



# Childhood Trauma Exposure and Toxic Stress: What the PNP Needs to Know **CE**

Gail Hornor, DNP, CPNP

## ABSTRACT

Trauma exposure in childhood is a major public health problem that can result in lifelong mental and physical health consequences. Pediatric nurse practitioners must improve their skills in the identification of trauma exposure in children and their interventions with these children. This continuing education article will describe childhood trauma exposure (adverse childhood experiences) and toxic stress and their effects on the developing brain and body. Adverse childhood experiences include a unique set of trauma exposures. The adverse childhood experiences or trauma discussed in this continuing education offering will include childhood exposure to emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, domestic violence, household substance abuse, household mental illness, parental separation or divorce, and a criminal household member. Thorough and efficient methods of screening for trauma exposure will be discussed. Appropriate intervention after identification of trauma exposure will be explored. *J Pediatr Health Care.* (2015) 29, 191-198.

## KEY WORDS

Toxic stress, childhood trauma exposure

---

Gail Hornor, Pediatric Nurse Practitioner, Nationwide Children's Hospital, Center for Family Safety and Healing, Columbus, OH.

Conflicts of interest: None to report.

Correspondence: Gail Hornor, DNP, CPNP, Nationwide Children's Hospital, Center for Family Safety and Healing, 655 E Livingston Ave, Columbus, OH 43205; e-mail: [gail.hornor@nationwidechildrens.org](mailto:gail.hornor@nationwidechildrens.org).

0891-5245/\$36.00

Copyright © 2015 by the National Association of Pediatric Nurse Practitioners. Published by Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.pedhc.2014.09.006>

## OBJECTIVES

1. Describe the physiology of toxic stress.
2. Explore the concept of resilience and factors promoting resilience.
3. State when and how to identify trauma exposure in children.
4. Describe appropriate interventions when trauma exposure has been revealed.

It is an unfortunate reality that many American children live lives filled with trauma. It is estimated that up to 90% of children experience some form of traumatic experience in their lives (Heinzelmann & Gill, 2013). Trauma can include a wide variety of experiences from accidental injury to severe illness to child maltreatment. For the purposes of our discussion, childhood trauma will be limited to those defined in the adverse childhood experiences (ACE) study (Felitti et al., 1998). These traumatic experiences can include but are not limited to child maltreatment, exposure to domestic violence, living with an impaired parent who is unable to meet their needs because of mental health or substance abuse concerns, and extreme poverty. Nearly 700,000 (678,810) children were maltreated in 2012, with 78% experiencing neglect; 18%, physical abuse; 9%, sexual abuse; and 11%, other forms of maltreatment (U.S. Department of Health & Human Services [USDHHS], 2013). Up to 10 million children witness domestic violence each year (USDHHS, 2013). One in five children younger than 18 years or 21.3% of American children live in poverty (U.S. Census Bureau, 2012).

One in five American children will sustain more than half of the medical and psychiatric morbidities within the population and will be responsible for the majority

of health/dental care use within the population (Boyce, 2014). The distribution of childhood disease within the population is not random and is most closely linked with low socioeconomic status, which increases the exposure of children to a variety of traumatic experiences (Boyce, 2014). Exposure to adverse childhood experiences (trauma) has been linked to multiple short- and long-term physical and psychological consequences (Felitti & Anda, 2010; Felitti & Williams, 1998; Felitti et al., 1998). Children exposed to these traumatic experiences are at high risk for a number of negative health outcomes in adulthood, including cardiovascular disease, obstructive pulmonary disease, cancer, asthma, autoimmune disease, and depression (Garner et al., 2012). Given the scope and severity of the problem, it is crucial that all pediatric nurse practitioners (PNPs) understand trauma exposure and its potential effects on the developing child. This continuing educational offering will define the concepts of adverse childhood experiences (trauma), toxic stress, and resilience. Identification of trauma exposure and appropriate intervention will be explored.

