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[Commentary] Recognising and Managing Medical Issues in Neurodiverse Females

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Abstract

The term 'neurodiversity' acknowledges that there are many different ways in which people experience life and interact with others. It incorporates autism, ADHD and Tourette's syndrome, and there is increasing evidence of an overlap with dyslexia and dyspraxia [1]. It was first proposed by Judy Singer, an Australian sociologist, in her PhD thesis to promote equality for and inclusion of "neurological minorities" [2]. Research and education into neurodiversity is essential in shaping clinicians' approaches to people who may present with a wide range of symptoms. Neurodiversity may influence a person's style of communication, learning, attitudes, and behaviour, and they may experience social isolation and inequity. Therefore, the focus should be on problems that neurodiverse people have rather than the problems that they are [3]. A formal diagnosis improves access to social and medical support and helps them and their family understand their challenges and differences. Neurodiverse people are more prone to a wide variety of physical and psychological health issues, and it is important that clinicians learn to recognise and respond to various clinical cues and clues for these.

Increasing recognition of the high prevalence of neurodiversity in females

Traditionally neurodiversity has been perceived to be more common among males, but it has become increasingly recognised among females in the last decade [4]. The diagnosis is often made later in females because of their tendency to mask or 'camouflage' their differences to reduce the perceived risk of social exclusion [5]. Partially due to this, the pattern of symptoms that they may develop is often also different to that seen in males. Increased sensitivity to a wide variety of sensory and emotional stimuli underlies much of the widespread distress and discomfort perceived by neurodiverse women [6]. This may manifest from an early age as anxiety, hyperfocus and rigidity of thought[7], leading to the later development of distress expressed through both mental and physical signs and symptoms. Difficulty in making and maintaining friendships despite often developing special interests and abilities can lead to low self-image and self-harm [8]. Widespread discomfort and an imbalance in their autonomic regulation may associate with increasing fatigue, even among those with a tendency to hyperactivity [9]. Such presentations often occur in primary care but not infrequently

lead to contact with neurology, rheumatology or pain services at a relatively young age, with circulatory, metabolic, and endocrine involvement over time. Adjustment disorders and secondary personality disorders are common features, while associations with eating disorders and gender dysmorphia are increasingly prevalent and relevant [10].

The healthcare needs of neurodiverse females

A recent review of the literature demonstrated that autistic people were more likely to suffer from many disorders than their neurotypical peers [11]. Adverse childhood experiences can adversely affect health[12] and appear to occur more frequently among autistic females [13]. This may help explain why autistic females access healthcare more than neurotypical females [14][15] and are more likely to require hospital treatment as both outpatients and inpatients[15][16]. Autistic females are more likely to feel that their physical health care needs are neglected, reporting with poorer outcomes as a result [17]. A systematic review suggested that hypersensitivity, impaired executive function and communication issues all contributed to difficulties with access to medical care and that lack of awareness of these issues by health care professionals accentuated this [18].

Whilst virtually every organ system is represented in the list of disorders experienced by neurodiverse people, very little published literature relates specifically to females. However, there is consensus within the limited available data that autistic females are at higher risk than their neurotypical female peers for many disorders and have a higher prevalence of circulatory disorders, asthma, symptomatic hypotension, and diabetes than neurotypical females, despite controlling for risk factors [11]. Data on mortality confirm that autistic females are higher risk of early death than autistic males[19][20][21]. Risks are greater for autistic females than autistic males for most disorders and their health status is generally reduced in comparison [22][23][24][25]. These findings apply across the age spectrum applying to both young autistic individuals [14][16][22][23][24][26], as well as older ones [27]. Some of these observations may be explained by genetic predisposition, especially to circulatory disorders, cancer, and diabetes [28]. A further factor may relate to hormonal dysregulation which appears increased among autistic females both prior to birth and in later life [29][30][31][32][33]. This may promote obesity and predispose towards diabetes and circulatory disease [34][35][36].

Physical health issues in neurodiverse females

Whilst a full description of each of the disorders associated with neurodiversity is outside the scope of this article, the range of conditions are briefly described below.

