BRITISH JOURNAL OF HOSPITAL MEDICINE

REVIEW

Recognising and responding to physical and mental health issues in neurodivergent girls and women

Clive Kelly[1]

Ren Martin[2]

Rachael Taylor[3]

Mary Doherty[4]

Author details can be found at the end of this article

Correspondence to:
Clive Kelly; clive.kelly2@nhs.net

Abstract

People experience life and interact with others in many ways. The term 'neurodivergence' refers to variations from what is considered typical. Research and education into conditions that cooccur with neurodivergence are essential in shaping clinicians' approaches to people who may present with a wide range of symptoms. Neurodivergence may influence a person's style of communication, learning, attitudes, and behaviour, and they often experience inequity and rejection. This review highlights the huge burden of cooccurring conditions carried by neurodivergent women and girls whose medical issues have largely gone under the radar. We suggest how clinicians might increase their awareness of diagnosis and management of their problems with mutual benefit.

Key words: Attention deficit hyperactivity disorder (ADHD); Autism; Females; Morbidity; Mortality; Outcomes; Suicide

Received: 09 October 2023; Revised: 27 December 2023; Accepted: 02 January 2024

Introduction

Neurodivergent people in general, and women and girls in particular, are more prone to a wide variety of serious physical and psychological health issues, and it is important that clinicians learn to recognise and respond to various clinical cues and clues for these. As a group of individuals with extensive experience of neurodivergence in females at both a personal and a clinical level, the authors of this paper are committed to highlighting health care issues among autistic girls and women. As part of this process, we wish to emphasise the wide range of associated conditions that they may develop, the potential differences in their presentation compared to non-autistic women, and the challenges which clinicians can face in aspects of both their diagnosis and management. We propose recommendations for clinicians to enhance the healthcare experience for this substantial and crucial demographic.

Explaining neurodiversity and neurodivergence

The term 'neurodiversity' acknowledges that there are many ways in which people experience life and interact with others. It emerged from the early autistic advocacy movement in the 1990s to promote equality for and inclusion of 'neurological minorities'. The term 'neurodivergence' refers to variations in mental or neurological function from what is considered typical and incorporates autism, attention deficit hyperactivity disorder (ADHD) and Tourette's syndrome, with evidence of an overlap with dyslexia and dyspraxia (Koi, 2021). As Stenning and Rosqvist highlighted, 'the focus should be on problems that neurodivergent people have, rather than the problems that they are' (Stenning and Rosqvist, 2021). A formal diagnosis improves access to support services and helps them and their family better understand themselves and the challenges they face. Neurodivergent females are very prone to developing many physical and psychological health issues, and it is important that clinicians learn to recognise and respond to these in a sensitive and timely manner. While this article focuses mainly on autism, we highlight some of the conditions associated with ADHD which coexists with autism among many women and girls.

How to cite this article:
Kelly C, Martin R, Taylor R, Doherty M. Recognising and responding to physical and mental health issues in neurodivergent girls and women. Br J Hosp Med. 2024. https://doi.org/10.12968/hmed.2023.0337

Increasing recognition of the high prevalence of neurodivergence in females

Traditionally neurodivergence has been diagnosed more commonly among males, but it has become increasingly recognised among females in the last decade (Young et al, 2020). The diagnosis is often made later in women because of their tendency to mask or 'camouflage' their differences to reduce their perceived risk of social exclusion. Partially due to this, the pattern of medical symptoms that they may develop is often also different from that seen in males. Later presentation to health care providers with nonspecific symptoms is common in neurodivergent women and may go unrecognised by clinicians, especially if the underlying diagnosis has not been established or is not voluntarily disclosed. Increased sensitivity to a wide variety of sensory and emotional stimuli may contribute to the widespread distress and discomfort perceived by neurodivergent women. This may manifest in girls from an early age as anxiety, hyperfocus and rigidity of thought, 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. Widespread discomfort and an imbalance in their autonomic regulation may be associated with increasing fatigue and pain, even among those with a tendency to hyperactivity. 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 developing over time. Adjustment disorders are common, while personality disorders are often suspected in females before recognition of neurodivergence, following which such labels may be reviewed and revised. Associations with eating disorders and gender incongruence are increasingly prevalent among neurodivergent females and are not confined to adolescent girls.

Further references to this topic are provided under '**Supplementary data**'.

