

Understanding Stress in Children

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Stress is increasingly present in all of our lives, yet as this term is used with greater frequency, its meaning has become less clear. What is stress? Often the term is used to refer to an external pressure exerted on systems of human homeostasis.¹ But it also can refer to the immediate result — a physiological reaction mediated by the hypothalamic-pituitary-adrenal (HPA) axis; neurohormonal mediators, such as corticotropin releasing factor; glucocorticoid release; and autonomic nervous system (ANS) response altering neurotransmitter levels, accompanied by adjustments in cardiovascular, immune system, and brain function, along with predictable behavioral manifestations — a “state of stress.”²

Humans share stress-responsive brain structures like the amygdala with other primates. But because of the evolution of brain structures, such as the hippocampus and prefrontal cortex, humans possess the unique ability to retrigger stress reactions in the absence of renewed external stress.^{1,2} All we need to do to unleash a physiological stress response is to think about a particular stress. ‘Stress’ has also come to refer not only to external pressures and immediate reactions to them, but to a prolonged internal state that may have long-term deleterious effects on health and mental health.

SPECTRUM OF STRESS

Stress reactions represent an evolutionary advantage in the face of danger when they prompt effective adaptations to changing environmental conditions.

Such reactions are often critical to survival and are not necessarily detrimental. This is usually the case for mild everyday stress, except when it piles onto an already stressed individual. More demanding stresses can prod an individual to develop new strengths, although perhaps at a cost. Stress reactions can be harmful when they are of extraordinary proportions, cumulative, or unremitting.

Mediated by physiologic HPA axis and ANS responses, prolonged reactions can increase risks to physical health (eg, hypertension, altered immune responses such as ‘pro-inflammatory’ states, metabolic changes associated with obesity, diabetes, and arteriosclerosis) and to mental health (eg, post-traumatic stress disorder, depression, anxiety, as well as motor hyperactivity, impaired attention, concentration, and other learning and behavioral challenges).^{1,2} Recent studies have shown that specific 5-HTT (5-hydroxytryptamine serotonin transporter) gene alleles code for increased vulnerability to depression secondary to early childhood stress suggest that early environmental influences such as stress can alter manifestations later in life. Studies also suggest that environmental factors can protect against expression of genetic risk.³

Acute stress

Short-lived stress of everyday proportions — an unpredicted change in a day’s schedule, a final exam, or an argument, for example — will result in transient HPA axis and ANS responses. These serve to mobilize appropriate ad-

aptations, and they return to baseline before causing any long-term physical or mental health problems. Rapid recovery from the effects of brief, everyday stresses can promote new coping skills, broader awareness of opportunities and demands, and a sense of competency.

Chronic stress

Sustained stresses —bullying, parental discord, academic failure, for example — can expose a child to long term effects of HPA axis and ANS stress responses on metabolism, cardiovascular and immune system functioning, and even brain development.^{1,2,4} External sources of stress may be amplified by the child’s anticipation of further or recurrent stressful stimuli, interfering with healthy development of self-esteem and the emotional availability for peers and caregivers.

The chronic stress of over-scheduling

The distinction between acute and chronic stress, between the opportunity for intermittent recovery, and return to baseline of HPA axis and ANS activity versus persistent physiological alterations may be useful in assessing the risks of over-scheduling children.⁵ Although condemnation of busy children’s schedules is tempting, clinicians should consider each child’s need for activity and rest, challenge and nurturance, based on the child’s temperament and behavioral response to the current regimen. Does the child brighten as she speaks enthusiastically about soccer and Advanced

TABLE 1.

