

Chapter 5

Childhood Stress and Resilience

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5.1 Introduction

Stress is defined as an event or situation that is unpredictable and/or not controllable and is perceived as having social–emotional significance as a threat to a person’s survival. Children differ in their responses to stress, influenced both by constitutional factors (such as threshold to stimuli) and psychosocial context (such as threat appraisal). Stressors such as severe social adversity, abuse, trauma, neglect, or maltreatment directly impact 1 in 7 US children, leading to abnormal brain development, altered physiological regulation, and chronic adult illness (Felitti et al., 1998; Middlebrooks & Audage, 2008). High levels of severe stress during childhood negatively impact the body (Garner et al., 2012; Shonkoff et al., 2012); lead to problems with achievement, behavior, and health (Gunnar, Morison, Chisholm, & Schuder, 2001; Obradovic, Bush, Stamperdahl, Adler, & Boyce, 2010); and are associated with greater risk of suicide (Barnes, Eisenberg, & Resnick, 2010; McGowan et al., 2009).

Acute stress activates the sympathetic autonomic nervous system (SAM), which responds within seconds, and the hypothalamic–pituitary–adrenal (HPA) system, which responds within 20–30 min, to prepare the body to deal with the perceived threat. This results in signals from the brain’s limbic system to prepare target organs for “fight or flight” via norepinephrine and epinephrine (SAM) and cortisol (HPA). Negative hormone feedback loops and the parasympathetic nervous system act as biological “brakes” on these responses, so that they are normally deactivated soon after a threat has passed (Berntson & Cacioppo, 2007). Oxytocin, a hormone

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released from the posterior pituitary, is also increased by acute stress and possibly aids recovery by increasing social bonding and reducing anxiety (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003).

Children experience a range of stressors throughout their lives, some of which are mild or even positive (e.g., moving to a new home, making new friends, mastering a new skill, solving a problem), and some of which are more intense or negative (e.g., the death of a parent, a natural disaster, medical procedures, major injury or illness). The physiological response to stress is generally proportional to its degree, such that high levels of negative stress can cause physical symptoms such as headaches due to elevated blood pressure, poor concentration due to elevated cortisol, or belly pain due to increased gastric acid production in the stomach. Normally, even when the body responds in these more disruptive ways to negative life events, such stress is thought of as “tolerable” because its effects are buffered by protective factors—such as nurturing adults or self-regulation skills—that bring the body back into balance and mitigate the impact of stress.

However, when negative stress is unrelenting and/or severe, especially in the absence of protective factors, the HPA and SAM systems become overloaded and begin to change to compensate—such stress is termed “toxic.” In such cases, these stress response systems can become overactive, underactive, or both; this leads to changes in brain architecture and normal physiology, increasing the risk of long-term problems with learning, behavior, and health. Examples of “toxic stress” include child abuse and maltreatment, untreated parental psychiatric and substance abuse disorders, extreme poverty, and exposure to violence within the family and/or community. These are also referred to as “adverse childhood experiences” (ACEs). Other stressor-related factors that have complex influences on children’s responses to stress include the developmental timing and the specific nature of an ACE (i.e., unfamiliar stressors and/or multiple ACEs lead to poor outcomes). Negative stress of a lesser degree that nevertheless occurs at a chronic, daily level also contributes to stress-related problems (Odgers & Jaffee, 2013).

5.2 The Impact of Stress on Children

Functionally, stress can impinge on children’s emotions, behavior, health, and socialization (Forkey, Gillespie, Pettersen, Spector, & Stirling, 2014). These effects are often seen as regression to younger-aged behavior, mood changes, somatic complaints, or activity-level changes and vary according to a child’s level of development. Among preschool-aged children, signs of stress include lower than usual self-regulation (e.g., recurrence of thumb-sucking in a child who stopped doing so months ago or bed-wetting in a child who has been continent for a year or more); increased levels of age-typical anxieties and fears (e.g., of separation, the dark, “monsters”); or lower threshold for tantrums. School-aged children can act more verbally and/or physically aggressive at home and/or school, be more irritable or “edgy,” be more “clingy” with caregivers, or have lower than usual levels of

concentration. Younger adolescents often have somatic complaints (headaches, stomachaches); sleeping difficulties; appetite changes; and decreased performance in academics and/or extracurricular activities. Older adolescents can become less social or have less interest in typical activities, have more risk-taking behavior than usual, or be more irritable than usual.