The healthcare needs of neurodivergent women

A recent review of the literature demonstrated that autistic people were more likely to suffer from many physical disorders than their neurotypical peers (Weir et al, 2021). Adverse childhood experiences can adversely affect health and appear to occur more frequently among autistic girls and women. This may help explain why autistic females access healthcare more than neurotypical females (Vohra et al, 2017) and are more likely to require hospital treatment as both outpatients and inpatients. A systematic review (Mason et al 2019) suggested hypersensitivity, impaired executive function and communication issues all contribute to the difficulty that autistic women and girls experience with accessing medical care. Lack of awareness of these issues by health care professionals accentuates the neglect of their health care needs, producing poorer outcomes as a result.

While virtually every organ system is represented in the list of disorders experienced by autistic people, very little published literature relates specifically to females. However, there is consensus within the limited available data that autistic women are at higher risk than their neurotypical peers for many disorders and have a higher prevalence of circulatory disorders, asthma, symptomatic hypotension, and diabetes than neurotypical women, despite controlling for risk factors (Weir et al, 2021). Data on mortality also demonstrate that autistic women are at higher risk of early death than both the general population and autistic men (Hwang et al, 2019). The risks of developing most disorders are greater for autistic women than autistic men and their health status is generally reduced in comparison. This is especially true for those with learning difficulties and is evident across the age spectrum, applying to both autistic girls and adult women. While some of these observations may be explained by genetic predisposition, especially to circulatory disorders, cancer, and diabetes, a further factor may relate to hormonal influences which are increased among autistic females both before birth and in later life. These may promote obesity and predispose towards diabetes and circulatory disease (Bhupathy et al, 2010).

Further references to this topic are provided under '**Supplementary data**'.

Physical health issues in neurodivergent females

These are summarised in Table 1 and the common manifestations are discussed here. Neurodivergent females with a learning disability have greater health needs than the general population. They are more prone to chronic health problems, epilepsy, physical and sensory disabilities, and are more likely to experience mental ill health.

Table 1 The common physical health issues experienced by neurodivergent females

NEUROLOGICAL
Movement disorders
Epilepsy
Functional neurological disorder
Headache
Sleep disorder
Cerebrovascular accident (older)
CIRCULATORY
Syncope due to postural orthostatic tachycardia syndrome (POTS)
Raynaud's phenomenon
Hypertension (older)
Hyperlipidaemia (older)
Ischaemic heart disease (older)
MUSCULOSKELETAL
Hypermobility syndromes
Fibromyalgia
Rheumatoid arthritis
Connective tissue disease
Osteoporosis
GASTROINTESTINAL
Inflammatory bowel disease
Gluten sensitive enteropathy
Irritable bowel syndrome
Nutritional deficiency
ENDOCRINE
Autoimmune thyroiditis
Hypercortisolaemia
Type 2 Diabetes (older)
GYNAECOLOGICAL
Polycystic ovary syndrome
Dysmenorrhoea / menorrhagia
Premature menopause

Table 1. (Continued)
RESPIRATORY
Asthma
Chest infection
DERMATOLOGICAL
Eczema
Hives
OTHERS
Mast cell activation syndrome
Chronic pain syndromes

Neurological

Neurodivergent people have an increased risk of many neurological conditions, especially epilepsy and rhythmic movement disorders. A pooled prevalence of epilepsy of 7% in autistic children and 19% in autistic adults is reported to be associated with female gender and intellectual impairment. Functional neurological disorders and pseudo-seizures are also more common among autistic females and may coexist with movement disorders. Neurodivergent females also have an increased prevalence of structural neurological anomalies such as the Chiari malformation 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 diagnostic. Sleep disturbance and sleep disorders are common and may contribute to fatigue, with obstructive sleep apnoea five times commoner among autistic (as compared to non-autistic) women. If a sleep study is positive, continuous positive airway pressure (CPAP) can greatly improve fatigue and pain. In contrast, hypersomnia is also grossly over-represented among autistic women. Migraine headaches are also much more common among neurodivergent females, may present with transient functional impairment and coexist with chronic pain syndromes.

Circulatory

Syncope in autistic females commonly relates to hypersensitivity of the autonomic nervous system triggering postural orthostatic tachycardia syndrome (POTS) which is now recognised as being associated with hypermobile joints. By contrast, with increasing age hypertension and hyperlipidaemia contribute to the high levels of cerebrovascular and cardiovascular disease observed in older autistic females (Catalá-López, 2022), while childhood ADHD is also associated with an excess of cardiovascular disease by the fifth decade (Thapar et al, 2023).