## TRAUMA AND TOXIC STRESS

The now famous ACE study was first published in 1998 (Felitti et al., 1998), but the findings of that groundbreaking study are perhaps even more significant today. More than 18,000 adult members of the Kaiser Health Plan were surveyed regarding childhood exposure to maltreatment, household dysfunction, and adult health behaviors (i.e., diet, exercise, tobacco, alcohol, and substance use). Specifically, the ACE queried participants regarding their childhood exposure to emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, domestic violence, household substance abuse, household mental illness, parental separation or divorce, and a criminal household member (Dong et al., 2004). Adverse childhood experiences include a unique set of trauma exposures. Kalmakis & Chandler (2014) define adverse childhood experiences as childhood events, varying in severity and often chronic, occurring in a child's family or social environment that cause harm or distress, thereby disrupting the child's physical or psychological health and development. More than two thirds (67.3%) of ACE study participants reported exposure to at least one ACE (Dong et al., 2004). The interrelatedness of adverse childhood experiences (trauma exposure) was supported by the study. If an individual reported having one ACE, the likelihood of them having another was 2 to 18 times higher than those reporting no ACEs (Dong et al., 2004). Of the persons reporting one ACE, 86.5% reported at least one additional ACE and 52% reported at least three additional ACEs (Dong et al., 2004). Exposure to multiple traumas was very common within the ACE study population.

Exposure to trauma can result in stress. Although we know that nearly every child experiences some form of trauma exposure and that the majority of children experience at least one trauma listed in the ACE study, not all traumatic events are equal in the stress resulting from that exposure (Lancaster, Melka, Rodriguez, & Bryant, 2014). Also keep in mind that stress is not always unhealthy. Stress can actually encourage healthy growth. However, exposure to childhood traumas included in the ACE study can result in stress that becomes chronic and/or unpredictable, and changes can occur in the developing brain and body (Kalmakis & Chandler, 2014). These traumatic exposures that are abusive, neglectful, or unpredictable can result in toxic stress (Letourneau, 2012). Toxic stress is defined as the extreme, frequent, or extended activation of the stress response that causes distress for the child and may lead to negative psychological and physical health outcomes (Johnson, Riley, Granger, & Riis, 2013). Children, by nature of age and development, are not independent creatures; they must rely upon the adults in their lives to provide safety, security, and sustenance. Children are not in positions of power and control. When traumatic experiences occur in childhood (ACEs), feelings of powerlessness and loss of control are generated, along with a greater amount of stress, resulting in toxic stress.

The body reacts physiologically to both physical and emotional stress. The mammalian stress response consists of two primary systems: the hypothalamic-pituitary-adrenal axis (HPA) and the sympathetic nervous system (Bernstein, Measelle, Laurent, Musser, & Ablow, 2013). The HPA axis regulates the body's slower responses to stress. The sympathetic nervous system, also known as the fight or flight response, regulates acute stress response. An understanding of the body's chronic or slower response to stress, the HPA axis, is most important in describing the potential effect of toxic stress on the developing child.

The brain is not mature at birth, and complete brain development is not thought to occur until age 25 (Grabe et al., 2012). Although the production of new neurons is essentially complete at birth, there does continue to be neuronal production in the hippocampal dentate gyrus and the prefrontal cortex (areas responsible for planning, intellectual insight, and judgment; Grogan & Murphy, 2011). Myelination of these structures occurs over decades. The brain triples in size from birth to age 5 years, in large part as a result of myelination. In the first few years of life the brain is sculpted to its environment by refinement of its neural network, greatly increasing the number of synapses and the pruning of redundant neurons, excitatory synapses, and receptor sites.

When children and their developing brains are exposed to toxic stress, changes can occur. If the stress or trauma that the child is exposed to does not go away and becomes toxic, the HPA axis remains activated,

resulting in increased pituitary sensitivity and cortisol spikes with trauma (Grogan & Murphy, 2011). The chronic activation of the HPA axis results in modification of brain structures, synapses, receptors, and neuro-hormones, and dendrite complexity is diminished. Cortisol reduces brain weight and DNA content, interferes with myelination, and decreases the number of dendritic spines (Grogan & Murphy, 2011). Cortisol delays maturation of auditory, visual, and somatosensory-evoked potentials. Cortisol decreases the volume of the hippocampus, which is important for memory storage and retrieval.

