

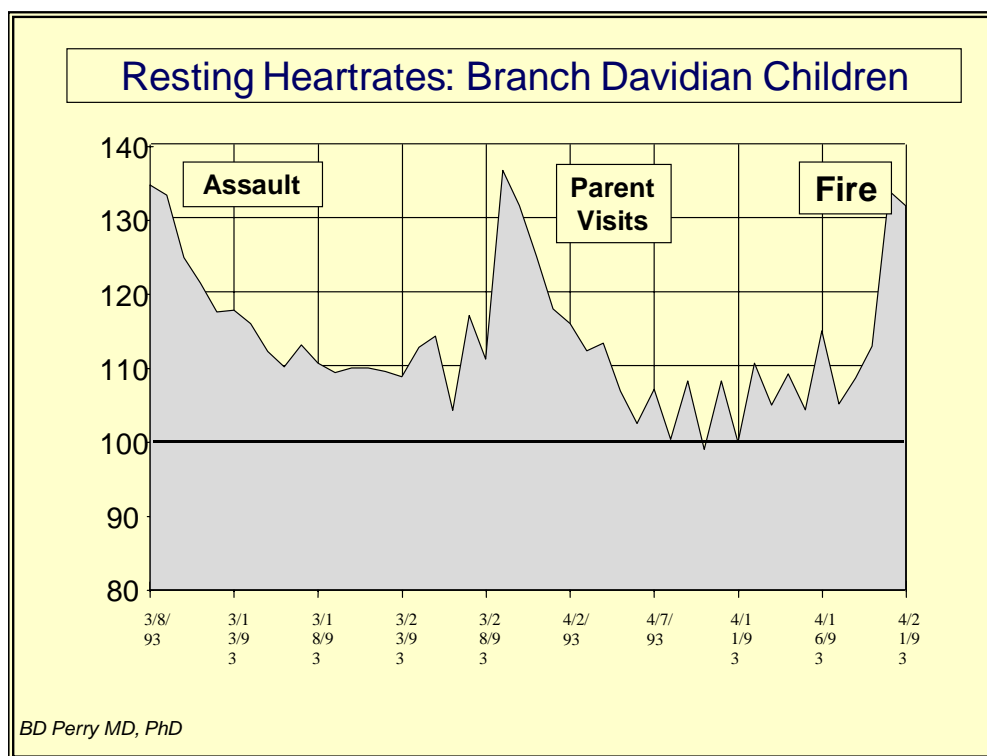


Video Series 1

UNDERSTANDING TRAUMATIZED AND MALTREATED CHILDREN:
THE CORE CONCEPTS

The Fear Response

The Effects of Trauma on Children



Bruce D. Perry, M.D., Ph.D.

This chapter is designed as supplemental material for The ChildTrauma Academy's video/DVD series *Understanding Traumatized and Maltreated Children: The Core Concepts*. These materials have been developed by the ChildTrauma Academy to assist parents, caregivers, teachers and various professionals working with maltreated and traumatized children. Continuing Education credits can be given for reviewing these materials. Please refer to the Introduction chapter for more information about additional supplemental resources and CEU credits.

TRAIN-THE-TRAINER SERIES
Edited by B. D. Perry

Introduction

Each year in the United States, approximately five million children experience some form of traumatic experience. More than two million of these are victims of physical and/or sexual abuse. Millions more are living in the terrorizing atmosphere of domestic violence. Natural disasters, car accidents, life-threatening medical conditions, painful medical procedures, exposure to community violence--all can have traumatic impact on the child. By the time a child reaches the age of eighteen, the probability that any child will have been touched directly by interpersonal or community violence is approximately one in four. Traumatic experiences can have a devastating impact on the child, altering their physical, emotional, cognitive and social development. In turn, the impact on the child has profound implications for their family, community and, ultimately, us all.

Traumatic events in childhood increase risk for a host of social (e.g., teenage pregnancy, adolescent drug abuse, school failure, victimization, anti-social behavior), neuropsychiatric (e.g., post-traumatic stress disorder, dissociative disorders, conduct disorders) and other medical problems (e.g., heart disease, asthma). Urban violence, the deterioration of public education, and the alarming social disintegration seen in some of our urban and rural communities can be traced back to the escalating cycles of abuse and neglect of our children.

This course is written for an interdisciplinary audience. Caregivers, childcare providers, teachers, law enforcement, child protection workers, social workers, judges, nurses, pediatricians, and mental health service providers all will work with traumatized or maltreated children. The more we can understand these children and the impact of traumatic experiences, the more compassionate and wise we can be in our interactions and problem solving. To date, few of the systems designed to care for, protect, educate, evaluate, or heal our children have solved the multiple problems posed by maltreated or traumatized children. A first step in solving these problems is learning about the roots of trauma-related problems: *the adaptive responses to threat* present during traumatic experiences.

Response to Trauma

Heterogeneity of response patterns

- Adaptive changes in *cognition*
- Adaptive changes in *affects*
- Adaptive changes in *behavior*
- Adaptive changes in *neurophysiology*
- Adaptive changes in *physiology*

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Course Objectives:

Present information about: 1) human response to threat; 2) how children "experience" trauma or maltreatment; and 3) classic responses and reactions to trauma or maltreatment in order to increase understanding, improve decision-making, enrich interventions, and better the existing systems serving children.

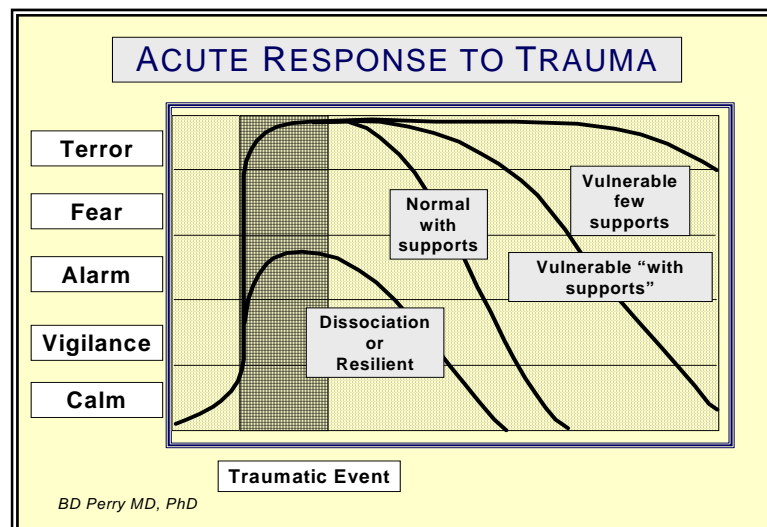
Section 1 - Key Points:

- The arousal continuum
- The hyper-arousal and dissociative responses
- Post-trauma behavior
- Persistent responses to trauma
- The brain's role in mediating our response to a trauma

The Alarm Response

The human body and human mind have a set of very important, very predictable responses to threat. Threat may come from an internal (e.g., pain) or external (e.g., an assailant) source. One common reaction to danger or threat has been labeled the 'fight or flight' reaction. In the initial stages of this reaction, there is a response called the alarm reaction.