Toxic stress during childhood negatively impacts the “programming” of interdependent biological systems—including the sympathetic nervous system (Massin, Withofs, Maeys, & Ravet, 2001), cognitive systems (Stevens, Lauinger, & Neville, 2009), hormonal functioning (Gunnar et al., 2001; Roisman et al., 2009), and immune-inflammatory regulation (Danese et al., 2008; McDade et al., 2005; Miller & Chen, 2007; Miller, Chen, & Cole, 2009; Shirtcliff, Coe, & Pollak, 2009). This occurs because chronic overactivation of the SAM and HPA systems leads to altered physiological “set points” that can predispose to stress-related physical and mental health conditions, which is termed allostasis (McEwen, 1998).

The timing of stress has important implications for its long-term consequences. Many chronic conditions of childhood, such as asthma (Chen et al., 2006) and hypertension (Shankaran et al., 2006), often have their roots in early exposure to toxic stress. Prenatal stress upon a mother increases the risk for her child to have restricted intrauterine growth and thus to be born with a lower than average weight, which is associated with chronic adult conditions predisposing to cardiovascular disease and metabolic problems such as type 2 diabetes (Barker, Osmond, Forsen, Kajantie, & Eriksson, 2005). Childhood health conditions can also be worsened by stress, such as asthma and eczema (Wright, Cohen, & Cohen, 2005), type 1 diabetes (Hanson, Henggeler, & Burghen, 1987), irritable bowel syndrome (Bennett et al., 1998), and juvenile rheumatoid arthritis (Schanberg et al., 2000). Most chronic pain conditions (e.g., migraine headaches or recurrent abdominal pain) are intrinsically linked with children’s responses to stress (Compas & Thomsen, 1999; Powers, Gilman, & Hershey, 2006). Children’s sleep problems are also strongly linked to family stress (Sadeh, Raviv, & Gruber, 2000).

The mental health consequences of toxic stress include anxiety and mood disorders that can emerge during childhood and persist into adolescence and adulthood (Heim, 1999). Adjustment disorders, post-traumatic stress disorder, and reactive attachment disorder are conditions that can emerge during childhood that are directly attributable to stress. Disorders that emerge during adulthood that have strong links to ACEs include drug use, antisocial behavior and conduct problems, and depressive symptoms (Schilling, 2007).

Stress is also associated with premature degeneration of the body, because it shortens the length of chromosomal telomeres—the DNA on the ends of chromosomes that gets removed as cells age or get damaged. While environmental stressors such as UV radiation have long been implicated in telomere shortening, it is now clear that severe psychosocial stress can do so as well, through uncertain mechanisms. For example, mothers of the most severely chronically ill children who perceived extremely high levels of stress had telomeres that were shortened the equivalent of 10 years of aging, compared to the mothers of healthy children who had low levels of

stress (Epel, 2004). For adults who experienced trauma during childhood, telomere length decreases as a function of the number and severity of trauma (Shalev et. al., 2012). Even prenatal stress can significantly shorten children's telomere length (Shalev, 2013), as well as alter HPA function (Tollenar, 2010) and lower immune responsiveness to vaccinations (O'Connor, 2013).

5.3 Protective Factors

Factors both internal and external to the child contribute to the impact of stress. Child-level variables that are constitutional and likely not as amenable to intervention or change include temperamental characteristics such as sensitivity to stimuli, high negativity of mood, and low levels of behavioral inhibition. Other factors within the child that might be more easily altered include cognitive appraisal and locus of control—for example, whether a situation is viewed by the child as controllable or not. Sex may play a role as well, in that girls seem to show more internalizing stress symptoms (such as anxiety and depression) than do boys, who tend to show more externalizing signs (such as aggression).