Early toxic stress results in HPA dysregulation because the developing neuroendocrine system is chronically called into action (Kertes, Gunnar, Madsen, & Long, 2008). The HPA axis also plays a crucial role in the immune response. Proinflammatory cytokines activate the HPA axis (resulting in excess cortisol); cortisol from the HPA axis creates a negative feedback loop and extinguishes the HPA axis (resulting in too little cortisol; Francis, 2009). HPA dysregulation has broad effects on immune and inflammatory processes (Johnson et al., 2013). Excess cortisol increases the risk of infection by suppressing immunity and the inflammatory response, and a lack of cortisol results in the persistence of the inflammatory response longer than needed.

Exposure to toxic stress in childhood is associated with physiologic dysregulation across multiple biological systems: immune, metabolic, and nervous (Slopen, McLaughlin, & Shonkoff, 2014). Felitti (2009) states that two broad mechanisms exist by which childhood trauma (toxic stress) exposure is translated into disease: disease caused by chronic stress mediated by chronic hypercortisolemia and cytokines (e.g., chronic headaches or back pain, primary pulmonary fibrosis, osteoporosis, or coronary artery disease) or disease that develops as the result of various coping mechanisms such as overeating, smoking, drug use, and risky sexual behaviors. The body develops these coping mechanisms in an attempt to find homeostasis; behavioral and physiologic changes occur to allow allostasis—a new level of homeostasis. Unfortunately, most often the coping mechanisms chosen by the individual are either psychologically or physically unhealthy choices.

Clinical studies have also found a moderate genetic contribution to the body's processing of toxic stress exposure with a heritability of 30% to 35% (Domschke, 2012). There is also interplay of genetic factors with environmental factors regarding the pathogenesis of or resilience toward stress-related disorders (Gillespie, Phifer, Bradley, & Ressler, 2009). Epigenetic mechanisms such as methylation or acetylation critically influence gene regulation and mediate adaptation to environmental influences, including toxic stress (Domschke, 2012). Children inherit their genotypes and their environments from their parents. Environ-

mental risks such as exposure to family violence (domestic violence or child maltreatment) are known to co-occur with genetic predispositions to negative health outcomes such as mental health disorders or neuropsychological dysfunctions (Moffitt & The Klaus-Grawe 2012 Think Tank, 2013). If you examined the genotype of three groups of people, all three groups would look genetically different: no posttraumatic stress disorder (PTSD); PTSD without child abuse; and PTSD with child abuse (DiGangi, Guffanti, McLaughlin, & Koenen, 2013). Our genetic makeup is influenced by our environmental exposures.

## RESILIENCE

Another important concept to consider to more completely understand toxic stress and its potential effect on the developing child is that of resilience. We know that many children experience adversity in childhood and that trauma exposure can have negative consequences on the developing brain and body. However, not all children exposed to trauma experience negative consequences, or at least not to the extent that other children with similar experiences do. What is different about these lesser affected children? Genetics influence the effect of early trauma on psychological well-being. Some persons have genetic resilience to the development of negative consequences after trauma exposure (DiGangi et al., 2013; Carli et al., 2011). Studies have suggested that individuals may have protective factors that promote resilience against stressors (Gloria & Steinhardt, 2014). Certain factors have been associated with resilience, including personality traits such as increased cognitive ability, high self-esteem, and an internal locus, as well as social support (McElroy & Hevey, 2013). Social support, especially a loving and stable adult, protects a child from potentially negative consequences of traumatic experiences.

Positive emotions including optimism and humor are also personality traits that provide resilience to stress (Southwick, Vythilingam, & Charney, 2005). The possession of cognitive flexibility is crucial to stress resilience. Resilient individuals, when exposed to stress, tend to place blame where it belongs, assess the problem as temporary and usually solvable, and view the problem as affecting only limited parts of their lives (Southwick et al., 2005). Many resilient persons have the ability to cognitively appraise, reframe, or find positive meaning in a traumatic event. This cognitive ability to redefine a traumatic event as a challenge and attributing meaning to it sparks resilience. Acceptance is a key element necessary for resilience. Acceptance is not the same as resignation. Spirituality and religion can be crucial to resiliency because they can help people understand their traumas and help them make sense of their negative life experiences. Resiliency can be inherent, but it can also be developed. This possibility

of building resilience in children is vital for the PNP to understand.

