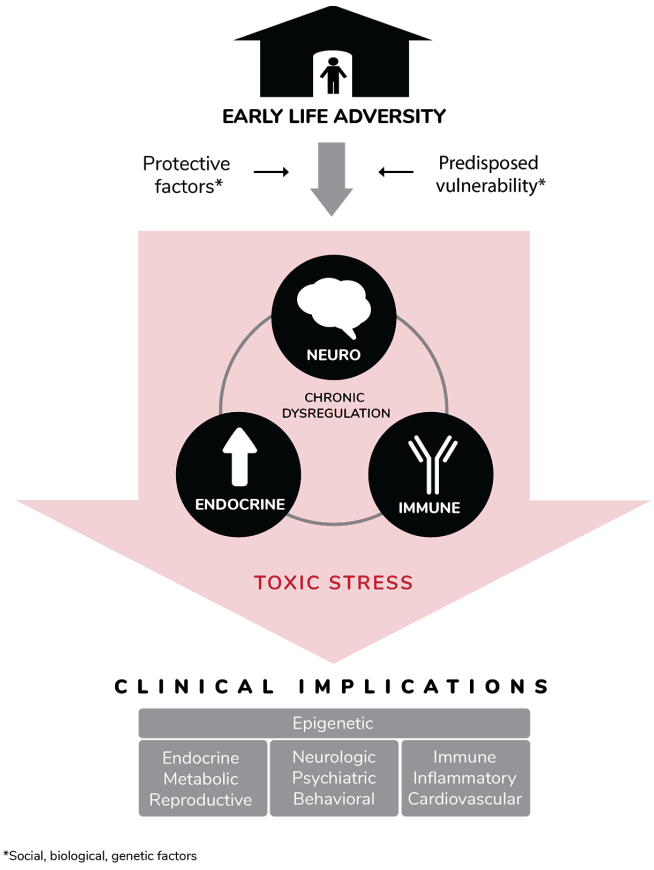
Symptoms and Manifestations of Toxic Stress Checklist

This *Symptoms and Manifestations of Toxic Stress Checklist* was recently created to offer medical providers an approach in considering the possible role of toxic stress with the overall picture of a child's medical presentation. While ACEs are known to be associated with elevated risk for poor physical health even in childhood (e.g. failure to thrive, asthma, obesity), in practice it may be difficult to see beyond the behavioral and mental health issues and symptoms (e.g. ADHD, oppositional behavior, school problems, drug use, depression, anxiety, violence). The hope is that this tool can support providers in linking what may seem to be disparate medical conditions (both mental and physical health issues) with the underlying toxic stress a child may be experiencing. The goal is to offer a tool that can be used by providers in a busy pediatric practice to quickly evaluate the extent that ACEs may be playing in the child's health and increase the provider's ability to select effective treatments targeted to the underlying physiology.

Biomedical, psychological, and social presentations may all be indicative of a dysregulation of the stress response and neuro-endocrine-immune disruption.



Source: Bucci et al (2016)

Many factors influence how and when a child's symptoms of exposure to ACEs present, and if a medical provider has the expertise and trained eye to identify them. Signs and symptoms may differ depending on the type of trauma. For example, research has shown that the odds of experiencing symptoms were significantly higher for children who had experienced both violent (physical and sexual abuse) and non-violent trauma (neglect and emotional abuse, and other forms of attachment trauma) than for children who had experienced only one form or the other (Kisiel et al., 2014). The timing of the trauma, as well as the severity and duration

are also important considerations, as is the the child's current stage of development (American Academy of Pediatrics, 2014). In addition, the duration of symptoms and impairments in the child's quality of life might also be indicative of a toxic stress state.

Careful consideration should also be given to determining how a symptom presentation may change in relation to ethnicity and gender. For example, the prevalence of eczema or skin allergy among children aged 0-17 years in the United States is higher in non-Hispanic Black children than in non-Hispanic White or Hispanic children (National Center for Health Statistics, National Health Interview Survey, 2014).

The checklist that follows was developed using several inputs, including empirical evidence from pediatric practice, findings from a systematic review of the literature (Oh, et al, 2018), and a symptoms list developed by the Bay Area Research Consortium (BARC) for a validation study of an ACEs screening tool. The contents of the checklist should not be considered comprehensive or validated, but rather a starting point for assessing pediatric patient's symptoms related to the physiology of a toxic stress response. The signs, symptoms, and conditions listed are considered consequences of a toxic stress response, via the dysregulation of the normal negative feedback loop of the neuro-endocrine-immune network of systems, and disruption of genetic regulatory mechanisms.

This checklist should be used in conjunction with ACE screening and with consideration of the child's full medical history. ACE screening plus the symptoms checklist may point to a change in diagnosis. For example, while there are potentially many causes for ADHD, Autism or Oppositional Defiance Disorder including a spectrum of normal neurodiversity, ACE screening and further assessment, including the symptom checklist, may identify which symptoms are manifestations of a trauma reaction, leading to a diagnosis of Developmental Trauma Disorder. This checklist can aid providers in assessing which symptoms may be indicative of a toxic stress response in the presence of exposure to ACEs, consider differential diagnostic approaches as well as treatment and follow-up plans, and better determine whether a dysregulated neuroendocrine-immune system is at the root of the medical problem.

