

Physical Disorders Associated with Neurodevelopmental Disorders (NDDs)

Introduction

Neurodevelopmental disorders (NDDs) such as autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), and intellectual disability (ID) are increasingly recognized to co-occur with a range of physical health conditions. Historically, NDDs were viewed primarily as brain-based conditions, but research now shows significant **comorbid physical disorders** across multiple organ systems. Individuals with NDDs often experience challenges beyond the nervous system, including immune abnormalities, gastrointestinal (GI) problems, metabolic and endocrine disturbances, and others. In fact, one twin study found that children with autism or ADHD had elevated odds ratios for various health conditions – for example, an over 8-fold higher odds of epilepsy in autism

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This report provides a comprehensive overview of known physical disorders associated with NDDs, encompassing both well-established and emerging associations. We organize the information by category (autoimmune, connective tissue, metabolic, gastrointestinal, chronic pain, neurological, immune dysfunction, and sleep-related conditions), list specific conditions within each category, and summarize supporting evidence for their links to NDDs. Possible mechanisms underlying these associations – such as genetic overlap, immune dysregulation, neurotransmitter imbalances, and shared environmental factors – are also highlighted. The goal is to aid understanding of the “whole-body” aspects of neurodevelopmental disorders, as recognizing and addressing these comorbidities can greatly improve comprehensive care.

Autoimmune Diseases

Research suggests that **autoimmune diseases** occur at higher-than-expected rates in individuals with NDDs (and in their families). Autoimmune conditions involve the immune system attacking the body's own tissues, and examples include Type 1 diabetes, celiac disease, and autoimmune thyroiditis. Epidemiological studies indicate a tangible overlap between autoimmunity and NDDs:

- **Type 1 Diabetes (T1D):** Large population studies and meta-analyses have found a bidirectional link between T1D and NDDs. Children with T1D show a higher prevalence of ASD and ADHD than the general population (one meta-analysis reported ~1.2% ASD and 5.3% ADHD in paediatric T1D, both above global norms)

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. Conversely, having an NDD (especially ADHD or ASD) is associated with difficulty managing blood glucose and higher risk of diabetic complications

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. The association may stem from shared genetic susceptibility and the challenges of managing a complex autoimmune illness in the context of neurodevelopmental impairments.

- **Celiac Disease (Gluten Enteropathy):** The relationship between celiac disease (an autoimmune disorder triggered by gluten) and NDDs has been debated. Earlier case reports and small studies suggested an overrepresentation of celiac in ADHD populations and improvements in ADHD symptoms on a gluten-free diet

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. For example, one study found about 15% of children with ADHD had unrecognized celiac disease, and treating it led to significant behavioural improvements

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. However, larger registry studies have generally **not** found a strong overall association between ASD and biopsy-confirmed celiac disease

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. In a Swedish registry of ~27,000 celiac patients, autism was not more common than in controls, although autistic children were slightly more likely to have positive celiac antibodies without intestinal damage

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. The consensus is that *clinically overt* celiac disease is not dramatically more frequent in autism than in the general population

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, but some children with NDDs may have gluten sensitivity or mild GI inflammation that contributes to behavioural issues. Thus, screening for celiac may be warranted in NDD patients with GI or nutritional concerns, even if the population-level link is weak.

- **Autoimmune Thyroid Disease:** Immune-mediated thyroid disorders (like Hashimoto's thyroiditis) have been observed alongside NDDs. Studies

indicate that families of autistic individuals have higher rates of thyroid autoimmunity

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. One genetic analysis found a slight but significant association between autoimmune thyroid disease and autism risk

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. Thyroid hormones are crucial for brain development, and maternal thyroid autoantibodies or hypothyroidism during pregnancy have been linked to elevated ASD risk in offspring

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. In children, untreated hypothyroidism can cause cognitive impairment, so co-occurring thyroid dysfunction may exacerbate developmental issues. While more research is needed, current evidence suggests monitoring thyroid function in NDD patients (and possibly their mothers) is important.

- **Other Autoimmune Conditions:** Immune diseases such as **rheumatoid arthritis (RA)**, **systemic lupus erythematosus (SLE)**, and **psoriasis** have been examined for links to NDDs. Notably, a mother's autoimmune disease history can influence her child's neurodevelopment. For instance, children born to mothers with active lupus or RA have shown higher rates of ASD and ADHD in some studies

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. One large study reported that maternal autoimmune disease was associated with ~15% higher odds of ADHD in the child

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. This is thought to reflect **maternal immune activation**, where autoimmune inflammation during pregnancy might affect the developing foetal brain (see **Mechanisms** section). As for individuals with NDDs themselves developing autoimmune diseases, the evidence is mixed. Some genetic studies suggest shared risk genes between autism and certain autoimmune disorders (e.g. autism-risk gene variants also increased risk for ankylosing spondylitis, a spinal arthritis)

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. However, population data have not found strong links between autism and rheumatoid arthritis or Crohn's disease

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. In ADHD, a nationwide study found childhood ADHD was associated with higher rates of immune-mediated diseases like type 1 diabetes and juvenile arthritis, as well as asthma, but not with Crohn's or celiac disease

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. Overall, immune system irregularities (whether frank autoimmune disease or subclinical inflammation) appear to be an important piece of the puzzle in many NDD cases.

Immune Dysfunctions and Allergies

Beyond diagnosable autoimmune illnesses, individuals with NDDs frequently exhibit **immune dysregulation** in more subtle ways. This can include atypical immune system markers, increased susceptibility to infections, or co-occurring atopic/allergic conditions. Several lines of evidence illustrate immune dysfunction in NDD populations:

- **Atopic Disorders (Allergies, Asthma, Eczema):** Allergic illnesses are more common in children with ASD or ADHD than in neurotypical peers

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. For example, studies have noted higher rates of asthma in those with ADHD (odds ratio ~1.3 in one study)

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. A large cohort study in Taiwan found significant associations between *family* history of allergies/autoimmune diseases and increased risk of ASD/ADHD in children

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. Children with ADHD or autism themselves often have a history of allergic rhinitis, food allergies, or atopic dermatitis. The chronic inflammation and immune chemicals involved in allergies (like elevated IgE or cytokines) may cross the blood-brain barrier and subtly influence brain function

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. Additionally, allergy-related discomfort (itchiness, congestion) can worsen sleep and behaviour. Treating allergies in NDD patients can thus sometimes alleviate some behavioural symptoms or improve concentration.

- **Immune System Irregularities in ASD:** Numerous studies have documented that autism, in particular, is accompanied by immune system abnormalities

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. Autistic individuals (and their mothers) have been found to have differences such as elevated pro-inflammatory cytokines, reduced regulatory T-cell function, and the presence of autoantibodies against brain proteins

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. One 2018 study reported that children with ASD have reduced immune regulatory capacity compared to typical children

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. Another striking finding is the presence of *maternal autoantibodies* to fetal brain proteins in some mothers of autistic children – these antibodies can cause autism-like changes when injected into pregnant animals

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. Such evidence supports the idea that immune dysregulation (either in the child or the mother during gestation) can contribute to neurodevelopmental differences.