Neurodiverse people have an increased risk of certain neurological conditions, especially epilepsy and rhythmic movement disorders. They may also have an increased prevalence of neurological structural anomalies such as the Chiari malformation [37] which commonly presents with headaches and may cause syncope or collapse due to compression at the foramen magnum. Magnetic resonance imaging of the brain is usually diagnostic. Other causes of syncope in females may relate to dysfunction of the autonomic nervous system producing postural hypotension and tachycardia (POTS) [38] which is well recognised as being associated with hypermobile joints[39]. Indeed, a range of joint

hypermobility syndromes including Ehlers-Danlos (EDS) are now known to be linked to the presence of neurodiversity [40]. Many patients with fibromyalgia exhibit neurodiverse features [41] and this may have a familial link [42]. Sleep disturbance and disorders are common and may contribute to fatigue [43]. Other chronic pain syndromes are also over-represented among neurodiverse females and many women attending chronic pain clinics carry a diagnosis of neurodiversity [44]. Migraine and irritable bowel syndrome are also common causes of chronic pain in younger neurodiverse females [45], although gastrointestinal symptoms may have more specific causes. There appears to be an increase in the prevalence of inflammatory bowel disease [46], probably coeliac disease [47], and possibly bile acid malabsorption in this population, along with an increased risk of eating disorders, especially of the restrictive intake type [48]. This can lead to nutritional deficiencies especially of iron and of vitamins B and D. Autistic children have reduced bone mineral density at all skeletal sites compared to controls [49]. Low bone density in has also been shown in young people with ADHD and may relate to medication [50]. This contributes to a greatly increased risk of fractures at the hip, spine and forearm in both autistic children and adults, again especially in females. The odds ratio for hip fractures in females rose from 8.1 in autistic girls to 24.8 in autistic adults [51]. Multiple potential contributing factors include vitamin D deficiency and restrictive eating disorders [52].

Endocrine disorders are also over-represented among younger neurodiverse females, where there appears to be an increase in auto-immune thyroid disorders [53]. Maternal hypothyroidism is also believed to contribute to an increased risk of autism in the offspring. Other auto-immune disorders are also over-represented in mothers of neurodiverse females, especially connective tissue disorders such as rheumatoid arthritis [54][55] and systemic lupus erythematosus [55][56]. Raynaud's phenomenon may be an early manifestation of a similar tendency in their female offspring. Neurodiverse females report an increased tendency to develop allergies and skin rashes including eczema and hives [57]. They may have an increased prevalence of mast cell activation syndrome, a condition that is attracting greater interest through its links with hypermobility and autism [58]. Perhaps related to this observation is the finding that the prevalence of airways disease, and especially of asthma, is much increased among females with neurodiversity [11][59]. With increasing age, obesity and diabetes become increasingly evident among neurodiverse females [11][60], and hypertension and hyperlipidaemia contribute to their high levels of cerebrovascular and cardiovascular disease [11][60].

Hormonal events are believed to have a greater impact on autistic females throughout their lives [61][62][63]. Clinically young autistic females report experiencing high levels of dysmenorrhoea, menorrhagia, and more intrusive effects of menstruation [62]. The sensory implications of menstruation care can also impact on the mental health and presentation of autistic females [63]. Parents report witnessing increased anxiety and emotional difficulties during menstruation, impacting socially and educationally [64]. Research indicates that autistic females may experience the physical symptoms of menopause over a longer period, while also experiencing greater impact from psychological and emotional symptoms such as poor sleep, increased anxiety, poor memory and concentration [61][63]. The menopause is known to impact on the mental health of neurotypical females, with most impact on autistic females who have experienced anxiety and/or depression from a young age. Autistic females may also experience more difficulties in reporting their experiences or accessing appropriate support [62]. The whole subject of the effect of hormonal factors from menarche to menopause in autistic females merits further research.

