

# Is Elevated Cortisol Affecting Your Child's Behavior?

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## STORY AT-A-GLANCE

- › Higher hair cortisol levels in children, especially boys, are linked to behavioral problems and environmental stressors. Maternal stress indirectly affects child behavior through elevated cortisol levels
- › Bullying experiences affect cortisol levels and patterns in children, with gender differences observed. Cortisol levels influence how victimization impacts mental health and brain development
- › Chronically elevated cortisol leads to various health issues, including brain tissue damage, accelerated aging and unhealthy eating habits. It's crucial to maintain balanced cortisol levels
- › To reduce cortisol levels, increase intake of healthy carbohydrates while avoiding processed foods. For those with compromised gut health, starting with pure glucose (dextrose) helps heal the gut
- › Aside from switching to a targeted high-carb diet, you should also address your stress levels to keep your body from producing excessive cortisol, and consider taking progesterone, which has an anti-cortisol function

Recent research has shed light on the complex interplay of factors affecting stress levels and behavior in children, as measured by hair cortisol concentration (HCC).<sup>1</sup> Hair cortisol concentration (HCC) measures long-term exposure to cortisol, a hormone released in response to stress.

Unlike blood, saliva, or urine tests that reflect short-term cortisol levels, HCC provides an assessment of chronic stress over weeks or months. Since hair grows at a relatively consistent rate, analyzing segments of hair can give insights into an individual's stress levels over time. Further, a study of 11-year-olds in Spain found that higher hair cortisol levels are linked to greater behavioral problems – suggesting keeping cortisol levels lower could benefit youth.<sup>2</sup>

## **Behavioral Problems Associated with Higher Cortisol Levels in Boys**

A study of 11-year-olds in Spain found that behavioral problems and environmental noise were significantly related to HCC, explaining 5% of the variance in cortisol levels. Interestingly, when the analysis was stratified by sex, these associations were only observed in boys, with stressful events also playing a role. Together, these factors accounted for 16% of the HCC variance in male participants.<sup>3</sup>

This suggests that boys may be particularly susceptible to stress-inducing environmental and behavioral factors. The study also highlighted the importance of maternal stress, which was linked to higher behavioral problems in children. This, in turn, was associated with elevated cortisol levels.

This indicates that parental stress could indirectly affect child behavior through elevated cortisol levels. The relationship between behavioral problems and HCC was only significant in boys, suggesting potential sex differences in how cortisol affects behavior.<sup>4</sup>

Other factors like involvement in bullying, sleep problems and experiencing stressful life events were associated with behavioral issues or factors that could influence cortisol levels, underscoring the need to consider both environmental and familial factors when assessing your child's stress levels and overall well-being.

Involvement in bullying was associated with lower health-related quality of life, more behavioral problems and higher environmental noise exposure. Additionally, lower

exposure to traffic-related air pollution and higher levels of physical activity were linked to better health-related quality of life. Sleep problems were associated with higher maternal stress and behavioral difficulties, revealing the importance of managing stress at the family level.<sup>5</sup>

Experiencing stressful life events was also related to lower levels of physical activity, showing the long-term impacts of stress on your child's lifestyle habits. Further, the study found that higher neighborhood greenness was associated with lower environmental noise and reduced traffic-related air pollution.<sup>6</sup> This suggests that green spaces may act as a buffer against other environmental stressors.

Interestingly, the relationship between socioeconomic status (SES) and environmental factors was not straightforward. While children living in more deprived areas had higher access to green spaces, they were also exposed to higher levels of air pollution. However, the increased exposure to green spaces seemed to mitigate the negative impact of lower SES on air pollution exposure.<sup>7</sup>

## **The Surprising Link Between Noise Exposure and Lower Cortisol Levels**

Contrary to expectations, the study found that higher exposure to residential environmental noise was associated with lower cortisol levels in children.<sup>8</sup> This challenges the conventional understanding of noise as a stress-inducing factor.

