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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 are close to them. This perspective explores the relationship between ADHD and early life trauma and examines the consequences of this combination for females in their later lives with regards to mental and physical health, along with social function. We discuss the increased risks of self-harm and of criminal behaviour associated with female ADHD and offer some suggestions as to how these risks can be mitigated in the future.

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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 and emotional lability are more common among young females than males with ADHD ^{[4][5][6]}. ADHD females often feel they are trying harder but with less initial success than others. They describe feeling that they constantly switch between channels without having control of the remote. They may perceive themselves as being weird or odd-ball, and they often fear, and may ultimately experience, both alienation and abandonment by others. Impulsivity and self-harm ^[7] are common features and they may also fulfil criteria for emotional instability disorder ^[8] with a high risk of other significant mental health difficulties^[9]. Indeed, the diagnosis of ADHD in females may be delayed ^{[10][11]} because of inter-personal conflict with anger, argument, and mood changes ^{[12][13]}. If these features do attract a diagnosis of personality disorder, this may in turn delay accurate diagnosis and the availability of appropriate supportive treatment ^[14].

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. ADHD females more often report feeling bullied ^[15] and victimised ^[16]. Teenage girls with ADHD diagnoses describe difficulty making and maintaining friendships and they may feel rejected ^[17] with connectivity issues among both friends and family^[18] persisting into adulthood ^[19]. Internalisation of feelings and dysfunctional coping ^[20] can precipitate self-harming behaviours ^[21], substance abuse and eating disorders, most commonly either binge eating with bulimia or avoidant restrictive food intake disorder (ARFID) ^[22]. Throughout puberty and early adulthood, risk taking behaviour is increased and is likely related to hyperactivity and impulsivity ^[23]. 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. Unsatisfactory romantic experiences are common ^[24] among ADHD females and can further reduce self-esteem^[23]. 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 ^[25].

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 [26]. Over-compensating or camouflaging their challenges may allow them to superficially maintain 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 [26]. 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 [27], especially emotional invalidation from parents [28]. If ADHD does increase the risk of evolving behaviours and presentation which could subsequently be identified as a personality disorder in females [29], it seems plausible that prompt identification of those at greatest risk might reduce the later development of these complications [30].

Risk of adverse outcomes

Such difficulties often extend into adult life and may impede personal and professional progress by causing educational, familial, financial and criminal problems [31][32]. 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 [33]. There is also an increase in oppositional defiance [34], conduct disorder [35] and criminal activity [36] among ADHD females, who are at greater risk of committing crimes compared with their peers due to ADHD characteristics such as impulsivity [37][38]. One study showed that convictions in ADHD females were eighteen times greater than that among the general population [39]. 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 [33]. Differentiating ADHD from personality disorders may be difficult given the high rates of overlapping features and diagnoses between these conditions [40] but this is especially important for females in the criminal justice setting. We 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 [41]. 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 [42]. ADHD females can have a prodigious capacity for work and may achieve great insights into specialised topics when 'switched on'. However, they can be so driven by hyperfocus that they forget to eat regularly, sleep patterns may become erratic [43], and focus on completing tasks may become difficult because they run so many different projects that executive functioning becomes a challenge [44]. ADHD females commonly rely 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 can be an issue.

Neurobiology

The structure and function of the brain differs between ADHD and neurotypical females^[45]. Neurological differences extend to the peripheral and autonomic nervous systems^[46]. Some of the imbalance in central neuronal activity appears to be driven by low dopamine levels^[47] 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^[48], but it is reduced in children^[49]. Sleep impairment is common and may contribute to tiredness^[50]. 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^[51].

Comorbid conditions

Fibromyalgia is a common complication of ADHD in females^{[52][53]} and is partially mediated by joint hypermobility^[54]. Many ADHD females also report migraine and irritable bowel syndrome as comorbid chronic pain syndromes. Some experience body dysmorphia while gender dysphoria is a frequent accompaniment, often associated with higher levels of chronic pain. The autonomic nervous system can produce a wide range of vascular, cardiac, respiratory, gastrointestinal, urinary and sexual problems^[55]. 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^[56]. 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^[57].