Mental health issues in neurodiverse females

Neurodiverse conditions are highly inheritable [65] while brain structure and function appear significantly different in neurodiverse females [66] along with both the peripheral and autonomic nervous systems [67]. Therefore, it may not be surprising that mental health problems occur frequently in neurodiverse people and are a particularly common feature in younger females. Emotional impulsivity is especially common among girls with ADHD [68] and may be associated with a variety of undesirable outcomes [69], including self-harm and suicidality [70]. Anxiety is an almost invariable accompaniment of neurodiversity among females [71] with ADHD thought to be more strongly associated than autism alone. Both may lead to meltdowns and panic attacks, while depression is also found in 38% of neurodiverse people, although it is as common in males as in females [72]. Dysfunctional coping can trigger self-harm [70], substance abuse [73] or eating disorders [74]. Some females with neurodiversity experience body dysmorphia, while gender dysphoria is well-recognised among young autistic females [75], both often being associated with higher levels of chronic pain [76]. Personality disorders may develop as a consequence of disordered resilience and are more common in females [77]. The prevalence of bipolar disorder [78] and schizophrenia [79] are also each significantly increased among neurodiverse females.

Challenges for the clinician

The medical profession has generally been slow to appreciate the wide range of differing symptoms that neurodiverse females can develop. This has been compounded by the trend towards increasing medical specialisation, meaning that such patients may have already been referred to multiple different departments. The difficulty many neurodiverse people experience with accurately communicating their feelings and bodily experiences can compound these challenges, as does the frequent lack of any objective signs on physical examination. Previously, this often led to autistic females being described as having psychosomatic illness or being hard to help. Such terminology is insensitive and outdated.

There are often subtle clues in the way that neurodiverse people present. They are more likely to bring a spokesperson and to avoid eye contact at consultation. They may appear unduly agitated or sometimes disengaged with the process. The frequent overlap in presentations between different specialities emphasises the need for all trainees to have 'common stem' experience in general medicine. Within a general practice setting, a wider appreciation of the range of common disorders experienced by neurodiverse females is important to acquire. The art of 'learning to listen' remains an essential tool in diagnosis. Neurodiverse people can feel uncomfortable if they are not given enough time to share their concerns, and an open unhurried dialog is more likely to facilitate a diagnosis. However, given the service pressures and time constraints clinicians face, this can be difficult to guarantee. However, if patients are encouraged to share their lived experience, it becomes easier for the clinician to ’join the dots’, which may allow the diagnosis of a neurodiverse condition to surface from what may have previously appeared to be a random collection of unrelated symptoms.

However, neurodiverse females may exhibit anxiety or anger in medical consultations, especially if they feel that they are invalidated or not taken seriously. Avoiding conflict with patients who may have fixed ideas and expectations of what they

are entitled to receive is as much an art as a science and requires experience and patience. Consistency within clinical contact to ensure continuity of care can help develop trust which neurodiverse people often take time to achieve. Once a diagnosis of neurodiverse condition is made or suspected, it is important to offer access to appropriate multidisciplinary support whilst avoiding unnecessary multiple cross- referral. It is relevant to recognise that the increasing delays to accessing such services at present may trigger a meltdown, panic attack, or the threat of self-harm.

Future priorities

It is essential that all clinicians are aware of the broad range of conditions experienced by neurodivergent females and the diverse presentations and symptoms expressed by their patients. If we are to become more effective at managing these conditions, breaking down barriers between services for physical and mental health would be a great help. Improving access to eating disorder services and gender identity clinics are important examples, as neurodiverse females are greatly over-represented in those seeking such support. Increasing the evidence base around treatment for people in these situations would facilitate this aim.

Neurodiverse females also account for a high percentage of patients presenting with chronic pain syndromes to pain clinics and rheumatologists. A more comprehensive understanding of what pain means to those with neurodiversity is essential, as this seems to differ from the experience of many neurotypical people. Broadening our concept of pain to include the role of the autonomic nervous system is important as dysautonomia is both common and under-recognised in neurodiverse females and accounts for a significant component of their lived experience of discomfort and dysfunction.

The multiple conditions experienced by many neurodiverse females are influenced by both genetic and environmental factors. A better understanding of the relationship between these influences is important, although it is important to appreciate the reasons behind heightened suspicion and sensitivity expressed by some neurodiverse people over the use of gene studies in autism [80]

Further exploration of the reasons behind the physical and psychological hypersensitivity that many neurodiverse females exhibit would be useful. This may allow the relationship between the limbic, endocrine and immune systems in neurodiverse individuals to be more fully understood. Ultimately, the sense of isolation and alienation experienced by so many neurodiverse females could, and should be addressed, as this plays a significant part in their health-seeking behaviour and support needs. If we can help society increase insight and understanding into neurodiversity by developing a concept of '*neuroconvergence'*, rather than neurodivergence, with the aid of non-judgemental language and acceptance of inter-personal differences, the mental and physical health burdens carried by many neurodiverse females may be diminished.