While previous research has shown mixed results, with some studies reporting higher cortisol levels in children living in noisier areas and others finding no significant effect, this study's findings suggest a more complex relationship. One hypothesis is that long-term stress exposure could lead to lower hair cortisol concentration, as observed in adults living in stressful economic situations or those who experienced childhood trauma.<sup>9</sup>

Alternatively, lower HCC levels might reflect a lack of hypothalamic-pituitary-adrenal (HPA) axis – which produces cortisol – reactivity in children exposed to chronic high

environmental noise. It's important to note that noise exposure in this study was estimated based on outdoor levels, which may not accurately reflect indoor exposure or noise levels in other contexts your child encounters throughout the day.

## **The Stress-Bullying Connection: How Cortisol Shapes Behavior**

Children's stress hormone levels may also play a surprising role in whether they become a bully, victim or neither. Research uncovered intriguing links between cortisol and bullying behaviors in children and teens.<sup>10</sup>

However, the relationship is far from straightforward. Some studies found that bullied children had lower cortisol reactivity than their peers, meaning their bodies produced less cortisol in response to stress.

Yet other research showed bullying victims had elevated cortisol reactivity. When looking at overall cortisol levels throughout the day, most studies observed that bullied students had higher total cortisol. This suggests their bodies were in a chronically stressed state.<sup>11</sup>

However, both cyberbullies and cybervictims displayed higher total cortisol levels.<sup>12</sup> The picture gets even more complex when examining daily cortisol patterns. Bullied youth often showed a flatter daily cortisol curve, with less of the normal rise and fall. This disrupted rhythm may reflect how chronic stress from bullying throws off your body's natural cycles.

Your child's sex also appears to influence how cortisol relates to bullying experiences. Some research indicates that verbally bullied girls had lower cortisol levels compared to boys. Another study found that only bullied boys showed significantly lower cortisol levels and flattened cortisol responses to stress.<sup>13</sup> These gender differences highlight how bullying may impact boys and girls differently on a physiological level.

The association between victimization and cortisol also affects brain development in sex-specific ways. In boys with low daily cortisol output, high victimization was linked to

a smaller right ventrolateral prefrontal cortex surface area. However, highly victimized boys with high cortisol showed a larger surface area in this brain region.

The prefrontal cortex plays a key role in emotional regulation and decision-making. These findings suggest that how a child's stress response system reacts to bullying may shape their brain development in ways that impact future behavior and mental health.

Beyond its direct relationship with bullying, cortisol also influences how victimization affects a child's mental well-being. Multiple studies found that higher cortisol levels strengthened the link between peer victimization and depressive symptoms. In other words, bullied children with elevated cortisol were more likely to develop depression.

Cortisol even impacts how bullying relates to brain changes. In boys with a steeper daily cortisol decline, high victimization was associated with a smaller right prefrontal cortex.

Those with a flatter cortisol curve showed the opposite pattern, suggesting your child's physiological stress response can amplify or dampen the psychological effects of bullying. Further, chronic stress from bullying can [dysregulate the HPA axis](#), leading to long-term health consequences.

## Health Risks of Elevated Cortisol Levels

While often labeled as the "stress hormone," cortisol's primary function in your body is far more crucial. Its main job is to act as a safeguard, preventing your blood glucose from plummeting to dangerously low levels. This vital role protects you from slipping into a potentially fatal hypoglycemic coma.<sup>14</sup>

Understanding cortisol's true purpose led me to a significant shift in thinking about low-carb diets. The hormone's method of action, while protective in the short term, has detrimental effects if levels remain consistently elevated.

As a glucocorticoid steroid hormone, cortisol's name reveals its connection to glucose and its origin in the adrenal cortex. When your blood sugar drops and your liver's glycogen stores are depleted, cortisol steps in. It triggers the breakdown of lean muscle,

bone and even brain tissue into amino acids. Your liver then converts these amino acids into glucose through gluconeogenesis.

This insight highlights why long-term adherence to a low-carb diet may not be ideal. While both low-carb eating and fasting can be beneficial short-term strategies for those struggling with weight and metabolic inflexibility, it's crucial to reintroduce carbs once metabolic flexibility is restored. Failing to do so can lead to decreased metabolic health and impaired mitochondrial function.

## **Cortisol's Complex Effects on Fat and Inflammation**

Cortisol also mobilizes stored fat through lipolysis. However, it primarily targets beneficial peripheral and subcutaneous fat, leaving behind harmful visceral fat that surrounds your organs and contributes to inflammation.