Cognition and coordination

Problems with cognition are often reported by ADHD females^[58]. 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^[59]. There is evidence that ADHD in females may be associated with impairment in intellectual functioning in some cases^[60]. Memory also appears to function differently in ADHD females^[61]. Short term recall may be described as patchy while recollection of past events is often preserved if not heightened^[61]. Balance and coordination are often impaired and ADHD females may describe taking longer to learn to ride a bicycle and to use a

keyboard.

Hypersensitivity

Hypersensitivity appears to be a common theme in female ADHD and applies to a range of both physical and emotional experiences. ADHD females may find it difficult to tolerate other people's failings, whilst being extremely sensitive to perceived criticism of themselves, often experiencing rejection sensitive dysphoria [62]. Indeed, finding the correct emotional thermostat does not appear to come naturally to many ADHD women. They may phone if they misplace keys or are given a free coffee but may forget to share the outcome of important exams or crucial interviews. Camouflaging these issues to fit in with the neurotypical majority offers a superficial short-term solution for some but typically increases anxiety [63]. Many young people with ADHD find their condition persistently and adversely affects their psychosocial function [64] and this is more likely among females [65][66]. Those exposed to conflict early in life appear to be at greater risk [21][67]. 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 [23]. There is potential for vulnerability to serious self-harm [68] or addiction [69] if rejection is received or perceived, or if they believe they are becoming a burden to others [21][33].

Emotions and empathy

ADHD females typically feel intense emotions but often struggle to understand and verbalise them. They be unable to contain and communicate their feelings accurately, despite often having otherwise excellent linguistic skills. Many have features of alexithymia [70] and may find it difficult to understand how others feel. 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 [17][18][19][20][21]. If emotions become internalised, this process may be associated with self-harm [68]. However, some females with ADHD try to develop a 'protective shell' and can subsequently be perceived as negative, manipulative and narcissistic [70]. Alternatively, they may externalise their feelings and project them onto others in the form of argument, anger and aggression [71]. 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 [72] through lack of appropriate support and understanding.

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. The combination of early life trauma and

ADHD appears to predict adverse outcomes with a high risk of conflict in adult life [73]. 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. The rates of co-occurrence of ADHD and autism are reported to be as high as 86% [74], with some researchers suggesting that there is a combined phenotype [75] or even that there is no biological or construct validity for autism to be considered as distinct from ADHD and other neurodevelopmental presentations [76][77]. The concept of neurodiversity is at the forefront of current psychological and psychiatric research, encompassing ADHD, autism, and other neurodevelopmental differences (e.g., dyslexia, dyspraxia, etc) [78] all of which have been shown to be both extremely heterogeneous and to commonly overlap, co-occur, or share genetic risk [79]. 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.

Therapeutic options

In terms of intervention and support, talking therapies such as Cognitive, Analytical or Behavioural therapy (CBT) are often helpful and mindfulness has been shown to be beneficial, especially for females [80] while stimulants can improve concentration and facilitate the completion of tasks [81]. 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 [82], and treatment is usually commenced later in life [83]. Early diagnosis and therapy are likely to improve long-term outcomes across all domains. A reduction in serious mental health difficulties has been recorded in females treated with stimulants for ADHD [84], while stimulants have also been reported to improve outcomes across both occupational and educational [85] endpoints.

Conflict and conviction

However, adherence to therapy can be a major issue [86] and this appears to be especially true for ADHD females [87]. A recent systematic review of the role of CBT recognises this and offers detailed guidance [88]. Female offenders have a high rate of ADHD [89], and this is most marked among those convicted of serious offences [90]. These issues often commence relatively early in life and may be associated with a failure to recognise and accept responsibility for repeated offences of a similar nature. This appears to relate to 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 [91]. In addition to reducing risks of criminal conviction, ADHD females may find that CBT improves executive dysfunction and reduces both self-harm in children [24] and actions which harm others in adults [92]. Specific individualised therapy may be needed to address more complex issues [93][94]. It is essential to reinforce strengths and achievements rather than focus exclusively on difficulties and challenges during therapy.