Musculoskeletal

A range of joint hypermobility syndromes including Ehlers-Danlos (EDS) are known to be linked to the presence of both autism and ADHD (Csecs et al, 2022). Furthermore, most patients with fibromyalgia are female and many of them exhibit neurodivergent features which may have a familial link. Other chronic pain syndromes are also over-represented among neurodivergent females, and a disproportionate number of women attending chronic pain clinics carry a diagnosis of autism and/or ADHD (Astelezy et al, 2019). They reported chronic pain in 77% of females with a neurodivergent condition who had a mean age of just 27 years. Autoimmune disorders are over-represented in mothers of neurodivergent females, especially connective tissue disorders such as rheumatoid arthritis (RA) and systemic lupus erythematosus. Raynaud's phenomenon can be an early manifestation of a connective tissue disorder in their female offspring and may be exacerbated by stimulants prescribed for ADHD.

Autistic children have reduced bone mineral density at all skeletal sites compared to controls. Low bone density has also been shown in young people with ADHD and may relate to medication. Osteoporosis 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 rises from 8.1 in autistic girls to 24.8 in adult neurodivergent females (Neumeyer et al, 2015). Multiple potential contributing factors to this greatly increased fracture risk include vitamin D deficiency and intestinal dysbiosis from avoidant restrictive food intake disorder (ARFID).

Gastrointestinal

Irritable bowel syndrome is a common cause of chronic pain among neurodivergent females. Intestinal dysbiosis, characterised by profound gut microbiota alterations, is frequent in neurodivergent individuals, and offers both potential explanations for their increased prevalence of gastrointestinal symptoms and the possibility of novel therapeutic intervention. Gut symptoms may however have more specific causes, and there is an increase in the prevalence of inflammatory bowel disease, especially ulcerative colitis, among autistic females (Kim et al, 2022). There is also an increased risk of eating disorders, especially of ARFID, which is most prevalent among neurodivergent females. This may contribute to nutritional deficiencies especially of iron and of vitamins B and D. Another systematic review (Quan et al, 2021) showed a possible association with coeliac disease for both autism and ADHD with a female preponderance.

Endocrine

Endocrine disorders are also over-represented among younger neurodivergent females, where there appears to be an increase in autoimmune thyroid disorders (Frye et al, 2017). Maternal hypothyroidism is believed to contribute to an increased prevalence of autism in their offspring. Type 1 diabetes is more common among autistic females, while with increasing age, obesity and maturity-onset diabetes become increasingly evident in the same population (Weir et al, 2021).

Mast cell activation syndrome and allergies

Neurodivergent females also report an increased tendency to develop allergies and skin rashes including eczema and hives (Chua et al, 2021). They have an increased prevalence of mast cell activation syndrome (MCAS), a condition that is attracting greater interest through its links with hypermobility and autism. Related to this observation is the finding that the prevalence of airway disease, and especially of asthma, is much increased among neurodivergent females (Weir et al, 2021). A relationship between intestinal dysbiosis and the occurrence of asthma and eczema in children with ADHD has now also been established. An increase in drug sensitivity and intolerance is recognised among both autistic females and those with ADHD, which may in part relate to MCAS.

Gynaecological

Polycystic Ovarian Syndrome (PCOS) is associated with both autism and ADHD (Berni et al, 2017) and produces hirsutism, elevated adrenal androgens, hypercortisolaemia and insulin resistance, often with resulting hyperglycaemia. Hormonal events are believed to have a large impact on autistic females throughout their lives. Clinically autistic girls report experiencing higher levels of dysmenorrhoea, menorrhagia, and more intrusive effects of menstruation than their neurotypical peers (Moseley et al, 2020). The sensory implications of menstruation care can also impact on the mental health and presentation of autistic females (Steward et al, 2018). Parents report witnessing increased anxiety and emotional difficulties during menstruation, impacting socially and educationally. Research indicates that autistic females and females with ADHD may experience the physical symptoms of menopause over a longer period (Moseley et al, 2020), while also experiencing greater impact from psychological and emotional symptoms such as poor sleep, increased anxiety, impaired recall, and concentration. The menopause may impact more markedly on the mental health of neurodivergent females who have experienced anxiety and/or depression from a young age (Moseley et al, 2020). Autistic females also experience more difficulties in reporting these experiences and accessing appropriate support (Steward et al, 2018). The effect of hormones from menarche to menopause in neurodivergent females merits further research.

Further references to this topic are provided under '**Supplementary data**'.