- **Primary Immunodeficiencies:** There is emerging evidence linking NDDs with certain immunodeficient conditions. **Selective Immunoglobulin A deficiency (IgA deficiency)**, the most common primary immunodeficiency, has been associated with higher rates of ADHD. A 2024 nationwide study in Israel found that 16.2% of patients with IgA deficiency had an ADHD diagnosis, compared to 12.9% in matched controls (OR ~1.30)

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. The IgA-deficient individuals also had more respiratory and gut infections, aligning with the idea that early-life infections or immune challenges might trigger neurodevelopmental symptoms. Other case reports have noted increased autism in patients with IgA deficiency or common variable immunodeficiency

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. While NDDs are not immunodeficiencies per se, these findings underscore overlapping vulnerabilities – genes affecting immune development might also impact brain development, or recurrent childhood infections/inflammation may contribute to attention and social cognition problems.

- **PANS/PANDAS:** Paediatric acute-onset neuropsychiatric syndrome (PANS), including the subset linked to streptococcal infection (PANDAS), is a condition where an infection triggers a sudden onset of OCD/tic symptoms and sometimes ADHD-like hyperactivity or regression in children. This is essentially an immune-based attack on parts of the brain. PANS/PANDAS is not the same as autism or ADHD, but it exemplifies how immune dysfunction (autoimmune encephalitis triggered by infection) can produce neurodevelopmental-like symptoms. Some clinicians evaluate NDD patients with abrupt behaviour changes for possible PANS, though it remains a specialized diagnosis. The concept reinforces the broader point: a dysregulated immune system can alter behaviour and cognition in developing children.

In summary, allergic and immune irregularities are **commonly comorbid** with NDDs

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. Immune-related genes (like the HLA variants involved in autoimmunity) have been implicated in ADHD and autism risk

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, suggesting a biological link. Additionally, immune challenges during critical developmental periods (e.g. maternal infections, early childhood illness) may set the stage for neurodevelopmental differences. Monitoring and managing immune health – from allergies to chronic inflammation – is therefore an important aspect of caring for individuals with NDDs.

Connective Tissue Disorders (Ehlers-Danlos & Hypermobility)

One of the most intriguing emerging associations is between NDDs and **connective tissue disorders**, particularly **Ehlers-Danlos syndrome (EDS)** and related joint

hypermobility conditions. EDS is a group of genetic disorders affecting collagen and connective tissues, leading to hyperflexible joints, fragile tissues, and sometimes autonomic nervous system issues. Recent research has revealed a surprising overrepresentation of joint hypermobility in neurodivergent populations:

- **Joint Hypermobility & hEDS:** Multiple studies have found that autism and ADHD frequently co-occur with generalized joint hypermobility. In one cohort of 109 adults with neurodevelopmental diagnoses, **51%** met criteria for joint hypermobility, compared to ~20% in the general population (OR ~4.5)

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. Using stricter criteria, hypermobility was still ~2.8 times more common in the NDD group than controls

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. Another report noted that individuals with hypermobile EDS were **7.4 times** more likely to be diagnosed with autism than those without EDS

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. Similarly, a Swedish registry found EDS patients had about **5.6-fold higher odds** of having ADHD than the general population

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. These are remarkably high associations, pointing to a real connection between connective tissue and neurodevelopment.

- **Clinical Observations:** Autistic children have been documented to show greater-than-normal joint mobility on physical exams

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. Case series have illustrated the overlap of autism or ADHD with **Joint Hypermobility Syndrome** (also known as hypermobility spectrum disorder, often considered a milder EDS)

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. Parents and clinicians are increasingly noting that many kids who are neurodivergent also have traits like flexible joints, frequent joint pain, or coordination difficulties. Developmental Coordination Disorder (dyspraxia) itself is more common in these children and could be related to underlying hypermobility in some cases.

- **Related Issues (Pain and Dysautonomia):** The link between hypermobility and NDDs also ties in with chronic pain and autonomic nervous system dysfunction (discussed further below). People with hypermobile EDS often

experience chronic pain, fatigue, and **orthostatic intolerance** (dizziness upon standing due to blood pressure dysregulation, often diagnosed as Postural Orthostatic Tachycardia Syndrome, POTS)

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. Intriguingly, these same symptoms – chronic fatigue, pain, dysautonomia – are reported at higher rates in autistic and ADHD individuals even without a formal EDS diagnosis

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. One study found neurodivergent adults had significantly more frequent symptoms of autonomic dysfunction and pain than controls, and that joint hypermobility **mediated** the link between neurodivergence and dysautonomia/pain

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. This suggests a shared underlying mechanism: perhaps connective tissue differences contribute to sensory and physiological issues that in turn affect neurodevelopmental features (or vice versa).

- **Potential Mechanisms:** Connective tissue proteins are found in the brain as well, and some researchers speculate that collagen gene variants might impact both joint properties and neural development (for example, altering how the brain's extracellular matrix guides neuron connections)

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. Another theory is that the chronic pain and proprioceptive differences in hypermobile individuals could shape brain development and behaviour – a constantly uncomfortable child may withdraw socially or struggle with attention. It's also possible that there is a pleiotropic genetic syndrome not yet fully understood that links flexible connective tissue and neurodivergence. In any case, this association is now well “clinically established” and practitioners are encouraged to screen for joint hypermobility in patients with ASD/ADHD, as recognizing it can lead to interventions (physical therapy, pain management) that improve quality of life

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Connective tissue disorders like EDS/hypermobility are emerging as important comorbidities of NDDs. In practice, this means many neurodivergent individuals may have unrecognized hypermobility, contributing to frequent injuries, chronic pain complaints, or even gastrointestinal and cardiovascular symptoms due to tissue laxity. Proper diagnosis of these connective tissue issues can validate patients' experiences and ensure they receive appropriate multidisciplinary care.

Metabolic and Endocrine Disorders

Metabolic disturbances – ranging from inborn errors of metabolism to acquired conditions like obesity – have been linked to neurodevelopmental disorders. Because metabolism and brain function are tightly intertwined (the brain is a highly metabolic organ), disorders in this category can both *cause* developmental issues and *co-occur* with NDDs at higher rates.

- **Inborn Metabolic Errors (Phenylketonuria and others):** It has long been known that certain metabolic diseases can lead to neurodevelopmental disability if untreated. The classic example is **Phenylketonuria (PKU)** – a genetic disorder of amino acid metabolism that causes intellectual disability and autism-like features unless a special diet is followed from infancy. PKU is screened for at birth precisely to prevent this NDD outcome. While PKU itself is rare and usually managed, it illustrates how metabolic pathways (in this case, phenylalanine breakdown) are crucial for normal brain development. Many other **neurometabolic diseases** (such as urea cycle disorders, mitochondrial disorders, and peroxisomal disorders) have high rates of ADHD symptoms and cognitive impairment as part of their phenotype

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. For instance, disorders affecting energy metabolism in the brain often present with attention deficits, developmental delays, or autism features along with physical symptoms (seizures, muscle weakness, etc.). Thus, any child with unexplained developmental regression or mixed neurological and systemic issues is often tested for underlying metabolic conditions.