Family, community, and environmental factors form the context in which the child experiences stress as well. High levels of social support and parenting quality help children build resilience to stress, whereas family disruption and harsh parenting predispose children to stress-related difficulties. Cultural differences and communities also exert powerful effects on children's adjustment, as do peers, immigration, war, natural disaster, and famine. For example, a child with a transgender identity might experience severe stigmatization and social stress in one culture, whereas the same child might be seen as merely different or even as a blessing to the community in another. Similarly, children who suffer from a disaster will have more negative stress-related outcomes if they are also living in a region with high levels of violence.

The interaction of a child's dispositional reactions to stress with his or her external environment is complex and has been termed "biological sensitivity to context" (Boyce and Ellis, 2005) or "differential susceptibility" (Pluess and Belsky, 2012). Research in this area has revealed that children who are highly stress reactive are more vulnerable to negative behavioral and health outcomes than children who are less so, but only when external factors are highly negative (e.g., high ACEs). On the other hand, these same "sensitive" children have a greater likelihood of enjoying positive outcomes under conditions of high support and lower levels of stress.

As children grow, their ways of mitigating stress generally become less externally regulated and more internally regulated. Competence in dealing with stress is ideally modeled, nurtured, and taught by caregivers who encourage their children to deal well with stress in an ongoing, developmentally sensitive way from the time of infancy, contributing to a child's degree of resilience.

5.4 Resilience to Stress

Resilience is operationalized as high developmental competence, good functioning, and positive outcomes in the face of high adversity and negative experiences that usually threaten or derail development (i.e., stress). Studies of individual differences in outcomes in children exposed to toxic stress converge on several characteristics common to those with very positive outcomes (Masten, 2001; Sapienza and Masten, 2011):

- Connections and secure attachment with responsive, caring adults
- Nurturing, authoritative parenting
- Positive connections with school
- Positive peer relationships
- Spiritual faith in a higher power
- Sense of purpose and meaning in life
- Intelligence and problem-solving skills
- Self-regulation and executive function skills
- Positive self-image
- Motivation toward self-efficacy and achievement

Some of these factors, such as intelligence, may be less malleable than others. As such, interventions that aim to promote resilience tend to focus on attachment and caregiving and/or self-regulation, which may be more amenable to change.

5.5 Resilience-Promoting Interventions

Stress-buffering preventive interventions aimed at increasing resilience in children can be universal, selected, or indicated. Universal interventions—those designed to prevent stress-related conditions and promote resilience to stress in the community as a whole, regardless of level of risk—can be delivered in a wide variety of venues, including school health and family education classes. Clinicians engage in this when doing prenatal classes or anticipatory guidance as part of routine well-child visits starting during infancy. Such interventions can include teaching parents to interpret and respond supportively to “baby body language” in the context of learning about their child’s temperament, as well as how to handle toddlers’ tantrums and use positive parenting strategies. For older children and adolescents, these efforts include educating caregivers and youth about individual differences and bullying, teaching about interpersonal communication and positive peer relationships, fostering connections to school and community organizations, and encouraging involvement in extracurricular activities. These interventions help to build the strong, nurturing relationships and self-regulatory skills that are fundamental to the development of resilience.

Selected (or targeted) interventions aim to prevent the onset of problems in at-risk youth with threats to their development due to high levels of stress and adversity.

Such risks may be identifiable on a demographic basis and/or through screening measures. These include large-scale programs such as home visits to low-SES pregnant mothers, parenting classes for families with children in Head Start, and early intervention for children who are homeless/highly mobile.