Ultimately, we believe that screening and assessment in a pediatric medical home coupled with targeted interventions can facilitate an ongoing partnership between families and pediatric providers, and help reduce or mitigate the toxic stress response in children and adolescents exposed to ACEs. We invite you to test this tool in your clinic, and help us advance pediatric practice in improving the health and well-being for children and families impacted by ACEs.

Symptoms and Manifestations of Toxic Stress Checklist				
	Neurologic System Responses	**Endocrine/ Metabolic/GI**	**Immune/ Inflammatory**	**Potential unhealthy coping strategies or adaptations**
Multiple Ages	❑ **ADHD diagnosis / symptoms** ❑ **Anxiety** ❑ **Autism diagnosis /** ❑ **symptoms Behavior challenges: impulsivity, oppositional** ❑ **defiance** ❑ **Depression Developmental Delay: motor,** ❑ **cognitive, speech** ❑ **Encopresis** ❑ **Enuresis** ❑ **Headaches Learning** ❑ **disability Poor/failing** ❑ **grades** ❑ **Sleep issues**	❑ **Constipation** ❑ **Diabetes** ❑ **Frequent abdominal pain** ❑ **Hypertension** ❑ **Loss of appetite** ❑ **Obesity** ❑ **Poor growth**	❑ **Allergic Rhinitis** ❑ **Asthma** ❑ **Eczema** ❑ **Food allergy** ❑ **Frequent infections**	❑ **Caregiver/Child interactions - strained or poor attachment** ❑ **Disordered eating** ❑ **Drug, alcohol, tobacco use** ❑ **Risky sexual behavior** ❑ **Self-harm: cutting, suicidal ideation/ attempt**
Infant, young child special/ additional concerns	❑ **Developmental Delay: motor, cognitive, speech** ❑ **Inconsolable crying/Colic** ❑ **Sleep issues**	❑ **Failure to Thrive**	❑ **Frequent infections**	❑ **Caregiver/Child interactions - strained or poor attachment**

Additional Referrals/Medical Evaluations:

- ❑ Tools to support anticipatory guidance
  - ❑ CYW/Healthy Steps handout(s) provided
  - ❑ Six Domains of Wellness handout provided and reviewed with the patient/caregiver
  - ❑ Stresshealth.org website
- ❑ Laboratory studies:
- ❑ Medications:
- ❑ Trauma-Informed Mental Health Evaluation/Treatment* for child:
- ❑ Trauma-Informed Mental Health Evaluation/Treatment for caregiver:
- ❑ Psychiatric Evaluation*:
- ❑ School Evaluation:
- ❑ Specialist Referral:
- ❑ Other referral:

**Strongly consider if ACE score is 1-3 with any of above symptoms or 4+*

RESOURCES:

National Pediatric Practice Community on Adverse Childhood Experiences https://nppcaces.org/
Stress Health https://www.stresshealth.org/
Child Trauma Academy http://childtrauma.org/
National Childhood Traumatic Stress Network www.nctsn.org

Appendix A

Neurological Symptoms		
Symptom/Diagnosis	*ICD-10*	*Scientific Literature*
New onset, or recent increase in anxiety	F41.9	**Hopkins et al, 2013**: **Micco et al, 2009 (meta-analysis**
New onset, or recent increase in depression	F32.9	**Hopkins et al, 2013**: **Kim et al, 2014 (systematic review):**
Enuresis and encopresis	(diurnal only ICD-10: R32; nocturnal only ICD-10: N39.44; nocturnal and diurnal ICD-10: R32, N39.44) (ICD-10: R15.9; functional ICD-10: F98.1)	**Anderson et al, 2014: Philips et al, 2015 (systematic review):**
Frequent headaches/migraines	Chronic tension-type headache, intractable. G44.221 Migraine G43.909	**Bailey et al, 2005: Fuh et al, 2010: Juang et al, 2004: Zafar et al, 2012:**
Excessive/prolonged/inconsolable crying during infancy (regulatory problems)	Excessive crying of infant (baby) R68.11	**Schmid et al, 2011:**
Sleep pattern disruption or nightmares	(sleep disorder ICD-10: G47.9; sleep disorder breathing ICD-10: G47.30; snoring ICD-10 R06.83)	**Armitage et al, 2009: Hairston et al, 2011: Hall Brown et al, 2016: Wolke & Lereya, 2014:**
Dissociation	(mental health problem, ICD-10: F48.9)	**Macfie et al, 2001:**
Apathy, withdrawal	mental health problem, ICD-10: F48.9)	**Naughton et al, 2013 (systematic review):**
School problems: absenteeism, poor/failing grades (ICD-10: Z55.3)	(ICD-10: Z55.3)	**Blodgett & Lanigan, 2018: Fry et al, 2018 (systematic review and meta-analysis):**