### TRAUMA EXPOSURE IDENTIFICATION

It is crucial for PNPs to better identify trauma exposure in their pediatric patients. Early identification of trauma exposure coupled with appropriate intervention can assist in the prevention of lifelong consequences for victims.

Early identification of trauma exposure coupled with appropriate intervention can assist in the prevention of lifelong consequences for victims.

The first step is to obtain a thorough familial psychosocial history. Draw a family tree and indicate who lives in the home with the child and in the home where the child visits (as in a separated/divorced family). Note maternal and paternal age at the time of the birth of their first child. Screen for psychosocial risk factors such as parental mental health/mental retardation, parental substance abuse, exposure to domestic violence, previous familial involvement with child protective services, parental involvement with law enforcement, parental history of child maltreatment as a child, and parental support systems (Hornor, 2013). A psychosocial history should be obtained at the child's initial health care visit and updated annually. Recognizing that domestic

violence is a pediatric health care problem, parents should be asked a few screening questions (see Box 1 for questions that can be used to screen parents and also adolescent patients for concerns of domestic violence). Screening questions should be asked at the initial patient visit, annually, or whenever a parent or teen presents with an injury that raises the concern for domestic violence or teen dating violence.

Children should be screened for trauma exposure. The National Child Traumatic Stress Network (Henry, Black-Pond, & Richardson, 2010) has a screening checklist tool to identify children at risk for trauma exposure (see Boxes 2 and 3). Trauma screening should occur at the initial visit, annually, or if presenting with concerning symptoms (e.g., changes in behaviors or school functioning). The screening tool is a parent/caregiver report and screens for trauma exposures, child behaviors, child mood, and child functioning. Concerning behaviors, moods, and functioning of the child are not diagnostic of trauma exposure. However, a demonstrated relationship exists between trauma and the behaviors, moods, and functioning elements listed in the screening tool (Henry et al., 2010). To lessen the time burden associated with screening, the trauma screen could be completed by the parent while waiting for the provider. The PNP could then follow up with areas of concern indicated on the trauma screen. Parents and children should be asked specific questions to screen for physical abuse/harsh discipline practices, sexual abuse, and neglect (see Boxes 4, 5, and 6). Screening questions should be asked at initial patient visits, annually, or whenever a patient presents with symptoms that raise concern about the possibility of maltreatment (e.g., behaviors, injury, or infection).

#### BOX 1. Domestic violence screening questions

##### Parents/Dating Teens

- Have you ever been hit, kicked, punched, or hurt by a partner/spouse/boyfriend or girlfriend, or have they ever threatened to hurt you?
- Do you feel safe in your current relationship?
- Do you have a past relationship where you did not feel safe?
- Is there a particular partner/spouse/boyfriend or girlfriend from a past or current relationship who is making you feel afraid or in danger?
- Has a partner/spouse/boyfriend or girlfriend ever made you feel ashamed, embarrassed, or hurt emotionally?
- Have you ever been forced to have sex?
- Have weapons ever been used against you?

##### Child/Teens

- What happens when Mommy and Daddy fight?
- Have you ever seen anyone hit/push/hurt Mommy?
- Have you ever seen anyone hit/push/hurt Daddy?

Reprinted from Hornor, 2013.

### TRAUMA EXPOSURE INTERVENTION

Although some elements of resiliency are unchangeable, such as basic cognitive ability and certain personality characteristics, PNPs can help build resiliency. Enhancing resiliency is important for all children and is crucial for children exposed to trauma. Healthy, supportive relationships should be encouraged between the parent and child. Anticipatory guidance needs to include the importance of being a consistent, loving, attentive caregiver. Positive parenting concepts including developmentally appropriate behavioral expectations, the importance of praise and attention, and the use of nonphysical methods of discipline should be discussed. Parents should be educated regarding the potential toxic effects of trauma exposure in children.

Enhancing resiliency is important for all children and is crucial for children exposed to trauma.