Future priorities

Further research is needed to understand the factors increase the risk of poor outcomes for some ADHD females. 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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References

1. [^] Bitsko RH, Claussen AH, Lichstein J, et al. Mental health surveillance among children—United States, 2013-2019. *MMWR Suppl.* 2022;71(2):1-48.
2. [^] Danielson ML, Holbrook JR, Newsome K., Charania SN, McCord RF, Kogan MD, Blumberg SJ. State-level estimates of the prevalence of parent-reported ADHD diagnosis and treatment among U.S. children and adolescents, 2016-2019. *Journal of Attention Disorders*, published online May 22, 2022
3. [^] Bramham J, Murphy DGM, Xenitidis K, Asherson P, Hopkin G, Young S. Adults with attention deficit hyperactivity disorder: An investigation of age-related differences in behavioural symptoms, neuropsychological function and co-morbidity. *Psychol Med.* 2012; 42:2225-34.
4. [^] Gershon J. A Meta-Analytic Review of Gender Differences in ADHD. *J Atten Disord.* 2002; 5:143-54.
5. [^] Cortese S, Faraone SV, Bernardi S, Wang S, Blanco C. Gender differences in adult attention-deficit/hyperactivity disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *J Clin Psychiatry.* 2016;77:e421-8.
6. [^] Mowlem F, Agnew-Blais J, Taylor E, Asherson P. Do different factors influence whether girls versus boys meet ADHD diagnostic criteria? Sex differences among children with high ADHD symptoms. *Psychiatry Res.* 2018;2019(272): 7653 <https://doi.org/10.1016/j.psychres.2018.12.128>.

7. [^]Edvinsson D, Lindström E, Bingeors K, Lewander T, Ekselius L. Gender differences of axis I and II comorbidity in subjects diagnosed with attention-deficit hyperactivity disorder as adults. *Acta Neuropsychiatr.* 2013;25:165-74.
8. [^]Stepp SD, Burke JD, Hipwell AE, Loeber R. Trajectories of attention deficit hyperactivity disorder and oppositional defiant disorder symptoms as precursors of borderline personality disorder symptoms in adolescent girls. *J Abnorm Child Psychol.* 2012;40:7-20.
9. [^]Cortese S, Faraone SV, Bernardi S, Wang S, Blanco C. Gender differences in adult attention-deficit/hyperactivity disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *J Clin Psychiatry.* 2016;77:e421-8.
10. [^]Cortese S. The neurobiology and genetics of Attention-Deficit/Hyperactivity Disorder (ADHD): What every clinician should know. *Eur J Paediatr Neurol.* 2012;16:422-33 <https://doi.org/10.1016/j.ejpn.2012.01.009>.
11. [^]Quinn P. Gender differences in ADHD. In: Buitelaar JK, Kan CC, Asherson P, editors. *ADHD in Adults: Characterization, Diagnosis, and Treatment.* Cambridge: Cambridge University Press; 2011.
12. [^]Shaw P, Stringaris A, Nigg J, Leibenluft E. Emotion Dysregulation in Attention Deficit Hyperactivity Disorder. *Am J Psychiatry.* 2014;171:276-93.
13. [^]Corbisiero S, Mörsstedt B, Bitto H, Stieglitz R-D. Emotional Dysregulation in Adults With Attention-Deficit/Hyperactivity Disorder-Validity, Predictability, Severity, and Comorbidity. *J Clin Psychol.* 2017;73:99-112 <https://doi.org/10.1002/jclp.22317>.
14. [^]Sciotto MJ, Nolfi CJ, Bluhm C. Effects of child gender and symptom type on referrals for ADHD by elementary school teachers. *J Emot Behav Disord.* 2004;12:247-53.
15. [^]Holmberg K, Hjern A. Bullying and attention-deficit-hyperactivity disorder in 10-year-olds in a Swedish community. *Dev Med Child Neurol.* 2008;50:134-8.
16. [^]Sciberras E, Ohan J, Anderson V. Bullying and peer victimisation in adolescent girls with attention-deficit/hyperactivity disorder. *Child Psychiatry Hum Dev.* 2012;43:254-70.
17. ^{a, b}Nijmeijer JS, Minderaa RB, Buitelaar JK, Mulligan A, Hartman CA, Hoekstra PJ. Attention-deficit/hyperactivity disorder and social dysfunctioning. *Clin Psychol Rev.* 2008;28:692-708.
18. ^{a, b}Babinski DE, Pelham WE, Molina BSG, Gnagy EM, Waschbusch DA, Yu J, et al. Late adolescent and young adult outcomes of girls diagnosed with ADHD in childhood: An exploratory investigation. *J Atten Disord.* 2011;15:204-14.
19. ^{a, b}Barkley RA, Fischer M. The unique contribution of emotional impulsiveness to impairment in major life activities in hyperactive children as adults. *J Am Acad Child Adolesc Psychiatry.* 2010; 49:503-13 <https://doi.org/10.1016/j.jaac.2010.01.019>.
20. ^{a, b}Young S, Heptinstall E, Sonuga-Barke EJS, Chadwick O, Taylor E. The adolescent outcome of hyperactive girls: Self-report of psychosocial status. *J Child Psychol Psychiatry Allied Discip.* 2005; 46:255-62.
21. ^{a, b, c, d}Swanson EN, Owens EB, Hinshaw SP. Pathways to self-harmful behaviors in young women with and without ADHD: A longitudinal examination of mediating factors. *J Child Psychol Psychiatry Allied Discip.* 2014;55:505-15.
22. [^]Kaisari P, Dourish CT, Higgs S. Attention deficit hyperactivity disorder (ADHD) and disordered eating behaviour: a systematic review and a framework for future research. *Clin Psychol Rev* (2017) 53:109-21. [doi:10.1016/j.cpr.2017.03.002](https://doi.org/10.1016/j.cpr.2017.03.002)