As the individual begins to feel threatened, the initial stages of a complex, total-body response will begin. The brain orchestrates, directs and controls this response. If the individual feels more threatened, their brain and



The Acute Response to Trauma: Each traumatic event has a beginning and an end. As the traumatic event begins, the individual will move along the arousal continuum. Their internal state will shift from calm to vigilance, alarm, fear and then terror. The descriptive labels--calm, vigilance, alarm, fear, terror--merely designate various points along this continuum and are common descriptive terms for the emotional state corresponding to various stages of the response to threat.

body will be shifted further along an arousal continuum in an attempt to ensure appropriate mental and physical responses to the challenges of the threat. The cognitive, emotional and behavioral functioning of the individual will reflect this shift along the arousal continuum. During the traumatic event, all aspects of individual functioning change--feeling, thinking, and behaving. Someone being assaulted doesn't spend a lot of time thinking about the future or making an abstract plan for survival. At that moment, their feeling, thinking, and behaving is being directed by more 'primitive' parts of the brain (see Table in Appendix). A frightened child doesn't focus on the words; they attend to the threat-related signals in their environment: the non-verbal signs of communication such as eye contact, facial expression, body posture or proximity to the threat. The internal state of the child shifts with the level of perceived threat. With increased threat, a child moves along the arousal continuum from vigilance through to terror. The alarm continuum is characterized by a graded increase in sympathetic nervous system activity, in turn, causing increased heart rate, blood pressure, and respiration, a release of glucose stored in muscle and increased muscle tone. Changes in the central nervous system cause hypervigilance; the child tunes out all non-critical information. These actions prepare the child to fight with or run away from the potential threat. This total body mobilization, the "fight-or-flight" response, has been well characterized and described in great detail for adults. These responses are highly adaptive and involve many coordinated and integrated neurophysiological responses across multiple brain areas such as the locus coeruleus, the amygdala, the hypothalamus and the brainstem nuclei responsible for autonomic nervous system regulation.

Differential Response to Threat

Dissociation

- Detached
- Numb
- Compliant
- Decrease HR
- Suspension of time
- De-realization
- 'Mini-psychoses'
- Fainting

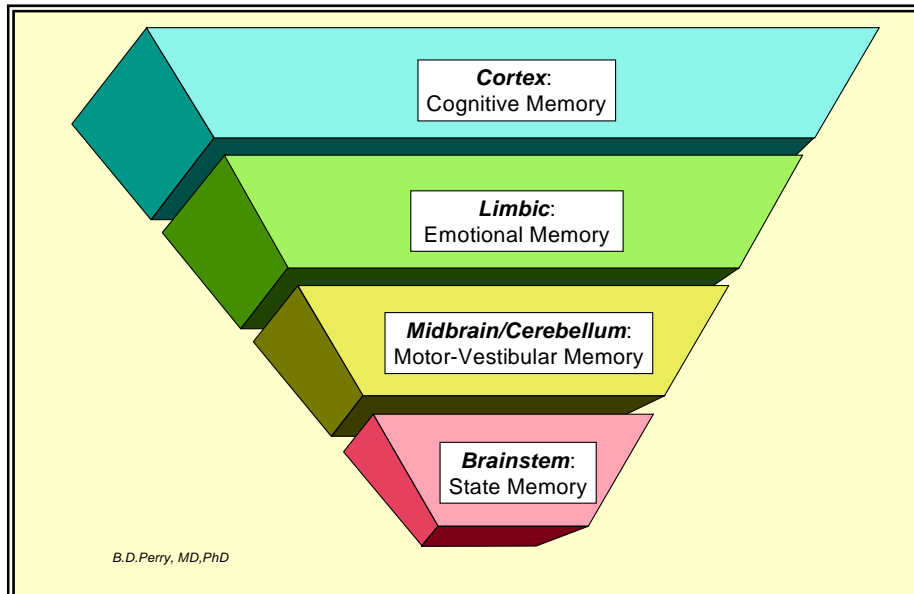
Hyperarousal

- Hypervigilance
- Anxious
- Reactive
- Alarm response
- Increase HR
- Freeze: Fear
- Flight: Panic
- Fight: Terror

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Heterogeneous Response to Threat: Dissociation

The most characterized response to threat is the fight-or-flight response. However, it is increasingly clear that individual responses to threat can vary tremendously. Another of the major adaptations to threat involves a different set of physiological and mental changes. Sometimes, when physically fighting or fleeing is not possible, the child will use avoidant and psychological fleeing mechanisms that are *dissociative*. Dissociation is basically a mental mechanism by which one withdraws attention from the outside world and focuses on the inner world. Dissociation may involve a distorted sense of time, a detached feeling that you are "observing" something happen to you as if it is unreal, the sense that you may be



Trauma and Memory: One of the key functions of nervous tissue is to store information. All areas of the brain store information related to the functions they mediate. The cortex stores cognitive information – names, faces, facts. The limbic system can store emotional information – fear, pleasure, sadness. Motor-vestibular memories such as typing, playing the piano or riding a bike are stored in other parts of the brain. In the brainstem, the anxiety or arousal states associated with a traumatic event can be stored. The symptoms of PTSD are stored throughout the brain in these various systems and areas. Re-exposure to cues associated with the trauma (e.g., sights, sounds, and smells) can elicit these stored “memories” and result in the signs and symptoms of PTSD.

watching a movie of your life. In extreme cases, children may withdraw into an elaborate fantasy world where they may assume special powers or strengths. Like the alarm response, this “defeat” or dissociative response is graded. The intensity of the dissociation varies with the intensity and duration of the traumatic event. Even when we are not threatened, we use dissociative mental mechanisms all of the time. Daydreaming is an example of a dissociative event. The period between wakefulness and sleep is another example of dissociating from the present to your inner thoughts, ideas, fears, and fantasies--ultimately, moving into the state of sleep. All children and most adults use some degree of dissociation during a traumatic event. Whether dissociation is the primary adaptive response used may depend on the individual or the kind of trauma.

For most children and adults, however, the adaptive response to an acute trauma involves a mixture of hyperarousal and dissociation. During the actual trauma, a child will feel threatened and the arousal systems will activate. With increased threat, the child moves along the arousal continuum. At some point along this continuum, the dissociative response is activated. This results in the host of protective mental (e.g., decreases in the perception of anxiety and pain) and

physiological responses (decreased heart rate) that characterize the dissociative response (see *Differential Response to Trauma* Figure, above).

The Acute Alarm Response

As a traumatic event ends, the mind and body slowly move back down the arousal or dissociative continuum. The child moves from the brink of terror, through fear, alarm and--with time and support--back to calm (see *The Acute Response to Trauma* figure above). Heart rate, blood pressure and other physiological adaptations normalize. When a child moves down the arousal continuum, his brain can restore baseline (i.e., pre-trauma) styles of feeling, thinking, and behaving. Hypervigilance decreases and the mental mechanisms related to attention begin to normalize as well. The child that has dissociated will begin to pay attention to external stimuli. While the child that has been completely focused on external cues related to threat will actually pay attention to *internal* stimuli (e.g., feelings, thoughts, sensing their pounding heart or noticing the cut on their leg from diving under a desk during the shooting).

This means, for example, that the child will now *perceive* the sense of fear and anxiety. This is when they will actually feel the fear associated with the trauma. The individual will begin to process and think about what happened, attempting to make sense out of what has just happened. Because the traumatic event is so far out of the normal range of experience, there will be a variety of mental attempts to process and "master" this event.

The event will play itself out in the child's mind again and again. A host of intrusive images related to the trauma may swamp the child's thinking. This set of re-living and re-experiencing phenomenon may include telling the story over and over again to friends. The child may act this event out in their play and drawings (see below) or have intrusive dreams. In essence, these children have created memories of the traumatic memory. But these memories are complex and multi-domain. Traumatic memory involves the storage and recall of traditional cognitive information (e.g., who, what, when, where), emotional information (e.g., fear, dread, sadness), motor-vestibular information (e.g., body position during a rape) and state memory (e.g., vigilance, physiological hyperarousal).

