

Chapter Two: Stress and a Child's Mind

Adults Manage Stress Better than Kids

Stress erodes everyone's ability to function, though it tends to be less obviously destructive to adults. Over the years, we've developed a repertoire of coping skills, responses that have become so automatic that we hardly realize when we rely upon them. That response might be healthy (going for a walk, talking to a friend) or not so healthy (knocking back a stiff drink, or overeating). Value judgements aside, our habits allow us to deal with a stressful situation (particularly one that recurs) on auto-pilot.

Of course, our workhorse routines can put blinders on us, thwarting perception. The ruts we've created can impede positive change. They may also have led to cirrhotic livers, unwanted pounds, and high blood pressure.

When young children encounter a novel stressor, they have no repertoire to draw from. Watching us as they do, they may simply borrow our stress responses, for better or worse. Nonetheless, their unguarded state renders them more vulnerable to stress.

Adults are also better at compartmentalizing stress. That is, we try to deal with job travails while at the office, family issues while at home, financial worries while we're bent over the checkbook. Some people – usually those who are more analytical and logical -- are much better at this skill than others. Others – usually those over whom emotions hold greater sway – let concerns bleed into all aspects of life. Kids definitely have a hard time containing their stress responses. They bring home every social slight and academic grievance that happened over the school day. They take their family conflicts with them to school and onto the playing field.

Adults generally have more choice in their lives than kids. We may get to decide what to cook for dinner, when to leave the house and come home. We probably also had some say in our chosen careers, marriages, friends. Kids get far fewer choices. A child has to make do with the parents he gets, the house he lives in, the meals he is served, the school he goes to – if he's lucky enough to have parents, shelter, food, and educational opportunities. But the point is that a lack of control is stressful. Total lack of control can cause people to feel helpless, hopeless, and eventually, depressed. I think that it's important to reel out control to kids.

Another advantage we adults possess is the perspective and wisdom granted by our accumulated experiences. That doesn't mean that we always manage stress well, though we ought to know better. Too many of us tend to overeat, smoke, drink, hold in our emotions, and watch TV. As a result, the top five causes of disability and death in industrialized countries are tobacco use, high blood pressure, alcohol consumption, high cholesterol, and obesity. Stress, or rather our response to it, causes a lot of illness.

A further difference between adults and kids is that we tend to recognize stress symptoms (stomach butterflies, cold and clammy palms, headache, neck and shoulder tension, and insomnia) for what they are and usually do something to relieve them. Again, not all adults are very good at connecting the dots, particularly when it comes to physical ailments. Young children are even more likely to take their physical symptoms at face value. They won't know what made their stomachs or heads hurt. They don't know why they cannot sleep. Nor can they trace their psychological symptoms to their origins. They don't why they feel like running around the classroom and yelling and slamming doors and breaking things.

Your Child's Brain

When it comes to sheer numbers of brain cells, your child wins hands down. Just before birth, nerve cells are generated at the rate of 250,000 a minute. About that time, a baby's brain contains 100 to 200 billion cells. Compared to an adult, some areas of the infant brain contain four to five times the number of brain cells.

Children's brains also undergo a lot of complicated changes. Later in infancy and again in adolescence, the total number of brain cells decreases in a process called pruning. During pruning, new connections are made and lost. The brain is essentially remodeling or sculpting itself. Experiences and the learning that arises from these experiences drive this neuronal topiary. In the neocortex, the outer layer of the brain responsible for our more sophisticated mental processes, infants possess about the same density of interconnects as an adult. During early childhood, this density rises until it peaks at about 40 to 50 percent higher than an adult's brain. Then the density declines until, by puberty, it's equivalent to that of an adult.

So what do children do with their superior brains? They learn easily and quickly. They discriminate sounds with such acuity that they can acquire new languages without a trace of an accent. They change and adapt swiftly. If an adult suffers brain damage due to a stroke or head injury, he may be left with lasting disabilities. Because his brain is more plastic, a child may suffer the same injury and have minimal to no residual deficits.

I am continually amazed by how children love to learn and do it with much more ease and enthusiasm than adults. A number of years ago, I took up snowboarding at the encouragement of my younger brother. Like most people who have both skied and snowboarded, I stopped skiing when I discovered snowboarding felt much more natural and more fun. I am often stunned by the comments I hear from adult skiers when I share my experience. "I don't think I want to go to all that effort to learn a new skill even if it is more fun." "I'm too old for that." "I think it would be a lot of work to learn a new skill. I don't want to go through that again." I never hear anything like that from kids, as they generally seem eager to learn new skills, especially when fun is involved. We adults, on the other hand, can become so fixated on serious issues like money, mortgages, chores and jobs that we often lose the joy, spontaneity and love of learning that characterized our youth. We have much to learn from children.