23. ^{a, b, c}Quinn PO, Madhoo M. A review of attention-deficit/hyperactivity disorder in women and girls: uncovering this hidden diagnosis. *Prim Care Companion CNS Disord.* 2014;16 <https://doi.org/10.4088/PCC.13r01596>.
24. ^{a, b}Bruner MR, Kuryluk AD, Whitton SW. Attention-deficit/hyperactivity disorder symptom levels and romantic relationship quality in college students. *J Am Coll Heal.* 2015;63:98-108.
25. [^]Gudjonsson GH, Sigurdsson JF, Eyjolfssdottir GA, Smari J, Young S. The relationship between satisfaction with life, ADHD symptoms, and associated problems among university students. *J Atten Disord.* 2009;12:507-15.
26. ^{a, b}Quinn PO, Madhoo M. A review of attention-deficit/hyperactivity disorder in women and girls: uncovering this hidden diagnosis. *Prim Care Companion CNS Disord.* 2014;16 <https://doi.org/10.4088/PCC.13r01596>.
27. [^]Gajwani, R., Minnis, H. Double jeopardy: implications of neurodevelopmental conditions and adverse childhood experiences for child health. *Eur Child Adolesc Psychiatry* (2022). <https://doi.org/10.1007/s00787-022-02081-9>
28. [^]Crowell SE, Beauchaine TP, Linehan MM. A Biosocial Developmental Model of Borderline Personality: Elaborating and Extending Linehan's Theory. *Psychol Bull.* 2009;135:495-510. <https://doi.org/10.1037/a0015616>.
29. [^]Matthies S, Philipsen A. Comorbidity of Personality Disorders and Adult Attention Deficit Hyperactivity Disorder (ADHD): Review of Recent Findings. *Curr Psychiatry Rep.* 2016;18:1-7.
30. [^]Young S, Gudjonsson GH. ADHD symptomatology and its relationship with emotional, social and delinquency problems. *Psychol Crime Law.* 2006;12:463-71.
31. [^]Barkley RA, Fischer M. The unique contribution of emotional impulsiveness to impairment in major life activities in hyperactive children as adults. *J Am Acad Child Adolesc Psychiatry.* 2010;49:503-13 <https://doi.org/10.1016/j.jaac.2010.01.019>.
32. [^]Skirrow C, Asherson P. Emotional lability, comorbidity and impairment in adults with attention-deficit hyperactivity disorder. *J Affect Disord.* 2013;147:80-6.
33. ^{a, b, c}Young, S., Adamo, N., Ásgeirsdóttir, B.B. et al. Females with ADHD: An expert consensus statement taking a lifespan approach providing guidance for the identification and treatment of attention-deficit/ hyperactivity disorder in girls and women. *BMC Psychiatry* 20, 404 (2020). <https://doi.org/10.1186/s12888-020-02707-9>
34. [^]Stepp SD, Burke JD, Hipwell AE, Loeber R. Trajectories of attention deficit hyperactivity disorder and oppositional defiant disorder symptoms as precursors of borderline personality disorder symptoms in adolescent girls. *J Abnorm Child Psychol.* 2012;40:7-20.
35. [^]Rösler M, Retz W, Yaqoobi K, Burg E, Retz-Junginger P. Attention deficit/hyperactivity disorder in female offenders: Prevalence, psychiatric comorbidity and psychosocial implications. *Eur Arch Psychiatry Clin Neurosci.* 2009;259:98-105.
36. [^]Dalsgaard S, Mortensen PB, Frydenberg M, Thomse PH. Long-term criminal outcome of children with attention deficit hyperactivity disorder. *Crim Behav Ment Heal.* 2013;23:86-98.
37. [^]Biederman J, Petty CR, Monuteaux MC, et al. Adult psychiatric outcomes of girls with attention deficit hyperactivity disorder: 11-year follow-up in a longitudinal case-control study. *The American Journal of Psychiatry.* 2010 Apr;167(4):409-417. DOI: 10.1176/appi.ajp.2009.09050736. PMID: 20080984.
38. [^]Molina BSG, Flory K, Hinshaw SP, Greiner AR, Arnold LE, Swanson JM, et al. Delinquent behavior and emerging substance use in the MTA at 36 months: Prevalence, course, and treatment effects. *J Am Acad Child Adolesc*