Table 2 The common mental health issues experienced by neurodivergent females
Anxiety disorders
Panic attacks
Meltdowns
Depression
Self-harm and suicidality
Addiction and substance abuse
Eating disorders
Body dysmorphia
Gender incongruence
Cluster B and C personality disorders
Bipolar disease
Schizophrenia

Mental health issues in neurodivergent females

These are summarised in Table 2 and the most frequent are discussed here. Neurodivergent conditions are highly inheritable (Demontis et al, 2019) while brain structure and function show variations from neurotypical in both autism and ADHD, as does the autonomic nervous system. Mental health problems occur frequently in neurodivergent people and are particularly common in younger women. These can have devastating consequences as 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 (Young et al, 2020).

Self-harm and suicidality

Suicide represents a leading cause of early death among autistic girls and women, with two-thirds reporting considering suicide at some stage (Cassidy et al, 2014), and over half of these planning or attempting it. Although completed suicide is more common in men across society generally, autistic females without learning difficulty are at higher risk of suicide than autistic males, with suicidal ideation often occurring in the absence of clinical depression. Neurodivergent females are more likely than neurotypical women to succeed in their suicide bid, and over 10% of completed suicides were reported to have autism. One study reported that among a largely female cohort of people who had attempted suicide more than once, over 40% had significant autistic traits (Cassidy et al, 2022). Multiple risk factors for completed suicide have been implicated for neurodivergent females, including adverse life events, social isolation, impulsivity, cognitive inflexibility, camouflaging and delayed diagnosis.

Anxiety, panic and depression

Anxiety disorders are an almost invariable accompaniment of neurodivergence in females, and ADHD may be more strongly associated with anxiety than autism alone (Hargitai et al, 2023). Both autism and ADHD are associated with meltdowns and panic attacks. Depression is also found in 38% of neurodivergent people, although it is as common in adolescent males as in young females. Dysfunctional coping mechanisms can trigger self-harm, substance abuse or eating disorders (Kaiseri et al, 2017). Working memory is frequently impaired and when combined with alexithymia, this can cause inter-personal conflict and misrepresentation of other people's actions and intentions (Shah et al, 2016).

Alexithymia and rejection sensitive dysphoria

Alexithymia is difficulty with understanding and responding appropriately to emotions (Shah et al, 2016). It is associated with both ADHD and autism and is often misinterpreted as demonstrating a lack of empathy. A reduction in interoceptive awareness has also been linked to alexithymia, which may relate to dysautonomia. As females with ADHD especially experience strong emotional impulses, alexithymia can be very disabling. It may be a major factor in the challenges many neurodivergent females experience with establishing and maintaining social contact with non-autistics. Ultimately, attempts to camouflage difficulties in achieving emotional connectivity can be so exhausting that social isolation results. Another factor contributing to the loss of inter-personal contact may be rejection sensitive dysphoria (RSD), which has been described as 'immense emotional pain from a real or perceived failure to meet others' expectations' (Bedrossian, 2021). RSD is common in both autism and ADHD and may manifest as internal strife, producing low self-esteem, or externally triggering anger or argument. Neurodivergent females suffer more bullying at school and experience more rejection from a variety of sources. Rejection and the fear of abandonment can become a dominant feature and may ultimately destroy social encounters, friendships and relationships.

Addiction and criminal activity

Environmental factors, especially adverse childhood experiences, may contribute to the production of a wide range of clinical manifestations of disordered mental health in females. Emotional impulsivity is especially common among girls with autism and ADHD (Barkley and Fischer, 2010) and may be associated with a variety of undesirable outcomes including self-harm and addiction (Young et al, 2005). Young women with ADHD exhibit higher rates of dependency on nicotine and alcohol, while a Swedish study revealed a threefold increased risk of drug dependency associated with ADHD (Sundquist et al, 2015). These figures are frightening, and it is noteworthy that the usual male predominance for drug dependency is not seen in ADHD. There is also an increase in oppositional defiance, conduct disorder and criminal activity among ADHD females diagnosed in childhood (Dalsgaard et al, 2013). Indeed, the prevalence of ADHD in female prison populations is estimated at 25% and this is thought to be an underestimate because of delayed or missed diagnoses.

Gender incongruence

Some autistic girls and women experience body dysmorphia, while gender incongruence is much more frequent among young autistic people (Warrier et al, 2020). A substantial number of trans males are autistic, as are a significant percentage of those who detransition. There is evidence that both conditions are often associated with higher levels of chronic pain, some of which is mediated by hypermobility (Ryan et al, 2023).