**BOX 2. Trauma Screening Checklist:  
identifying children ages 0–5 years who are at  
risk**

**Are you aware of or do you suspect the child  
has experienced any of the following:**

- Physical abuse
- Suspected neglectful home environment
- Emotional abuse
- Exposure to domestic violence
- Known or suspected exposure to drug activity (parental)
- Parental drug use/substance abuse
- Multiple separations from parent or caregiver
- Frequent and multiple moves or homelessness
- Sexual abuse or exposure
- Other \_\_\_\_\_

**Does the child show any of these behaviors:**

- Excessive aggression or violence toward self or others
- Repeated violent and/or sexual play
- Explosive behavior (excessive and prolonged tantrums)
- Disorganized behavioral states (attention/play)
- Very withdrawn or very shy
- Bossy and demanding behavior with adults and peers
- Sexual behaviors not typical for the child’s age
- Difficulty with sleeping or eating
- Regressed behaviors (toileting, play)
- Other \_\_\_\_\_

**Does the child exhibit any of the following  
emotions or moods:**

- Chronic sadness; doesn’t seem to enjoy any activities
- Very flat affect or withdrawn behavior
- Quick, explosive anger
- Other \_\_\_\_\_

**Is the child having relational and/or attachment difficulties?**

- Lack of eye contact
- Sad or empty-eyed appearance
- Overly friendly with strangers
- Changing between clinginess and disengagement and/or aggression
- Failure to reciprocate (hugs, smiles, vocalizations, play)
- Failure to seek comfort when hurt or frightened
- Other \_\_\_\_\_

*From Henry, Black-Pond, & Richardson, 2010.*

Many community-based programs are available that can aid in building resiliency in children exposed to trauma. Programs such as after-school care that offer supervised interactive activities for children, mentoring

**BOX 3. Trauma Screening Checklist:  
identifying children ages 6–18 years who are at  
risk**

**Are you aware of or do you suspect the child  
has experienced any of the following:**

- Physical abuse
- Suspected neglectful home environment
- Emotional abuse
- Exposure to domestic violence
- Known or suspected exposure to drug activity (not parental)
- Known or suspected exposure to any other violence
- Parental drug use/substance abuse
- Frequent and multiple moves or homelessness
- Sexual abuse or exposure
- Other \_\_\_\_\_

**Does the child show any of these behaviors:**

- Excessive aggression or violence toward self
- Excessive aggression or violence toward others
- Explosive behavior (going from 0–100 instantly)
- Hyperactivity, distractibility, inattention
- Very withdrawn or very shy
- Oppositional and/or defiant behavior
- Sexual behaviors not typical for the child’s age
- Peculiar patterns of forgetfulness
- Inconsistency in skills
- Other \_\_\_\_\_

**Does the child exhibit any of the following  
emotions or moods:**

- Excessive mood swings
- Chronic sadness; doesn’t seem to enjoy any activities
- Very flat affect or withdrawn behavior
- Quick, explosive anger
- Other \_\_\_\_\_

**Is the child having problems at school?**

- Low or failing grades
- Inadequate performance
- Difficulty with authority
- Attention and/or memory problems
- Other \_\_\_\_\_

*From Henry, Black-Pond, & Richardson, 2010.*

programs such as Big Brothers/Big Sisters, and athletic and artistic camps/programs are examples of programs that can stimulate resilience and healing in children exposed to trauma. Many of these programs are available to participants at little to no cost. PNPs should know their community resources and refer children who have been exposed to trauma and their families to these valuable programs.

Whenever screening reveals a previously unreported concern for any form of child maltreatment, a referral to child protective services must be made. PNPs must know their state reporting laws. Children who have experienced trauma, especially those who are

#### BOX 4. Sexual abuse screening questions

##### Parents

- Do you have any concerns of sexual abuse?
- Were you or your partner sexually abused as a child?
- Is there a history of sexual abuse in your family or your partner's family?
- Is your child ever in contact with anyone who has been accused of sexually abusing a child or adolescent?

##### Child

- Have the child identify his or her body parts.
- Have the child identify his or her private parts.
- Using the child's words for his or her private parts, ask if anyone has ever touched, tickled, hurt, or put anything in their private parts.