Psychiatry. 2007;46:1028-40 <https://doi.org/10.1097/chi.0b013e3180686d96>.

39. [^]Rösler M, Retz W, Yaqoobi K, Burg E, Retz-Junginger P. Attention deficit/hyperactivity disorder in female offenders: Prevalence, psychiatric comorbidity and psychosocial implications. *Eur Arch Psychiatry Clin Neurosci*. 2009;259:98-105.
40. [^]Young S, Gudjonsson GH, Wells J, Asherson P, Theobald D, Oliver B, et al. Attention deficit hyperactivity disorder and critical incidents in a Scottish prison population. *Pers Individ Dif*. 2009;46:265-9 <https://doi.org/10.1016/j.paid.2008.10.003>.
41. [^]Stolte M, Trindade-Pons V, Vlaming P, Jakobi B, Franke B, Kroesbergen EH, Baas M, Hoogman M Characterizing Creative Thinking and Creative Achievements in Relation to Symptoms of Attention-Deficit/Hyperactivity Disorder and Autism Spectrum Disorder. *Front Psychiatry*. 2022 Jul 1;13:909202. doi: 10.3389/fpsy.2022.909202. eCollection 2022.
42. [^]Hoogman M, Stolte M, Baas M, Kroesbergen E. Creativity and ADHD: A review of behavioral studies, the effect of psychostimulants and neural underpinnings. *Neurosci Biobehav Rev*. 2020 Dec;119:66-85. doi: 10.1016/j.neubiorev.2020.09.029. Epub 2020 Oct 6. PMID: 33035524.
43. [^]Philipsen A, Hornyak M, Riemann D. Sleep and sleep disorders in adults with attention deficit / hyperactivity disorder. *Sleep Med Rev*. 2006;10:399-405.
44. [^]Milioni ALV, Chaim TM, Cavallet M, de Oliveira NM, Annes M, dos Santos B, Serpa MH (2017) High IQ may “mask” the diagnosis of ADHD by compensating for deficits in executive functions in treatment-naïve adults with ADHD. *J Atten Disord* 21:455-464. <https://doi.org/10.1177/1087054714554933>
45. [^]Hoogman M, Bralten J, Hibar DP, Mennes M, Zwiers MP, Schweren LSJ, Jahanshad N (2017) Subcortical brain volume differences in participants with attention deficit hyperactivity disorder in children and adults: a cross-sectional mega-analysis. *Lancet Psychiatry* 4:310-319. [https://doi.org/10.1016/S2215-0366\(17\)30049-4](https://doi.org/10.1016/S2215-0366(17)30049-4)
46. [^]Bellato A, Arora I, Hollis C, Groom MJ. Is autonomic nervous system function atypical in attention deficit hyperactivity disorder (ADHD)? A systematic review of the evidence. *Neurosci Biobehav Rev*. 2020 Jan;108:182-206. doi: 10.1016/j.neubiorev.2019.11.001. Epub 2019 Nov 10. PMID: 31722229.
47. [^]Kollins SH, Adcock RA. ADHD, altered dopamine neurotransmission, and disrupted reinforcement processes: implications for smoking and nicotine dependence. *Prog Neuropsychopharmacol Biol Psychiatry*. 2014 Jul 3;52:70-8. doi:
48. [^]Bonvicini, C., Faraone, S. & Scassellati, C. Attention-deficit hyperactivity disorder in adults: A systematic review and meta-analysis of genetic, pharmacogenetic and biochemical studies. *Mol Psychiatry* 21, 872-884 (2016). <https://doi.org/10.1038/mp.2016.74>
49. [^]Isaksson J, Nilsson K, Nyberg F, Hogmark A, Lindblad F. Cortisol levels in children with Attention-Deficit/Hyperactivity Disorder. *Journal of Psychiatric Research*, Volume 46, Issue 11, 2012, Pages 1398-1405, ISSN 0022-3956. <https://doi.org/10.1016/j.jpsychires.2012.08.021>.
50. [^]Philipsen A, Hornyak M, Riemann D. Sleep and sleep disorders in adults with attention deficit / hyperactivity disorder. *Sleep Med Rev*. 2006;10:399-405.
51. [^]Sáez-Francàs N, Alegre J, Calvo N, Antonio Ramos-Quiroga J, Ruiz E, Hernández-Vara J, et al. Attention-deficit hyperactivity disorder in chronic fatigue syndrome patients. *Psychiatry Res*. 2012;200:748-53.