Personality disorders

The exact relationship between personality disorder (PD) and neurodivergent conditions in females is unclear. Increases in schizoid, paranoid, narcissistic and emotionally unstable traits have all been described in neurodivergent females. Clinical features of Cluster A PDs overlap mainly with autism, while aspects of Cluster B PDs are more typical in ADHD, sometimes causing diagnostic uncertainty. Cluster C PDs are less well studied in the context of neurodivergence, but again increased obsessive-compulsive tendencies are well-recognised in the context of both autism and ADHD. There is an impression that neurodivergent females with average or high intellectual ability and a delayed diagnosis are more likely to demonstrate features that may lead to a label of PD.

Bipolar disease and schizophrenia

The prevalence of bipolar disorder and schizophrenia are also each significantly increased among females with neurodivergence. However, we suggest that what is sometimes initially thought to be psychotic behaviour may simply reflect the rich inner life of some autistic women whose imagination can be extremely vivid, and whose state of social withdrawal represents their construction of a self-absorbed inner world of fantasy based on their special interests.

Further references to this topic are provided under '**Supplementary data**'.

Challenges for the patient

The challenges of navigating a world where neurodivergent people are the exception rather than the norm pose particular problems for females, who often adopt camouflaging behaviour in an attempt to disguise their difficulties. De Vaan et al argues that neurodivergent people 'are more susceptible to stress,' due to missing 'auditory and visual information (which makes) situations more unpredictable, uncertain, and stressful' (De Vaan et al, 2020). This additional stress precipitates an enhanced cortisol response in autism which may contribute to some of the physical comorbidities of neurodivergent females. This may contribute to the significant reduction in the lifespan of neurodivergent females which is due to a combination of accelerated vascular disease in older autistic females, along with suicide and epilepsy in younger females with autism and/or ADHD (Catalá-López et al, 2022).

Challenges for the clinician

The medical profession has generally been slow to appreciate the wide range of differing symptoms that neurodivergent 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 neurodivergent 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, except for hypermobility. Previously, this often led to autistic females being described as having psychosomatic illness or those with ADHD as being hard to help. Such terminology is insensitive and outdated.

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 neurodivergent females is important to acquire. Some neurodivergent 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. Once a diagnosis of a neurodevelopmental condition is made or suspected, it is important to offer access to appropriate multidisciplinary support while recognising multiple cross-referrals may not always be required. The present delay in accessing diagnostic and support services can trigger adverse consequences such as meltdown, panic attack, or the threat of self-harm.

How can clinicians improve the healthcare experience for neurodivergent females?

There is much that clinicians can do. Indeed, a framework for improving the healthcare experiences of autistic people has already been proposed and merits more widespread consideration by providers (Doherty et al, 2023). There are often subtle clues in the way that neurodivergent people present (Doherty et al, 2021). They are more likely to bring a spokesperson and avoid eye contact at consultation. They may appear unduly agitated or sometimes disengaged with the process. Hence the art of 'learning to listen' remains an essential tool in both diagnosis and management. Establishing preferred pronouns is often relevant and important.

Neurodivergent people can feel uncomfortable if they are not given enough time to share their concerns, and an open unhurried dialogue 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 neurodivergent condition to surface from what may have previously appeared to be a random collection of unrelated symptoms.

Once a diagnosis of autism or ADHD has been established, consistency within clinical contact to ensure continuity of care can help develop trust which neurodivergent people

often take time to achieve. Although this can be challenging within the present constraints of both primary and secondary care structures, autistic females especially appreciate a consistent and predictable format and value having someone they can trust to talk to. A quiet room with low-level lighting and no visual or other sensory distraction is recommended.

As neurodivergent females with learning disability account for much of the premature mortality and are most likely to have multiple physical and mental health cooccurring conditions, it is essential for clinicians to understand their specific needs and adaptations. They may require extra time both to communicate and absorb information and may need this to be provided in specific format. They may prefer written advice and instructions over verbal information, while the combination of both is recommended. Other reasonable adjustments may include the use of hospital passports and advance directives which may specify their individual needs and preferences in writing, especially if they are non-verbal or are prone to develop selective mutism when placed in a stressful environment.

