disorders (HR 3.2), addiction (HR 2.7) and anxiety (HR 2.3) when compared to neurotypical females [36]. There is also an increase in oppositional defiance [8], conduct disorder [37] and criminal activity [38] among ADHD females, who are at greater risk of committing crimes compared with their peers due to ADHD characteristics such as impulsivity [39][40]. One study showed that convictions in ADHD females were eighteen times greater than that among the general population [37]. Indeed, the prevalence of ADHD in female prison populations is estimated at 25% and this is likely to be an underestimate because of delayed or missed diagnoses [36]. Differentiating ADHD from personality disorders may be difficult given the high rates of overlapping features and diagnoses between these conditions but this is especially important for females in the criminal justice setting [41]. The relatively high social skills exhibited by females with ADHD produce less overt conduct problems in early life, which can contribute towards the diagnosis being delayed or missed. This can increase the risk of later secondary personality disorders among females. Health care professionals need to better understand the influence of ADHD on female behaviour in this setting to ensure more effective and appropriate support and outcomes for all concerned.

Positive aspects of female ADHD

ADHD also produces several specific positive traits, including considerable capacity for innovation and creativity [42]. ADHD females can often think out of the box and come up with a range of new ideas to solve old problems. Hyperfocus facilitates fulfilment of this potential, and they may excel in both arts and sciences [43]. ADHD females often exhibit a prodigious capacity for learning, studying, and working: they can achieve great insights into specialised topics when 'switched on'. However, they can be so driven by hyperfocus that they describe forgetting to eat regularly, having erratic sleep patterns [44], and difficulty in focussing on completing tasks because they run so many different projects that executive functioning becomes a challenge [45]. Their ability to channel the excess energy generated by hyperactivity often

allows them to participate, and even excel, in sporting activities which can help to camouflage or mitigate the social difficulties that they encounter. Regular activity can also help to reduce their anxiety, while the need to control their actions and interactions is often a powerful motivating factor in maintaining a fixed daily routine.

Comorbid health conditions

ADHD is highly inheritable in both males and females with recent genetic studies revealing aspects of the biological basis of ADHD [46]. The structure and function of the brain differs between ADHD and neurotypical females [47]. Neurological differences extend to the peripheral and autonomic nervous systems [48]. Some of the imbalance in central neuronal activity appears to be driven by low dopamine levels [49] and a need to seek physical or cerebral stimulation to drive them back up via adrenaline release. There is evidence that the normal circadian cortisol rhythm is not directly impaired in adults [50], but it is reduced in children [51]. Sleep impairment is common and may contribute to tiredness [44]. Fatigue may result if illness, stress or lifestyle changes make demands on the hypothalamic pituitary adrenal (HPA) axis that it cannot meet, resulting in an impaired adrenal flight or fight response. This can evolve from initial impulsivity, through anxiety, ultimately resulting in fatigue, brain fog and chronic pain [52].

Fibromyalgia is a common complication of ADHD and autism in females [53][54] and is partially mediated by joint hypermobility [55]. Many ADHD females also report migraine and irritable bowel syndrome as comorbid chronic pain syndromes [56]. Some experience body dysmorphia while many describe gender dysphoria as a frequent accompaniment, both often being associated with higher levels of chronic pain. Dysfunction of the autonomic nervous system can produce a wide range of vascular, cardiac, respiratory, gastrointestinal, urinary and sexual problems [57]. Cardiovascular features include vasospasm, with migraine and Raynaud's phenomenon, while postural orthostatic tachycardia syndrome (POTS) is common, as is bronchospasm triggered by cold or chemicals. Gastrointestinal features include irritable bowel syndrome, while urinary frequency, dysuria and dyspareunia are all frequently reported [58]. In addition, mast cell activation (MCA) is regularly triggered at low thresholds by a myriad of stimuli. Skin rashes such as eczema, urticaria or hives are common, but MCA may also contribute to a wide range of internal organ dysfunction. Its role in mediating both physical and psychological symptomatology in ADHD in females is presently a subject of increasing interest [59].

Cognition and coordination

Problems with cognition are often reported by ADHD females [60]. These include executive dysfunction as well as impairments in other cognitive domains such as difficulties with face recognition, slower reaction times and inconsistent responses to similar scenarios [61]. There is evidence that ADHD in females may be associated with impairment in intellectual functioning in some cases [62]. Memory also appears to function differently in ADHD females [63]. Short term recall may be described as patchy while recollection of past events is often preserved if not heightened [64]. Balance and coordination are often impaired, as is spatial awareness, due to co-existing dyspraxia or developmental coordination disorder which is comorbid with ADHD in 50% of cases [65].