The normal and predictable mental mechanisms that are used to process all experiences will, at times, fail in the attempts to master and understand a traumatic event. Because traumatic events have features that are so outside the range of normal experience, there are

The further outside the range of the normal experience and the more life-threatening an experience, the more difficult it will be for the normal mental mechanisms to work efficiently to process and master that experience.

very few internal experiences by which to judge or make sense out of the event. The further outside the range of the normal experience and the more life-threatening an experience, the more difficult it will be for the normal mental mechanisms to work efficiently to process and master that experience. The inability to control elements of the traumatic event or the intrusive thoughts that follow leads to a set of predictable, mental and physiological responses.

Emotional Memory and Physiological Hyperarousal

Unfortunately, as this event plays itself out again and again in the mind of the child, not only will the thoughts of the event be recalled, the emotions and feelings (fear, anxiety, pain) of being out of control and threatened will be re-experienced as well. Each intrusive thought, nightmare and re-enactment in play also re-evokes the emotional or affective memory of being in the midst of the threatening event.

A classic set of predictable symptoms and physical changes seen in the acute post-traumatic period is related to the ability to re-evolve the emotional and physiological memories of being in the traumatic event. In other words, in addition to having cognitive remembrances of the facts and narrative details of their thoughts during the event, the child has the capacity for recollection and reliving of the physiological changes that were present in the alarm reaction. *In effect, the child has emotional and state memories from the traumatic event.* This means that the child will be hypervigilant, and may have an increased startle response, increased muscle tone, a fast heart rate (tachycardia) and blood pressure. Indeed, even at rest in the weeks following a traumatic event, children and adolescents often exhibit signs

State and Affect Memories Elicited in a Non-Conscious State

David is a 9-year-old boy. From age 2 through 6 years, he was sexually abused by his father. This abuse induced severe physical injuries. At age 6 he was removed from the family.

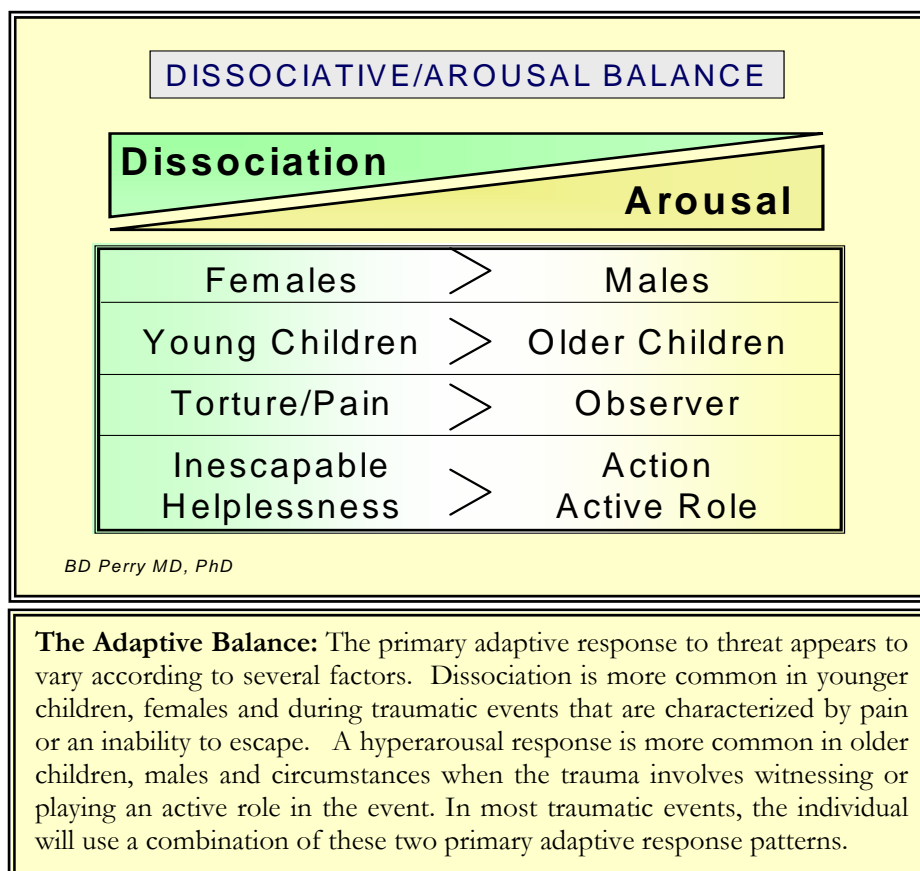
At age 8, he was seriously injured in a fall. He suffered from serious brain injury resulting in a coma state for 8 months following the injury. He continues to be difficult to arouse and is non-verbal. He exhibits no form of meaningful communication. However, in the presence of his biological father, he screams, moans, and his heart rate increases dramatically. Audiotapes of his biological father elicit a similar response. The scent of his father (one of the father's shirts) results in similar agitated behavior and physiological hyperarousal. These "memories" are stored in lower parts of the brain and do not require cognitive memory or consciousness to be expressed.

of physiological hyperarousal--including tachycardia. Despite normal behaviors in most situations, children exposed to trauma are internally agitated. They have not truly been able to move back down the arousal continuum to the state of calm. This has profound implications for the child's long term functioning (see Post-traumatic Stress Disorders below).

Persisting physiological and emotional distress is physically exhausting and emotionally painful. Because of the pain, energy and discomfort associated with the recurring intrusive thoughts and the physiological and emotional 'memories' connected with these thoughts, a variety of protective *avoidance* mechanisms are used to escape reminders of the original trauma. These include active avoidance of any reminders of the trauma and the mental mechanisms of numbing and dissociation.

Avoidance, Numbing and Dissociation

Traumatized children, when faced with reminders of the original traumatic event, may experience so much pain and anxiety that they become overwhelmed. As described above, in these situations--when they cannot physically withdraw from those reminders--they may dissociate. Following a traumatic experience, children may act stunned or numb. Dissociating children often appear to be gazing off into nowhere. They will not readily respond to questions by adults. Their answers to questions will seem unclear, unfocused or evasive. This is understandable if we remember that while these children are present in body, their minds may be "off in another place"—dissociated--trying to avoid the painful reminders of the original trauma.



Avoiding direct reminders of the trauma sometimes is extremely difficult. In that case, children will withdraw in to themselves in a variety of ways. This inward-focused withdrawal basically means that they will have fewer opportunities to be provoked into having more intrusive thoughts about the event and, therefore, they can avoid pain.

In the first days and weeks following a traumatic event, the symptoms listed above--1) re-experiencing phenomena, 2) attempts to avoid reminders of the original event and 3) physiological hyper-reactivity--are all relatively predictable, indeed, highly adaptive physiological and mental responses to a trauma. Unfortunately, the more prolonged the trauma and the more pronounced the symptoms during the immediate post-traumatic period, the more likely there will be long term chronic and potentially permanent changes in the emotional, behavioral, cognitive and physiological functioning of the child. It is this abnormal persistence of the originally adaptive responses that result in trauma-related neuropsychiatric disorders such as Post-traumatic Stress Disorder (PTSD).

Children and adults surviving traumatic events very frequently will have persistence of the acute post-traumatic stress response beyond six months. When this occurs, the child or adult is then considered to be suffering from post-traumatic stress disorder (PTSD). Post-traumatic stress disorder is a diagnostic label that has been traditionally associated with combat veterans. More recently however, it has been very well described in children who have been survivors of physical abuse, sexual abuse, exposure to community or domestic violence, natural disasters, motor vehicle accidents and a host of other traumatic events. The three major clusters of symptoms as described above are observed in a variety of forms of post-traumatic stress disorder.