Referral for assessment and/or support to related services is recommended for all neurodivergent females unless they specifically decline this. Reducing barriers between services for physical and mental health to minimise delay would be ideal, although hard to guarantee in the light of present waiting times for community and hospital mental health services. Information sharing between disciplines is very helpful, but it is essential to obtain the patient's consent for this in advance. For neurodivergent females with mental health and/or behavioural issues, cognitive behavioural therapy (CBT) and psychotherapy such as acceptance and commitment therapy (ACT) are often helpful. For females with ADHD, stimulants can improve concentration and facilitate the completion of tasks. Evidence exists to guide successful therapeutic interventions and reduce adverse psychosocial outcomes.

Future priorities

If we can help society increase insight and understanding into neurodivergence with the aid of non-judgemental language and acceptance of inter-personal differences, the mental and physical health burdens carried by many autistic women, and those with ADHD or related conditions, may diminish. It is essential that all clinicians are aware of the variety of comorbid conditions experienced by neurodivergent females and the wide range of symptoms that can accompany these. If we are to become more effective at managing these conditions, we must work together to improve communication between service providers, as well as with service users. Improving access to eating disorder services and gender identity clinics are important examples, as neurodivergent females are greatly over-represented among those seeking such support. Increasing the evidence base around treatment for people in these situations would facilitate this aim.

Neurodivergent 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 neurodivergence is essential, as this seems to differ from the experience of many neurotypical people (Moore and Failla, 2021). 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 neurodivergent females and accounts for a significant component of their lived experience of discomfort and dysfunction. It is essential for us to understand and address the barriers to physical healthcare services access for autistic adults (Mason et al, 2019).

The multiple conditions experienced by many neurodivergent females are influenced by both genetic and environmental factors. A better understanding of the relationship between these influences is essential, although it is important that we appreciate the reasons behind the heightened suspicion and sensitivity expressed by many autistic people over the use of gene studies in autism (Natri, 2021). However, we suggest that the complexity of polygenic influences on the clinical expression of diseases in autistic females justifies such an approach (Warrier et al, 2022). Further exploration of the reasons behind the physical and psychological hypersensitivity that many neurodivergent females exhibit would be invaluable to improving our insight into this phenomenon. This may allow the relationship between the limbic, endocrine, and immune systems in neurodivergent individuals to be more fully understood. Ultimately, the sense of isolation and alienation experienced by so

many neurodivergent females could, and should be addressed, as this plays a significant part in their health-seeking behaviour and support needs.

How patients and the public contributed to this article

Three authors of this paper have direct lived experience of female neurodivergent conditions, and three work directly in the provision of health care delivery to girls and women with neurodivergent conditions.

Key points

- The health care needs of women and girls with neurodivergence have been largely overlooked until recently, perhaps because of underdiagnosis as a consequence of camouflage and masking.
- Neurodivergent females suffer increased morbidity and mortality from a wide range of physical and mental health comorbid conditions.
- Doctors should increase their awareness of both the diagnosis and management of neurodivergent conditions in women and girls.
- Priorities for clinical research should include the management of chronic pain, eating disorders and gender incongruence, all of which are grossly overrepresented with neurodivergent females.

Author details

[1]Department of Medicine, James Cook University Hospital, Middlesbrough, UK

[2]Autism Support Centre, Healios, Middlesbrough, UK

[3]Department of Psychology, Durham University, Durham, UK

[4]School of Medicine, University College Dublin, Ireland

Availability of Data and Materials

All data included in this study are available upon request by contact with the corresponding author.

Author Contributions

RM, RT, MD and CK all made substantial contributions to the concept and design of the review. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

Acknowledgement

The authors would like to thank all their patients whose combined lived experience acted as a catalyst for the production of this paper.

Funding

No funding.

Conflict of Interest

All authors have completed the ICMJE uniform disclosure form. RM works for Healios, which is a private company providing private diagnostic facilities to those who may have neurodivergent conditions. Other authors have no conflicts of interest to declare.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://www.magonlinelibrary.com/doi/suppl/10.12968/hmed.2023.0337

References

Anna S, Bertilsdotter Rosqvist H. Neurodiversity studies: mapping out possibilities of a new critical paradigm. Disability and Society. 2021;36(9):1532–1537. https://doi.org/10.1080/09687599.2021.1919503

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. Journal of Pain Research. 2019;Volume 12:2925–2932. https://doi.org/10.2147/JPR.S212422

Barkley RA, Fischer M. The unique contribution of emotional impulsiveness to impairment in major life activities in hyperactive children as adults. Journal of the American Academy of Child and Adolescent Psychiatry. 2010;49(5):503–513. https://doi.org/10.1016/j.jaac.2010.01.019