52. [^]Reyero F, Ponce G, Rodriguez-Jimenez R, Fernandez-Dapica P, Taboada D, Martin V, et al. High frequency of childhood ADHD history in women with fibromyalgia. *Eur Psychiatry*. 2011;26: 482-3
53. [^]Kelly C, Martin R and Saravanan V. The links between fibromyalgia, hypermobility and neurodivergence. *Touch Reviews* March 15th 2022 <https://www.touchimmunology.com/fibromyalgia/journal-articles/the-links-between-fibromyalgia-hypermobility-and-neurodivergence/>
54. [^]Casanova EL, Baeza-Velasco C, Buchanan CB, Casanova MF. The relationship between autism and Ehlers-Danlos syndromes/hypermobility spectrum disorders. *J Pers Med*. 2020;10:260.
55. [^]Jameson ND, Sheppard BK, Lateef TM, Vande Voort JL, He JP, Merikangas KR. Medical Comorbidity of Attention-Deficit/Hyperactivity Disorder in US Adolescents. *J Child Neurol*. 2016; 31:1282-1289.
56. [^]Katzman MA, Bilkey TS, Chokka PR, Fallu A, Klassen LJ. Adult ADHD and comorbid disorders: clinical implications of a dimensional approach. *BMC Psychiatry*. 2017; 17:302.
57. [^]Song Y, Lu M, Yuan H, Chen T, Han X. Mast cell-mediated neuroinflammation may have a role in attention deficit hyperactivity disorder (Review). *Exp Ther Med*. 2020 Aug;20(2):714-726. doi: 10.3892/etm.2020.8789.
58. [^]Boonstra AM, Oosterlaan J, Sergeant JA, Buitelaar JK. Executive functioning in adult ADHD: A meta-analytic review. *Psychol Med*. 2005;35:1097-108.
59. [^]Sibley MH, Swanson JM, Arnold LE, Hechtman LT, Owens EB, Stehli A, Mitchell JT (2017) Defining ADHD symptom persistence in adulthood: optimizing sensitivity and specificity. *J Child Psychol Psychiatry* 58:655-662. <https://doi.org/10.1111/jcpp.12620>
60. [^]Gaub M, Carlson CL. Gender differences in ADHD: A meta-analysis and critical review. *J Am Acad Child Adolesc Psychiatry*. 1997;36:1036-45 <https://doi.org/10.1097/00004583-199708000-00011>.
61. ^{a, b}Miller CJ, Newcorn JH, Halperin JM (2010) Fading memories: retrospective recall inaccuracies in ADHD. *J Atten Disord* 14:7-14. <https://doi.org/10.1177/1087054709347289>
62. [^]Babinski DE, Kujawa A, Kessel EM, Arfer KB, Klein DN. Sensitivity to peer feedback in young adolescents with symptoms of ADHD: examination of neurophysiological and self-report measures. *J Abnorm Child Psychol*. 2019;47(4):605-617. doi:10.1007/s10802-018-0470-2
63. [^]Kosaka H, Fujioka T, Jung M (2018) Symptoms in individuals with adult-onset ADHD are masked during childhood. *Eur Arch Psychiatry Clin Neurosci*. <https://doi.org/10.1007/s00406-018-0893-3>
64. [^]Barbaresi WJ, Colligan RC, Weaver AL, Voigt RG, Killian JM, Katusic SK. Mortality, ADHD, and psychosocial adversity in adults with childhood ADHD: a prospective study. *Pediatrics*. 2013 Apr;131(4):637-44. PMID: 23460687
65. [^]Greene RW, Biederman J, Faraone SV, Monuteaux MC, Mick E, Dupre EP, et al. Social impairment in girls with ADHD: Patterns, gender comparisons, and correlates. *J Am Acad Child Adolesc Psychiatry*. 2001;40:704-10.
66. [^]Quinn P. Gender differences in ADHD. In: Buitelaar JK, Kan CC, Asherson P, editors. *ADHD in Adults: Characterization, Diagnosis, and Treatment*. Cambridge: Cambridge University Press; 2011.
67. [^]Agnew-Blais JC, Polanczyk GV, Danese A, Wertz J, Moffitt TE, Arseneault L (2016) Evaluation of the persistence, remission, and emergence of attention-deficit/hyperactivity disorder in young adulthood. *JAMA Psychiatry* 73:713-720.
68. ^{a, b}Swanson EN, Owens EB, Hinshaw SP. Pathways to self-harmful behaviors in young women with and without ADHD: A longitudinal examination of mediating factors. *J Child Psychol Psychiatry Allied Discip*. 2014;55:505-15.