Plasticity, the process whereby the brain rewires the cell network, continues throughout life, although the overall resilience or responsiveness declines. If the adult brain couldn't manage to reconfigure itself, then we could never be able to learn anything new again. Fortunately, that's not the case. Furthermore, new research suggests that neurogenesis, the birth of new nerve cells, can occur in mature brains, at least in certain areas. In *The End of Stress as We Know It* (Joseph Henry Press, 2002), Dr. Bruce McEwen, a professor at New York's Rockefeller University, writes that accumulated research demonstrates that stress suppresses and learning stimulates plasticity and neurogenesis.

Your Child's Brain on Stress

Earlier, we mentioned that a stressful event will stimulate the adrenal gland to release adrenaline (also called epinephrine) and will activate the sympathetic nervous system, which runs on epinephrine and norepinephrine (also called adrenaline and noradrenaline). The result is that a person is primed to flee or to stay and fight.

The next step is that the brain releases a hormone that causes the adrenal glands to release cortisol. Remember that this hormone acts as a double-edged sword. When released as nature intended for short periods, it provides distinct survival advantages: maintenance of blood sugar levels, immune stimulation, or memory production. Over the long term, the effects of cortisol are not pretty: brittle bones, cataracts, wasted muscles, fat bellies, poor concentration, memory loss, mood problems, immune suppression, and sometimes, paradoxically overactive immune responses such as asthma, allergy, and auto-immune disease. The combined effects of the two arms of the stress response account for much of America's burden of chronic disease.

The relationship between stress and the brain is a two-way street. First, the brain initiates the stress response. What I mean is that your body doesn't mount a stress response unless and until your brain decides the situation poses some threat. A child who loves to read will skip merrily into a literature class. For the child with dyslexia, each time the teacher calls upon him to read aloud evokes sheer terror. The good news is that, by adopting positive coping methods, kids can learn to use their minds to counteract the stress response.

Once the brain sets in motion the nerves and hormones of the stress response, the stress response acts upon the brain. Stress generally arouses the brain. All systems are on alert. In the case of young children, stress activates areas that are not yet adequately developed.

For instance, studies of children who have been "parentified" (forced prematurely to care for younger siblings or to otherwise function as adults in order to survive), show that the prefrontal cortex develops prematurely, but the long-range development becomes deranged and damaged. The prefrontal cortex (a region of the frontal lobes) governs focus, memory, planning, decision-making, and impulse control. These children must use this part of the brain to manage their overloaded lives. I believe that other kinds of

premature responsibilities (academic, athletic, and those that sometimes befall kids of working and single parents), as well as premature exposure to sex and violence, harm kids in similar ways. I often see pre-adolescent children caught between two hostile divorced parents who must function as the most reasonable and mature of the lot.

The effect of stress on the brain is not all bad (otherwise the stress response wouldn't have endured in the animal kingdom for these many years). An acute stressor sends a burst of cortisol to areas deep in the brain that are critical to memory formation: the hippocampus and amygdala. The amygdala lays down the emotional content (e.g., that rattlesnakes now and forever after inspire fear and the urge to flee). The hippocampus stores contextual information (rattlesnakes live in hot places, sun themselves on flat rocks, nest underground, etc.). It's the amygdala that sparks the flight or fight response. This reflex has allowed humans to survive. We've learned to avoid venomous snakes (unless you're a crazy Australian TV personality), run from lions, do what the man with the guns asks us to do, etc.

Problems arise when stress overwhelms a child's ability to cope. The stressor can come in the form of a single horrifying event or recurrent lower-grade threats. According to Dr. McEwen, stress overload puts the brakes on plasticity and neurogenesis. It causes wear and tear in many parts of the body, including the brain.

The central actor in this wear and tear process is cortisol. Normally this hormone follows a daily rhythm, spiking in the early morning to help us cope with the stress of getting out of bed, then tapering to low levels in the evening. Levels become abnormal in mood disorders, general stress overload, and posttraumatic stress disorder. In such conditions, cortisol is often moderately elevated all day. Paradoxically, some people with chronic posttraumatic stress disorder have decreased cortisol in the face of higher corticotropin-releasing factor (the brain hormone that causes the pituitary gland to release adrenocorticotropic hormone, which stimulates the adrenals to release cortisol). Regardless, the hormonal regulatory system has ceased to function properly. That beautiful state of balance has been lost. Research shows that soldiers who recover from PTSD also recapture the normal daily rhythm of cortisol secretion.¹

Anyway, with any kind of chronic stress, the regulation of cortisol itself can go out of whack, as though the systems' "off" button ceased to function. Chronically flooded with cortisol, the hippocampus shuts down, interfering with memory formation and retrieval. And, because the hippocampus is involved in shutting off the stress response, the stress response becomes chronic. Early trauma can cause the brain system that control cortisol to become hyper-reactive.