This dual nature of cortisol — initially anti-inflammatory but proinflammatory when chronically elevated — underscores the importance of maintaining balanced levels. Whether triggered by chronic stress or a prolonged low-carb diet, persistently high cortisol is not conducive to long-term health and longevity.

Chronically high cortisol levels have wide-ranging negative effects on your body. It can damage brain tissue, contributing to conditions like dementia and depression.<sup>15</sup> It may also accelerate aging<sup>16</sup> — a factor often overlooked in longevity research.

High cortisol impedes the building of healthy tissues, which is crucial for healthy aging. Furthermore, it stimulates the release of neurotransmitters that trigger food cravings,<sup>17</sup> potentially leading to unhealthy eating habits. Understanding cortisol's true role and its complex effects on your body emphasizes the importance of maintaining balanced levels for optimal health and longevity.

## **Progesterone's Role in Reducing Cortisol Levels**

One of the most effective and straightforward methods to reduce cortisol levels in your body is by using natural, not synthetic (progestins), progesterone. This naturally occurring hormone possesses potent anti-cortisol and anti-adrenaline properties, making it a valuable tool in managing stress and its physiological effects.

Progesterone works in several ways to combat the effects of stress on your body. First and foremost, it directly counteracts the effects of cortisol, helping to lower its levels in the bloodstream. This can lead to reduced stress symptoms and improved overall well-being.

Additionally, progesterone enhances the activity of GABA (gamma-aminobutyric acid), the primary inhibitory neurotransmitter in the brain. This activation promotes relaxation and can help reduce anxiety.

Another key aspect of progesterone's stress-fighting abilities lies in its moderation of adrenal gland activity. By regulating the production of stress hormones, including cortisol and adrenaline, progesterone helps maintain a more balanced stress response. Furthermore, progesterone can enhance sleep quality, which is crucial for maintaining healthy cortisol rhythms and overall stress management.

The benefits of using progesterone for stress management are numerous. Many individuals experience reduced anxiety and irritability, improved mood stability, and enhanced sleep quality. Physical symptoms of stress, such as muscle tension and headaches, often decrease. Some people also report better cognitive function under stress when their progesterone levels are optimized.

While progesterone can be highly effective in managing cortisol levels, it's important to note that hormone therapy should always be conducted under the guidance of a healthcare professional. Proper dosing and administration are crucial for optimal results and to minimize potential side effects. The right approach can vary significantly from person to person, depending on their specific needs.

It's also worth mentioning that while progesterone can be a powerful tool in stress management, it's most effective when used as part of a comprehensive approach to

health and wellness. Lifestyle factors such as regular exercise, a balanced diet, and stress-reduction techniques like meditation can complement the effects of progesterone in managing cortisol levels and overall stress.

Progesterone offers a promising avenue for those looking to manage their stress levels more effectively. Its natural anti-cortisol and anti-adrenaline properties make it a valuable ally in the fight against chronic stress. However, as with any health intervention, it's crucial to approach its use thoughtfully and under professional guidance to ensure the best possible outcomes.

## **Reduce Your Cortisol Levels by Increasing Carbohydrate Intake**

Although consuming more carbs is recommended for lowering cortisol, it's important to be mindful of the type of carbs you consume. You should avoid processed foods and snacks because these junk carbs contain ingredients like **linoleic acid** and high-fructose corn syrup (HFCS). These disrupt your gut microbiome and contribute to endotoxin production, which is a major driver of increased cortisol and inflammation.

However, many people have lost the ability to maintain a high enough concentration of beneficial bacteria in their gut that digest the healthy fibers in healthy carbs like fruit, vegetables and grain. Then, when you do eat those types of foods, you feel worse, as you have a buildup of pathogenic bacteria that produce toxic endotoxin, one of several factors that destroys mitochondrial function.

If you're unable to tolerate healthy carbs, try pure glucose – which is more commonly called dextrose – for a few weeks. This is especially useful for those who are seriously damaged, who don't have the capacity to eat virtually any carbohydrates. You can go on a high-dextrose diet until your gut starts to heal. You save more cellular energy, which allows you to introduce more carbs back in to your diet, helping to restore your mitochondrial function.

For a severely compromised gut, use dextrose water. This must be sipped slowly over time. Next, try introducing fruit juice with pulp or whole fruit. Then, once your gut health



improves, you'll be able to incorporate more fiber-rich fruits, vegetables and starches.