69. ^Yen JY, Liu TL, Wang PW, Chen CS, Yen CF, Ko CH. Association between Internet gaming disorder and adult attention deficit and hyperactivity disorder and their correlates: Impulsivity and hostility. *Addict Behav.* 2017;64:308-13
70. ^{a, b}Kiraz S, Sertçelik S, Erdoğan Taycan S. The Relationship Between Alexithymia and Impulsiveness in Adult Attention Deficit and Hyperactivity Disorder. *Turk Psikiyatri Derg.* 2021 Summer;32(2):109-117.
71. ^Robison RJ, Reimherr FW, Gale PD, Marchant BK, Williams ED, Soni P, et al. Personality disorders in ADHD part 2: the effect of symptoms of personality disorder on response to treatment with OROS methylphenidate in adults with ADHD. *Ann Clin Psychiatry.* 2010;22(2):94-102.
72. ^Matthies S, Philipsen A. Comorbidity of Personality Disorders and Adult Attention Deficit Hyperactivity Disorder (ADHD)—Review of Recent Findings. *Curr Psychiatry Rep.* 2016;18:1-7.
73. ^Katzman et al. Adult ADHD and comorbid disorders: clinical implications of a dimensional approach. *BMC Psychiatry* (2017) 17:302 DOI 10.1186/s12888-017-1463-3
74. ^Bougeard, C., Picarel-Blanchot, F., Schmid, R., Campbell, R. & Buitelaar, J.. (2021) 'Prevalence of Autism Spectrum Disorder and Co-morbidities in Children and Adolescents: A Systematic Literature Review', *Frontiers in psychiatry*, 12pp. 744709-744709.
75. ^Craig, F., Lamanna, A.L., Margari, F., Matera, E., Simone, M. & Margari, L. (2015) 'Overlap Between Autism Spectrum Disorders and Attention Deficit Hyperactivity Disorder: Searching for Distinctive/Common Clinical Features', *Autism research*, 8(3), pp. 328-337.
76. ^Waterhouse, L., London, E. & Gillberg, C. ASD Validity. *Rev J Autism Dev Disord* 3, 302-329 (2016). <https://doi.org/10.1007/s40489-016-0085-x>
77. ^Mandy, W. (2018). The Research Domain Criteria: A new dawn for neurodiversity research? *Autism*, 22(6), 642-644. <https://doi.org/10.1177/1362361318782586>
78. ^Jaarsma, P., Welin, S. Autism as a Natural Human Variation: Reflections on the Claims of the Neurodiversity Movement. *Health Care Anal* 20, 20-30 (2012). <https://doi.org/10.1007/s10728-011-0169-9>
79. ^Koi, P. (2021) 'Genetics on the neurodiversity spectrum: Genetic, phenotypic and endophenotypic continua in autism and ADHD', *Studies in history and philosophy of science. Part A*, 89pp. 52-62. 73 Gudjonsson GH, Sigurdsson JF, Sigfusdottir ID, Young S. An epidemiological study of ADHD symptoms among young persons and the relationship with cigarette smoking, alcohol consumption and illicit drug use. *J Child Psychol Psychiatry Allied Discip.* 2012;53:304-12.
80. ^Williamson D, Johnston C. Gender differences in adults with attention-deficit/hyperactivity disorder: A narrative review. *Clin Psychol Rev.* 2015; 40:15-27 <https://doi.org/10.1016/j.cpr.2015.05.005>.
81. ^Mowlem, F. D., Rosenqvist, M. A., Martin, J., Lichtenstein, P., Asherson, P., & Larsson, H. (2019). Sex differences in predicting ADHD clinical diagnosis and pharmacological treatment. *European child & adolescent psychiatry*, 28(4), 481-489. <https://doi.org/10.1007/s00787-018-1211-3>
82. ^Dalsgaard S, Leckman JF, Nielsen HS, Simonsen M. Gender and injuries predict stimulant medication use. *J Child Adolesc Psychopharmacol.* 2014;24:253-9.
83. ^Biederman J, Monuteaux MC, Spencer T, Wilens TE, Faraone SV. Do stimulants have a protective effect on the development of psychiatric disorders in youth with ADHD? A ten-year follow-up study. *Pediatrics.* 2009;124:71-8