Research on posttraumatic stress disorder shows that stress can damage the brain. Some of this research involves people who endured trauma (such as physical and sexual abuse) in early childhood.² Areas of the brain actually wither notably the hippocampus and prefrontal cortex, both of which are critical to memory and learning. People with chronic depression and Cushing's syndrome (an illness wherein the body manufactures excessive cortisol) also have shrunken hippocampi.

On a more hopeful note, these changes may not be permanent, provided a person's situation improves. One research group found that when they restored cortisol levels to normal in a group of people with Cushing's syndrome then repeated brain scans, the hippocampus began to resume normal size.³ Animal studies by Dr. McEwen and colleagues also suggest that stress-induced damage to the brain can be reversed.⁴

McEwen postulates that, under severe stress, the brain withdraws and slows down as a means of protection. Once the stress resolves, the brain comes out of its shell. The danger comes when life stress becomes habitual, routine, and ever present. There may a point of no return, when the brain can not bounce back after chronic stress. In this case, chemicals (e.g., the excitatory neurotransmitter glutamate) build to levels that are lethal to brain cells. Cortisol-induced changes may also cause brain cells to become more sensitive to these chemicals.

Another explanation for the reduced growth of parts of the brain has to do with a chemical called brain-derived neurotrophic factor or BDNF. When BDNF is secreted, nerves grow, new connections are made, and learning is enhanced. It also protects brain cells from noxious influences such as low-oxygen conditions. Stress (including the stress of a high-fat, high-carbohydrate diet) decreases BDNF with resultant atrophy of certain brain regions. The bottom line is that acute trauma and chronic stress can decrease a child's ability to form new brain cell connections and decreases his ability to learn.

Another effect of stress is that it imbalances brain chemicals and depletes nutrients such as vitamin C, pantothenic acid (vitamin B5), vitamin B6, zinc and magnesium. Many of these nutrients are critical to the production of neurotransmitters, the brain chemicals that allow nerve cells to communicate with one another. Add this fact with the trend for most kids to consume insufficient amounts of these same nutrients, and you've got a prescription for brain meltdown. Plus, poor dietary and other unwise lifestyle choices tend to ramp up cortisol, thus aggravating the situation.

Unfortunately, these stress-induced alterations in brain circuits and systems can last a long time. The intensity and duration of the stressful event, and timing of the stressor in life, have a strong impact. As I said, the research on stress and brain damage focuses on posttraumatic stress disorder, where the stressful event is typically horrifying. Recent research suggests that chronic, lower levels of stress can create similar negative brain alterations. In fact, kids who grow up in an environment rife with chaos and fighting can develop posttraumatic stress disorder, even though they have never suffered a single terrifying trauma.

Stress and the Child's Mind

Stress hurts kids physically and psychologically, eroding resistance to illness on both planes. Changes in brain function can cause a child to become hyper-responsive to stress. Stress arouses the nervous system, causing a child to be hyper-vigilant to any perceived threat, to sleep poorly, and to exhibit mood swings, rages, agitation, and aggression.

Brain chemical changes can cause a child to be worried, anxious, or depressed. Functional and anatomic changes can cause him to be inattentive, plan poorly, forgetful, and impulsive. I find it telling that many of these symptoms match those of depression, anxiety, childhood bipolar disorder, and attention deficit and hyperactivity disorder – the four conditions that have been steadily on the rise in this country.

Even in the absence of structural brain alterations, stress can adversely affect a child's thoughts, emotions, and behavior. Think how a very young child responds to her first day in preschool. Think how an older child acts the night before a big exam. Think how a child of any age behaves when he learns he must move to a new city. Any frightening situation makes kids feel edgy, irritable, worried, and perhaps angry. They are unable to think about anything but the problem at hand. Their focus excludes school work and other people's needs.

Repeated traumas can narrow and pervert a child's worldview. If he sees too much violence in his life and on video screens, he will think the world is more dangerous than it really is. If his parent neglects or abuses him, he will come to see the world as a hostile, unpredictable place. He will not develop trust. He becomes wary and defensive. He may even choose to take the offensive, aggressive response of striking out before someone hurts him. Over time, he may lose the ability to see that they have other ways of responding to situations other than with verbal or physical aggression.