Touchpoint: Prenatal and Newborn

Touchpoint	Focus	Major Themes	Opportunities for Practice	Anticipatory Guidance
Prenatal: "The Ideal Baby"	Formation of functional alliances between the family and the community support system	Preparation; imagined babies; relationships; imagined parent	Alliance with parents; imaginary babies; support	Establishing expertise; circumcision; feeding
Newborn: "The Real Baby"	Supporting parents in learning about their new baby (the "real baby") and incorporating the reality of giving birth	Health; parental emotions; the real baby; attachment	Behavioral profile; the story of birth; support	Trial and error; feeding; language of behavior; play

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Placement Math, or does she glaze over, withdraw, and look away? Does she seem to have her own motivation and rewards – a driving hunger for stimulation and activity, or is she affected by external pressure at the expense of a more quiet temperament's need for 'down time' or 'refueling'? When over-scheduling is out-of-sync with a child's needs and strengths, signs of chronic stress, such as persistent irritability, emotional over-reactions to minor demands, lack of pleasure in usually enjoyable activities, and withdrawal are likely to emerge.

CME EDUCATIONAL OBJECTIVES

1. Describe at least four types of stress.
2. Explain two common ways children are buffered from external stressors.
3. List at least one example of the Systems Theory for stress.

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Extraordinary stress and trauma

Short-lived stressors can result in long-term effects when they are of extraordinary proportions, bearing little resemblance to the child's everyday reality. Neuropsychological responses, such as hyperarousal (on edge, ready to overreact) and hypervigilance (on guard, scanning the environment for danger at all times), may persist long after a traumatic episode. Evocative reminders can retrigger traumatic memories and "re-experiencing" and may lead to withdrawal from routine activities. "Psychic numbing" can also emerge. This is a reactive underresponsiveness that prevents emotional shifts congruent with new events, a costly protective shield that interferes with full engagement in life as it unfolds.⁶⁻⁸

Geographic proximity of the child to an event, displacement, loss of or separation from family members, disruption of regular routines, immediate physical consequences of the event, and prolonged reminders of the event due to altered physical surroundings and conditions of life are among the more obvious factors increasing a child's risk of a serious stress reaction. History of previous severe acute or chronic stresses, pre-existing mental illness, or disrupted relationships with primary caregivers are

also risk factors⁶⁻⁹ for serious stress reactions.

Several months after the attacks of September 11, 2001, one parent reported that her child, a student at a middle school near the World Trade Center, seemed to have recovered from the initial shock and manifested no signs of long-term effects. In passing, however, she noted

that the child's grades had remained stable in all but his French class. As she recounted his story, this mother began to realize that her child's French class met on Tuesdays at 9 a.m. in a classroom overlooking Ground Zero, from which he had witnessed first hand the horrors of the attack. Her understandable wish that her child might have emerged entirely unscathed may have prevented her from recognizing that every time her son entered that classroom he was "retriggered" into a transient dissociative state interfering with attention, memory, and learning.

Chronic stress of poverty and war – everyday 'extraordinary' stress

A child chronically exposed to extraordinary levels of stress, for example chronic abuse, poverty, or a war zone, may not suffer from post traumatic stress disorder, but from chronic traumatic stress disorder.^{6,8} No therapeutic intervention can be effective until physical safety has been restored.¹⁰

Cumulative stress

A child may endure one acute stress after another or multiple stresses simultaneously. The former may be more likely to lead to sustained physiological

responses similar to those of chronic stress, while the latter may lead to those of an acute extraordinary stress, eg, a post-traumatic stress reaction. Many conditions predisposing to chronic stress (eg, poverty, prolonged, or life-threatening pediatric illness, a parent with mental illness, or substance abuse) heighten vulnerability to superimposed acute stress. Chronic and cumulative stress interfere with self-regulatory functions (eg, affect modulation, impulse control) and are likely to lead to more severe reactions to acute stresses, such as a move or hospitalization. Acute stress reactions that appear out of proportion to the stressor should prompt clinical inquiry about covert sources of underlying chronic stress.^{6,7,8}

HOW CHILDREN RESPOND TO STRESS

Initial biological stress reactions are quickly followed by the search for protection from familiar, reliable caretaking adults. Longstanding secure attachment to trustworthy parents is a potent protective factor throughout childhood.^{6,8-10}

TABLE 2.