How patients and the public contributed to this article

Two of the authors of this paper have direct lived experience of female neurodiversity, and two authors work in the provision of health care delivery to females with neurodiverse conditions.

References

1. ^*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*
2. ^*Singer, J. (1998). Odd People In: The Birth of Community Amongst People on the "Autistic Spectrum": a personal exploration of a New Social Movement based on Neurological Diversity. A thesis presented to the faculty of Humanities and Social Sciences in partial fulfilment of the requirements for the degree of Bachelor of Arts Social Science (Honours), Faculty of Humanities and Social Science, University of Technology, Sydney, 1998.*
3. ^*Anna Stenning & Hanna Bertilsdotter Rosqvist (2021) Neurodiversity studies: mapping out possibilities of a new critical paradigm, Disability & Society, 36:9, 1532-1537, DOI: 10.1080/09687599.2021.1919503*
4. ^*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*
5. ^*Rynkiewicz A, Schuller B, Marchi E, Piana S, Camurri A, Lassalle A, Baron-Cohen S. An investigation of the 'female camouflage effect' in autism using a computerized ADOS-2 and a test of sex/gender differences. Mol Autism. 2016 Jan 21;7:10. doi: 10.1186/s13229-016-0073-0. PMID: 26798446; PMCID: PMC4721191.*
6. ^*Rynkiewicz A, Janas-Kozik M, Słopień A. Girls and women with autism. Psychiatr Pol. 2019 Aug 31;53(4):737-752. doi: 10.12740/PP/OnlineFirst/95098. Epub 2019 Aug 31. PMID: 31760407.*
7. ^*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*
8. ^*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.*
9. ^*Edvinsson D, Lindström E, Bingefors 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.*
10. ^*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.*
11. a, b, c, d, e*Weir, E., Allison, C., Warrier, V., & Baron-Cohen, S. (2021). Increased prevalence of non-communicable physical health conditions among autistic adults. Autism, 25(3), 681–694. https://doi.org/10.1177/1362361320953652*
12. ^*Rigles B. (2017). The relationship between adverse childhood events, resiliency and health among children with autism. Journal of Autism and Developmental Disorders, 47(1), 187–202. https://doi.org/10.1007/s10803-016-2905-3*
13. ^*Griffiths S., Allison C., Kenny R., Holt R., Smith P., Baron-Cohen S. (2019). The vulnerability experiences quotient (VEQ): A study of vulnerability, mental health and life satisfaction in autistic adults. Autism Research: Official Journal of the International Society for Autism Research, 12, 1516–1528. https://doi.org/10.17863/CAM.40985*
14. a, b*Vohra R., Madhavan S., Sambamoorthi U. (2017). Comorbidity prevalence, healthcare utilization, and expenditures*

of Medicaid enrolled adults with autism spectrum disorders. Autism, 21(8), 995–1009. https://doi.org/10.1177/1362361316665222