In brief, children who survive a traumatic event and have persistence of this low level fear state, may be behaviorally impulsive, hypervigilant, hyperactive, withdrawn or depressed, have sleep difficulties (including insomnia, restless sleep and nightmares) and anxiety. Generally, these children may show some loss of previous functioning or a slow rate of acquiring new developmental tasks. Children may act in a regressed fashion. Many of these children also have persisting physiological hyper-reactivity with resulting fast heart rate or borderline high blood pressure.

Whether or not someone develops post-traumatic disorder following a traumatic event is related to a variety of factors. The more life-threatening the event, the more likely someone is to develop PTSD. In addition, the probability of developing PTSD is greater the more the event disrupts their normal family or social experience. Having an intact, supportive and nurturing family appears to be a relatively protective factor.

Persisting “Fear” in a Traumatized Child

Rachel is a 10-year-old girl. She lives in a foster home after being removed from her family following the severe physical assault of a sibling by her stepfather. She was exposed to chronic violence in the home as her stepfather battered her mother and her older male sibling. She was referred to the ChildTrauma Clinic with presenting problems of sleep difficulties, increased startle response, difficulty concentrating (hypervigilance), academic failure and pervasive anxiety. Her resting heart rate was 120 beats per minute (bpm).

Following a multidisciplinary evaluation, she was diagnosed with post-traumatic stress disorder. Her symptoms were interpreted as being the persistence of the fear-related emotions and behaviors that were normative and adaptive during the violence but now were maladaptive. Treatment included: a) psychoeducation for the foster family and school regarding the impact of exposure to trauma on the emotional, behavioral and cognitive functioning of children, b) small group therapy with a focus on social skills and c) pharmacotherapy with clonidine, a medication that specifically decreases the activity of fear-related neurobiological systems in the brain. Dramatic improvement in sleep, impulsivity, anxiety and concentration were noted following the clonidine. Temporary discontinuation of the medication resulted in partial return of symptoms.

Unfortunately, a great majority of children who survive traumatic experiences also have a concomitant major disruption in their way of life, their sense of community, and their family structure as well as exposure to a variety of ongoing provocative reminders of the original event (e.g., ongoing legal actions, high press visibility). The frequency with which children develop post-traumatic stress disorders following comparable traumatic events is relatively high (45-60%).

A complicated clinical aspect of working with traumatized children involves the wide array of symptoms they can display. Children who survive traumatic events and exhibit this diverse set of symptoms and physical signs are frequently also able to meet diagnostic criteria for Attention-Deficit, Hyperactivity Disorder (ADHD), Anxiety Disorder NOS, Major Depressive Disorder, Conduct Disorder, and a variety of DSM-IV Axis I diagnoses. Keeping in mind, however, that these children have been traumatized and that the symptoms of anxiety, depression and behavioral impulsivity are reflective of core changes related to the traumatic event helps one provide better diagnostic, prognostic and the therapeutic services for these children.

Stress and Adaptation

Post-traumatic stress disorder and other neuropsychiatric symptoms that are seen following traumatic events are related to the symptoms that are present during

the acute response to threat. Indeed PTSD, a disorder, originates from the maladaptive persistence of *appropriate* and *adaptive* responses present during traumatic stress. The organ mediating the adaptive--and the maladaptive--responses related to traumatic stress is the human brain.

Our brain is designed to sense, process, store, perceive and act on information from the external and internal world to keep us alive. In order to do this, our brain has hundreds of neural systems, all working in a continuous, dynamic process of modulating, regulating, compensating - increasing or decreasing activity to control the body's physiology. Each of our many complex physiological systems has a rhythm of activity that regulates key functions. For example, when blood sugar falls below a certain level, a set of compensatory physiological actions is activated. When tissue oxygen is low from exertion, when an individual is dehydrated, sleepy, or threatened by a predator, still other sets of regulating activity will be turned on to respond to the specific need. For each of these systems, there are "basal" (or homeostatic) patterns of activity within which the majority of environmental challenges can be sustained. When an internal condition (such as dehydration) or an external challenge (an unpredictable and unstable employment situation) persists, this is a stress on the system.

Activity-dependent Neural Differentiation

- Neurons are designed to change in response to patterned repetitive stimulation
- During development, patterns of activity define patterns of synaptic connectivity and, thereby, functional capacity
- In adults, activity can alter pre-existing neural organization - in children, activity literally provides the organizing template for neural systems

Stress is a commonly used term in both lay and professional language. Often, unfortunately, there is no agreement about what "stress" actually means. For the purposes of this booklet--and using a concept more commonly familiar to biologists--"stress" is any challenge or condition which forces our regulating physiological and neurophysiologic systems to move outside of their normal dynamic activity. Stress occurs when homeostasis is disrupted. Traumatic stress is an extreme form of stress.

It is important to understand that stress during development is not necessarily a bad thing. Indeed, the development of stress-response neural systems depends upon exposure to moderate, controllable levels of stress. The opportunity for a toddler to control his or her exploration, to discover, and to experience moderated novelty is essential for healthy development. Children given the opportunity for moderate, controlled exposures to stress during childhood--with a consistent, available, and safe caregiver to serve as "home-base"--can become inoculated against future, more severe stressors. The levels of arousal and "stress" associated with novelty and safe exploratory behavior help build a healthy child.

Dramatic, rapid, unpredictable, or threatening changes in the environment, however, will activate "stress"-response systems. These brain-mediated responses recruit a set of immune, neuroendocrine, and central and peripheral nervous system responses that promote adaptive "survival" functions and, later, a return to equilibrium (or homeostatic) patterns. Events that disrupt homeostasis are, by definition, stressful. If this stress is severe, unpredictable, prolonged or chronic, the compensatory mechanisms can become over-activated, or fatigued and incapable of restoring the previous state of equilibrium or homeostasis. The physiological system re-organizes its "basal" patterns of equilibrium. An event is "traumatic" if it overwhelms the organism, dramatically and negatively disrupting homeostasis. In a very real sense, trauma throws the organism "off balance," and creates a persisting set of compensatory responses which create a new, but less functionally flexible, state of equilibrium. This new, trauma-induced homeostasis is more energy consuming and maladaptive than the previous state. By inducing this "expensive" homeostasis and compromising full functional capability, trauma robs the organism. It has survived the traumatic experience, but at a cost.

Individual adaptive stress responses during a trauma vary. The specific nature of a child's responses to a given traumatic event will depend upon the nature, duration and the pattern of trauma, and characteristics of the child and his or her family and social situation. (e.g., genetic predisposition, age, gender, history of previous stress exposure, presence of attenuating factors such as supportive caregivers).

Whatever the individual response, however, the extreme nature of the external threat is often matched by an extreme and persisting internal activation of the neurophysiological systems mediating the stress. A primary adaptive feature of the threat-response system is single-trial "learning"--the capacity to generalize from a threatening event to other experiences with similar features. Unfortunately, this very adaptive capacity is at the core of the emotional, behavioral and physiological symptoms that develop following a traumatic experience.