Touchpoint: The 3-Week-Old Baby and the 6- to 8-Week-Old Baby

Touchpoint	Focus	Major Themes	Opportunities for Practice	Anticipatory Guidance
3 Weeks: "The Energy Sink"	Assessing the level of disorganization being experienced by the family and the capacity and support available for healthy reorganization	Parental exhaustion; feeding; individuality; relationships	Interpreting states; support system; interaction	Fussiness; thumb sucking; parental stress
6 to 8 Weeks: "The Rewarding Baby"	Emergence of the newborn as a member of the family and reconfiguration of the family to include this new person	Sociability; parental self-confidence; relationships	Interaction; caregiving; depression	Cognitive burst; play; work

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Parents also influence their children's stress reactions with their own responses to their children's panicked state.

Parental emotional availability

The most potent buffer for young children is the quality of their relationships with parents and other important adult caregivers. To fall in love with a young child, to be sensitive and responsive to her cues, to know when to engage and to disengage, to lead and to follow her lead, and to challenge and to comfort all demand emotional availability. Overwhelming stress or crisis for parents makes these far more difficult tasks. Yet many parents in such circumstances

still manage to free up enough emotional energy to supply the early ingredients of resiliency to their young children. Some parents' resiliency may be traced to the "angels from their nurseries," the early positive experiences in their own lives, especially strong attachments in their earliest relationships.⁹ The powerful protective urges that their children stimulate in them may also help parents reestablish their emotional availability to their children.

Meaning-making

Overwhelming stress leads children to struggle to understand: Who or what is responsible? What can be done to make things better? What is the likelihood of recurrences, and how can these be prevented? They may ask, for example, "Why did I have to get leukemia?" "Why did my mother go off to war?" "Did I make my parents get divorced?" "If I am very, very good will there be no more hurricanes?" A common

TABLE 3.

Touchpoint: The 4-Month-Old Baby and the 7-Month-Old Baby

Touchpoint	Focus	Major Themes	Opportunities for Practice	Anticipatory Guidance
4 Months: "Looking Outward"	Infant's attachment to and incorporation into the family	Attachment; interest in the world; patterns of care; baby's demands; father engagement	Interactions; crying; synchrony; interest in the world; the alliance; caregiving routines	Feeding; sleeping; play; stranger anxiety
7 Months: "Up at Night"	Assessment of the family's patterns and capacity for adaptation, change, and functional reparation	Motor abilities; feeding; sleeping; object permanence	Caregiving routines; discipline; temperament	Safety; limit setting; sleeping and feeding; stranger awareness

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TABLE 4.

Touchpoint: The 9-Month-Old Baby

Touchpoint	Focus	Major Themes	Opportunities for Practice	Anticipatory Guidance
9 Months: "The Pointer"	Observation of the baby's capacities and response of the family to the baby's new autonomy	Mobility; social referencing; person permanence; control	Feeding; stranger anxiety; limit setting; doubts and fears about development	Separation; feeding; safety
12 Months: "The Walker"	Reflection on the past year and the new capacities for the infant and family, patterns of coping, and established relationships	Independence; motor skills; learning; irritability	Sleeping; feeding; play	Temper tantrums; toilet training; aggression

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explanation is for a child to blame herself. Psychological effects of stress on children are partly determined by their answers to questions like these. They may interpret their world as hopelessly dangerous, or as a balance between life's perils and life's sustaining opportunities. Stances for facing the future may take the form of passive resignation, hunger for revenge, or resilient readiness to face adversity and stake a claim for survival and fulfillment.^{6,8} The meaning-making process is influenced by children's developmental stage, by the effects of individual temperaments (traits) and by the acute emotional environment (state) in which they are figuring out their world. Caregiving adults can contribute to children's meaning-making and support the development of positive adaptations even when stress is overwhelming or when safety remains beyond reach. Resilient adaptations to stress in children are supported by ongoing proximity to parents who can model self-calming abilities in the face of stress and offer interpretations that preserve hope. Studies comparing children who remained with their parents during the World War II bombing of London to those who were sent away to safer territory showed that the group who maintained proximity to their parents demonstrated fewer long-