84. [^] Halmøy A, Fasmer OB, Gillberg C, Haavik J. Occupational Outcome in Adult ADHD: Impact of Symptom Profile, Comorbid Psychiatric Problems, and Treatment. *J Atten Disord.* 2009;13:175-87.
85. [^] Biederman J, Monuteaux MC, Spencer T, Wilens TE, Faraone SV. Do stimulants have a protective effect on the development of psychiatric disorders in youth with ADHD? A ten-year follow-up study. *Pediatrics.* 2009;124:71-8.
86. [^] Lachaine J, Beauchemin C, Sasane R, Hodgkins PS. Treatment patterns, adherence, and persistence in ADHD: A Canadian perspective. *Postgrad Med.* 2012;124:139-48.
87. [^] Quinn PO. Treating adolescent girls and women with ADHD: Gender-specific issues. *J Clin Psychol.* 2005; 61:579-87.
88. [^] Young Z, Moghaddam N, Tickle A. The Efficacy of Cognitive Behavioral Therapy for Adults With ADHD: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *J Atten Disord.* 2020; 24:875-88.
89. [^] Hollingdale J, Woodhouse E, Asherson P, Gudjonsson GH, Young S. A Pilot Study Examining ADHD and Behavioural Disturbance in Female Mentally Disordered Offenders. *AIMS Public Heal.* 2014; 1:100-8.
90. [^] Young S, Moss D, Sedgwick O, Fridman M, Hodgkins P. A meta-Analysis of the prevalence of attention deficit hyperactivity disorder in incarcerated populations. *Psychol Med.* 2015;45:247-58.
91. [^] Young S, Gudjonsson GH. ADHD symptomatology and its relationship with emotional, social and delinquency problems. *Psychol Crime Law.* 2006;12:463-71.
92. [^] Dalsgaard S, Nielsen HS, Simonsen M. Consequences of ADHD medication use for children's outcomes. *J Health Econ.* 2014;37:137-51 <https://doi.org/10.1016/j.jhealeco.2014.05.005>.
93. [^] Lichtenstein P, Halldner L, Zetterqvist J, Sjölander A, Serlachius E, Fazel S, et al. Medication for attention deficit-hyperactivity disorder and criminality. *N Engl J Med.* 2012;367:2006-14.
94. [^] Young S, Gudjonsson G, Chitsabesan P, Colley B, Farrag E, Forrester A, et al. Identification and treatment of offenders with attention-deficit/hyperactivity disorder in the prison population: A practical approach based upon expert consensus. *BMC Psychiatry.* 2018; 18:1-16.