Neural systems respond to prolonged, repetitive activation by altering their neurochemical and sometimes, microarchitectural (e.g., synaptic sculpting) organization and functioning. These are presumed to be the molecular mechanisms that mediate memory and learning. This is no different for the neural systems mediating the stress response. Following any traumatic event, children will experience some persisting emotional, behavioral, cognitive and physiological signs and symptoms related to the, sometimes temporary, shifts in their internal

physiological homeostasis. In general, the longer the activation of the stress-response systems (i.e., the more intense and prolonged the traumatic event), the more likely there will be a “use-dependent” change in these neural systems. In some cases, the stress-response systems do not return to the pre-event homeostasis. In these cases, the signs and symptoms become so severe, persisting and disruptive that they reach the level of a clinical disorder. In a new context and in the absence of any true external threat, the abnormal persistence of a once adaptive response becomes maladaptive.

Section 2 - Key Points:

- *Post-traumatic Stress Disorder: DSM-IV definition; challenges in diagnosis of PTSD; figures demonstrating the prevalence of PTSD; factors affecting the development of PTSD--those that increase and decrease vulnerability; gender differences in the development of PTSD; problems for which PTSD increases risk*

Post-traumatic Stress Disorders (PTSD)

Post traumatic stress disorder (PTSD) is a clinical syndrome that may develop following extreme traumatic stress (Diagnostic and Statistical Manual, Version IV,

American Psychiatric Association referred to as DSM IV). There are six diagnostic criteria for PTSD. The first is an extreme traumatic stress accompanied by intense fear, horror or disorganized behavior. The next three are symptom clusters: 1) persistent re-experiencing of the traumatic event such as repetitive play or recurring intrusive thoughts; 2) avoidance of cues associated with the trauma or emotional numbing; 3) persistent physiological hyper-reactivity or arousal. Finally, the last two diagnostic criterions refer to how

POST-TRAUMATIC STRESS DISORDER

- A. RECURRING INTRUSIVE RECOLLECTIONS OF THE TRAUMA:**
Intrusive thoughts, dreams, flashbacks, 'dissociative' events, intense emotional and physiological distress when re-exposed to trauma associated stimuli
- B. AVOIDANCE OF TRAUMA -ASSOCIATED STIMULI OR 'NUMBING':**
Sense of detachment, restricted range of affect, dysphoria, loss of recently acquired developmental skill, sense of a foreshortened future
- C. PERSISTENT PHYSIOLOGICAL HYPERAROUSAL:**
Sleep difficulties, hypervigilance, difficulty concentrating, increased startle response, emotional lability, behavioral impulsivity, irritability, profound anger, increased physiological reactivity

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long and how disabling the symptoms are. Signs and symptoms must be present for more than one month following the traumatic event and cause clinically significant disturbance in functioning. A child is considered to have Acute Stress Disorder (DSM IV) when these criteria are met during the month following a traumatic event. PTSD is further characterized as Acute when present for less than three months, Chronic for more than three months or Delayed Onset when symptoms develop initially six months or more after the trauma.

Clinical Presentation of PTSD

Children with PTSD may present with a combination of problems. In fact, two children may both meet diagnostic criterion for PTSD but have a very different set of symptoms. This can be somewhat confusing to non-clinical professionals trying to understand traumatized children. In addition, the signs and symptoms of PTSD can look very similar to other neuropsychiatric disorders in children, including attention deficit hyperactivity disorder (ADHD) and major depression.

Typical signs and symptoms of PTSD include impulsivity, distractibility and attention problems (due to hypervigilance), dysphoria, emotional numbing, social avoidance, dissociation, sleep problems, aggressive (often re-enactment) play, school failure and regressed or delayed development. In most studies examining the development of PTSD following a given traumatic experience, twice as many children suffer from significant post-traumatic signs or symptoms (PTSS) but lack all of the criteria necessary for the diagnosis of PTSD. In these cases, the clinician may identify trauma-related symptoms as being part of another neuropsychiatric syndrome (e.g., hypervigilance is often considered an attention problem resulting in traumatized children being diagnosed and treated as if they have ADHD).

The misdiagnosis of traumatized children with PTSD is common. Sometimes, a clinician may be unaware of ongoing traumatic stressors (e.g., domestic violence or abuse). In other cases, the family brings in a child because of new symptoms such as school failure or social withdrawal but

makes no association between the child's symptoms and events in the distant past (e.g., car accident, death of a relative, exposure to violence). Without any relevant trauma history to aid the clinician, PTSD may not be diagnosed and post-traumatic stress symptoms (PTSS) are classified as part of other conditions. Children with PTSD as a primary diagnosis are often labeled with ADHD, major depression, oppositional-defiant disorder, conduct disorder, separation anxiety or specific phobia. In some cases, children with PTSD will meet diagnostic criterion for multiple diagnoses. This is especially so when examining co-morbidity (the co-occurrence of multiple DSM IV diagnoses) in children with chronic trauma such as physical or sexual abuse. In some studies, the majority of maltreated children met diagnostic criteria for *three or more* Axis I diagnoses in addition to PTSD.

Childhood PTSD

anxiety
behavioral impulsivity
aggressive
hypervigilance
hyperactivity
apathetic or depression
sleep difficulties
tachycardia or hypertension

When children are evaluated multiple times over several years, the diagnostic confusion can get worse. The clinical presentation of trauma-related symptoms can evolve. In the typical evaluation process, the evaluating clinical team or clinician rarely has the benefit of complete history about the origin and evolution of symptoms. Histories are frequently based upon one caregiver's recollection and assessment is based upon a single clinical visit (e.g., a school-mandated evaluation). In these cases, the traumatized child may "accumulate" diagnoses over time. It is not unusual for a child with PTSD related to chronic traumatic exposure (e.g., sexual abuse, domestic violence, physical abuse) to have six, seven or eight diagnoses given over five or six previous evaluations. Unfortunately, there are often six, seven or eight different (and partial) treatment approaches that match these diagnostic impressions. This can be tremendously frustrating to the caregivers, teachers, caseworkers or other professionals trying to understand and help these children.

It is important to remember that DSM IV diagnostic criteria can yield multiple labels in maltreated children but these diagnoses rarely provide useful information about etiology, course, treatment response or prognosis. At present, despite an evolving clinical phenomenology, it is clear that PTSD is not the only, or an inevitable, outcome of traumatic events during childhood.

Post-traumatic hyperarousal or dissociative-like symptoms often co-exist with these other Axis I disorders. Furthermore, severe early trauma appears to be an expresser of underlying constitutional or genetic vulnerability and may be a primary etiologic factor in the development of a broad range of disorders later in life. In short, traumatic events can result in a host of clinical syndromes including "pure" PTSD. However, except in discreet, single trauma events, the clinical presentation and evolution of trauma-related symptoms is typically complex.



Re-enactment in drawing. Several weeks after living through a shooting, in which bullets came within inches of her head while she was in her bedroom, a child draws a picture of her "home." Note the bullet holes in the wall and the window (orange four panel square on the outside of the house border).

Incidence and Prevalence of PTSD

When examining how widespread PTSD is in the adult population, studies find a lifetime incidence of PTSD ranging from 3 to 14%. This incidence is a total population estimate. Similar studies in adolescents find incidence figures between 2 and 5%. These figures refer to total population estimates. When examining a sample of children exposed to trauma, however, these figures skyrocket.

Controlled studies document that between 15 to 90% of children exposed to traumatic events develop PTSD. The percentage varies depending upon the nature of the event. Universally, however, the rates of children developing PTSD following traumatic events are higher than those reported for adults. This is consistent with the growing recognition that children are, if anything, *more* vulnerable to traumatic experiences than adults.