Bedrossian L. Understand and address complexities of rejection sensitive dysphoria in students with ADHD. Disability Compliance for Higher Education. 2021;26(10):4. https://doi.org/10.1002/dhe.31047

Berni T, Morgan C, Berni E, Rees A. Polycystic ovary syndrome is associated with adverse mental health and neurodevelopmental outcomes: a retrospective, observational study. Endocrine Abstracts. 2017; 50:P353. https://doi.org/10.1530/endoabs.50.P353

Bhupathy P, Haines CD, Leinwand LA. Influence of sex hormones and phytoestrogens on heart disease in men and women. Women's Health (London, England). 2010;6(1):77–95. https://doi.org/10.2217/whe.09.80

Cassidy S, Bradley P, Robinson J et al. Suicidal ideation and suicide plans or attempts in adults with Asperger's syndrome attending a specialist diagnostic clinic: a clinical cohort study. Lancet Psychiatry. 2014;1(2):142–147. https://doi.org/10.1016/S2215-0366(14)70248-2

Cassidy S, Au-Yeung S, Robertson A et al. Autism and autistic traits in those who died by suicide in England. British Journal of Psychiatry. 2022;221(5):683–691. https://doi.org/10.1192/bjp.2022.21

Catalá-López F, Hutton B, Page MJ et al. Mortality in persons with autism spectrum disorder or attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. JAMA Pediatrics. 2022;176(4):e216401. https://doi.org/10.1001/jamapediatrics.2021.6401

Chua R, Tay M, Ooi D et al. Understanding the link between allergy and neurodevelopmental disorders: a current review of factors and mechanisms. Frontiers in Neurology. 2021;11. https://doi.org/10.3389/fneur.2020.603571

Csecs JLL, Iodice V, Rae CL et al. Joint hypermobility links neurodivergence to dysautonomia and pain. Frontiers in Psychiatry. 2022;12:786916. https://doi.org/10.3389/fpsyt.2021.786916

Dalsgaard S, Mortensen PB, Frydenberg M, Thomse PH. Long-term criminal outcome of children with attention deficit hyperactivity disorder. Criminal Behaviour and Mental Health. 2013;23(2):86–98. https://doi.org/10.1002/cbm.1860

De Vaan G, Beijers R, Vervloed M et al. Associations between cortisol stress levels and autism symptoms in people with sensory and intellectual disabilities. Frontiers in Education. 2020;5. https://doi.org/10.3389/feduc.2020.540387

Demontis D, Walters RK, Martin J et al. Discovery of the first genome-wide significant risk loci for attention deficit/hyperactivity disorder. Nature Genetics. 2019;51(1):63–75. https://doi.org/10.1038/s41588-018-0269-7

Doherty M, Haydon C, Davidson IA. Recognising autism in healthcare. British Journal of Hospital Medicine. 2021;82(12):1–7. https://doi.org/10.12968/hmed.2021.0313

Doherty M, McCowan S, Shaw SC. Autistic SPACE: a novel framework for meeting the needs of autistic people in healthcare settings. British Journal of Hospital Medicine. 2023; 84(4). https://doi.org/10.129.68/hmed.2023.0006

Frye RE, Wynne R, Rose S et al. Thyroid dysfunction in children with autism spectrum disorder is associated with folate receptor α autoimmune disorder. Journal of Neuroendocrinology. 2017;29(3). https://doi.org/10.1111/jne.12461

Hargitai LD, Livingston LA, Waldren LH et al. Attention-deficit hyperactivity disorder traits are a more important predictor of internalising problems than autistic traits. Scientific Reports. 2023;13(1):31. https://doi.org/10.1038/s41598-022-26350-4

Hwang YI, Srasuebkul P, Foley K-R, Arnold S, Trollor JN. Mortality and cause of death of Australians on the autism spectrum. Autism Research. 2019;12(5):806–815. https://doi.org/10.1002/aur.2086

Kaisari P, Dourish CT, Higgs S. Attention deficit hyperactivity disorder (ADHD) and disordered eating behaviour: a systematic review and a framework for future research. Clinical Psychology Review. 2017; 53:109–121. https://doi.org/10.1016/j.cpr.2017.03.002

Kim JY, Choi MJ, Ha S et al. Association between autism spectrum disorder and inflammatory bowel disease: a systematic review and meta-analysis. Autism Research. 2022;15(2):340–352. https://doi.org/10.1002/aur.2656

