



Buffering the Brain from Toxic Stress

Developing brains need new experiences, consistency, and loving care in order to thrive. Unfortunately, not all babies receive this type of nurturing. Some babies grow up in chaotic and stressful environments. Children who live in unpredictable worlds, who do not have the

opportunity to form a secure attachment with a caregiver, or who live in an unsafe physical environment live in a constant state of heightened stress. This severe, chronic stress can have profound and long-lasting negative effects on brain development. Buffering children from toxic stress and helping reduce that stress to more tolerable levels are important ways adults can support early brain development.



► The Stress Response

Whenever we experience stress, our brains and bodies go through specific physical and psychological changes. The brain is flooded with a stress hormone called cortisol, which prepares the body to deal with the stressor. Our attention becomes highly focused on the stressful situation, and we typically respond in one of three ways: by running away, by fighting back, or by freezing in place and not responding.

The stress response helps ensure our safety and survival in a stressful situation. But when we are under extreme stress, the brain is focused only on immediate survival and not on higher-order abilities like critical thinking, decision-making, or communication. Most minor or short-term stresses do not harm the developing brain because once they are over, the brain can return to these higher-order abilities. But severe or long-term stresses can cause permanent damage to the developing brain. Chronic stress hurts brain development because the neurons are damaged by overexposure to cortisol and because the child does not have the opportunity to strengthen higher-order thinking skills through practice.

► What Is Stress?

Stress is the body's normal reaction to anything that disrupts normal life. The frightening, challenging, difficult, or even exciting events or situations that cause stress are known as stressors. All children experience stress as a normal part of growing and learning. Stress can result from positive events as well as negative ones. Welcoming a new baby, for example, is a happy event that still causes stress because it disrupts the normal patterns of the family's life. Stress continues to happen throughout life, and small amounts of stress can actually help us be productive and learn to manage stress better. But high levels of stress in young children can have negative effects on early brain development. Overexposure to toxic levels of stress over a long period of time can lead some parts of the brain to be overdeveloped and others to be underdeveloped.



► Levels of Stress

Not all stresses are alike. Researchers classify stress into three levels based on the severity and potential for long-term negative consequences.

- **Positive stress is a short-term, everyday stress experience, such as having another child take away a toy or not receiving a treat.** These stresses are called “positive,” not because they are pleasant, but because experiencing positive stress can actually enhance brain development. Coping with small everyday stresses helps the brain learn how to deal with challenges and prepares the child to handle more serious stresses.
- **Tolerable stress results from more challenging or longer-term stressors, such as moving to a new home, changing child care providers, parents’ relationship problems, or the birth of a sibling.** These stressors are considered tolerable because the child has warm, loving caregivers to support her. Even if caregivers cannot remove the stressor itself, they help keep the stress from becoming toxic to the developing brain by teaching the child how to handle the stress in a healthy way. Without that support system, stressors that start out as tolerable may become toxic.
- **Toxic stress occurs when a person is overexposed to stress in a way that is damaging to the developing brain.** Stress can become toxic when a child experiences long-term stress and does not have the resources to help reduce the effects of the stressor. Difficult events such as a death of a loved one, long illnesses, abuse or neglect, maternal depression, family violence, natural disasters, chronic poverty, and other crises can build to a toxic level without the support of a nurturing adult. But even the most challenging stressors may be reduced to more tolerable levels when adults provide appropriate consistency, emotional support, and secure relationships.

► Why Is Prolonged Stress Dangerous?

Overexposure to stress, especially high levels of chronic stress, can have long-lasting negative effects on the developing brain. Some common patterns among children exposed to toxic stress include:

- **Fewer synaptic connections.** Children under prolonged stress do not have regular opportunities to practice decision-making, problem-solving, and other higher-order thinking skills to strengthen neuron pathways. Over time, underdeveloped executive function skills may lead to school difficulties, trouble with relationships, behavior problems, and other challenges.