A brief sampling of recent studies gives some feel for the incidence of PTSD following a traumatic event. Thirty-five percent of a sample of adolescents diagnosed with cancer met criteria for lifetime PTSD. Fifteen percent of children surviving cancer had moderate to severe PTSS. Ninety-three percent of a sample of children witnessing domestic violence had PTSD; over 80% of the Kuwaiti children exposed to the violence of the Gulf Crisis had PTSS; more than 68% of the children surviving the Branch Davidian Siege at Waco met criteria for PTSD. Seventy three percent of adolescent male rape victims develop PTSD; 34 % of a sample of children experiencing sexual or physical abuse and 58 % of children experiencing both physical and sexual abuse met criteria for PTSD. In all of these studies, clinically significant symptoms--though not full PTSD--were observed in essentially all of the children or adolescents following the traumatic experiences.

Not all children exposed to traumatic events develop PTSD and those who do, don't all have the same severity of symptoms. A major research focus has been identifying factors (mediating factors) that are associated with increased (vulnerability) or decreased (resilience) risk for developing PTSD following table above. In brief, these factors can be divided into three broad categories: 1) characteristics of the child; 2) characteristics of the event; and 3) characteristics of family/social system (see Table). Each of these mediating factors can be related to the degree to which they either prolong or decrease the child's stress-response activation resulting from the traumatic experience. Factors that increase stress-related reactivity (e.g., family chaos) will make children more vulnerable while factors that provide structure, predictability, nurturing and sense of safety will decrease vulnerability.

There are apparent gender differences in the expression and development of

"Not a day goes by that I don't think that I could have saved him. I was eight. He was a hard man, always on me. Never could please that man. That day at lunch he kept on me, telling my mother how lazy I was. He told me to go to the shop behind the house and bring back the chair he had been working on. I said 'yes sir'... but I went to my room after lunch. I guess he went to the shop himself to get the chair. I heard an explosion. The shop had blown up. I guess it was a gas leak. My mother and I watched the fire melt the shop--he never came out. My mother was screaming--and I just stood and watched. I hate to say this but part of me was happy. I didn't cry for a long time. Later that year I took my first drink. It helped me feel good."

- 68-year-old man talking about the guilt and shame associated with the traumatic death of his father.
He traces his history of alcoholism to this event

PTSD. Clinical experience and recent studies suggest that females tend to exhibit more internalizing (i.e., anxiety, dysphoria, dissociation, avoidance) and males more externalizing (i.e., impulsivity, aggression, inattention, hyperactivity) post-traumatic symptoms. In epidemiological studies of PTSD in the general adult population, females have higher rates of PTSD than males. While lacking the extensive epidemiological data of these adult studies, a gender difference has been observed in several studies with children and adolescents. There appear to be gender differences in adaptive response in the acute event (females dissociate more than males) that may be related to this observed difference in development and expression of trauma-related symptoms.

Vulnerability and Resilience

	<i>Event</i>	<i>Individual</i>	<i>Family and Social</i>
<i>Increase Risk</i> (Prolong the intensity or duration of the acute stress response)	<ul style="list-style-type: none"> Multiple or repeated event (e.g., domestic violence or physical abuse) Physical injury to child Involves physical injury or death to loved one, particularly mother Dismembered or disfigured bodies seen Destroys home, school or community Disrupts community infrastructure (e.g., earthquake) Perpetrator is family member Long duration (e.g., flood) 	<ul style="list-style-type: none"> Female Age (Younger = more vulnerable) Subjective perception of physical harm History of previous exposure to trauma No cultural or religious anchors No shared experience with peers (experiential isolation) Low IQ Pre-existing neuropsychiatric disorder (especially anxiety related) 	<ul style="list-style-type: none"> Trauma directly impacts caregivers Anxiety in primary caregivers Continuing threat and disruption to family Chaotic, overwhelmed family Physical isolation Distant caregiving Absent caregivers
<i>Decrease Risk</i> (Decrease intensity or duration of the acute stress response)	<ul style="list-style-type: none"> Single event Perpetrator is stranger No disruption of family or community structure Short duration (e.g., tornado) 	<ul style="list-style-type: none"> Cognitively capable of understanding abstract concepts Healthy coping skills Educated about normative post-traumatic responses Immediate post-traumatic interventions Strong ties to cultural or religious belief system 	<ul style="list-style-type: none"> Intact, nurturing family supports Non-traumatized caregivers Caregivers educated about normative post-traumatic responses Strong family beliefs Mature and attuned parenting skills

Chronic Effects of Childhood Trauma

PTSD is a chronic disorder. Untreated, PTSS and PTSD remit at a very low rate. Indeed, the residual emotional, behavioral, cognitive and social sequelae of childhood trauma persist and appear to contribute to a host of neuropsychiatric problems throughout life. Traumatic stress in childhood increases risk for attachment problems, eating disorders, depression, suicidal behavior, anxiety, alcoholism, violent behavior, mood disorders and, of course, PTSD, to name a few.

Traumatic stress impacts other aspects of physical health throughout life, as well. Adults victimized by sexual abuse in childhood are more likely to have difficulty in childbirth, a variety of gastrointestinal and gynecological disorders, and other somatic problems such as chronic pain, headaches and fatigue. The Adverse Childhood Experiences study (see Resources) examined exposure to seven categories of adverse events during childhood (e.g., sexual abuse, physical abuse, witnessing domestic violence: events associated with increase risk for PTSD). This study found a graded relationship between the number of adverse events in childhood and the adult health and disease outcomes examined (e.g., heart disease, cancer, chronic lung disease, and various risk behaviors). With four or more adverse childhood events, the risk for various medical conditions increased 4- to 12-fold.

Section 3 - Key Points:

- *Treatment of PTSD: different conceptual frameworks for understanding/treating PTSD; recommendations for those seeking treatment; psychoeducation, debriefing; pharmacotherapy; individual psychotherapy; cognitive-behavioral therapy*

Treatment of Children with PTSD

To date, few treatment outcome studies in children with PTSS and PTSD have been published. Despite this dearth of objective data, a wealth of clinical experience and subjective treatment approaches has been published. The nature of these reported clinical approaches depends upon the theoretical perspective of the author. At present, the mechanism-based conceptual frameworks explaining the development of PTSD fall into four main categories: 1) psychoanalytic; 2) cognitive behavioral; 3) developmental and 4) neurodevelopmental. Each of these offers certain insights but none provides a complete and unambiguous treatment approach. Therefore, the treatment of children with PTSD varies greatly depending upon the specific clinician's training, perspective and experience. This can be confusing to non-mental health professionals or caregivers trying to help the traumatized child. They may often get conflicting recommendations or information about how traumatic events should be handled. Some may hear that talking about the event is most important; others may recommend not talking about the trauma and focusing on the current set of functional

problems the child may have (e.g., the social or academic problems that have resulted from the PTSD symptoms).

Acute Prophylactic Treatment of Traumatic Hyperarousal

Dominic is a seven-year-old boy. Five days prior to evaluation, he had been in a car accident in which his mother was killed. Immediately following the accident, he was trapped in the car with his mother's body. She had been significantly disfigured by the accident--including a near decapitation. For the hour that the EMS attempted to cut him out of the car, he was immobilized with only a view of his dead mother's now disfigured face. On evaluation, he had not been able to sleep, his resting heart rate was 136. He was noted to be withdrawn but resistant to the medical treatment necessary for his multiple broken bones.

Treatment included psychoeducation for the family and clonidine (a medication that helps decrease the reactivity of the stress-response neural systems). His resting heart rate fell to 90. Sleep normalized and he was able to cooperate with medical treatments. Individual therapy focused on loss and trauma was started on discharge. Six months following the accident, Dominic had a resting heart rate of 100 when tapered off the clonidine. He had continuing, and expected, sadness over the loss of his mother, but did not meet criterion for PTSD.