- **Mitochondrial Dysfunction:** Mitochondria are the energy-producing organelles in cells, and mitochondrial abnormalities have been observed in some individuals with ASD. A meta-analysis reported that a subset of autistic children (estimates range around 5% but vary) meet criteria for **mitochondrial disease or dysfunction**, far above the rate in the general population

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. These children may have signs like muscle weakness, fatigue, lactic acidosis, or seizures in addition to autism. Even when not meeting full

mitochondrial disease criteria, autistic individuals often show biomarkers of atypical energy metabolism

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. One hypothesis is that genetic mutations or environmental hits that impair mitochondrial function could simultaneously affect high-energy organs like the brain and muscles, leading to co-occurring autism and physical fatigue/weakness. Mitochondrial dysfunction might also contribute to the GI problems and motor delays seen in ASD. While not every person with autism has metabolic issues, recognizing the subset that does is important – dietary modifications, supplements (like carnitine or CoQ10), or other metabolic treatments may offer benefit in those cases

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- **Obesity and Metabolic Syndrome: Obesity** is a physical condition that shows a notable association with ADHD (and to a lesser extent with ASD). Children and adults with ADHD have higher odds of being overweight or obese than neurotypical peers

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. In one meta-analysis, ADHD was significantly linked to obesity (with an odds ratio suggesting ADHD individuals are more likely to have high BMI)

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. In childhood, about 20–30% of ADHD kids may be overweight

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, a rate above population expectation. Several factors explain this: impulsivity can lead to overeating or poor diet, inattention might interfere with structured meal planning, and ADHD-related depression or sleep problems can promote weight gain. Moreover, some ADHD medications affect appetite (usually suppressing it short-term, but ADHD that is untreated or in adults can correlate with obesity). Obesity itself can have neurological effects – for example, systemic inflammation and insulin resistance might worsen cognitive focus. Similarly in autism, altered eating habits (limited food selections, preference for high-carb foods

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) and lower physical activity can predispose to weight gain. Adolescents with ASD have been found to have higher rates of metabolic syndrome (a cluster of obesity-related issues) compared to typical peers

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. Treating obesity and metabolic syndrome (through diet, exercise, or medical therapies) in NDD patients is important, as it reduces risks of diabetes and cardiovascular disease and may also improve cognitive function and stamina.

- **Endocrine Disorders:** Hormonal disorders can shape neurodevelopment. **Thyroid hormone** is one example already touched on – congenital hypothyroidism causes developmental delay if not corrected early, and even milder thyroid dysfunction can affect cognition. As noted, autoimmune thyroiditis is slightly more common in autistic families

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. Another endocrine link is **prenatal**: maternal diabetes (Type 1, Type 2, or gestational) has been associated with higher rates of ASD and ADHD in children, possibly via intrauterine metabolic and inflammatory effects

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. On the flip side, children with neurodevelopmental disorders sometimes show differences in stress hormone regulation (cortisol rhythms) and may be at risk for earlier puberty or growth hormone abnormalities if their condition involves hypothalamic differences. While these endocrine issues are not universal, clinicians managing NDDs stay alert for signs of hormonal problems. For instance, if an autistic teen suddenly gains excessive weight or has fatigue, checking thyroid function or cortisol levels might reveal an underlying treatable disorder contributing to behavioural changes.

In summary, **metabolic health and neurodevelopment are deeply intertwined**. Genetic metabolic diseases can present as NDDs, and common metabolic problems (like obesity or diabetes) co-occur at non-random rates with ADHD/ASD. Shared genetic factors (e.g., genes affecting brain neurotransmitters and appetite regulation) could be at play, as well as behavioural cycles (inattention leading to poor diet, etc.). Attention to nutrition and metabolic screening should be part of holistic NDD care, as managing these comorbidities can improve overall outcomes.

Gastrointestinal Disorders

Gastrointestinal problems are among the **most frequent medical comorbidities** observed in autism, and they also occur in ADHD more often than once assumed. The “gut-brain axis” – the bidirectional communication between the GI tract and central nervous system – appears to be altered in many neurodevelopmental conditions, potentially contributing to symptoms.

- **Functional GI Disorders in ASD:** Children with autism commonly experience chronic GI symptoms such as **constipation, diarrhoea, abdominal pain, and bloating**. Estimates of GI symptom prevalence in ASD vary widely (from ~9% to over 90% in different studies)

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, but a comprehensive meta-analysis concluded that autistic children are **more than four times as likely** as neurotypical children to have GI problems

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. The most common issues reported are constipation and abdominal pain, followed by diarrhoea

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. For many children, constipation is a persistent problem that can cause significant discomfort and even behavioural regression (a non-verbal child in pain may express it through meltdowns or self-injury). Notably, severity of autism has been correlated with GI issues – kids with more severe social-communication impairments often have worse constipation, suggesting a possible shared biological factor or simply that those who cannot communicate pain suffer more

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. Feeding difficulties are also rampant in ASD: up to five times more common than in typical children

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. Many autistic individuals have very selective diets and sensory aversions to certain textures, which can lead to nutritional imbalances and exacerbate GI dysfunction (e.g. low fibre intake worsening constipation). Untreated GI disorders in ASD have been linked to sleep disturbances and challenging behaviours

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, so identifying and managing these issues is crucial.

- **GI Disorders in ADHD:** While less studied than in autism, **ADHD** has also been associated with a higher incidence of functional GI disorders. A large Israeli cohort study of young adults (over 33,000 with ADHD) found significantly elevated rates of **irritable bowel syndrome (IBS)**, **functional dyspepsia** (chronic indigestion), and **chronic constipation** in the ADHD group compared to controls

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. ADHD was *not* linked with inflammatory bowel diseases or celiac disease in that study

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, but the functional GI issues were notably more frequent. ADHD patients had more frequent abdominal pain, reflux, nausea, and diarrhoea symptoms as well

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. Importantly, these findings persisted even in those not on ADHD medication, indicating it's not just stimulant side effects – the ADHD condition itself likely predisposes to GI troubles

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. Stress and lifestyle may play a role; ADHD can involve irregular eating patterns and heightened stress responses, which can trigger IBS flare-ups. Additionally, there may be shared neurotransmitter links (for example, serotonin and dopamine regulate both gut motility and attention). Clinicians are advised that in a young person with ADHD and unexplained GI complaints, a functional GI disorder could very well be the explanation

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- **Inflammatory GI Diseases:** Unlike functional disorders, true inflammatory diseases like **Crohn's disease or ulcerative colitis** do not show a clear increased prevalence in NDDs (aside from any increase explained by shared genetics or the slight overlap via autoimmune tendencies). The aforementioned study found no association between ADHD and IBD

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. Earlier speculation about a link between autism and intestinal inflammation (the discredited “autistic enterocolitis” hypothesis) has not been borne out by

large epidemiological data. However, some autistic individuals *do* have inflammatory GI diseases, and when present, these can worsen behavioural symptoms. It remains important to evaluate GI pain in non-communicative patients, as they may have treatable conditions like reflux esophagitis or constipation with overflow diarrhoea that can be resolved. There is also interest in whether the gut microbiome differences seen in autism and ADHD contribute to both functional and inflammatory GI issues – research is ongoing, and some experimental treatments (like probiotics or faecal transplant) are being explored for their potential to improve both gut and behavioural symptoms

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- **Gut-Brain Axis Mechanisms:** The co-occurrence of GI disorders with NDDs has spurred investigation into the gut-brain axis. It's known that the gut hosts a “second brain” (the enteric nervous system) and produces many neurotransmitters (like serotonin) that influence mood and cognition. Autism research has found differences in gut bacteria composition in some patients, and treating GI problems sometimes yields improvement in attentiveness or sleep. Additionally, chronic GI inflammation or discomfort can drive systemic inflammation, which may affect the brain. There is “topical interest” in dietary and microbiome-based interventions for autism/ADHD, reflecting these connections

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. For example, some families report behavioural benefits from gluten-free or casein-free diets, although evidence for broad efficacy is limited – it may help a subset who have specific intolerances

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. Overall, the gut-brain link is a significant area of emerging science in NDDs.