Reprinted from *Honor, 2011*.

symptomatic, need specialized treatment and interventions to build resiliency and begin the healing process. Trauma-focused cognitive behavioral therapy (TF-CBT) has been proven to be particularly effective for children exposed to trauma (*Moffitt & The Klaus-Grawe 2012 Think Tank, 2013*). TF-CBT includes parent (or caregiver) and child skills-based components within a framework of a trauma model. The components of TF-CBT consist of psychoeducation, parenting skills, relaxation skills, affective modulation, cognitive coping, trauma narrative and processing in vivo mastery of trauma reminders, and safety planning for the future (*Moffitt & The Klaus-Grawe 2012 Think Tank, 2013*). TF-CBT is a complex model of treatment; specific training and experience are required to be able to provide this type of treatment effectively. Referral to a clinician skilled in TF-CBT is essential.

Other models of mental health treatment also can be beneficial to children who have been exposed to trauma. Eye movement desensitization and reprocessing using bilateral stimuli to restore distressing memories has been found to result in significant reductions of memory-related distress and problem behavior, along with a decrease in posttraumatic stress symptoms (*Leenarts, Diehle, Doreleijers, Jansma, & Lindauer, 2013*). Models of care that aim to strengthen the parent-child relationship can be valuable in these children (*Kearney & Cushing, 2012*). Models such as parent-child interactive therapy, child-parent psychotherapy, child and family traumatic stress intervention, and risk reduction through family therapy have been used with success (*Leenarts et al., 2013*).

For children to truly heal from trauma exposure, their exposure to trauma must be eliminated or greatly reduced. Traumas revealed in the screening process, such as parental substance abuse or domestic violence, must be addressed. Parents must be linked with the appropriate services to address any identified concerns.

#### BOX 5. Discipline/corporal punishment screening questions

##### Parents

- How do you discipline your child?
- Do you or anyone else ever spank your child with a hand?  
Where on their body?  
How often?  
Has it ever left a mark?
- Do you or anyone else ever hit your child with an object?  
What object?  
Where on their body?  
How often?  
Has it ever left a mark?
- Do you ever use other physical means of discipline?  
Kicking/pinching/pulling hair/hot sauce on tongue
- Do you ever use nonphysical means of discipline?  
Time out  
Stand in corner  
Take away privileges  
Grounding/send to room

##### Child

- What happens when you get in trouble?
- What does Mommy do when you get in trouble?
- What does Daddy do when you get in trouble?
- Does anyone ever hit/whoop/or spank you?  
What do they hit you with?  
Where on your body do they hit?  
Who hits you?  
How often do you get hit?  
Does it ever leave a mark on your body?

Reprinted from *Honor, 2013*.

Parental follow-through with suggested services must be monitored, and if lack of parental follow-through places the child at risk for safety or maltreatment concerns, a referral to child protective services must be made.

Several prevention programs have been studied and been proven to be effective in the reduction of violence exposure and child maltreatment. These programs focus on providing education and supervision to parents of very young children. Two such programs are home visitation programs: Nurse Family Partnership and Early Start. Project Support and Triple P are both child maltreatment prevention programs aiming to improve parental skills and motivation. Research has demonstrated that structured parenting programs are one of the few clinically proven interventions to be efficacious in promoting the mental health and well-being of children (*Mihalopoulos, Vos, Pirkis, & Carter, 2011*). All of these programs target parents who have been identified as being at high risk.

Trauma exposure can result in lifelong mental and physical health care problems for children extending

## BOX 6. Neglect screening questions

- Do you have trouble getting health care or medicines for your child?
- Do you sometimes have a difficult time getting enough food for your family?
- Does anyone at home smoke cigarettes or use drugs or alcohol?
- Are poisons and other dangerous items out of your child's reach?
- Does your child wear a helmet when riding a bike?
- Do you have a working smoke alarm?
- Is there a gun in your home?
- Are there times when you have to leave your child home alone?
- Are there times when you do not know where your child is?
- Do you often feel sad, down, or hopeless? How are you managing the children?
- How are things going at school for your child? (behavior, learning, and peers)
- Is there a pattern of poor hygiene?
- Is there a pattern of inadequate clothing?
- Have you been homeless in the past year?