Hypersensitivity

Hypersensitivity is a common theme in female ADHD and applies to a range of both physical and emotional experiences [66] often precipitating rejection sensitive dysphoria [67]. Trouble regulating emotions may lead to a disproportionate fear of rejection and an overinterpretation of others' intentions. High levels of impulsivity and reduced interoception may exacerbate this tendency and increase the risk of an adverse outcome. Camouflaging these issues to fit in with the neurotypical majority offers a superficial short-term solution for some but typically increases anxiety [68]. Many young people with ADHD report that their condition persistently and adversely affects their psychosocial function [60] and this is more likely among females [69]. Those exposed to conflict early in life appear to be at greater risk [10][70]. Feeling inadequate or ashamed with low self-esteem may drive a desire to try even harder for acceptance by others but seeking positive reinforcement and validation can lead to emotional instability and risky behaviour [71]. There is potential for vulnerability to serious self-harm [22][23][24] or addiction [72] if rejection is received or perceived, or if they believe they are becoming a burden to others [22][36]. Interestingly, ADHD females also exhibit a high rate of justice sensitivity, and they may assume the role of a protector of victims [73]. This tendency is associated with rejection sensitive dysphoria where a heightened sense of perceived injustice may produce an aggressive approach to the organisation or individual considered responsible and may ultimately lead to the assumption of a victim mentality themselves [74].

Masking and its consequences

The struggle for acceptance in a largely neurotypical world is exhausting and many ADHD females stop trying to camouflage and drop their mask. Seeking external professional help is strongly advised to avoid burnout or conflict with the consequential adverse effects for the ADHD female and their prospects [69]. The combination of early life trauma and ADHD appears to predict adverse outcomes with a high risk of conflict in adult life [75]. It is important to note that almost all the associations outlined above in relation to female ADHD are also true for autistic females or autistic individuals who are often undiagnosed into adulthood [76][77]. The potential for conflict may be greater in autistic females with ADHD, where impulsivity generated by their ADHD may contrast with the need for routine demanded by their autism. Maintaining control of their actions and interactions in this setting adds to stress, making masking increasingly difficult. Internal conflict may manifest as self-harm, while external conflict may contribute to relationship difficulties and precipitate actions which others deem unacceptable [70][75].

Overlap with other neurodivergent conditions

The rates of co-occurrence of ADHD and autism are reported to range up to 86% [77], with some researchers suggesting that there is a combined phenotype [78] or even that there is no biological or construct validity for autism to be considered as distinct from ADHD and other neurodevelopmental presentations [79][80]. The concept of neurodivergence is at the forefront of current psychological and psychiatric research, encompassing ADHD, autism, and other neurodevelopmental differences (e.g., dyslexia, dyspraxia, etc) [81], all of which have been shown to be both extremely heterogeneous and to commonly overlap, co-occur, or share genetic risk [82]. It is important, therefore, that research, support and understanding

for ADHD in females is embedded within this broader conceptualisation and awareness of the overlaps with similar neurodevelopmental differences, and that such presentations are not assumed to be mutually exclusive.

Discussion

In terms of intervention and support, Cognitive Behavioural Therapy (CBT) and psychotherapy such as Acceptance and Commitment Therapy (ACT) are often helpful, especially for females [83] while stimulants can improve concentration and facilitate the completion of tasks [84]. Some evidence already exists to guide successful therapeutic interventions and reduce adverse psychosocial outcomes. ADHD females are less likely to receive treatment with stimulants than are ADHD males [85], and treatment is usually commenced later in life [86]. Early diagnosis and therapy are likely to improve long-term outcomes across all domains [75][76]. A reduction in serious mental health difficulties has been recorded in females treated early with stimulants for ADHD [87], while stimulants have also been reported to improve outcomes across both occupational and educational [86] endpoints. However, adherence to therapy for all can be a major issue [88] and this appears to be true for ADHD females [89]. A recent systematic review of the role of CBT recognises this and offers detailed guidance [90].

Female offenders have a high rate of ADHD [91], and this is most marked among those convicted of serious offences [92]. These issues often commence relatively early in life and may relate to a failure to recognise and accept responsibility for repeated offences of a similar nature. This appears to associate with difficulties in social judgement and emotional adjustment, along with stubborn adherence to a conviction that their actions are somehow justified, in the absence of corroborative evidence [34]. In addition to reducing risks of criminal conviction, ADHD females may find that CBT improves executive dysfunction and reduces both self-harm in children [36] and actions which harm others in adults [93]. Specific individualised therapy may be needed to address more complex issues [94][95]. It is essential to reinforce strengths and achievements rather than focus exclusively on difficulties and challenges during therapy.

Future priorities

The aim of this article is to offer an insight into the challenges faced by females with ADHD. Further research is needed to understand the factors that increase the risk of poor outcomes for some ADHD females. Understanding why suicide is more common in young women with ADHD [96] is a priority, as is insight into the association between ADHD and addiction and obsession [97]. Comparing female with male attitudes, understanding sexual behaviours as well as vulnerabilities to victimisation, assault, and bullying may help to clarify these issues. Appreciating the subtle features of female ADHD, the greater tendency towards internalisation and masking, and the influence of trauma in early life are all important elements that require further exploration. Ultimately therapeutic intervention must improve outcomes for ADHD females, along with those who care for them, and for society in general. Further data to guide specific intervention among those ADHD females with a conflict-orientated approach would be especially welcome.

All authors have either direct lived experience of being neurodivergent or have extensive experience of working with and supporting neurodivergent females across the age spectrum.

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