term psychopathological sequelae.^{1,6,8}

STRESS AND DEVELOPMENT**Prenatal stress — effects on development**

The influence of parents on children's vulnerability to stress begins far earlier than is commonly recognized. Stress-related maternal states such as depression, anxiety, and self-reported anger are associated with neurophysiologic changes that may affect the fetus.¹¹⁻¹⁶ Alterations in maternal cortisol and neurotransmitter (eg, norepinephrine and serotonin) levels have been correlated with corresponding cord blood levels and neonatal behavioral changes.^{11-14,16,17} Uterine artery constriction may be another mode of transmission of stress reactions from expectant mother to the fetus.^{11,14,18,19} Maternal stress and elevated maternal cortisol levels during pregnancy are correlated with developmental risk from toddlerhood through adolescence, affecting language acquisition, attentional function, and behavioral controls.^{16,19-32}

Developmental Stress: Touchpoints

The Touchpoints model of development identifies periods of predictable regression that precede or accompany developmental progress: the process of

development itself can be another source of stress for child and parents.³³⁻³⁷ A few examples of Touchpoints that can be shared with parents in advance during anticipatory guidance include:

- Visual accommodation extending beyond 20 cm at 4 to 5 months old predictably leads infants to temporarily lose interest in the breast or bottle as they begin to assimilate the larger world around them.
- Increased mobility at the end of the first year is often preceded by temporary sleep disturbances for infants who just can't stop their intense drive for motor activity. In addition, once they get going, they often become cranky and irritable, partly out of frustration with falling, and partly because their ability to move away from their parents is both exciting and terrifying.
- Crying, clinging, and temper tantrums often increase briefly in young children as they let go of well established skill acquisitions (eg, crawling) before reorganizing and reaching for new ones (eg, walking.) Equally predictable is the parents' disorganization as their children "fall apart." Parental misunderstandings and overreactions to these developmental phenomena can lead to developmental derailment in the child. For example, a child who

briefly regresses in the area of recently acquired continence may have greater difficulty regaining ground in this area if parents react with shaming or harsh punishments.³⁷

Pediatric providers who learn to recognize transient regressions and disorganization that predict new developmental strides can mitigate the stress reactions that are provoked in parents by offering anticipatory guidance prior to each expected Touchpoint and by helping parents to understand the purpose they serve.^{33,37} In turn, they can reduce the effects of developmental stress on children by helping parents to individualize the careful balance of gentle prodding and coddling that best fits their child's needs, strengths, and individual temperament at challenging moments.

Touch Points Tables

It is critical for primary care pediatricians to be aware of the multidirectional forces within the child, family, and community systems as they assess both the risk for long-term psychopathological sequelae to stress, and the sources of strength to prevent such outcomes, and to heal.³⁸ As members of the community system, pediatricians may play a larger role than they recognize in symbolizing hope, as reliable and trustworthy helpers whose beliefs and values remain unshaken by stressful events. As the late Fred Rogers exhorted young children in the aftermath of 9-11, "Look to the helpers."

The Touchpoints Tables were produced to assist the pediatrician in incorporating Touchpoints into your practice. As with any new skill, it will take time and repeated use to begin to feel comfortable using this new framework when interacting with families. This reference packet has been developed to provide you with a quick Touchpoints reference.