Key point: Gastrointestinal comorbidities are **very common in autism (and present in ADHD)** and should not be overlooked. Managing constipation, reflux, or IBS in a neurodivergent individual can not only improve physical health but also lead to better sleep, behaviour, and learning. Close collaboration between paediatricians/gastroenterologists and behavioural specialists is recommended for optimal care of these patients.

Chronic Pain Syndromes

Chronic pain conditions, which often have mysterious aetiologies, appear to overlap with neurodevelopmental disorders at a greater-than-chance rate. These include syndromes like **fibromyalgia**, **chronic fatigue syndrome** (myalgic encephalomyelitis), and chronic headache/migraine. Such disorders are

characterized by persistent pain and fatigue that are not explained by acute injury – and interestingly, people with ASD or ADHD seem more prone to developing them.

- **Fibromyalgia (FMS):** Fibromyalgia involves widespread musculoskeletal pain, tenderness, unrefreshing sleep, and fatigue. Several studies have identified a high prevalence of ADHD among fibromyalgia patients. For example, rates of ADHD (diagnosed or via symptom scales) in fibromyalgia cohorts have ranged from ~25% up to 45%

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. A summary letter in 2023 noted ADHD prevalence in FMS patients was reported as 44.7% in South Africa, 24.5% in Italy, 32.3% in Spain, ~25% in the Netherlands, and 29.5% in Turkey – consistently well above population levels

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. ADHD symptoms (like inattention) also correlated with fibromyalgia pain severity in those studies

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. Conversely, some patients with long-standing ADHD later develop fibromyalgia, suggesting a link in the pathophysiology. In fact, as early as 1998, clinicians observed that stimulant medication for ADHD also unexpectedly reduced fibromyalgia pain in some patients

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. Besides ADHD, **autism** has also been associated with fibromyalgia: one survey found fibromyalgia in roughly 20–25% of autistic females

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, and a recent community study found that *autistic traits* were directly correlated with chronic pain severity, with those endorsing more autistic traits being at higher risk of fibromyalgia

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. Hypermobile EDS (discussed above) often overlaps with fibromyalgia, and since EDS is linked with autism/ADHD, it creates a triad where many individuals have all three: neurodivergence, hypermobility, and chronic pain

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. The presence of dysautonomia (POTS) in these patients further connects the dots – fibromyalgia pain may be partly driven by nervous system dysregulation, something also seen in ADHD and autism. Overall,

fibromyalgia appears to be **significantly co-occurring with NDDs**, and some researchers consider whether the constant pain acts as a chronic stressor impacting attention and mood, or if neurodivergent sensory processing amplifies pain perception. Regardless, clinicians managing fibromyalgia are now advised to screen for ADHD/autism

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, as treating the underlying NDD (e.g. with ADHD medications or autism-specific strategies) might improve overall quality of life.

- **Chronic Fatigue Syndrome (CFS/ME):** Chronic fatigue syndrome, characterized by profound fatigue not relieved by rest (often post-viral in onset), has also been linked to NDDs. Just as with fibromyalgia, studies have found an elevated frequency of lifetime ADHD in CFS patients

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. One hypothesis is that both conditions involve dysregulation of the autonomic nervous system and neurotransmitter systems (like dopamine and norepinephrine). Some have even proposed that ADHD and certain chronic fatigue or obesity phenotypes might represent different manifestations of a shared dysregulatory syndrome

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. Clinically, a person with ADHD may be prone to poor sleep and health behaviours that eventually lead to a state of chronic fatigue; conversely, someone with CFS may struggle with attention and memory as a result of their illness. There is not as much data on autism and CFS, but anecdotal reports suggest autistic individuals can also suffer from chronic fatigue at higher rates than average. Both fibromyalgia and CFS often coexist and are more common in women; notably, women with ASD/ADHD might be at particular risk (some of the studies above were in predominantly female samples

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).

- **Chronic Headache and Migraine:** Migraines are another chronic pain condition where a link to ADHD has been observed. A Taiwanese cohort study found that adults with persistent ADHD had a **higher prevalence of migraine** than those without ADHD

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. Similarly, children with ADHD (and their mothers) were reported to have more frequent headaches/migraines than controls in one study

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. The prevalence of migraine among individuals with ADHD in some reviews is around 28%, while the prevalence of ADHD among migraine sufferers is higher than expected as well

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. Migraine and ADHD may share underlying factors such as dopamine dysfunction (dopamine plays a role in both conditions) or general neuronal hyperexcitability. Autistic individuals too can experience high rates of headaches, possibly due to sensory sensitivities, anxiety, or co-occurring conditions. Chronic pain of any type can exacerbate attention difficulties and stress, creating a vicious cycle. It is important for practitioners to address headaches and pain complaints in NDD patients rather than attributing them solely to behavioural issues, as effective pain management can significantly improve day-to-day functioning.

In summary, **chronic pain syndromes (fibromyalgia, chronic fatigue, migraines)** are increasingly recognized in neurodivergent populations. There may be a shared biological terrain – for instance, EDS/hypermobility linking to fibromyalgia, or immune dysregulation linking to fatigue and autism. Neurotransmitter imbalances (low dopamine/norepinephrine activity is implicated in ADHD and might also predispose to fibromyalgia pain perception

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) could be a common thread. It's also possible that coping with neurodevelopmental challenges over time induces stress that manifests physically. Regardless of cause, awareness of these overlaps means clinicians should be vigilant: if an autistic patient reports widespread pain, fibromyalgia should be considered; if an adult with long-standing ADHD has severe fatigue, screening for CFS or sleep apnoea is warranted. Treatment of these pain syndromes often requires a multidisciplinary approach (medication, exercise therapy, counselling) and can greatly benefit from also treating any underlying ADHD or anxiety.

Epilepsy and Neurological Conditions

Epilepsy (seizure disorder) is one of the most well-established medical comorbidities with neurodevelopmental disorders, especially autism and intellectual disability. Both epilepsy and NDDs stem from atypical brain function, so it is perhaps not surprising they co-occur frequently. Additionally, other neurological conditions like tic disorders or cerebral palsy can co-exist with NDDs, but here we focus on epilepsy and related seizure issues, as well as briefly note others.

- **Epilepsy in Autism and ID:** The relationship between autism and epilepsy has been documented for decades. Roughly **20–30% of individuals with autism** will develop epilepsy (recurrent seizures) by adulthood

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. Similarly, about 30% of children with epilepsy show signs of ASD – it's a bidirectional overlap

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. Intellectual disability (especially more severe ID) further increases the risk of seizures; many syndromic forms of ID (like tuberous sclerosis, Rett syndrome, etc.) inherently include epilepsy as part of the picture. The high co-occurrence is thought to arise from shared brain circuitry issues: the same atypical neural connectivity that contributes to autistic behaviours might also predispose to epileptic activity

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. There are also **single-gene disorders** that cause both conditions – for example, *Fragile X syndrome* often leads to autism symptoms and about 20% have seizures, and *Tuberous Sclerosis Complex* causes benign brain tumours that frequently result in epilepsy and autism. Early-life severe seizures (such as infantile spasms) can *cause* autism in some cases

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, demonstrating a causal route: disruptive electrical activity in developing brain networks can lead to neurodevelopmental problems. Conversely, having autism might modify how epilepsy manifests (some seizures in autistic people may be misinterpreted as stimming or “zoning out” and vice versa, requiring careful evaluation