15. [a, b]*Zerbo O., Qian Y., Ray T., Sidney S., Rich S., Massolo M., Croen L. A. (2018). Health care service utilization and cost among adults with autism spectrum disorders in a U.S. integrated health care system. Autism in Adulthood, 1(1), 27–36. https://doi.org/10.1089/aut.2018.0004*
16. [a, b]*Weiss J. A., Isaacs B., Diepstra H., Wilton A. S., Brown H. K., McGarry C., Lunsky Y. (2018). Health concerns and health service utilization in a population cohort of young adults with autism spectrum disorder. Journal of Autism and Developmental Disorders, 48(1), 36–44. https://doi.org/10.1007/s10803-017-3292-0*
17. [^]*Nicolaidis C., Raymaker D., McDonald K., Dern S., Boisclair W. C., Ashkenazy E., Baggs A. (2013). Comparison of healthcare experiences in autistic and non-autistic adults: A cross-sectional online survey facilitated by an academic-community partnership. Journal of General Internal Medicine, 28(6), 761–769. https://doi.org/10.1007/s11606-012-2262-7*
18. [^]*Mason D., Ingham B., Urbanowicz A., Michael C., Birtles H., Woodbury-Smith M.,... Parr J. R. (2019). A systematic review of what barriers and facilitators prevent and enable physical healthcare services access for autistic adults. Journal of Autism and Developmental Disorders, 49(8), 3387–3400. https://doi.org/10.1007/s10803-019-04049-2*
19. [^]*Hirvikoski T., Mittendorfer-Rutz E., Boman M., Larsson H., Lichtenstein P., Bölte S. (2016). Premature mortality in autism spectrum disorder. The British Journal of Psychiatry: The Journal of Mental Science, 208(3 Special Issue: Physical Health Across the Lifespan), 232–238. https://doi.org/10.1192/bjp.bp.114.160192*
20. [^]*Hwang Y. I., Srasuebkul P., Foley K.-R., Arnold S., Trollor J. N. (2019). Mortality and cause of death of Australians on the autism spectrum. Autism Research, 12(5), 806–815. https://doi.org/10.1002/aur.2086*
21. [^]*Woolfenden S., Sarkozy V., Ridley G., Coory M., Williams K. (2012). A systematic review of two outcomes in autism spectrum disorder—Epilepsy and mortality. Developmental Medicine & Child Neurology, 54(4), 306–312. https://doi.org/10.1111/j.1469-8749.2012.04223.x*
22. [a, b]*Croen L. A., Zerbo O., Qian Y., Massolo M. L., Rich S., Sidney S., Kripke C. (2015). The health status of adults on the autism spectrum. Autism, 19(7), 814–823. https://doi.org/10.1177/1362361315577517*
23. [a, b]*Davignon M. N., Qian Y., Massolo M., Croen L. A. (2018). Psychiatric and medical conditions in transition-aged individuals with ASD. Pediatrics, 141(Suppl. 4), S335–S345. https://doi.org/10.1542/peds.2016-4300K*
24. [a, b]*Fortuna R. J., Robinson L., Smith T. H., Meccarello J., Bullen B., Nobis K., Davidson P. W. (2016). Health conditions and functional status in adults with autism: A cross-sectional evaluation. Journal of General Internal Medicine, 31(1), 77–84. https://doi.org/10.1007/s11606-015-3509-x*
25. [^]*Rydzewska E., Hughes-McCormack L. A., Gillberg C., Henderson A., MacIntyre C., Rintoul J., Cooper S.-A. (2018). Prevalence of long-term health conditions in adults with autism: Observational study of a whole country population. BMJ Open, 8(8), e023945. https://doi.org/10.1136/bmjopen-2018-023945*
26. [^]*Kohane I. S., McMurry A., Weber G., MacFadden D., Rappaport L., Kunkel L., Churchill S. (2012). The co-morbidity burden of children and young adults with autism spectrum disorders. PLOS ONE, 7(4), Article e33224. https://doi.org/10.1371/journal.pone.0033224*
27. [^]*Hand B. N., Angell A. M., Harris L., Carpenter L. A. (2020). Prevalence of physical and mental health conditions in*

Medicare-enrolled, autistic older adults. Autism, 24, 755–764. https://doi.org/10.1177/1362361319890793