SYSTEMS THEORY APPROACHES TO STRESS

Child, parents, and the pediatric pro-

vider can be seen as constituent members of a system. Systems theory, in which inter-relationships and multi-directional interactions within a system are the focus of inquiry rather than its constituent parts in isolation, is a useful perspective for understanding the effects of stress within a single child, family, and communities. Each member of a system is not only affected by external forces on the system, but each member also exerts influences on the others.^{34,37}

Biologic systems

Similarly, in the neurobiological/psychological context, this approach also illuminates the multidirectional interactions of neurohormonal and neurotransmitter mediators of stress reactions with adaptations in attentional and perceptual functions such as hyperarousal and hypervigilance, or shifts in amygdala 'alarm' signals, hippocampal contextualizing, and prefrontal cortex analysis and response planning to external stress.^{1,2}

Family systems

In family contexts, systems theory draws attention to multiple factors influencing a child's experience and reactions to stress. The child influences, and is influenced by, her family system. Her response will both stimulate a response in her parents and will be modulated by her parents' response.^{34,37} A child's response to traumatic stress can be mitigated by the parents' ability to cope with it and to offer interpretations of the trauma that reaffirm sources of strength and restore hope.^{6,8} Ironically, the self-comforting capacity of parents to cope with stress may be thrown off track by a sensitive, easily frightened, and difficult-to-soothe child, further influencing the inter-relational process.

Stress without supports

Stresses on parents interfering with their ability to buffer stress for their children appear to be mounting as more

parents are working and raising children alone, often without the support of extended family, and in dispersed communities.³⁸

Community and cultural systems

Community members and institutions also interact to modulate reactions to stress from within and external to the community "system."⁸ For example, the stress of Hurricane Katrina on New Orleans was modulated by alienated relations of ethnic groups. The hurricane and flooding alone did not suffice to explain the range of stress reactions, and psychological recovery for the community will require not only the reestablishment of safety (strengthening the levees, emergency plans, etc.) but also the healing of a historically factionalized community.

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TABLE 5.

Touchpoint: The 15-Month-Old, the 18-Month-Old, the 2-Year-Old, and the 3-Year-Old

Touchpoint	Focus	Major Themes	Opportunities for Practice	Anticipatory Guidance
15 Months: "The Clinger"	This is the time when stranger and separation anxiety are at their peak. Despite his typically short attention span, the fifteen month old is a student of the world. He manipulates objects now not only with the purpose and interest of the last several months but also with a sense of experimentation. The polarities of toddlerhood are intense. The understanding of cause and effect that has developed with his experimentation with objects can also be applied to his relationships. This new power can result in confusion for both himself and his parents.	Autonomy; play; motor skills; dependence; language	Discipline; sleeping; feeding; learning	Parenting responsibilities; shifting attachments; individual differences
18 months: "Rebel with a Cause"	She can now think independently from her direct experience which allows her to engage in fantasy play, to use language for more than meeting basic needs and to relate to others with a stronger sense of purpose. She is beginning to incorporate the standards, rules and values of the people around her. This often leads to tension between what she wants to do and what she is expected to do. Battles for control and the emergence of temper tantrums mark the beginning of a new adventure as parents and caregivers are now seen as barriers to independence.	Cognition; sense of self; battles for control; language	Discipline; social skills; feeding; sleep	Temper tantrums; safety; childhood; toilet training
2 Years: "Getting to No!"	Profound changes for the child and large adjustments for the parents. Awareness of his capacities leads him into conflicts with those who would limit his power. Parents must struggle to keep up with this person, who continues to require the emotional closeness of a baby but also demands the independence of a child.	Pretend play; language; autonomy; motor skills	Sleeping; feeding; play; toilet training; social skills	Toilet training; emotionality; aggression; responsibility; television
3 Years: "Why?"	Three may be a plateau between the conflicts of the previous year and the storm that is coming, with the identity struggles of the 4 to 6 year old. This behavioral stability reflects a smoother period of development in which language and cognitive capacities are developing at a rapid rate. Some children also have increased capacity to internalize concerns that may exhibit themselves as fears, nightmares, or a lack of self-efficacy.	Imagination; fears and phobias; language; peer relations; social understanding	Toileting training; meals; separation	Preschool; sexual identity; empathy

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