From Dubowitz, Giardino, & Gustavson, 2000.

into adulthood. PNPs can play a vital role in the prevention, identification, and treatment of trauma exposure in their patients. Prompt identification coupled with appropriate intervention can truly diminish the impact of trauma exposure in children. PNPs can be champions in the primary prevention of trauma exposure by consistently encouraging positive parenting practices. PNPs need to educate parents regarding trauma exposure and its potential effects on children. PNP practice must include providing anticipatory guidance to parents and children to educate them and screening for key traumatic exposures such as domestic violence, disciplinary practices, sexual abuse, and neglect.

We must never be too busy to thoroughly screen our patients and families for adverse childhood experiences (trauma). PNPs must recognize and address childhood trauma exposure as a crucial public health problem. PNPs need to be advocates for the prevention of trauma exposure within our communities. PNPs can work collaboratively with parents, social workers, teachers, coaches, civic leaders, policy makers, and other invested stockholders to advocate for ecologically based, public health initiatives that address toxic

**PNPs can be champions in the primary prevention of trauma exposure by consistently encouraging positive parenting practices.**

stress and trauma exposure at the community, state, and national levels (Garner & Shonkoff, 2012). PNPs can make a difference in the lives of the children of today and tomorrow by having a thorough understanding of trauma exposure and its potential effects on children and then advocating for needed changes in clinical practice and public health policy.

## REFERENCES

- Bernstein, R., Measelle, J., Laurent, H., Musser, E., & Ablow, J. (2013). Sticks and stones may break my bones but words relate to adult physiology? Child abuse experience and women's sympathetic nervous system response while self-reporting trauma. *Journal of Aggression, Maltreatment & Trauma*, 22, 1117-1136.
- Boyce, W. (2014). The lifelong effects of early childhood adversity and toxic stress. *Pediatric Dentistry*, 36, 102-108.
- Carli, V., Mandelli, L., Zaninotto, L., Roy, A., Recchia, L., Stoppia, L., ... Serretti, A. (2011). A protective genetic variant for adverse environments? The role of childhood traumas and serotonin transporter gene on resilience and depressive severity in a high-risk population. *European Psychiatry*, 26, 471-478.
- DiGangi, J., Guffanti, G., McLaughlin, K., & Koenen, K. (2013). Considering trauma exposure in the context of genetics studies of posttraumatic stress disorder: A systematic review. *Biology of Mood & Anxiety Disorders*, 3, 1-12.
- Domschke, K. (2012). Patho-genetics of posttraumatic stress disorder. *Psychiatria Danubina*, 24, 267-273.
- Dong, M., Anda, R., Felitti, V., Dube, S., Williamson, D., Thompson, T., ... Giles, W. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect*, 28, 771-784.
- Dubowitz, H., Giardino, A., & Gustavson, E. (2000). Child neglect: Guidance for pediatricians. *Pediatrics in Review*, 21, 111-116.
- Felitti, V. (2009). Adverse childhood experiences and adult health. *Academic Pediatrics*, 9, 131-132.
- Felitti, V., & Anda, R. (2010). The relationship of adverse childhood experience to adult medical disease, psychiatric disorders and sexual behavior: Implications for healthcare. In R. Linius, E. Vermetten & C. Pain (Eds.), *The impact of early life trauma on health and disease: The hidden epidemic* (pp. 77-87). Cambridge, MA: Cambridge University Press.
- Felitti, V., Anda, R., Nordenberg, D., Williamson, F., Spitz, A., Edwards, V., ... Marks, J. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences Study. *American Journal of Preventive Medicine*, 14, 245-248.
- Felitti, V., & Williams, S. (1998). Long-term follow-up and analysis of more than 100 patients who each lost more than 100 pounds. *The Permanente Journal*, 2, 17-21.
- Francis, D. (2009). Conceptualizing child health disparities: A role for developmental neurogenomics. *Pediatrics*, 124(Suppl. 3), S196-S202.
- Garner, A., & Shonkoff, J. (2012). Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. *Pediatrics*, 129(1), e224-e231.
- Garner, A., Shonkoff, J., Siegel, B., Dobbins, M., Earls, M., Garner, A., ... Wood, D. (2012). Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. *Pediatrics*, 129, e224-e231.
- Gillespie, C., Phifer, J., Bradley, B., & Ressler, K. (2009). Risk and resilience: Genetic and environmental influences on development of the stress response. *Depression and Anxiety*, 26, 984-992.
- Gloria, C., & Steinhardt, M. (2014). Relationships among positive emotions, coping, resilience and mental health. *Stress and Health* 1-12.