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). Clinicians are advised that **comorbidity of autism and epilepsy is frequent (~30%)** and to maintain a high index of suspicion for seizures in autistic individuals, especially if there are episodes of loss of awareness or unusual repetitive behaviours

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- **Epilepsy in ADHD:** The connection between ADHD and epilepsy is also noteworthy, though not as dramatically high as with autism. Still, ADHD is *the most common co-occurring disorder in children with epilepsy*, with some estimates that 30–40% of kids with epilepsy meet criteria for ADHD

epilepsy.com

. Children with early-onset epilepsy are nearly twice as likely to develop ADHD later in life compared to those without epilepsy

[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)

. The presence of seizures during development can affect attention networks in the brain, and certain anti-epileptic medications can contribute to attention problems. Additionally, ADHD-like symptoms might actually be an early manifestation of underlying neurological dysfunction that later also produces seizures. There is also a suggestion of shared genetic influences: for example, some rare gene mutations (like in the GRIN2A gene) can lead to both epilepsy and ADHD symptoms. Managing a child with both ADHD and epilepsy can be challenging, as stimulant medications (the standard ADHD treatment) may lower seizure threshold in some cases, so clinicians must balance treatments carefully. Nonetheless, recognizing ADHD in an epilepsy patient is important for academic and social support, and treatments like atomoxetine (a non-stimulant) can be considered to avoid seizure risk.

- **Other Neurological Co-Occurrences:**

- **Tic Disorders and Tourette Syndrome:** Tourette syndrome (a chronic tic disorder) is *technically* another neurodevelopmental disorder, and it often overlaps with ADHD and autism. Up to 50–60% of people with Tourette's have ADHD, and many have autistic traits

[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)

. While tics are not a “physical disorder” in the sense of affecting other body systems, they represent additional neurological burden. The triad of ADHD, OCD, and tics is well-known in child psychiatry. Tourette's has also been tentatively linked to joint hypermobility as mentioned earlier (perhaps via shared dopamine/serotonin factors that also affect the gut and heart)

[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)

- **Sleep-Related Neurological Phenomena:** (These will be discussed in the sleep section, but include things like nocturnal epileptic seizures, which can be mistaken for sleep disorders, and restless legs syndrome, which has neurological underpinnings and is co-occurring with ADHD.)
- **Motor Coordination Disorders:** Many children with ASD or ADHD have **developmental coordination disorder (DCD)**, leading to clumsiness. While not exactly a systemic physical illness, DCD affects the neuromuscular system and can cause joint pain or injuries. As noted, DCD can overlap with hypermobility issues

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- **Genetic Syndromes:** There are numerous genetic syndromes (Down syndrome, fragile X, Angelman syndrome, etc.) that cause intellectual disability and often ASD/ADHD features alongside physical anomalies. Detailing these is beyond scope, but it's worth noting that sometimes what appears to be an "autism plus physical disorder" case is in fact a single genetic condition causing both (for example, *neurofibromatosis type 1* can cause learning disabilities/ADHD and also tumours on the skin and brain).

In summary, **neurological comorbidities** like epilepsy are highly prevalent in NDD populations. Shared neurobiological pathways (e.g. imbalances in excitation/inhibition in the brain) likely contribute to both seizures and developmental symptoms

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. Genetic pleiotropy is clearly at play in some instances (one gene influencing multiple conditions). For patients, this means that having one diagnosis (say autism) warrants at least screening for others (like a history of any staring spells or convulsions). Addressing seizures with anti-epileptic therapy can sometimes improve behaviour and cognition in these children, underscoring the importance of an integrated medical approach.

Sleep Disorders

Sleep disturbances are extremely common in individuals with NDDs, to the extent that they are often considered part of the phenotype. Adequate sleep is critical for learning, memory, and emotional regulation; thus, sleep disorders can significantly exacerbate neurodevelopmental symptoms. Both ASD and ADHD populations experience a range of sleep problems at much higher rates than the general population.

- **Insomnia and Poor Sleep Quality: Insomnia** (difficulty falling or staying asleep) is the most frequent sleep issue in both autism and ADHD. Studies suggest that **up to 50–80% of autistic children** have chronic sleep difficulties

thetransmitter.org

. One large 2019 study found nearly 80% of preschool-aged children with ASD had disrupted sleep patterns

thetransmitter.org

– about double the rate of sleep problems in non-autistic children

thetransmitter.org

. Children with ADHD likewise have very high rates of insomnia; one report indicated that insomnia affects ~70% of children with ADHD, significantly more than neurotypical peers

neurodivergentinsights.com

. Even in adults, around two-thirds of those with ADHD report persistent insomnia

cambridge.org

. These difficulties include prolonged sleep latency (taking a long time to fall asleep – on average, autistic individuals take 11 minutes longer to fall asleep than controls)

thetransmitter.org

, frequent night wakings, and early awakenings. As a result, people with NDDs often get less restorative sleep. In autism, studies using EEG have found reduced REM (dream) sleep percentage (only ~15% of sleep time, versus ~23% in neurotypicals)

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, which may impact learning and memory consolidation. Insomnia in ADHD can be partly behavioural (difficulty turning off an active mind at night) and partly biological (there are genetic mutations in some ADHD folks affecting melatonin production and circadian rhythm)

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. Lack of sleep, in turn, can worsen attention, irritability, and repetitive behaviours, creating a vicious cycle

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- **Circadian Rhythm Disorders:** Many neurodivergent individuals have irregular **circadian rhythms**. For example, **delayed sleep phase syndrome** (a strong tendency to fall asleep very late at night and wake late) is commonly reported in ADHD. There is evidence of melatonin hormone dysregulation in

both ASD and ADHD – melatonin levels may rise later in the evening than normal, shifting the biological clock

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. Genetic studies have linked some clock genes to ADHD. Consequently, even when strict bedtimes are imposed, the person's brain might not feel sleepy until the early morning hours. These circadian issues often manifest in adolescence (as teens naturally have some delay, which is exacerbated in ADHD/ASD). If unaddressed, circadian disorders result in chronic sleep deprivation (e.g., an ADHD teen unable to fall asleep until 2 AM but needing to wake for school at 7 AM) and can lead to secondary problems like depression or metabolic issues.

- **Sleep-Disordered Breathing:** Conditions like **obstructive sleep apnoea (OSA)** – pauses in breathing due to airway collapse, often associated with snoring – occur in some NDD patients as well. Children with syndromic autism or Down syndrome might have low muscle tone or anatomical differences that predispose to OSA. Additionally, the higher prevalence of obesity in ADHD can increase risk of sleep apnoea in that group. Sleep apnoea leads to fragmented, low-quality sleep and daytime behavioural problems that can mimic or worsen ADHD. Although not all studies find a higher incidence of apnoea in autism, one review noted some autistic people do have sleep apnoea and benefit from treatments like tonsillectomy or CPAP

thetransmitter.org

. **Sleep-related movement disorders** like **restless legs syndrome (RLS)** (an uncomfortable urge to move the legs at night) and periodic limb movements are also reported more in ADHD populations – one source estimated 25–50% of individuals with ADHD may have RLS or periodic limb movement disorder, compared to much lower prevalence in others

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. RLS is linked to iron metabolism and dopamine, which again ties to ADHD biology. Treating RLS (for example, with iron supplementation) can sometimes improve ADHD symptoms and sleep quality.