The best recommendation we can give about this is to try and find a professional team that has experience with traumatized children as well as a clinician or clinical team willing to listen to you and learn from the resources you may bring to the situation. In some cases, caregivers or other professionals working routinely with traumatized children may be more familiar with clinical advances in this area than a mental health clinician with limited experience with trauma.

The nature and severity of specific symptoms (e.g., impulsivity, withdrawal, hypervigilance, dissociation, dysphoria, and aggression) will define treatment approach rather than the diagnosis. A major consideration in treatment is distinguishing between a single discreet traumatic event (e.g., car accident or witnessing an assault) and chronic or pervasive trauma (e.g., chronic abuse). Symptoms following a single event (e.g., motor vehicle accident) tend to be fewer and less treatment-resistant, compared to the more complex symptom clusters associated with chronic or pervasive traumatic stress (e.g., a combination of physical and sexual abuse). There are a host of clinical treatments used with traumatized children including family therapy, group therapy, EMDR (eye-movement desensitization and re-programming), music and movement therapies, "play" therapy, and art therapy among many others. Four of the major therapeutic approaches used alone or in combination are discussed below.

Acute post-traumatic interventions: secondary prevention

In the immediate post-traumatic period, several models of intervention have been used to diminish the acute distress and improve post-traumatic outcome. One of the most important is psychoeducation. Telling the family and child what the expected signs and symptoms are following a traumatic event can help diminish anxiety, increase sense of competence and provide a baseline from which parents and children can be aware of abnormally intense or prolonged symptoms requiring further clinical attention. Several modifications of a critical incident stress-debriefing paradigm have been reported, though efficacy has not yet been determined. In some cases, clinicians have used anti-anxiety agents or clonidine to decrease the level of physiological hyperarousal and distress in the acute post-traumatic period. While clinically helpful during this period, it is not yet clear that any of these post-acute interventions actually alter the development, course or severity of PTSD (see insert clinical vignette).

Acute Stress Reaction

- Persistence of original stress response
- Target for aggressive intervention
- 'Use-dependent' neurophysiological changes are the cause of chronic PTSD
- Decreasing the intensity and duration of the acute stress reaction can decrease the development of PTSD symptoms

BD Perry MD, PhD

Pharmacotherapy

There are very few published trials with psychotropic medications in childhood PTSD. Despite this, extensive clinical experience would strongly suggest that medications can be very helpful in diminishing the symptoms of PTSD. Empirical clinical judgment and experience guide the selection of specific medication. The primary symptoms in PTSD appear to respond to psychotropic agents proven to be useful for those same symptoms in other neuropsychiatric disorders (e.g., depakote and lithium for aggressive behavior; fluoxetine for depressive symptoms).

Many of the symptoms of PTSD can be traced to the core symptoms of physiological hyperarousal. These symptoms include sleep problems (including difficulties following asleep, early night awakening, nightmares, night terrors), generalized anxiety, behavioral impulsivity or hyper-reactivity of the sympathetic nervous system (including tachycardia, hypertension, increased muscle tone, respiratory problems and body temperature dysregulation). Clonidine, an alpha-2 adrenergic partial agonist, which modulates the reactivity of the locus coeruleus and decreases the physiological hyper-reactivity associated with PTSD, has been shown to be an effective agent in children with PTSD. Other agents altering the biogenic amine neurotransmitter systems in the brain (i.e., serotonin, dopamine, and norepinephrine) may also modulate the symptoms of PTSD. In this regard, preliminary reports support the efficacy of propranolol and fluoxetine in children with anxiety and PTSD.

Individual psychotherapy

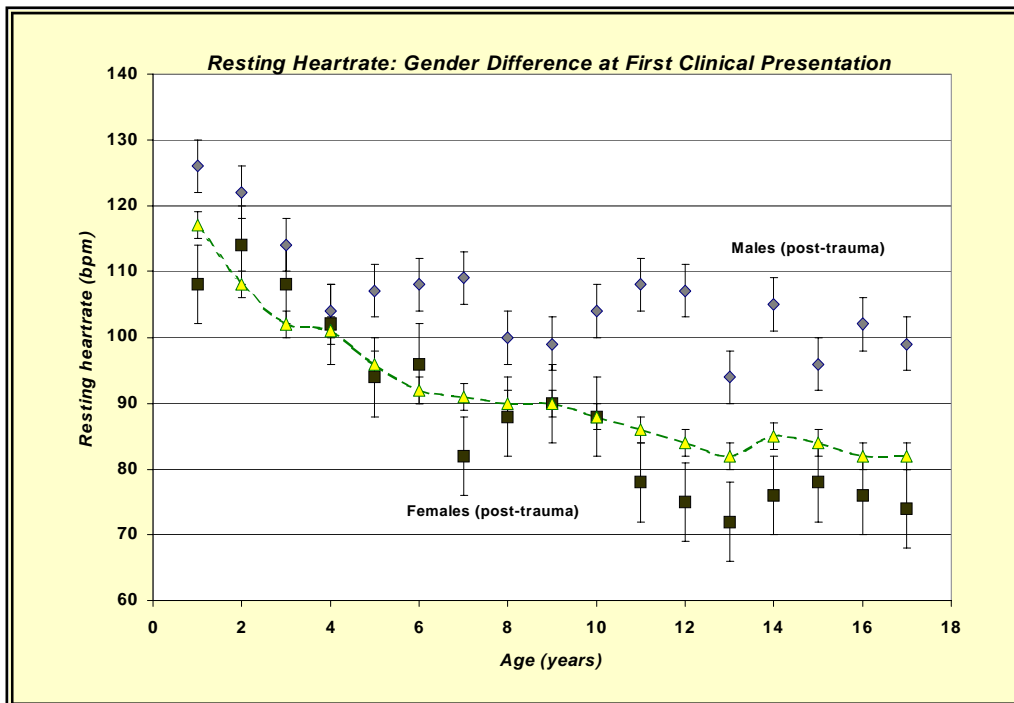
The core hyperarousal symptoms result in a cascade of secondary, inter-related problems. Inability to engage in appropriate intimacy leads to difficulties with peer and adult relationships; inability to perform adequately in school leads to poor self-esteem, resulting in a variety of learned behaviors which both mask and defend against these core deficits driven by their physiological hyper-reactivity. The resulting vicious cycle of poor performance, poor self-esteem, development of maladaptive problem-solving styles, in turn, are difficult to treat as long as the underlying physiological hyper-reactivity impairs the ability to modulate anxiety, concentrate on academic or social learning tasks, and contain behavioral impulsivity. Successful treatment, therefore, often requires 'containing' or modifying this core physiological dysregulation with medications and using other psychotherapeutic interventions to address issues related to self-esteem, competence, social skills and mastery of specific fears.

Cognitive-behavioral therapies

Cognitive-behavioral therapy (CBT) is the most studied and, likely, the most effective therapeutic intervention in adults with single-event related PTSD. The few CBT studies in children and adolescents are very promising and studies demonstrate the efficacy of CBT following a single traumatic event. CBT, unfortunately, is difficult to apply in the same fashion to very young children or to children with chronic pervasive trauma.