Indicated interventions (or treatments) are aimed at children who have developed symptomatic problems or conditions that are due to, or influenced by, toxic stress. These include evidence-based programs such as Parent–Child Interaction Therapy (Funderberk and Eyberg, 2011) as well as highly individualized therapy specific to the child that address his or her unique strengths to aid in overcoming risk.

5.5.1 Attachment and Caregiving

All children will experience stress—be it grief, loss, transition, illness, poverty, or disaster—in the context of important adults in their lives also experiencing stress. Promoting children’s adaptive adjustment in the face of any adversity must thus take into account the stress reactions of important adults in their lives. In order to meet children’s needs during times of crisis and to teach them how to recover well from future crises, caregivers must cultivate their own competence in meeting stressful life events with equanimity. Caregivers need to learn to “roll” with children’s normative emotional–behavioral distress, guiding and reassuring with love—while not encouraging avoidant coping (i.e., overprotection), being dismissive of children’s negative feelings and thoughts, or permitting the child to suffer without support. Encouraging awareness, acceptance, and problem-solving engagement using reflective listening and empathetic language is a critical skill for adults to use when helping children under duress thrive by establishing an atmosphere of safety and restoring a sense of equilibrium. A number of interventions have demonstrated efficacy in enhancing these processes to promote resilience.

High-quality adoption and foster care is very well established as an intervention for children who have been maltreated, neglected, and/or have lived within extremely disrupted families with very low-quality or inconsistent caregiving. In studies of Romanian orphans, those placed into a foster home by age 24 months show more secure and organized attachment, and better interpersonal relationships, by preschool age than children who remain institutionalized in a sterile orphanage environment or those are placed into foster care at later ages (Gunnar, 2001).

Similarly targeted interventions, such as Multidimensional Treatment Foster Care for Preschoolers (MTFC-P), Positive Parenting Program (Triple-P), and the Incredible Years (Webster-Stratton et al., 2001), aim to improve parenting quality by training families of very young children to use contingency management and behavioral modification strategies (Fisher and Kim, 2007; Sanders, 1999; Brotman et al., 2007). Such programs prevent or decrease stress among caregivers of these high-risk children, and children whose families participate in these programs show improved social–emotional development and behavior and reduced disruptive behavior. Biologically, these children also normalize their cortisol rhythms and HPA reactivity (Bruce, 2013).

A specific example of one such intervention is Attachment and Biobehavioral Catch-up (ABC). This is a ten-session program for birth, foster, and adoptive parents of toddlers and preschoolers who have experienced neglect, maltreatment, or other early trauma (Dozier, 2008). The intervention aims to address three key issues common to this group of children by teaching their caregivers to provide nurturing care unconditionally, even with children who apparently do not often elicit it or who “push away” the caregiver; respond to children’s positive and negative behaviors in a timely and appropriate way to help them “co-regulate” their social–emotional interactions; and behave in a non-threatening, non-frightening, peaceful, and calm manner with their children. In a randomized controlled trial, the ABC program improved high-risk children’s secure, organized attachment behavior and normalized their diurnal cortisol secretion greater than a control condition (a family educational program about child development).

Other therapies focus on helping children recover from their reactions to stress by helping them learn self-regulation skills to deal more effectively with the resulting negative thoughts, feelings, and behaviors. One such example, Trauma Focused Cognitive–Behavioral Therapy (TF-CBT), is indicated for children who show signs of PTSD (Cohen et al., 2004). It involves narrative reframing and direct discussion of the trauma and stressful life events experienced by the child, teaching the child to identify negative cognitive distortions and self-correct them with more balanced alternatives, and practicing relaxation and physiological self-regulation to reduce distress. For younger children, TF-CBT includes caregiver training in these techniques, whereas older children and adolescents can benefit from individual or group work.