- **Nightmares and Parasomnias:** Children with ASD or ADHD can also experience more **nightmares, night terrors, and sleepwalking** than typical children

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. The reasons aren't entirely clear, but could relate to higher baseline anxiety (leading to nightmares) or differences in REM sleep structure. Night terrors (sudden screaming episodes in deep sleep) have been anecdotally reported to be more frequent in autistic kids. While parasomnias usually outgrow with

age, their presence can further disrupt family sleep and should be addressed (through reassurance, safety measures, or treating underlying stress).

Managing sleep disorders is often a priority in NDD interventions because **better sleep usually yields better daytime function**. Approaches include behavioural strategies (consistent bedtime routines, sensory accommodations like weighted blankets, and visual schedules to ease anxiety around bedtime), environment modifications (reducing evening screen time and light exposure to help melatonin release), and, when necessary, medical interventions. Low-dose melatonin is widely used and has evidence for helping autistic children fall asleep faster and sleep longer. In ADHD, treating the core symptoms (with stimulant or non-stimulant meds) sometimes paradoxically improves sleep because the person can regulate their schedule better, though for some it worsens it (requiring a tailored approach). For severe cases, referral to a sleep specialist for conditions like apnoea or RLS is warranted. Given that sleep problems are “*among the most urgent concerns*” of families of autistic children

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, addressing this domain is crucial for overall health.

Mechanisms Linking NDDs and Physical Conditions

Understanding **why** neurodevelopmental disorders are so often accompanied by physical ailments is an active area of research. The associations described above likely arise from a complex interplay of biological and environmental factors. Here we highlight several possible mechanisms that may explain these overlaps:

- **Shared Genetic Architecture:** Many NDDs and physical disorders share common genetic roots. Large studies have identified **pleiotropic genes** that can influence both brain development and bodily systems

molecularautism.biomedcentral.com

. For example, variations in the **HLA genes** (which regulate immune responses) have been linked to ADHD risk

pmc.ncbi.nlm.nih.gov

and also drive autoimmune diseases. Likewise, a genetic study found significant correlation between gene variants associated with autism and those associated with ankylosing spondylitis (an autoimmune arthritis), suggesting some of the same genetic predispositions underlie both conditions

thetransmitter.org

. Another example is connective tissue genes: a mutation in a collagen gene could hypothetically lead to joint hypermobility (EDS) while also affecting neural wiring, hence co-occurring autism

pmc.ncbi.nlm.nih.gov

. Additionally, certain *single-gene mutations* and copy number variants manifest with a spectrum of effects – e.g., a mutation in the PTEN gene can cause macrocephaly, skin lesions, and autism; 22q11 deletion can cause heart defects and ADHD/ID, etc. Thus, **genetic overlap** is a fundamental mechanism, where one genetic variant influences multiple organ systems, producing a constellation of neurodevelopmental and physical symptoms.

- **Immune Dysregulation and Neuroinflammation:** Immune system abnormalities can directly affect brain development, a concept supported by both human and animal studies. **Maternal immune activation** during pregnancy (due to infections or autoimmune flare-ups) can release pro-inflammatory cytokines that cross the placenta and alter foetal brain development, increasing risk for ASD and ADHD

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mdpi.com

. Epidemiological data show that maternal infections (especially significant ones like flu or herpes) and high maternal C-reactive protein are associated with higher autism risk in offspring

bmcmmedicine.biomedcentral.com

. In the child postnatally, chronic inflammation (from asthma, eczema, or gut inflammation) may also impact the brain through cytokines that reach the brain and activate microglia (brain immune cells). Children with autism and ADHD have been found to have elevated levels of certain cytokines and an imbalance in immune cell subsets

mdpi.com

. This **neuroinflammation** might contribute to symptoms like hyperactivity or social withdrawal. For instance, one study noted that upregulation of pro-inflammatory T-helper cells (Th17) was significantly associated with ASD

mdpi.com

. Autoimmune antibodies that attack neural proteins (found in some mothers of autistic kids, and in conditions like PANDAS) provide a direct link between immune dysfunction and neuropsychiatric manifestations

thetransmitter.org

. In summary, an **overactive or misguided immune system** can create an environment in which the developing brain is altered, explaining why immune-mediated conditions (autoimmune diseases, allergies) cluster with NDDs.

- **Neurotransmitter and Endocrine Imbalances:** Neurotransmitters (brain chemicals) don't only act in the brain – they have peripheral roles as well. Imbalances in these systems could simultaneously produce physical and cognitive effects. For example, **serotonin** is heavily involved in gut motility and mood regulation; many autistic individuals have elevated blood serotonin, which might impact both GI function and brain signalling. **Dopamine** and **norepinephrine**, which are deficient in ADHD brains, also help regulate pain pathways, movement, and even immune cell activity. Low dopamine could therefore predispose someone to ADHD and restless legs syndrome (a movement disorder), or ADHD and higher pain sensitivity (contributing to fibromyalgia)

[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)

. Another example is **GABA**, an inhibitory neurotransmitter: genetic disorders of GABA metabolism can cause seizures (epilepsy) and developmental delays. Hormones may play a role too – **melatonin** dysregulation in ASD/ADHD affects sleep-wake cycles

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, and **cortisol** (the stress hormone) often shows abnormal daily patterns in autism, potentially linking chronic stress and physical issues like abdominal pain or immune suppression. In essence, **the same chemical messengers** often operate in the brain and body, so a defect in those messenger systems can present with a dual set of symptoms.

- **Developmental Timing and Shared Pathways:** The human body's systems develop in parallel and are interconnected during early life. An insult or variation at a critical time (say, mid-gestation) could have ripple effects. For instance, **preterm birth** or perinatal complications can cause both cerebral palsy/neuromotor problems and later ADHD or ASD. A **nutrient deficiency** in utero (like iodine or iron deficiency) could lead to thyroid problems and cognitive impairments. The concept of critical windows means that an environmental factor (infection, toxin, malnutrition) can simultaneously derail development of multiple systems. This is seen in congenital infections (like cytomegalovirus causing deafness and intellectual disability) or foetal alcohol exposure (causing growth stunting, heart defects, and behavioural disorders). So, **shared environmental risk factors** during development contribute to the co-occurrence of physical and neurodevelopmental issues. Even in later childhood, events like traumatic brain injury can lead to pituitary hormone issues and ADHD-like attention problems together.
- **Behavioural and Lifestyle Factors:** Living with a neurodevelopmental disorder can indirectly lead to health issues. For example, children with ADHD might have poor impulse control leading to **unhealthy diets**, which in turn cause obesity or nutritional deficiencies. Autistic individuals with sensory food

aversions may become deficient in certain vitamins (like scurvy from extreme diets) or suffer constipation from low-fibre diets

[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)

. The **stress** of coping with social challenges may lead to elevated stress hormones and sleep loss, contributing to migraines or fibromyalgia pain. Inactivity (common in socially withdrawn or screen-absorbed youth with ASD/ADHD) predisposes to poor fitness and chronic pain. Conversely, having a painful condition can restrict participation in activities, potentially worsening autistic withdrawal or ADHD restlessness. These feedback loops mean that NDDs and physical disorders can reinforce each other. Treating one can often benefit the other: e.g., improving sleep can significantly reduce ADHD symptoms, and treating ADHD can allow better routines that improve sleep and diet.