28. ^*Wen Y., Alshikho M. J., Herbert M. R. (2016). Pathway network analyses for autism reveal multisystem involvement, major overlaps with other diseases and convergence upon MAPK and calcium signaling. PLOS ONE, 11(4), Article e0153329. https://doi.org/10.1371/journal.pone.0153329*
29. ^*Baron-Cohen S., Tsompanidis A., Auyeung B., Nørgaard-Pedersen B., Hougaard D. M., Abdallah M., Pohl A. (2019). Foetal oestrogens and autism. Molecular Psychiatry. Advance online publication. https://doi.org/10.1038/s41380-019-0454-9*
30. ^*Cherskov A., Pohl A., Allison C., Zhang H., Payne R. A., Baron-Cohen S. (2018). Polycystic ovary syndrome and autism: A test of the prenatal sex steroid theory. Translational Psychiatry, 8(1), 1–10. https://doi.org/10.1038/s41398-018-0186-7*
31. ^*Pohl A., Cassidy S., Auyeung B., Baron-Cohen S. (2014). Uncovering steroidopathy in women with autism: A latent class analysis. Molecular Autism, 5(1), 27. https://doi.org/10.1186/2040-2392-5-27*
32. ^*Ruta L., Ingudomnukul E., Taylor K., Chakrabarti B., Baron-Cohen S. (2011). Increased serum androstenedione in adults with autism spectrum conditions. Psychoneuroendocrinology, 36(8), 1154–1163. https://doi.org/10.1016/j.psyneuen.2011.02.007*
33. ^*Schwarz E., Guest P. C., Rahmoune H., Wang L., Levin Y., Ingudomnukul E, Bahn S. (2011). Sex-specific serum biomarker patterns in adults with Asperger's syndrome. Molecular Psychiatry, 16(12), 1213–1220. https://doi.org/10.1038/mp.2010.102*
34. ^*Bhupathy P., Haines C. D., Leinwand L. A. (2010). Influence of sex hormones and phytoestrogens on heart disease in men and women. Women's Health (London, England), 6(1), 77–95. https://doi.org/10.2217/whe.09.80*
35. ^*Brand J. S., van der Tweel I., Grobbee D. E., Emmelot-Vonk M. H., van der Schouw Y. T. (2011). Testosterone, sex hormone-binding globulin and the metabolic syndrome: A systematic review and meta-analysis of observational studies. International Journal of Epidemiology, 40(1), 189–207. https://doi.org/10.1093/ije/dyq158*
36. ^*Mantovani A., Fucic A. (2014). Puberty dysregulation and increased risk of disease in adult life: Possible modes of action. Reproductive Toxicology, 44, 15–22. https://doi.org/10.1016/j.reprotox.2013.06.002*
37. ^*Jayarao M, Sohl K, Tanaka T. Chiari malformation I and autism spectrum disorder: an underrecognized coexistence. J Neurosurg Pediatr. 2015 Jan;15(1):96-100. doi: 10.3171/2014.10.PEDS13562. PMID: 25396704.*
38. ^*Owens A, Mathias C and Iodice V. Autonomic Dysfunction in Autism Spectrum Disorder. Front. Integr. Neurosci., 30 December 2021. Volume 15 - 2021 | https://doi.org/10.3389/fnint.2021.787037*
39. ^*Eccles, J., Lodice, V., Dowell, N., and Owens, A. (2014). Joint hypermobility and autonomic hyperactivity: relevance to neurodevelopmental disorders. J. Neurol. Neurosurg. Psychiatry 85:8883. doi: 10.1136/jnnp-2014-308883.9*
40. ^*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.*
41. ^*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*
42. ^*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/