- **Persistent hyper-arousal.** When a child is under stress, the brain stem, cerebellum, and limbic system are highly activated. These parts of the brain control basic survival and unconscious processing of emotions. When these parts of the brain are overused because of chronic stress, children tend to lash out in aggression at any perceived threat, even if the “threat” was just an accidental brush of the arm. Children whose brains are flooded with cortisol may have a hair-trigger temper and fly off the handle inappropriately. Because they are always coping with stress, their developing brains have fewer opportunities to reinforce connections in the cerebral cortex, which is where thoughtful planning occurs.
- **Reduced ability to learn.** Children under chronic stress are focused on their survival and often do not have energy left over to concentrate and learn. Children whose families are undergoing extreme stress may also fall behind their peers in learning. They may miss school regularly and may not be part of important learning experiences at home such as reading aloud and having conversations with adults. Missing these important experiences early in life may keep children from succeeding in elementary and secondary education.

► What Can You Do?

The key to lessening the toxic effects of stress on the developing brain is to provide children with loving support as they deal with the major stresses in their lives. Toxic stress can become tolerable in the presence of a strong support system. The following are some important ways you can help young children deal with stress:

- **Be available and responsive.** Children under stress are dealing with chaos and need a source of stability in their lives. One of the most important ways to buffer their stress is to be available when they need you. Be sure to respond warmly and sensitively to their needs; respond consistently when your baby cries; reassure children that you are there to help them; keep daily routines as consistent as possible; and prepare children in advance for changes in the regular routine.
- **Provide a safe environment.** Having one place where they know they are safe can make stress tolerable by providing a break when the brain does not need to be on high alert for danger. If a child is experiencing or witnessing violence at home, school or child care may be a place where they know they will not be hurt.
- **Let children practice managing small stresses.** Some caregivers try to protect children from all stresses in order to reduce disappointment or sadness. But stress is a part of life. Children who are so protected that they never experience life's little ups and downs may not learn how to manage when things go wrong. These children may not have coping skills to get through more challenging stresses. Instead of always "rescuing" children from little disappointments, such as not getting a treat at the store, use these stresses as learning experiences. Help children find ways to cope, and reassure them that they can handle their disappointment. Experience dealing with everyday positive stresses builds children's competence and confidence for dealing with larger stresses.
- **Encourage physical activity.** Running, swimming, bicycling, playing on the playground, and other physical activities are positive outlets for stress, both for adults and for children. Be sure to build in plenty of time for active play indoors and outdoors, especially when children are experiencing stress. And try being active with children—it will help them recognize that physical activity is important and may reduce your own stress as well.
- **Model healthy coping skills.** Young children learn many important skills by watching the adults around them. Pay attention to the ways you cope with stress, and work to model healthy habits. Teach children simple strategies such as taking a deep breath, taking time to cool down before responding, and listening to others' viewpoints. If you handle stress in healthy ways, children will follow your example.





Selected References:

- Bales, D. W., Falen, K., Butler, T., Marshall, L. E., Searle, L., & Semple, P. (2012). *Better Brains for Babies Trainer's Guide*, (2nd ed.).
- National Scientific Council on the Developing Child. (2014). *Excessive stress disrupts the architecture of the developing brain: Working paper No. 3 (updated edition)*. Retrieved from http://developingchild.harvard.edu/index.php/resources/reports_and_working_papers/working_papers/wp3/.
- National Scientific Council on the Developing Child. (2010). *Persistent fear and anxiety can affect young children's learning and development: Working paper No. 9*. Retrieved from http://developingchild.harvard.edu/index.php/resources/reports_and_working_papers/working_papers/wp9/.
- Perry, B. D. (2009). Examining child maltreatment through a neurodevelopmental lens: Clinic applications of the neurosequential model of therapeutics. *Journal of Loss and Trauma*, 14, 240-255.
- Young, A., Kenardy, J., & Cobham, V. (2011). Trauma in early childhood: A neglected population. *Clinical Child and Family Psychology Review*, 14(3), 231-250.

For questions about this program in Kansas, contact Bradford Wiles, Ph.D., K-State Research and Extension child development specialist, bwiles@ksu.edu

For more information about brain development, visit www.bbbgeorgia.org

Adapted from UGA Extension Series Building Baby's Brain, authored by Diane Bales and published August 2014