It's likely that **multiple mechanisms act together** in any given individual. For instance, a child might have a genetic makeup that predisposes to both autoimmunity and ADHD (genetic overlap), then an environmental trigger like a viral infection could set off immune activation (immune mechanism), which then causes neuroinflammation affecting brain circuits (neurochemical mechanism), resulting in ADHD and maybe tics; subsequently the child's impulsive behaviour leads to an accident, causing chronic pain (lifestyle/environment mechanism). This complex chain illustrates how intertwined the physical and neurodevelopmental realms are. Modern research, such as twin studies and integrative genomics, is beginning to untangle these webs – one twin study found modest but significant genetic correlations between autism/ADHD traits and conditions like epilepsy and constipation

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, indicating shared hereditary factors, while also noting that unique environmental factors were important too.

Understanding these mechanisms is not just academic – it opens the door for more holistic treatments. For example, if immune dysregulation is a key player, immune-modulating therapies (like IVIG or anti-inflammatory diets) might help a subset of autism cases. If genetic overlap is identified, screening for certain medical issues when an NDD is diagnosed becomes possible (as is already done with autism and fragile X genetic testing, for instance). If lifestyle is a factor, interventions in diet, exercise, and sleep hygiene can be emphasized as part of the standard care for ADHD/ASD. Ultimately, appreciating the **whole-body nature of neurodevelopmental disorders** leads to better outcomes, as clinicians will be vigilant for physical comorbidities and patients will receive more well-rounded care.

Summary Table of Physical Conditions and NDD Associations

To summarize the extensive information, the table below lists major categories of physical disorders associated with NDDs, specific example conditions, and a brief note on their observed linkage with neurodevelopmental disorders:

Category	Physical Condition	Association with NDDs (ASD, ADHD, etc.)
Autoimmune	Type 1 Diabetes	Higher rates of ASD and ADHD in T1D youth than general population pmc.ncbi.nlm.nih.gov . Comorbid NDDs in T1D linked to poorer glycaemic control news.ki.se . Maternal diabetes during pregnancy raises offspring's NDD risk.
	Celiac Disease	Overrepresented in some ADHD samples (15% in one study pmc.ncbi.nlm.nih.gov), but large studies show no overall ASD–celiac association news.ki.se . Gluten-free diet may improve ADHD symptoms in those with gluten sensitivity.
	Autoimmune Thyroiditis	Family history of thyroid autoimmunity slightly increases autism risk thetransmitter.org . Maternal thyroid antibodies associated with ASD in child nature.com . Monitor thyroid function in NDD patients with fatigue or growth issues.
	Rheumatoid Arthritis, Lupus	Maternal RA/SLE associated with modestly higher ASD/ADHD risk in children pmc.ncbi.nlm.nih.gov jamanetwork.com . No strong evidence that individuals with ASD have higher RA rate thetransmitter.org . Shared immune genes and maternal inflammation are possible links.
Immune Dysfunction	Allergies (Asthma, Eczema)	Children with ASD/ADHD have more allergic conditions on average mdpi.com

Category	Physical Condition	Association with NDDs (ASD, ADHD, etc.)
		mdpi.com . For example, ADHD symptoms are 24% more likely in kids with any autoimmune disease (including asthma) pmc.ncbi.nlm.nih.gov . Allergies can worsen sleep/behaviour; treating them may help.
	Selective IgA Deficiency	Associated with ~30% increased odds of ADHD pmc.ncbi.nlm.nih.gov . Some reports of higher autism rates in IgA-deficient patients ijaai.tums.ac.ir . Suggests immune deficiencies and neurodevelopment may co-occur (possibly via more infections or shared genetics).
	Neuroinflammatory Syndromes	PANS/PANDAS (post-infectious autoimmune encephalitis) can acutely cause OCD, tics, ADHD-like behaviour. Illustrates how immune attacks on the brain yield NDD-like symptoms. Also, chronic low-grade inflammation (elevated cytokines) found in many autistic individuals mdpi.com .
Connective Tissue	Ehlers-Danlos Syndrome (hEDS)	Very strong association with neurodivergence. EDS patients are 7.4× more likely to have ASD pmc.ncbi.nlm.nih.gov and ~5.6× more likely to have ADHD pmc.ncbi.nlm.nih.gov . ~50% of neurodivergent adults meet joint hypermobility criteria vs ~20% of general population pmc.ncbi.nlm.nih.gov . Suggests common connective tissue factors in ASD/ADHD.
	Joint Hypermobility Syndrome	High co-occurrence with both ASD and ADHD pmc.ncbi.nlm.nih.gov . Studies found 32–74% of ADHD patients had hypermobile joints vs ~13% of controls pmc.ncbi.nlm.nih.gov

Category	Physical Condition	Association with NDDs (ASD, ADHD, etc.)
		. Often accompanied by chronic pain and dysautonomia, which neurodivergent individuals also experience at higher rates pmc.ncbi.nlm.nih.gov .
	Dysautonomia (POTS)	Frequently seen in hypermobile/EDS patients, causing fainting, rapid heartbeat pmc.ncbi.nlm.nih.gov . Neurodivergent people report more autonomic symptoms (light-headedness, GI dysmotility) than typical pmc.ncbi.nlm.nih.gov . Hypermobility may mediate link between neurodivergence and autonomic/pain symptoms pmc.ncbi.nlm.nih.gov .
Metabolic	Phenylketonuria & Metabolic Errors	Untreated PKU causes ID and ASD features, exemplifying metabolic cause of NDD. Many inherited metabolic diseases (urea cycle, mitochondrial disorders) present with developmental delay and ADHD/autistic traits sciencedirect.com . Important to screen for in regression or global delay.
	Mitochondrial Dysfunction	Evidence of mitochondrial abnormalities in ~5% of autism cases sciencedirect.com . These individuals often have muscle weakness, fatigue, and lactic acidosis along with ASD. Points to energy metabolism issues contributing to neurodevelopmental symptoms.
	Obesity & Metabolic Syndrome	Significantly associated with ADHD: meta-analyses show higher obesity prevalence in ADHD populations psychiatryonline.org . Impulsivity and medications influence weight. ASD may also predispose to obesity due to selective diets and inactivity frontiersin.org . In turn, obesity can worsen motor skills and sleep apnoea in NDDs.
	Thyroid Dysfunction	Hypothyroidism in early life causes developmental delays (newborn screening

Category	Physical Condition	Association with NDDs (ASD, ADHD, etc.)
		prevents cretinism). Even mild thyroid dysfunction in childhood can affect cognitive function; some ADHD-like symptoms resolve with thyroid treatment. Family autoimmunity links thyroid issues to ASD risk thetransmitter.org .
Gastrointestinal	Chronic Constipation	Very common in ASD – often the top GI complaint. Autism increases constipation risk >3-fold pmc.ncbi.nlm.nih.gov . Linked to sensory issues (holding stool) and diet. Constipation has genetic correlation with autism traits in one twin study molecularautism.biomedcentral.com . Can cause pain that worsens behaviour if untreated.
	Irritable Bowel Syndrome (IBS)	Overrepresented in ADHD adults: significantly higher IBS and functional dyspepsia rates than controls wignet.com wignet.com . Stress and altered brain-gut signalling in ADHD may trigger IBS. Some autistic people also meet IBS criteria (alternating diarrhoea/constipation pmc.ncbi.nlm.nih.gov) beyond what is seen in other disabilities.
	Inflammatory Bowel Disease	No general increase in Crohn's or ulcerative colitis in ADHD/ASD (according to large cohort data) wignet.com wignet.com . However, when IBD <i>does</i> occur in an autistic individual, managing it can improve their overall function. Some speculative links via microbiome and immune genes exist, but not confirmed.
	Feeding Disorders	Neurodevelopmental conditions often include feeding selectivity (rigid food preferences) pmc.ncbi.nlm.nih.gov

