Chapter 2

NEURODEVELOPMENTAL IMPACT OF CHILD MALTREATMENT

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KEY POINTS
1. Children who are exposed to multiple traumatic events are frequently referred to mental health settings.
2. The emotional and behavioral disturbances they exhibit interfere in their functioning at home, school, and in relationships with others.
3. Neurobehavioral effects of trauma on language, memory, sensory processing, executive functioning, and cognition are the unrecognized primary contributors to these difficulties.

INTRODUCTION
Trauma disrupts a child's normal brain development, interfering with neurological, cognitive, and developmental functioning from the cellular to the social level, or from "communication between cells to communication between people." The recognition of the neurodevelopmental impact of child maltreatment and subsequent traumatization is a relatively new phenomenon. An increasing body of research now highlights the deleterious neurodevelopmental effects of maltreatment, suggesting that children who experience multiple chronic traumatic events, including abuse, neglect, and sexual abuse, often develop relational disturbances, deficits with language and cognition, dysregulation of mood and behavior, and social/emotional disturbances. Physiologically, the experience of trauma affects core regulatory systems, compromising the processing and modulation of sensory experience, increasing sensitivity to or need for sensory stimuli, and preventing optimal integration of sensory experience. A child's inability to modulate physiological responses to environmental demands creates chronic internal stress. Changes in the hypothalamic-pituitary-adrenal (HPA) axis, which is the body's critical stress response system, prevents modulation of the resulting distress and frustration that accompanies sensory dysregulation, rendering a child incapable of efficient self-regulation of both affective states and behavioral self-control.

Given what is known about the global neurodevelopmental impact of trauma, the most effective assessment of this impact must examine not only the effects on particular areas of functioning, but effects occurring between areas of functioning. Therefore, a team of professionals at the Southwest Michigan Children's Trauma Assessment Center (CTAC),
under the auspices of Western Michigan University, came together to address the need for this type of comprehensive transdisciplinary trauma assessment, one which is vastly different from the medical or mental health models of assessment. This multidisciplinary team includes professionals from occupational therapy, neurobehavioral pediatrics, speech-language pathology, psychology, and social work, with the objective of providing a more holistic view of trauma assessment. Creating an assessment environment, in which multiple specialties can contribute, ensures a more comprehensive understanding of trauma and enables the team to better understand the world as seen through a child’s eyes.

**NEURODEVELOPMENTAL IMPACT OF TRAUMA**

The complex interplay between genetics, prenatal environment, and postnatal environment is central to all observed behavior in humans. This interplay also contributes to aberrant thought, emotion, and behavior seen in children and adolescents exposed to chronic and significant traumatic stress. In the collective clinical experience of the CTAC team, insufficient understanding of this complex interplay is one of the primary reasons that traumatized children and adolescents are not often comprehensively assessed and frequently do not consistently respond optimally to various traditional treatment strategies.9

**GENETIC FACTORS**

The genetic component of this paradigm is exceedingly complex and includes the inheritance of personality and temperament,10 neurobiological disorders and/or mental illness (e.g., attention-deficit/hyperactivity disorder [ADHD], thought disorders, mood disorders, and anxiety disorders), various neurodevelopmental/neurocognitive components (e.g., attention,11,12 language,13 visual-spatial processing,14 memory,15 sensory processing,16 and neuromotor abilities17), and learning.18 Clinicians working with traumatized children and adolescents often limit the clinical familial history to a simple review of the patient history of mental illness or are unable to interview the biological parents to obtain any pertinent information. A parent’s diagnosis of a mental illness indicates possible genetic inheritance of the disorder; yet this assumption does not account for the possibility of intergenerational traumatic experience. While the role of genetics in some mental health conditions is not to be discounted, it is important to realize that a “bipolar” parent does not necessarily translate to a “bipolar” child based solely on inheritance of the characteristic, understanding family trauma history is crucial before making the diagnosis. Otherwise, if a clinician elicits a positive family history of severe mental illness during an assessment of a traumatized child or adolescent, they may be tempted to attribute the child’s severe behavioral problems solely to the presumed genetic risk of mental illness. As the CTAC has demonstrated, many of the biological parents of traumatized clients are adult survivors of childhood abuse and/or neglect, and these individuals have their own complex genetic endowment and set of environmental influences. Differential diagnosis must, therefore, consider genetic predisposition to mental illness, a child’s vulnerability to genetically driven disorders when exposed to chronic stress,19 and/or the transmission of traumatic stress reactivity as a result of a parent’s own trauma history and self-regulatory dysfunction.20

