MERCOLA
Take Control of Your Health

Hair Cortisol Signals Mental Health Risk in Children with Chronic Illness

Analysis by Dr. Joseph Mercola | November 14, 2025

STORY AT-A-GLANCE

- One in four children lives with a chronic physical illness, creating hidden stress that can be measured through hair cortisol concentration
- In one study about cortisol in children, three distinct patterns emerged — Consistently high (most problematic), consistently low (system burnout), and high-to-low (most hopeful, showing adaptation and resilience)
- Children under mental health care showed significantly elevated hair cortisol levels compared to healthy peers, indicating chronic stress across various psychiatric disorders regardless of irritability
- Dietary interventions focus on quality carbohydrates while avoiding ultraprocessed foods. Severely compromised digestive systems can benefit from temporary pure glucose before reintroducing fiber-rich foods
- Simple lifestyle changes effectively reduce cortisol. Examples include breathwork, pet interaction, limiting nighttime screen usage, consuming fermented foods, and engaging in joyful activities

One in every four children are currently living with a chronic physical illness. These include various respiratory and cardiovascular conditions, such as asthma, congenital heart disease, rheumatic heart disease, and stroke.[1] That said, their condition causes them a great deal of stress, which they can hide very effectively.

According to a report from United Nations Children's Fund (UNICEF), children often imitate an adult's behavior to stress to help manage their own experiences.[2] Now, to identify when kids are under stress (and subsequently help them), researchers from the University of Waterloo have turned to a non-invasive diagnostic method — hair cortisol concentration. As noted by one co-author:[3]

> *"Hair cortisol offers a non-invasive, easy-to-collect biomarker that could one day be used to screen children and track whether treatments or support programs are helping to reduce stress."*

Hair Cortisol Patterns Reveal Hidden Stress in Children with Chronic Illness

In a study published in Stress and Health, researchers tracked children with chronic physical illnesses over a four-year period to see how their stress biology is linked to mental health outcomes.

To perform the analysis, the team regularly collected 3-centimeter hair samples — each representing about three months of cortisol buildup — and compared those hormone levels with caregiver reports of emotional and behavioral symptoms. The aim was to create a more accurate picture of long-term stress patterns than blood or saliva tests, which only reflect cortisol levels during sample collection.[4]

The study population included children diagnosed with conditions such as asthma, epilepsy, diabetes, and juvenile arthritis. The children were already carrying a chronic disease burden, and the research showed that the way their stress hormones behaved added another layer of risk.

- **Stress eventually affects behavior in children —** Nearly a third of participants displayed unusual cortisol patterns across the years of follow-up, and those patterns aligned with higher levels of anxiety, withdrawal, or behavior problems compared to peers with more stable stress profiles.

- **The children did not all follow the same hormonal path —** Three groups emerged from the analysis — some kids maintained consistently high cortisol levels, others maintained consistently low levels, and others shifted from high levels down to lower levels as time went on.

- **Each pattern carried a different set of implications for mental health —** Children stuck in the "always high" group experienced the most ongoing challenges. Elevated cortisol, the body's main stress hormone, kept their system in a constant state of alert. Caregivers reported that these children were more likely to struggle with internalizing symptoms, meaning anxiety, sadness, or withdrawal, and externalizing symptoms like aggression, defiance, or hyperactivity.

  On the other hand, children with consistently low cortisol also showed cause for concern. At first glance, low hormone results might look like a sign of less stress, but the reality is more complex. Low long-term cortisol often reflects a system that has been overloaded for so long that it no longer mounts a strong stress response. This "blunted" profile is linked with fatigue, lack of motivation, and difficulty handling new stressors.

- **The most hopeful group were those whose hair cortisol started high and dropped over time —** These children showed fewer reported symptoms than their peers who stayed in the high cortisol group. Researchers interpreted this as a sign of adaptation — the child's stress system found a healthier balance, and that adjustment reduced the risk of developing depression or disruptive behaviors. The improvement wasn't instant but tracked over multiple years.

- **Symptoms didn't always appear right away —** Instead, the hormonal trajectory predicted later mental health outcomes. This matters for parents because it means interventions do not need to wait until a child is visibly struggling. If a child's stress profile shows risk early on, you can step in with supportive measures right away before problems snowball.