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. ^*Asztély K, Kopp S, Gillberg C, Waern M, Bergman S. Chronic Pain And Health-Related Quality Of Life In Women With Autism And/Or ADHD: A Prospective Longitudinal Study. J Pain Res. 2019;12:2925-2932 https://doi.org/10.2147/JPR.S212422*
45. ^*Drossman D.A. Functional Gastrointestinal Disorders: History, Pathophysiology, Clinical Features and Rome IV. Gastroenterology. 2016; 150:1262–1279. doi: 10.1053/j.gastro.2016.02.032.*
46. ^*Lee M, Krishnamurthy J, Susi A, Sullivan C, Gorman GH, Hisle-Gorman E, Erdie-Lalena CR, Nylund CM. Association of Autism Spectrum Disorders and Inflammatory Bowel Disease. J Autism Dev Disord. 2018 May;48(5):1523-1529. doi: 10.1007/s10803-017-3409-5. PMID: 29170940.*
47. ^*Quan J, Panaccione N, Jeong J, Underwood FE, Coward S, Windsor JW, Ronksley PE, Gidrewicz D, deBruyn J, Turner JM, Lebwohl B, Kaplan GG, King JA. Association Between Celiac Disease and Autism Spectrum Disorder: A Systematic Review. J Pediatr Gastroenterol Nutr. 2021 May 1;72(5):704-711. doi: 10.1097/MPG.0000000000003051. PMID: 33847288.*
48. ^*Nickel K, Maier S, Endres D, Joos A, Maier V, Tebartz van Elst L, Zeeck A. Systematic Review: Overlap Between Eating, Autism Spectrum, and Attention-Deficit/Hyperactivity Disorder. Front Psychiatry. 2019 Oct 10; 10:708. doi: 10.3389/fpsyt.2019.00708. PMID: 31649563; PMCID: PMC6796791.*
49. ^*Rostami Haji Abadi, M., Neumeyer, A., Misra, M. et al. Bone health in children and youth with ASD: a systematic review and meta-analysis. Osteoporos Int 32, 1679–1691 (2021). https://doi.org/10.1007/s00198-021-05931-5*
50. ^*Howard J, Walick K, Rivera J. Evidence of an Association between ADHD Medication and Diminished Bone Health in Children and Adolescents. Abstract 641 presented at 2016 Annual Meeting of the American Academy of Orthopaedic Surgeons, Orlando, Florida.*
51. ^*Neumeyer AM, O'Rourke JA, Massa A, Lee H, Lawson EA, McDougle CJ, Misra M. Brief report: bone fractures in children and adults with autism spectrum disorders. J Autism Dev Disord. 2015 Mar;45(3):881-7. doi: 10.1007/s10803-014-2228-1. PMID: 25193141; PMCID: PMC4590779.*
52. ^*Farag F, Sims A, Strudwick K, Carrasco J, Waters A, Ford V, Hopkins J, Whitlingum G, Absoud M, Kelly VB. Avoidant/restrictive food intake disorder and autism spectrum disorder: clinical implications for assessment and management. Dev Med Child Neurol. 2022 Feb;64(2):176-182. doi: 10.1111/dmcn.14977. Epub 2021 Aug 17. PMID: 34405406.*
53. ^*Frye RE, Wynne R, Rose S, Slattery J, Delhey L, Tippett M, Kahler SG, Bennuri SC, Melnyk S, Sequeira JM, Quadros EV. Thyroid dysfunction in children with autism spectrum disorder is associated with folate receptor α autoimmune disorder. J Neuroendocrinol. 2017 Mar;29(3). doi: 10.1111/jne.12461. PMID: 28199771.*
54. ^*Sun CK, Cheng YS, Chen IW, Chiu HJ, Chung W, Tzang RF, Fan HY, Lee CW, Hung KC. Impact of parental rheumatoid arthritis on risk of autism spectrum disorders in offspring: A systematic review and meta-analysis. Front Med (Lausanne). 2022 Nov 10;9:1052806. doi: 10.3389/fmed.2022.1052806. PMID: 36438039; PMCID: PMC9687371.*
55. [a, b]*Dalsgaard S. More Evidence Linking Autoimmune Diseases to Attention-Deficit/Hyperactivity Disorder. JAMA*