Aside from switching to a high-carb diet, you should also address your stress levels to keep your body from producing excessive cortisol, and consider taking progesterone, which has an anti-cortisol function.

## **How to Use Progesterone**

Before you consider using progesterone, it is important to understand that it is not a magic bullet, and that you get the most benefit by implementing a Bioenergetic diet approach that allows you to effectively burn glucose as your primary fuel without backing up electrons in your mitochondria that reduces your energy production. My new book, "Your Guide to Cellular Health: Unlocking the Science of Longevity and Joy" comes out very soon and covers this process in great detail.

Once you have dialed in your diet, an effective strategy that can help counteract estrogen excess is to take transmucosal progesterone (i.e., applied to your gums, not oral or transdermal), which is a natural estrogen antagonist. Progesterone is one of only four hormones I believe many adults can benefit from. (The other three are thyroid hormone T3, DHEA and pregnenolone.)

I do not recommend transdermal progesterone, as your skin expresses high levels of 5-alpha reductase enzyme, which causes a significant portion of the progesterone you're taking to be irreversibly converted primarily into allopregnanolone and cannot be converted back into progesterone.

## **Ideal Way to Administer Progesterone**

Please note that when progesterone is used transmucosally on your gums as I advise, the FDA believes that somehow converts it into a drug and prohibits any company from advising that on its label. This is why companies like Health Natura promotes their progesterone products as "topical."

However, please understand that it is perfectly legal for any physician to recommend an off-label indication for a drug to their patient. In this case, progesterone is a natural hormone and not a drug and is very safe even in high doses. This is unlike synthetic progesterone called progestins that are used by drug companies, but frequently, and incorrectly, referred.

Dr. Ray Peat has done the seminal work in progesterone and probably was the world's greatest expert on progesterone. He wrote his Ph.D. on estrogen in 1982 and spent most of his professional career documenting the need to counteract the dangers of excess estrogen with low LA diets and transmucosal progesterone supplementation.

He determined that most solvents do not dissolve progesterone well and discovered that vitamin E is the best solvent to optimally provide progesterone in your tissue. Vitamin E also protects you against damage from LA. You just need to be very careful about which vitamin E you use as most supplemental vitamin E on the market is worse than worthless and will cause you harm not benefit.

It is imperative to avoid using any synthetic vitamin E (alpha tocopherol acetate – the acetate indicates that it's synthetic). Natural vitamin E will be labeled "d alpha tocopherol." This is the pure D isomer, which is what your body can use.

There are also other vitamin E isomers, and you want the complete spectrum of tocopherols and tocotrienols, specifically the beta, gamma, and delta types, in the effective D isomer. As an example of an ideal vitamin E, you can look at the label on our vitamin E in our store. You can use any brand that has a similar label.

You can purchase pharmaceutical grade bioidentical progesterone as Progesterone Powder, Bioidentical Micronized Powder, 10 grams for about \$40 on many online stores like Amazon. That is nearly a year's supply, depending on the dose you choose.

However, you will need to purchase some small stainless steel measuring spoons as you will need a 1/64 tsp, which is 25 mg and a 1/32 tsp, which is 50 mg. A normal dose is typically 25-50 mg and is taken 30 minutes before bed, as it has an anti-cortisol function and will increase GABA levels for a good night's sleep.

Unfortunately, this vendor frequently runs out of product, and if that's the case, then you can use [Simply Progesterone by Health Natura](#). It's premixed with vitamin E and MCT oil. Again, while Health Natura states that its product is for "topical use only," I recommend applying it transmucosally, by rubbing it on your gums.

If you are a menstruating woman, you should take the progesterone during the luteal phase or the last half of your cycle, which can be determined by starting 10 days after the first day of your period and stopping the progesterone when your period starts.

If you are a male or non-menstruating woman, you can take the progesterone every day for four to six months and then cycle off for one week. The best time of day to take progesterone is 30 minutes before bed as it has an anti-cortisol function and will increase GABA levels for a good night's sleep.

This is what I have been personally doing for over a year with very good results. I am a physician so do not have any problems doing this. If you aren't a physician, you should consult one before using this therapy, as transmucosal progesterone therapy requires a doctor's prescription.

## Sources and References

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