- **The largest benefits appeared in children who showed the high-to-low shift —** This group fared better than both the consistently high and consistently low groups, suggesting that flexibility in the stress system offers protection. As a parent, that means watching for change is just as important as monitoring the level itself. Improvement in cortisol over time signals resilience, and helping your child build coping strategies could encourage this positive shift.

- **Comparing the different groups also revealed that static measures are misleading —** For instance, a single low-cortisol reading can suggest that a child is relaxed, but when viewed across months, it could mean the system has collapsed under pressure. A one-time high reading might simply reflect a rough week, but a persistent high pattern flags deeper trouble.

  Long-term sampling makes these differences clear, giving you and your child's health care providers a more reliable tool for decision-making.

- **Mechanisms that explain why the patterns matter —** Cortisol regulates energy use, immune activity, and brain signaling. When it runs high for too long, it disrupts mood, sleep, and focus. When it runs too low, the body struggles to handle everyday stressors. Chronic illness already strains a child's body, and a dysfunctional stress system magnifies that burden.

- **Stress hormones interact with the brain's emotional circuits —** The hippocampus and prefrontal cortex, which handle memory and self-control, are sensitive to cortisol levels. Too much hormone damages these areas, fueling anxiety or poor impulse control. Too little hormone leaves the brain sluggish, contributing to low energy and withdrawal.

- **Hair cortisol testing provides a practical, non-invasive way to analyze cortisol —** Unlike drawing blood, collecting hair is painless, requires no special storage, and reflects months of hormone history. This means a less stressful experience for your child if you wish to follow this route.

Children in Mental Health Care Carry Higher Stress Hormone Loads

In a related study published in Psychoneuroendocrinology, researchers also examined hair cortisol levels in children. The study population included kids referred for mental health services, such as those diagnosed with disruptive mood dysregulation disorder (DMDD) and other psychiatric conditions, as well as a comparison group of healthy controls.[5]

- **Children in the clinical group had significantly higher hair cortisol levels —** This meant that children struggling with psychiatric issues carried a heavier biological burden of stress than their peers without diagnoses.

  Breaking down the findings further, the study confirmed that both DMDD and other clinical diagnoses were associated with elevated hair cortisol. This is a noteworthy finding because it shows stress signals are not unique to one specific disorder. Whether children were experiencing disruptive mood problems, depression, or other conditions, their bodies reflected the same prolonged stress exposure.

- **Irritability did not correlate with hair cortisol levels within the clinical group —** In other words, children could have high cortisol even if they weren't rated as more irritable than their peers. This points to the fact that cortisol captures a deeper, more systemic stress load rather than just surface-level emotional symptoms. If you rely only on outward behaviors, you could miss hidden stress that your child is still carrying.

- **Age differences added another dimension to the results —** Younger children with DMDD tended to have higher cortisol, while levels dropped as they got older. This suggests that as children mature, their stress biology adapts, though often not in ways that fully restore balance.

- **Differences between sex were not significant —** Boys and girls in the healthy control group showed similar cortisol levels, suggesting that sex was not a strong factor in distinguishing stress loads at this stage of development. This is an important point to emphasize because if your child is struggling, cortisol testing could provide valuable insight no matter whether they are male or female.

- **Prolonged cortisol elevation impacts brain regions —** For example, the amygdala, which processes fear and threat, becomes hyperactive. Meanwhile, the prefrontal cortex, which manages decision-making and self-control, becomes less effective. This imbalance drives cycles of irritability, poor impulse control, and heightened sensitivity to stress.

The study reinforces the usefulness of hair cortisol testing, as it offers an insightful, non-invasive way to uncover hidden stress in children. Unlike questionnaires or observation alone, this method shows what the child's body has been through over weeks or months.

Dietary Recommendations to Help Reduce Cortisol Levels

Increasing carbohydrate intake can be helpful for lowering cortisol, but it's important to pay attention to the quality of those carbs. Ultraprocessed snacks and refined foods need to be avoided, since they often contain harmful additives such as linoleic acid and high-fructose corn syrup (HFCS). These compounds disrupt the gut microbiome, trigger endotoxin production, and ultimately drive higher cortisol levels and inflammation.

- **Many people have compromised gut microbiomes —** The challenge many people face is that their gut no longer maintains sufficient populations of beneficial bacteria that break down the fibers found in wholesome carbs like fruits, vegetables, and whole grains. Without this balance, eating healthy carbs can backfire, since harmful bacteria take over, releasing toxic endotoxins that damage mitochondrial function and worsen overall health.