- Grabe, H. J., Schwahn, C., Mahler, J., Schulz, A., Spitzer, C., Fenske, K., ... Freyberger, H. J. (2012). Moderation of adult depression by the serotonin transporter promoter variant, childhood abuse and adult traumatic events in a general population sample. *American Journal of Medical Genetics*, 159B(3), 298-309.
- Grogan, S., & Murphy, K. (2011). Anticipatory stress response in PTSD: Extreme stress in children. *Journal of Child and Adolescent Psychiatric Nursing*, 24, 58-71.
- Heinzelmann, M., & Gill, J. (2013). Epigenetic mechanisms shape the biological response to trauma and risk for PTSD: A critical review. *Nursing Research and Practice*, 2013, 1-10.
- Henry, J., Black-Pond, C., & Richardson, M. (2010). *The National Child Traumatic Stress Network Trauma Screening Checklist*. Kalamazoo, MI: Southwest Michigan Children's Trauma Assessment Center, Western Michigan University.
- Honor, G. (2013). Child maltreatment: Screening and anticipatory guidance. *Journal of Pediatric Health Care*, 27, 242-250.
- Honor, G. (2011). Medical evaluation for child sexual abuse: What the PNP needs to know. *Journal of Pediatric Health Care*, 25, 250-256.
- Johnson, S., Riley, A., Granger, D., & Riis, J. (2013). The science of early life toxic stress for pediatric practice and advocacy. *Pediatrics*, 131, 319-327.
- Kalmakis, K., & Chandler, G. (2014). Adverse childhood experiences: Towards a clear conceptual meaning. *Journal of Advanced Nursing*, 70(7), 1489-1501.
- Kearney, J., & Cushing, E. (2012). A Multi-modal pilot intervention with violence-exposed mothers in a child psychiatric trauma-focused treatment program. *Issues in Mental Health Nursing*, 33, 544-552.
- Kertes, D., Gunnar, M., Madsen, N., & Long, J. (2008). Early deprivation and home basal cortisol levels: A study of internationally adopted children. *Developmental Psychopathology*, 20, 473-491.
- Lancaster, S., Melka, S., Rodriguez, B., & Bryant, A. (2014). PTSD symptom patterns following traumatic and nontraumatic events. *Journal of Aggression, Maltreatment & Trauma*, 23, 414-429.
- Leenarts, L., Diehle, J., Doreleijers, T., Jansma, E., & Lindauer, R. (2013). Evidence-based treatments for children with trauma-related psychopathology as a result of childhood maltreatment: A systematic review. *European Child & Adolescent Psychiatry*, 22, 269-283.
- Letourneau, N. (2012). Relationships are the antidote to toxic stress. *Canadian Nurse*, 108, 48.
- McElroy, S., & Hevey, D. (2013). Relationship between adverse early experiences, stressors, psychosocial resources and well being. *Child Abuse & Neglect*, 38(1), 65-75.
- Mihalopoulos, C., Vos, T., Pirkis, J., & Carter, J. (2011). The economic analysis of prevention in mental health programs. *Annual Review Clinical Psychology*, 7, 169-201.
- Moffitt, T., & The Klaus-Grawe 2012 Think Tank. (2013). Childhood exposure to violence and lifelong health: Clinical intervention science and stress-biology research join forces. *Development and Psychopathology*, 25, 1619-1634.
- Slopen, N., McLaughlin, K., & Shonkoff, J. (2014). Interventions to improve cortisol regulation in children: A systematic review. *Pediatrics*, 133, 312-326.
- Southwick, S., Vythilingam, M., & Charney, D. (2005). The psychobiology of depression and resilience to stress: Implication for prevention and treatment. *Annual Review Clinical Psychology*, 1, 255-291.
- U.S. Census Bureau. (2012). *The 2012 statistical abstract, population*. Retrieved from <http://www.census.gov/compendia/statab/cats/population.html>
- U.S. Department of Health and Human Services. (2013). *Child maltreatment 2012*. Retrieved from <http://www.acf.hhs.gov/sites/default/files/cb/cm2012.pdf>