Category	Physical Condition	Association with NDDs (ASD, ADHD, etc.)
		. This can lead to nutritional deficiencies (e.g., low fibre, vitamin D) and exacerbate GI issues or growth problems. Ensuring proper nutrition is a key part of managing physical health in ASD/ADHD.
Chronic Pain	Fibromyalgia	Strongly linked with ADHD: 25–45% of fibromyalgia patients have ADHD pmc.ncbi.nlm.nih.gov . ADHD may predispose to FMS via central pain sensitization. Autistic individuals also at higher risk of fibromyalgia lidsen.com . Shared features include poor sleep, sensory sensitivity, and autonomic dysregulation.
	Chronic Fatigue Syndrome	Higher prevalence of childhood ADHD in CFS patients than expected pmc.ncbi.nlm.nih.gov . Both conditions disproportionately affect females and involve autonomic nervous system issues. An ADHD diagnosis might increase susceptibility to post-viral fatigue syndromes due to stress and sleep disruption.
	Migraine & Chronic Headache	Bidirectional link: adults with ADHD have about double the incidence of migraine as those without pubmed.ncbi.nlm.nih.gov , and adults with migraines show more ADHD symptoms than those without psychiatryadvisor.com . Shared dopamine neurotransmission issues are suspected. Migraines in ASD can be hard to detect if communication is limited, but untreated pain will aggravate behavioural challenges.
	Chronic Back/Joint Pain	Often seen in those with joint hypermobility (common in NDDs as above). For example, an autistic person with EDS might have chronic orthopaedic pain from joint subluxations. Even without EDS, muscle tone differences in autism (hypotonia) can lead to back pain. Chronic pain can increase anxiety and executive function difficulties.

Category	Physical Condition	Association with NDDs (ASD, ADHD, etc.)
Neurological	Epilepsy (Seizure Disorder)	One of the most significant comorbidities: ~20–30% of autistic individuals have epilepsy practicalneurology.com , and ~30% of children with epilepsy meet criteria for ASD practicalneurology.com or another NDD. Shared genetic causes (e.g., tuberous sclerosis, fragile X) and early brain insults link them. Proper seizure control can improve developmental progress in many cases.
	Tourette Syndrome (Tics)	Frequently co-occurs with ADHD (up to 60%) and ASD (up to 50% in some samples) pmc.ncbi.nlm.nih.gov . Tics are a neurological motor disorder but considered a “close cousin” NDD. The stress of tics can worsen attention; conversely ADHD impulsivity can aggravate tics. Treatment of one often benefits the other.
	Sleep Disorders	(Detailed separately below, but neurologically, conditions like restless legs (a neurological sensorimotor disorder) are 2–3× more common in ADHD neurodivergentinsights.com . Nocturnal epileptic seizures can mimic insomnia or night terrors in ASD, so neurological evaluation of sleep issues is sometimes needed.)
	Others (CP, DCD)	<i>Cerebral palsy</i> (motor disability from early brain injury) can co-occur with intellectual disability and autism (due to shared perinatal injury causes). <i>Developmental coordination disorder</i> often coexists with ADHD/ASD, leading to clumsiness and joint stress. These are developmental neuro-motor conditions often found alongside core NDDs.
Sleep	Insomnia	Extremely prevalent in NDDs: ~50–80% in ASD thetransmitter.org and ~70% in ADHD children neurodivergentinsights.com

Category	Physical Condition	Association with NDDs (ASD, ADHD, etc.)
		suffer from insomnia. Causes include melatonin regulation issues, anxiety, and sensory sensitivities. Leads to daytime fatigue and worsened attention/repetitive behaviour if not addressed.
	Circadian Rhythm Disorder	Many ADHD (and some ASD) patients have delayed sleep phase – “night owls” who can’t sleep until very late. Irregular schedules and lower evening melatonin found in studies neurodivergentinsights.com . Requires behavioural adjustments or melatonin to manage.
	Sleep Apnoea	Occurs in a subset (e.g., in kids with low muscle tone or high obesity). When present, it exacerbates hyperactivity and irritability. Treating enlarged tonsils/adenoids in autistic children with apnoea has improved sleep and daytime behaviour.
	Restless Legs Syndrome	Up to half of individuals with ADHD may experience RLS or periodic limb movements at night neurodivergentinsights.com , causing bedtime discomfort and sleep fragmentation. Tied to dopamine and iron; treating it (e.g., iron supplements) can improve sleep and possibly ADHD symptoms.
	Parasomnias	Night terrors, sleep-walking, REM behaviour disorder reported in some ASD cases at higher rates. Managing stress and ensuring safety is key. Often improve with age or with better sleep quality.

Table: Overview of various physical disorders and conditions and their documented associations with neurodevelopmental disorders (ASD = autism spectrum disorder, ADHD = attention-deficit/hyperactivity disorder, etc.). This includes both well-established links (e.g., epilepsy with ASD) and emerging ones (e.g., EDS with ASD/ADHD), along with illustrative evidence from research.

Conclusion

Neurodevelopmental disorders do not occur in isolation from the rest of the body. As the evidence compiled here demonstrates, individuals with ASD, ADHD, intellectual disabilities, and related conditions frequently contend with a host of physical health

challenges – from autoimmunity and allergies, to GI distress, hormonal imbalances, chronic pain, connective tissue laxity, epilepsy, and beyond. These comorbidities are not mere coincidences; rather, they often stem from shared genetic susceptibilities, interconnected physiological pathways, and reciprocal interactions between brain and body. Recognizing these associations is crucial for clinicians, educators, and families: an integrated treatment approach that addresses both neurological and physical aspects can significantly enhance quality of life. For instance, an autistic child who receives proper management for their severe constipation and sleep disorder may show improvements in behaviour and learning capacity. Likewise, an adult with ADHD and fibromyalgia may find that treating their ADHD (improving executive function) helps them implement lifestyle changes that reduce pain.

Research into the mechanistic underpinnings of these links is ongoing. It holds promise for novel interventions – perhaps anti-inflammatory therapies for a subset of autism, or connective tissue-targeted treatments to aid those with ADHD and joint hypermobility. Meanwhile, awareness is half the battle. Healthcare providers should proactively screen for common physical comorbidities in any neurodivergent patient (for example, checking thyroid function, ensuring adequate sleep, asking about gastrointestinal habits, etc.), and vice versa consider neurodevelopmental evaluations for patients presenting with unusual constellations of physical issues (for example, an extremely hypermobile patient with dysautonomia might benefit from an ADHD/autism screening).

In conclusion, **neurodevelopmental disorders are multi-system conditions**. By embracing a holistic view – treating “the whole person” rather than a single diagnosis – we can better support individuals with NDDs in achieving their fullest potential and healthiest lives. This comprehensive understanding also underscores the importance of collaboration across specialties (neurology, psychiatry, immunology, gastroenterology, etc.) in both research and clinical care. Continued investigation will further illuminate how the mind, brain, and body interact in the context of neurodiversity, hopefully guiding us to more effective and personalized interventions for these complex and fascinating conditions.

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