5.5.2 Self-Regulation

The control of one’s own mind and body is central to the process of resilience. Children’s natural movement toward greater self-mastery and autonomy in orchestrating the interactions between their cognition, emotion, and physiology begins during infancy and drives the development of self-regulation throughout early childhood, which continues even beyond adolescence (Sussman Gertz & Culbert, 2009). Cognitive aspects of self-regulation include executive function—also referred to as effortful control—encompassing self-monitoring and self-talk, alertness (e.g., starting a complex task), attention (e.g., following directions), and inhibition (e.g., delaying gratification). Emotional self-regulation includes motivation, reward seeking, and avoidance of discomfort. Physiological self-regulation includes interoception (e.g., responsiveness to internal hungry or full signals) and functional control of selected autonomic functions (e.g., sweating). These domains of self-regulation are related and interdependent, and there are individual differences within and between these domains. Some children may be highly regulated with respect to some domains such as switching attention between tasks but poorly regulated in others such as control of breathing; similarly, some children are well regulated in some contexts (e.g., with peers) and less in others (e.g., with teachers). Helping children capitalize

on strengths in one area of self-regulation can often help them to strengthen or generalize their skills to other areas for which they may be relatively more limited, in turn helping to drive resilience processes and overall competence.

Executive function is increasingly a target of targeted and selective intervention for youth at risk (Riggs et al., 2006; Diamond 2011). Directly training the brain in these domains, e.g., by playing memory games on a computer, has so far been of minimal impact in studies that have attempted to produce a generalizable improvement in children's self-regulation. A number of educational curricula improve academic readiness and achievement, in part by improving executive function and cognitive and/or emotional self-regulation, such as Tools of the Mind (Vygotsky, 1980), PATHS (Riggs et al., 2006), the Chicago Schools Readiness Project (Raver et al., 2011), and the Incredible Years.

Aerobic exercise and sports training can improve cognitive aspects of self-regulation such as creativity and cognitive flexibility and emotional aspects such as persistence. While physical activity in general can be beneficial for building resilience, certain kinds of physical activity that include focused attention training, such as yoga or martial arts, seem to produce greater benefits on self-regulation in children (Diamond, 2011). Yoga is a physical activity that utilizes postures, breathing techniques, focused attention, and self-control to foster resilience. It is helpful for stress management and cognition (Noggle, 2012; Chaya, 2012) and stress-associated health problems such as asthma (Jain, 1991) and irritable bowel syndrome (Kuttner, 2006).

Other programs that bolster resilience through self-regulation include meditation and/or relaxation training. This is a consciously directed process of quiet, calm, nonjudgmental attentiveness to one's own thoughts and feelings as they ebb and flow. One common and oft-studied type of meditation, mindfulness-based stress reduction has salutary effects on stress-reactive cognition and physiology (Davidson et al., 2003). In children and adolescents, meditation helps with general stress reduction and prosocial behaviors, cognitive and emotional regulation, sleep problems, and pain conditions (Broderick, 2009, 2014; Diamond, 2011).

Similar to (and often part of) meditation or relaxation training as well as yoga, diaphragmatic breathing can work quite well for acute stress reduction and alleviation of children's stress-related problems such as sleep disturbance and anxiety (Olness, 2009). Children can be coached to alter the breathing cycle so that inhalation pushes out the abdominal wall, and slow, rhythmic exhalation allows the abdominal wall to relax. Children younger than school age can be learn this technique as a game of bubble blowing (which requires controlled exhalation) or blowing out imaginary birthday candles, and older children can benefit from paced breathing (e.g., being taught to breathe in for a silent count of three and out for a silent count of five) and/or visually aided pacing (e.g., with an expanding/collapsing Hoberman sphere toy). Related techniques, such as progressive muscle relaxation and autogenic training, can be taught directly to older children and through story to younger children.

Biofeedback is a method of psychophysiological training that uses a computer to provide visual or auditory feedback (positive reinforcement) to a child of their biological signals of stress (such as heart rate variability, muscle tension, peripheral

skin temperature, or levels of perspiration), so that as the child downregulates physiologically (e.g., by activating parasympathetic nervous system pathways that serve as “breaks” on the fight-or-flight response), he or she can see or hear the results immediately and thus entrain or condition new “automatic” responses. Commercially available packages that use biofeedback games with high-definition graphics can be quite engaging for children as they learn to “be the boss” of their stress in this way (Culbert and Kajander 2007).