Koi P. Genetics on the neurodiversity spectrum: genetic, phenotypic and endophenotypic continua in autism and ADHD. Studies in History and Philosophy of Science. 2021;89:52–62. https://doi.org/10.1016/j.shpsa.2021.07.006

Mason D, Ingham B, Urbanowicz A et al. A systematic review of what barriers and facilitators prevent and enable physical healthcare services access for autistic adults. Journal of Autism and Developmental Disorders. 2019;49(8):3387–3400. https://doi.org/10.1007/s10803-019-04049-2

Moore D, Failla MD. Pain in Autism Spectrum Disorders. In: Volkmar FR (ed). Encyclopedia of autism spectrum disorders. Cham: Springer; 2021

Moseley RL, Druce T, Turner-Cobb JM. When my autism broke': a qualitative study spotlighting autistic voices on menopause. Autism. 2020;24(6):1423–1437. https://doi.org/10.1177/1362361319901184

Natri H. Spectrum 10K and the questionable past, present, and future of genetic autism research. ResearchGate [Preprint]. 2021. https://doi.org/10.13140/RG.2.2.14973.28642

Neumeyer AM, O'Rourke JA, Massa A et al. Brief report: bone fractures in children and adults with autism spectrum disorders. Journal of Autism and Developmental Disorders. 2015;45(3):881–887. https://doi.org/10.1007/s10803-014-2228-1

Quan J, Panaccione N, Jeong J et al. Association between celiac disease and autism spectrum disorder: a systematic review. Journal of Pediatric Gastroenterology and Nutrition. 2021;72(5):704–711. https://doi.org/10.1097/MPG.0000000000003051

Ryan L, Thomson E, Beer H, Philcox E, Kelly C. Autistic traits correlate with chronic musculoskeletal pain: a self-selected population-based survey. OBM Neurobiology. 2023;7(1):1–21. https://doi.org/10.21926/obm.neurobiol.2301155

Shah P, Hall R, Catmur C, Bird G. Alexithymia, not autism, is associated with impaired interoception. Cortex. 2016;81:215–220. https://doi.org/10.1016/j.cortex.2016.03.021

Steward R, Crane L, Roy E, Remington A, Pellicano E. Life is much more difficult to manage during periods": autistic experiences of menstruation. Journal of Autism and Developmental Disorders. 2018;48(12):4287–4292. https://doi.org/10.1007/s10803-018-3664-0

Sundquist J, Ohlsson H, Sundquist K, Kendler K. Attention-deficit/hyperactivity disorder and risk for drug use disorder: a population-based follow-up and co-relative study. Psychological Medicine. 2015;45(5):977–983. https://doi.org/10.1017/S0033291714001986

Thapar AK, Riglin L, Blakey R et al. Childhood attention-deficit hyperactivity disorder problems and mid-life cardiovascular risk: prospective population cohort study. British Journal of Psychiatry. 2023;223(4):472–477. https://doi.org/10.1192/bjp.2023.90

Vohra R, Madhavan S, Sambamoorthi U. Comorbidity prevalence, healthcare utilization, and expenditures of Medicaid enrolled adults with autism spectrum disorders. Autism. 2017;21(8):995–1009. https://doi.org/10.1177/1362361316665222

Warrier V, Greenberg DM, Weir E et al. Elevated rates of autism, other neurodevelopmental and psychiatric diagnoses, and autistic traits in transgender and gender-diverse individuals. Nature Communications. 2020;11(1):3959. https://doi.org/10.1038/s41467-020-17794-1

Warrier V, Zhang X, Reed P et al. Genetic correlates of phenotypic heterogeneity in autism. Nature Genetics. 2022;54(9):1293–1304. https://doi.org/10.1038/s41588-022-01072-5

Weir E, Allison C, Warrier V, Baron-Cohen S. Increased prevalence of non-communicable physical health conditions among autistic adults. Autism. 2021;25(3):681–694. https://doi.org/10.1177/1362361320953652

Young S, Heptinstall E, Sonuga-Barke EJS, Chadwick O, Taylor E. The adolescent outcome of hyperactive girls: self-report of psychosocial status. Child Psychology Psychiatry. 2005;46(3): 255–262. https://doi.org/10.1111/j.1469-7610.2004.00350.x

Young S, Adamo N, Ásgeirsdóttir BB 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. 2020;20(1):404. https://doi.org/10.1186/s12888-020-02707-9