In order to develop empathy and compassion, children must feel safe and secure. They need to know that the adults in their lives will respond predictably, gently, kindly. And this world is anything but gentle, predictable or safe. This kind of stress interferes with a child's freedom to express the full gamut of his emotions, and also to learn socially acceptable ways of releasing strong feelings. A child must possess such self-awareness and self-control, before he imagines how someone else feels and know how to respond compassionately to relieve person's pain.

Repeated traumas can exact other adverse effects. Take exposure to sex and violence. Excessive or premature exposure to either create tension and conflict in the child's unconscious. Unconscious disturbances are the most difficult to understand, quantify or address, because we are not aware of them. The younger the child, the more disturbing images of violence and sex can be.

Research suggests that kids who view media violence also become desensitized toward violence in general and are prone to mimicking or modeling such behavior. Because the escalation of these influences in our culture over the last 40 years has been so insidious and progressive, we may not yet have a handle on their true impact. We should not be fooled by our kids' precocious worldliness. The hip clothes, witty jokes, blasé attitudes toward what they see on the media – these things are superficial; they are facades borrowed from sitcoms. The truth is that their psychological maturity lags behind their seeming sophistication.

Stress can precipitate hasty and even unwise judgments. It can drive older kids, teens, and adults to seek relief in alcohol, drugs, and sex. It can cause kids to “burn out” on academic and athletic pressures before they make it through college. And, when kids are faced with repeated events outside their control, they can begin to feel helpless to turn things around. They may give up. Or, they may become so fed up that they vandalize property or injure those they view as their tormentors. Look around and you’ll see the cultural expressions of our children’s angst -- dark music, dark clothing, body piercings, tattoos, angry graffiti. The things are merely the ripples generated by a deeper current.

Some of the stressors that damage kids may not strike us as particularly noxious. I talking about that fine line between encouraging children to learn and do their best and pressuring kids to accomplish more than is healthy. Kids unduly pressured to perform (to get As, score goals, make it to the Olympics or Carnegie Hall) may begin to internalize this need to strive and achieve and develop into impatient, hostile, aggressive, and Type As. Like cows running through a chute, they may let themselves get tracked in the way their parents have herded them. In other words, kids may dutifully fulfill their parents’ fantasies that they become lawyers, doctors, tennis stars, or musical virtuosos. After all, our children really do hate to let us down and yearn for our approval. As they trudge obediently forward along the career track of their elders’ choosing, they may harbor subconscious resentment or downright anger at the parents who seem to have turned them into performing seals.

Or, as seems to be happening more often these days, kids internalize and adopt their parents’ values and place extraordinary demands on themselves. They crave economic and financial success for themselves, neglecting other measures of success such as humanitarian acts and thoughtful stewardship of natural resources. In the current economic climate, they may worry about not being able to sustain their parents’ lifestyles.

When we burden kids with adult issues, we should not be surprised to see a corresponding increase in “adult diseases” in kids. And, indeed, today’s children have an increased likelihood of developing physical conditions such as “adult-onset” diabetes and ulcerative colitis, as well as psychiatric illnesses. One study found that, between 1979 and 1996, the proportion of kids with a psychiatric diagnosis jumped from 6.8 to 18.7 percent. Bipolar disease, once unheard of in kids, has become a common diagnosis. Rates of childhood depression, anxiety, and attention deficit disorder have skyrocketed. Since the 1950s, the teen suicide rate has more than tripled, and suicide currently ranks as the second-leading cause of death among 15-to 19-year-olds. Kids are exhibiting more extreme behaviors, as witnessed by mass murders such as the one that occurred in 1999 at Columbine High School in Littleton, Colorado. Basically, kids are showing us that things are getting worse.

American children now face the much of the pressure and complexity that used to be relegated to the realm of adulthood. They are being hurried into adulthood and at an increasing pace.

“Hurried children are forced to take on the physical, psychological and social trappings of adulthood before they are prepared to deal with them. We dress our children in miniature adult costumes (often with designer labels). We expose them to gratuitous sex and violence and we expect them to cope with an increasingly bewildering social environment – divorce, single parenthood, and homosexuality. Through all of these pressures the child senses that it is important for him or her to cope without admitting the confusion and pain that accompany such changes... This pressure to cope without cracking is a stress in itself the effects of which must be tallied with all the other effects of hurrying our children.” --David Elkind, Ph.D. The Hurried Child

The Cause of Mental Illness

The million dollar question is, of course, why are kids showing more signs of psychological illness? To answer that question, we must first examine theories about the roots of mental illness. The most current model is called the stress-diathesis model. Simply put the combination of stress levels and genetic pre-disposition (diathesis) creates mental illness. In a genetically predisposed child, it might not take a lot of stress before he develops psychiatric symptoms. In other words, nature and nurture both play a role.