Clinical hypnosis utilizes focused attention (often in combination with mental imagery and/or relaxation) to produce a heightened ability to incorporate therapeutic suggestions. In children and adolescents, it is especially critical to emphasize that all hypnosis is in fact self-hypnosis, because no one in hypnosis can be made to follow suggestions or “be controlled” against their will—quite the contrary, as children most often develop a sense of self-mastery and competence from regular practice of self-hypnosis (Kohen & Olness, 2011). Stages of hypnosis include induction, deepening, therapeutic suggestions, re-alerting, and de-briefing; these stages are highly consistent with children’s everyday natural experiences and thus can be easily individualized and tailored to the child’s developmental level (Sugarman & Wester, 2013). For example, infants with colic might be engaged in hypnotic experiences aimed at stress reduction, such as swaddling and rocking; preschool-aged children do so via fantasy play; and adolescents often access hypnotic states while daydreaming. Childhood conditions that are stressful, exacerbated, and/or caused by stress are very responsive to hypnosis and similar cognitive–behavioral interventions, including various recurrent pain conditions (Eccleston et al., 2012) including chronic abdominal pain and irritable bowel syndrome (Vlieger et al., 2012) and chronic headache (Olness and Kohen, 1984). Self-regulation training through hypnosis is also effective for alleviating stress and pain due to invasive medical procedures (Uman et al., 2008).

Formal cognitive–behavioral therapy (CBT), usually delivered individually but sometimes in a group format for children under stress (e.g., due to trauma or maltreatment), is also an effective way to enhance self-regulation. This consists of various techniques that teach children to identify feelings and thoughts in stressful situations, changing perception of negative thoughts through cognitive reframing, and to respond with appropriate adaptive behaviors. Programs that are referred to as CBT often incorporate many of the aforementioned interventions. There is little evidence to compare various formats of such interventions or the effective components of them (Forman-Hoffman et al., 2013; Fraser et al., 2013).

5.6 Conclusion

Stress, both acute and chronic, causes changes to the mind and body that can have negative, lasting effects on physical and mental health. Extremely negative or traumatic childhood experiences thus literally get under the skin, directly impacting children’s behavior, cognition, and physiology. Some children seem more susceptible to this than

others. However, this vulnerability is based on complex interactions between children's individual biological differences and the timing, context, and type of the stress they experience. Fortunately, it is this susceptibility itself that also enables children to respond exquisitely well to positive influences and take advantage of opportunities for recovery, healing, and growth. This capacity, termed resilience, is the tendency of a dynamic system—whether a child, a family, a school, a neighborhood, or a community—to adapt successfully to highly adverse experiences. Resilience processes can be external to the child, such as nurturing adults, and internal to the child, such as self-regulation. These factors buffer or blunt children's biological and psychological stress responses, restoring biological homeostasis and preserving developmental competence, in turn preventing problems and promoting lifelong social–emotional development, mental health, and physical well-being. There is a growing body of programs and interventions—some targeting caregivers, some directly working with children—that can bolster such resilience, restoring typical function in all domains and promising better outcomes for children suffering adversity than would have been predicted.

Web Resources

For Families

American Academy of Child and Adolescent Psychiatry: Facts for Families

http://www.aacap.org/cs/root/facts_for_families/facts_for_families

American Academy of Pediatrics: Healthy Children

<http://www.healthychildren.org/English/healthy-living/emotional-wellness/pages/Helping-Children-Handle-Stress.aspx>

For Practitioners and Professionals

The National Child Traumatic Stress Network

www.nctsn.org

The AMBIT Network for Research and Practice in Child Trauma

<http://www.cehd.umn.edu/fsos/projects/ambit/default.asp>

The Center for the Developing Child

<http://developingchild.harvard.edu>

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