Pediatr. 2021;175(3):e205502. doi:10.1001/jamapediatrics.2020.5502

56. ^*Li DJ, Tsai CS, Hsiao RC, Chen YL, Yen CF. Associations between Allergic and Autoimmune Diseases with Autism Spectrum Disorder and Attention-Deficit/Hyperactivity Disorder within Families: A Population-Based Cohort Study. Int J Environ Res Public Health. 2022 Apr 8;19(8):4503. doi: 10.3390/ijerph19084503. PMID: 35457368; PMCID: PMC9025211.*
57. ^*Chua R, Tay M, Ooi D et al., Understanding the Link Between Allergy and Neurodevelopmental Disorders: A Current Review of Factors and Mechanisms. Front. Neurol., 15 February 2021 Sec. Pediatric Neurology Volume 11 - 2020 | https://doi.org/10.3389/fneur.2020.603571*
58. ^*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.*
59. ^*Cortese S Sun S Zhang J et al. Association between attention deficit hyperactivity disorder and asthma: a systematic review and meta-analysis and a Swedish population-based study. Lancet Psychiatry. 2018; (published online July 24.) http://dx.doi.org/10.1016/S2215-0366(18)30224-4.*
60. [a, b]*Gilmore, D.G., Longo, A. & Hand, B.N. The Association Between Obesity and Key Health or Psychosocial Outcomes Among Autistic Adults: A Systematic Review. J Autism Dev Disord 52, 4035–4043 (2022). https://doi.org/10.1007/s10803-021-05275-3.*
61. [a, b]*Duffy O. K., Iversen L., Aucott L., Hannaford P. C. (2013). Factors associated with resilience or vulnerability to hot flushes and night sweats during the menopausal transition. Menopause, 20(4), 383–392. https://doi.org/10.1097/gme.0b013e31827655cf*
62. [a, b, c]*Groenman, A. P., Torenvliet, C., Radhoe, T. A., Agelink van Rentergem, J. A., & Geurts, H. M. (2022). Menstruation and menopause in autistic adults: Periods of importance? Autism, 26(6), 1563–1572. https://doi.org/10.1177/13623613211059721*
63. [a, b, c]*Moseley RL, Druce T, Turner-Cobb JM. 'When my autism broke': A qualitative study spotlighting autistic voices on menopause. Autism. 2020 Aug;24(6):1423-1437. doi: 10.1177/1362361319901184. Epub 2020 Jan 31. PMID: 32003226; PMCID: PMC7376624*
64. ^*Steward, R., Crane, L., Roy, E., Remington, A., Pellicano, E. (2018). "Life is Much More Difficult to Manage During Periods": Autistic Experiences of Menstruation. Journal of Autism and Developmental Disorders, 48(12), 4287-4292.*
65. ^*Demontis, D., Walters, R.K., Martin, J. et al. Discovery of the first genome-wide significant risk loci for attention deficit/hyperactivity disorder. Nat Genet 51, 63–75 (2019). https://doi.org/10.1038/s41588-018-0269-7*
66. ^*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*
67. ^*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.*
68. ^*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.

69. ^*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.*
70. 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.*
71. ^*Hargitai, L.D., Livingston, L.A., Waldren, L.H. et al. Attention-deficit hyperactivity disorder traits are a more important predictor of internalising problems than autistic traits. Sci Rep 13, 31 (2023). https://doi.org/10.1038/s41598-022-26350-4*
72. ^*Accardo, A.L., Pontes, N.M.H. & Pontes, M.C.F. Heightened Anxiety and Depression Among Autistic Adolescents with ADHD: Findings From the National Survey of Children's Health 2016–2019. J Autism Dev Disord (2022). https://doi.org/10.1007/s10803-022-05803-9*
73. ^*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.*
74. ^*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*
75. ^*Warrier V, Greenberg DM, Weir E, Buckingham C, Smith P, Lai MC, Allison C, Baron-Cohen S. Elevated rates of autism, other neurodevelopmental and psychiatric diagnoses, and autistic traits in transgender and gender-diverse individuals. Nat Commun. 2020 Aug 7;11(1):3959. doi: 10.1038/s41467-020-17794-1. PMID: 32770077; PMCID: PMC7415151.*
76. ^*Ryan L, Thomson E, Beer H, Philcox E, Kelly C. Autistic traits correlate with chronic musculoskeletal pain: a self-selected population survey. OBM Neurobiology 2023, Volume 7, Issue 1, doi:10.21926/obm.neurobiol.2301155 16 February 2023;*
77. ^*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.*
78. ^*Dunalska A, Rzeszutek M, Dębowska Z, Bryńska A. Comorbidity of bipolar disorder and autism spectrum disorder - review paper. Psychiatr Pol. 2021 Dec 31;55(6):1421-1431. English, Polish. doi: 10.12740/PP/OnlineFirst/122350. Epub 2021 Dec 31. PMID: 35472236.*
79. ^*Pina-Camacho, L., Parellada, M., & Kyriakopoulos, M. (2016). Autism spectrum disorder and schizophrenia: Boundaries and uncertainties. BJPsych Advances, 22(5), 316-324. doi:10.1192/apt.bp.115.014720*
80. ^*(20) Spectrum10K on Twitter: "Please read our statement. https://t.co/n1TsDHZ862" / Twitter*