- **Repair your child's gut with this tip —** If your child's stomach (or your own) can't handle natural carb sources, I recommend starting with gentle, easy-to-digest carbs like whole fruits and white rice. If there are severe gut issues, sip dextrose water instead to provide your child with a steady source of easy-to-digest, healthy carbohydrates for energy.

- **Fermented foods like homemade yogurt, kefir, sauerkraut, and kimchi nurture the gut microbiome —** The gut plays a direct role in emotional regulation and stress resilience. Staying properly hydrated is equally important, since even mild dehydration can cause temporary cortisol surges, especially during the late-afternoon slump.

Lifestyle Changes to Help Your Child Beat Stress of Daily Life

Simple, consistent lifestyle changes can already do wonders for your child's stress management program. Here are some of my recommendations:

- **Breathwork practices like the 4-7-8 method calm the nervous system —** Teach your child to inhale for four seconds, then hold their breath for seven seconds, and exhale for eight seconds. This stimulates the vagus nerve, which is a key regulator of rest and relaxation. Just a few rounds can already shift the body out of "fight or flight" and into a calmer state.

- **Interacting with pets boosts oxytocin and lowers stress hormones —** Do you have pets at home? If not, consider adopting one that's suited to your family's dynamics.

  Spending a few minutes petting a dog or cat already increases oxytocin, which is the hormone associated with calm and connection, while simultaneously reducing cortisol. This makes animal companionship one of the fastest, most reliable ways to offset stress.

- **Nighttime screen use interferes with hormonal rhythms —** Blue light from phones and tablets after sunset keeps the human brain in daytime mode. This suppresses melatonin while raising cortisol when it should be winding down. Encourage your children to turn off devices an hour before bed, and switch to warmer, softer lighting at night to protect the body's natural sleep-wake cycle.
- **Joyful activities can beat stress —** Whether it's playing a musical instrument or crafting arts, encourage your children to pursue an enjoyable hobby that gives them joy.

Frequently Asked Questions (FAQs) About Cortisol and Stress in Children

Q: How can stress in children with chronic illnesses be detected?

A: Researchers use hair cortisol testing as a non-invasive way to measure long-term stress. Unlike blood or saliva samples, which only capture stress at a single moment, a 3-centimeter strand of hair reflects about three months of cortisol buildup. This method makes it possible to identify hidden stress patterns that children may conceal from parents or caregivers.

Q: Why do cortisol patterns matter for children's mental health?

A: Cortisol patterns provide valuable insight into a child's emotional and behavioral risks. For example, children with consistently high cortisol often struggle with anxiety, sadness, aggression, or hyperactivity because their stress system is stuck in overdrive. On the other hand, consistently low cortisol is not a sign of calmness but rather of a stress system that has become exhausted, leaving children prone to fatigue, low motivation, and poor resilience.

Q: What do studies show about children in mental health care?

A: Research shows that children diagnosed with psychiatric conditions such as disruptive mood dysregulation disorder (DMDD) or depression typically have higher hair cortisol levels compared to healthy peers. Elevated cortisol highlights the hidden burden these children experience, even if outward symptoms vary.

Q: How can diet and nutrition influence cortisol levels?

A: Diet plays an important role in regulating cortisol. Ultraprocessed foods containing additives like linoleic acid or high-fructose corn syrup (HFCS) can disrupt gut bacteria and fuel inflammation, which in turn drives higher cortisol.

Q: What lifestyle habits help lower cortisol naturally?

A: Several everyday practices can help bring stress hormones down. Breathing exercises, such as the 4-7-8 technique, directly calm the nervous system and reduce cortisol levels. Interacting with pets also has a powerful effect, since it boosts oxytocin, the bonding hormone, while lowering stress.

Protecting the sleep cycle is equally important — limiting blue light exposure at night by turning off screens or using softer lighting helps the body produce melatonin and avoid unnecessary cortisol spikes. Finally, engaging in activities you genuinely enjoy — such as music, gardening, or creative hobbies — acts as a natural reset button, signaling to the brain that it is safe to relax.

Sources and References

- [1] Children (Basel). 2025 Jul 23;12(8):967
- [2] Unicef, “How to recognize signs of distress in children”
- [3] University of Waterloo, September 15, 2025

- [4] Stress Health. 2025 Aug;41(4):e70087
- [5] Psychoneuroendocrinology Volume 157, November 2023, 106363