Non-conventional therapies

Some of the most promising interventions appear to be non-traditional. Clinicians and therapists are beginning to report the powerful impact of such interventions as EMDR (eye-movement desensitization and reprocessing), music and movement, animal-assisted, drama, and modifications of play therapies. Research on the efficacy of all of these is needed; the case reports and clinical feedback, however, is very hopeful. These non-traditional approaches all have certain multi-sensory component that includes patterned, repetitive, and neutral brainstem activation in a safe, relational context. In other words, they help create the very neurobiological conditions that would be required to "calm" the sensitized neural systems originating in the brainstem and diencephalons; systems which are known to be altered by traumatic stress.



Evidence of altered brainstem regulation in traumatized children. Over a five-year period, each child referred to the ChildTrauma Clinic--specializing in working with traumatized or maltreated children--had a resting heart rate taken at first presentation. These resting rates were plotted by age and gender (total n=526; traumatized males are the grey diamonds +/- SEM, n=320; traumatized females are the black squares +/- SEM, n=206). The yellow diamonds are values from normal pediatric population norms in which there are no observed gender differences. In young children, there do not appear to be any gender differences; by age five, however, gender differences emerge with males having higher resting heart rate (consistent with persisting hyperarousal) and females having somewhat lower resting heart rate (consistent with persisting dissociative adaptations). These resting rates are pre-treatment..

The Adaptive Response to Trauma

The brain mediates threat with a set of predictable neurobiological, neuroendocrine and neuropsychological responses.

These responses may include different 'survival' strategies -- ranging from fighting or fleeing to 'giving up' or a 'surrender' reaction.

There are multiple sets of neurobiological and mental responses to stress. These vary with the nature, intensity and frequency of the event. Different children may have unique and individualized 'response' sets to the same trauma.

Two primary adaptive response patterns in the face of extreme threat are the hyperarousal continuum (defense -- fight or flight) and the dissociation continuum (freeze and surrender response). Each of these response 'sets' activates a unique combination of neural 'systems'.

These response patterns are somewhat different in infants, children and adults -- though they share many similarities. Adult males are more likely to use hyperarousal (fight or flight) response -- young children are more likely to use a dissociative pattern (freeze and surrender) response.

As with all experience -- when the brain 'activates' the neurophysiological systems associated with alarm or with dissociation, there will be use-dependent neurobiological changes (or in young children, use-dependent *organization*) which reflects this activation.

It is these use-dependent changes in the brain development and organization which underlie the observed emotional, behavioral, cognitive, social and physiological alterations following childhood trauma.

In general, the predominant adaptive style of an individual in the acute traumatic situation will determine which post-traumatic symptoms will develop -- hyperarousal or dissociative.

The Threatened Child

How Fear Changes Thinking, Feeling and Behaving

<u>Sense of Time</u>	Extended Future	Days Hours	Hours Minutes	Minutes Seconds	No Sense Of Time
Arousal Continuum	REST	VIGILANCE	RESISTANCE Crying	DEFIANCE Tantrums	<i>AGGRESSION</i>
Dissociative Continuum	REST	AVOIDANCE	COMPLIANCE Robotic	DISSOCIATION Fetal Rocking	FAINTING
Regulating Brain Region	NEOCORTEX Cortex	CORTEX Limbic	LIMBIC Midbrain	MIDBRAIN Brainstem	BRAINSTEM Autonomic
Cognitive Style	ABSTRACT	CONCRETE	EMOTIONAL	REACTIVE	REFLEXIVE
Internal State	CALM	AROUSAL	ALARM	FEAR	TERROR

The continuum of adaptive responses to threat. Different children have different styles of adaptation to threat. Some children use a primary hyperarousal response, others a primary dissociative response. Most use some combination of these two adaptive styles. In the fearful child, a defiant stance is often seen. This is typically interpreted as a willful and controlling child. Rather than understanding the behavior as related to fear, adults often respond to the 'oppositional' behavior by becoming angry and more demanding. The child, over-reading the non-verbal cues of the frustrated and angry adult, feels more threatened and moves from alarm to fear to terror. These children may end up in a primitive "mini-psychotic" regression or in a very combative state. The behavior of the child reflects their attempts to adapt and respond to a perceived (or misperceived) threat.

When threatened, a child is likely to act in an 'immature' fashion. Regression, a 'retreat' to a less mature style of functioning and behavior, is commonly observed in all of us when we are physically ill, sleep-deprived, hungry, fatigued or threatened. During the regressive response to the real or perceived threat, less-complex brain areas mediate our behaviors. If a child has been raised in an environment of persisting threat, the child will have an altered baseline such that the internal state of calm is rarely obtained (or only artificially obtained via alcohol or drug use). In addition, the traumatized child will have a 'sensitized' alarm response, over-reading verbal and non-verbal cues as threatening. This increased reactivity will result in dramatic changes in behavior in the face of seemingly minor provocative cues. All too often, this over-reading of threat will lead to a 'fight' or 'flight' reaction - and increase the probability of impulsive aggression. This hyper-reactivity to threat can, as the child becomes older, contribute to the transgenerational cycle of violence.

Glossary

Dissociation: The mental process of disengaging from the stimuli in the external environment and attending to inner stimuli. This is a graded mental process that ranges from normative daydreaming to pathological disturbances that may include exclusive focus on an inner fantasy world, loss of identity, disorientation, perceptual disturbances or even disruptions in identity.

Dysphoria: The subjective emotional state of sadness, disquiet, malaise.

Hyperarousal: Mental and physical changes caused by alterations in central and peripheral nervous system activation related to perceived or actual threat. This graded response includes increased sensory and perceptual focus on the threat, activation of physiological systems required for survival and corresponding changes in emotional and behavioral functioning.

Homeostasis: The tendency for stability in normal physiological states achieved by a system of control mechanisms activated by various feedback systems.

Hypervigilance: The state of increased arousal and attention to any cue in the external environment that may potentially be associated with threat. Often results in distractibility and attention problems when present in children with PTSD.

Post-traumatic Stress Disorder (PTSD): A neuropsychiatric disorder that may develop following a traumatic event that includes changes in emotional, behavioral and physiological functioning.

Stress: Any challenge or condition that forces the regulating physiological and neurophysiological systems to move outside of their normal dynamic activity. Stress occurs when homeostasis is disrupted.

Trauma: A psychologically distressing event that is outside the range of usual human experience, often involving a sense of intense fear, terror and helplessness.

About the Author

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Dr. Perry is the Senior Fellow of the ChildTrauma Academy. Dr. Perry served as the Thomas S. Trammell Research Professor of Child Psychiatry at Baylor College of Medicine and Chief of Psychiatry at Texas Children's Hospital in Houston, Texas from 1992 to 2001. In addition he has served as the Director of Provincial Programs in Children's Mental Health for Alberta, Canada, and is the author of more than 200 scientific articles and chapters. He is the recipient of dozens of awards and honors and is an internationally recognized authority in the area of child maltreatment and the impact of trauma and neglect on the developing brain.

About The ChildTrauma Academy

The ChildTrauma Academy, a not-for-profit organization based in Houston, TX, is a unique collaborative of individuals and organizations working to improve the lives of high-risk children through direct service, research and education. These efforts are in partnership with the public and private systems that are mandated to protect, heal and educate children. The work of the Academy has been supported, in part, by grants from Texas Department of Protective and Regulatory Services, the Children's Justice Act, the Court Improvement Act and through innovative partnerships with academic and corporate partners such as Powered, Inc., Scholastic, Inc., Linkletter Media and Digital Consulting and Software Services.

The mission of the ChildTrauma Academy is to foster the creation of innovations in practice, programs and policy related to traumatized and maltreated children. To support this mission, the Academy has two main activities; 1) Program development and consultation and 2) Specialized education and training services.

For more information or to direct donations:

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