Is it possible that a shift in the gene pool has increased mental illness? I doubt it. For one, the country’s genetic balance hasn’t much changed in the past few decades. The immigrants who come to our country often are in better shape, psychologically speaking, than are the citizens. In fact, population studies show that a host of physical and psychological conditions become more common among immigrants after they move to the U.S. Environment, it appears, plays a huge role in health.

It also seems clear to me that increasing our emphasis on biological/biochemical approaches to deal with the genetic side of the equation has not been successful. When all you have is a hammer, everything looks like a nail. At this point our mental health system is mostly wielding the hammer of biochemical interventions and we have failed to see the bigger picture. Stated simply, deteriorating environmental issues (which create stress) are responsible for the rapid escalation and the rates of psychiatric signs and symptoms from American children.

Children’s Varying Vulnerability to Stress

Children vary widely in their ability to cope with stress. A host of factors governs this vulnerability. One factor is a child’s inherent resilience. Another is genetics. Genetics can influence the brain systems that either respond in a stalwart, leonine way to stress or in scared-rabbit fashion.

Some of these inherited traits influence the enzyme systems involved in the production of neurotransmitters. A number of nutrients play key roles in neurotransmitter production, including several B vitamins (particularly folic acid and B6), vitamin C, and the minerals

magnesium and zinc. The essential fatty acids docosapentaenoic acid (DHA) and eicosapentaenoic acid (EPA) are involved. These fatty acids control various enzyme systems, cell membrane fluidity, inflammatory processes, and several aspects of neurotransmitter function. Unfortunately, many kids don't consume enough of these critical nutrients. Some of them possess the double whammy of genetic vulnerability to stress and poor nutrition, rendering them almost defenseless in the face of stress.

Case Study: Joey's Story

When I first met him, Joey was a chunky seven-year-old boy who loved to play Nintendo and do stunts on his bicycle. His early years were spent with a mother who high on drugs most of the time and with her alcoholic boyfriend, who physically and sexually abused Joey from his birth until he was three years old. At that time, his mother was arrested on drug charges and Joey was placed in foster care. There he tested his foster family with his explosive anger, aggression, and refusal to cooperate. He also injured the family dog. The last straw came when he began to sexually act out on their younger child

He moved to a residential treatment center and stayed there, aside from his four psychiatric hospitalizations for violent and aggressive behavior. Despite being on three powerful psychiatric medications, he was far from stable. So far, the modern pharmaceutical industry has yet to create a magic bullet for posttraumatic stress disorder.

Almost every day of the past year (and sometimes many times in a day), Joey has gone into a rage over some minor frustration. Simply saying, "You can't do that right now, Joey," can cause him to explode into a screaming, biting, scratching, punching tornado. His violence is sometimes so extreme that several staff members have to restrain him. No matter what the staff and I tried to do to help him, he couldn't seem to learn or change.

Neglect can be as destructive. I recently treated a cute, 4-year-old boy with curly red hair who was removed from an extremely neglectful home. He appeared to be extremely developmentally delayed and we were concerned that he might be intellectually compromised because his mother was developmentally disabled as well. This young boy was generally cheerful but seemed extremely slow to learn and even his play was slow. When I got down on the floor with him he would push a toy slowly across the room without the usual vigor or drive of a child his age. After six months of being placed in our residential treatment center he perked up, speeded up and regained most of his deficit. Researchers document that these types of children such as those discovered in Romanian orphanages often have atrophy in parts of their brain where it has literally failed to develop. Children are truly wondrous at their ability to respond and adapt when given the right circumstances.

Keep in mind that the human research showing that stress can damage the brain involves children who have endured serious trauma. If these children can make a comeback, kids who encounter run-of-the-mill stress can surely recover. The brain – especially the brain

of a child – is an amazingly resilient organ. And the mind and spirit have a tremendous capacity to nurse that healing process.

Recommended reading:

Elkind, David, Ph.D. *The Hurried Child: Growing Up Too Fast Too Soon*, 3rd edition. Cambridge, MA: Perseus Publishing, 2001.

McEwen, Bruce. *The End of Stress as We Know It*. Washington, D.C.: Joseph Henry Press, 2002.

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