		Lansford et al, 2002: **Maguire et al, 2015 (systematic review):**
ADD or ADHD (ICD-10: R46.3) symptoms	(ICD-10: R46.3)	**Aguado-Gracia et al, 2018:** **Barnow et al, 2007:** **Maguire et al, 2015 (systematic review):**
Behavioral problems: impulsivity, oppositional defiance, aggression	(behavioral concerns ICD-10: R46.89; behavioral disturbance ICD-10: F91.9)	**Maniglio, 2015 (systematic review):** **Naughton et al, 2013 (systematic review):** **Winiarski et al, 2018:**
Autism symptoms/diagnosis	(ICD-10: F48.0)	**Beversdorf et al, 2018 (review):** **Abbott et al, 2018:**
Developmental delays: cognitive	(ICD-10: R62.50)	**Enlow et al, 2012:** **Naughton et al, 2013 (systematic review):** **Richards & Wadsworth, 2004:** **Strathearn et al, 2001:**
Executive function: working memory, cognitive flexibility, inhibitory control	Frontal lobe and executive function deficit. R41.844	**Cowell et al, 2015:** **Hughes et al, 2013:** **Kirke-Smith et al, 2014:**
Endocrine/ Metabolic Symptoms		
Diabetes	(ICD-10: E11.9; pre-diabetes/metabolic syndrome ICD-10: E88.81)	**Nygren et al, 2015:** **Sepa et al, 2005:** **Shevlin et al, 2017:**
Frequent abdominal pain	R10.9	**Rajindrajith et al, 2018 (review):** **van Tilburg et al, 2010:**
Obesity/Overweight	(ICD-10: E66.9)	**Boynton-Jarrett et al, 2010:** **Noll et al, 2007:** **Schmeer, 2012:**
Poor growth	Unspecified lack of expected normal physiological development in childhood. R62.50	**Li & Power, 2004:** **Li et al, 2004:**

Constipation	K59.00	**Philips et al, 2015 (systematic review):** **Rajindrajith et al, 2014:**
Loss of appetite	Anorexia. R63.0	**Bailey et al, 2005:**
Hypertension	ICD-10: I10	**Gooding et al, 2016**: **Su et al, 2015**:
Immune / Inflammatory Symptoms		
Asthma development and poorly controlled asthma/asthma exacerbation	(ICD-10: J45.909)	**Rosa et al, 2018 (review):** **Lanier et al, 2010:** **Kozyrskyj et al, 2008:** **Berz et al, 2007:**
Unexplained eczema/atopic dermatitis flare-ups	(ICD-10: L20.9)	**Karlen et al, 2015:** **Kilpeläinen et al, 2002:** **Smejda et al, 2018:**
Food allergy	(ICD-10: NEC T78.1)	**Cortes et al, 2018:** **Flanigan et al, 2017 (systematic review and meta-analysis):** **Schreier et al, 2014 (review):**
Allergic rhinitis	(ICD-10: J30.89, J30.9)	**Flanigan et al, 2017 (systematic review and meta-analysis):**
Higher than average rate of infections or infections requiring hospitalization	(otitis media ICD-10: H66.90; upper respiratory infections [URI, URI acute, URI with cough/congestion] ICD-10: J06.9; pneumonia ICD-10: J18.9; urinary tract infections ICD-10: N39.0)	**Karlen et al, 2015:** **Bick et al, 2012 (review):** **Nielsen et al, 2012:** **Lanier et al, 2010**
Higher than average rate of febrile illnesses	(ICD-10: R50.9)	**Caserta et al, 2008:** **Wyman et al, 2007:**

Potential unhealthy coping strategies or adaptations		
Caregiver/Child interactions - strained or poor attachment	Reactive Attachment Disorder F94.1 Parent-biological child conflict Z62.82 Problems related to upbringing Z62 Other problems related to primary support group, including family circumstances Z63	**McWilliams 2010;** **Meaney 2001;** **Holt-Lunstad 2010**
Disordered eating: binge eating, restrained eating, loss of appetite, self-induced vomiting, misuse of laxatives or diuretics	(mental health problem, ICD-10: F48.9) **Bulimia** nervosa. F50.2 Anorexia. **R63.0**	**Jaite et al, 2012:** **Neumark-Sztainer et al, 2000:**
High-risk behaviors: drug, alcohol, tobacco use; risky sexual behavior (e.g., early initiation, multiple partners, unprotected sex, having sex under the influence of alcohol or drugs)	(behavioral concerns ICD-10: R46.89; behavioral disturbance ICD-10: F91.9)	**Lansford et al, 2002:** **Naughton et al, 2017 (systematic review):** **Thompson et al, 2017:** **Yoon et al, 2017:** **Yoon et al, 2018:**
Self-harm: cutting, suicidal ideation/attempt	(behavioral concerns ICD-10: R46.89; behavioral disturbance ICD-10: F91.9)	**Gomez et al, 2017:** **Hu et al, 2017:** **Miller et al, 2013 (systematic review):**

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