**PRENATAL FACTORS**

Another key component of this gene-plus-environment model involves the prenatal period. The lifelong environmental sculpting of the inherited genetic blueprint begins prenatally. Traumatized children and adolescents frequently have significant and prolonged prenatal exposure to a number of deleterious influences including maternal traumatic stress21 (e.g., domestic violence, poverty, homelessness, and untreated...
clinical anxiety disorders), prescription medications, alcohol, and drugs (i.e., nicotine, cannabis, methamphetamine, and cocaine). Prenatal alcohol exposure in particular is associated with profound deleterious effects. The authors have previously reported that 37% of the CTAC clinical sample of 274 known traumatized children and adolescents met clinical criteria for fetal alcohol spectrum disorder (FASD).

**POSTNATAL FACTORS**

The final component of this gene-environment model involves children's ongoing environmental experience with a number of critical factors including parental attachment and nurturing, parenting style and psychopathology, nutritional status, exposure to violence, natural disasters, chronic neglect, and maltreatment (i.e., abuse, neglect, exposure to familial violence). Neuroscientific evidence explaining the deleterious impact of maltreatment is steadily accumulating and may involve novel mechanisms such as the mirror neuron system. Additionally, behavioral epigenetics, or the chemical and/or structural alteration of DNA after conception, has recently emerged in the neuroscience literature as an essential link between all 3 gene-environment components already discussed. The authors' data demonstrated a significant and previously unreported additive neurodevelopmental impact in children and adolescents with both traumatic stress and prenatal alcohol exposure.

**THE CTAC MODEL OF TRANSDISCIPLINARY NEURODEVELOPMENTAL TRAUMA ASSESSMENT**

Based on this understanding of the complexity underlying children's neurodevelopmental functioning, the CTAC model of assessment for traumatized children was developed. The CTAC transdisciplinary team was formed in 1999 with the goal of conducting neurodevelopmentally comprehensive assessments for maltreated children in order to provide the courts, agencies, resource parents, and biological parents with comprehensive neurodevelopmental results, facilitating a better understanding of the multiple needs of a child and supplying recommendations on how best to address those needs.

The original CTAC transdisciplinary assessment components included: an ethnographic interview with the current caregivers of the child before the assessment, a physical examination, neurodevelopmental testing, intelligence testing (Kaufman Brief Intelligence Test), behavioral questionnaires (Connors, ADHD Rating Scale, Child Sexual Behavioral Inventory), a sensory questionnaire (Sensory Profile), trauma self-report tools (Trauma Symptom Checklist), and a psychosocial interview of the child. Subsequently, the CTAC assessment added a pragmatic protocol, an alexithymia scale, and an enhanced medical exam including a standardized Fetal Alcohol Syndrome (FAS) assessment protocol. CTAC also became 1 of 5 FAS diagnostic clinics in the State of Michigan and an FAS-Diagnostic Prevention Network site associated with the University of Washington, Center on Human Development and Disability.

CTAC recognizes that exposure to potentially traumatic events can affect a child's functioning across multiple developmental domains. To assess this potentially global impact, a transdisciplinary team provides the most effective method for understanding the needs of each child. However, the continuum of neurodevelopmental trauma assessment protocols provides a myriad of choices for professionals to utilize depending on their professional training, interest and availability, and the cost of components of the protocol.
OVERVIEW OF THE CTAC TRAUMA ASSESSMENT

Required information from the referral source includes reasons for referral, past assessments (e.g., psychological, academic), and current reports from child welfare for children that are temporary or permanent wards. This historical information in the referral packet often fails to capture a child’s current situation, so a clinician is assigned to contact the current caregiver and gather a recent history from the caregiver’s perspective. An ethnographic interview is conducted over the phone. The history is then typed up and distributed to the team on the day of assessment at the pre-assessment team meeting. In addition, previous testing results, child welfare records, and medical records are reviewed.

Two clinicians from the team, usually from different disciplines, are assigned to assess 1 child. Assignments are made according to the child’s specific needs based on the case history information gathered by a CTAC member. Team members, particularly those representing disciplines different from those of the assigned clinicians, view the assessment from an observation room. Social workers are assigned the psychosocial portion of the assessment. Speech and occupational therapy team members conduct assessments from their areas of specialty if the child has articulation issues and/or sensory processing concerns. The morning session lasts up to 2 hours. In addition to gathering information from instruments and protocols, the assessment involves an engagement process with the child, making the child feel safe and comfortable in order to optimize the child’s ability to perform the variety of tasks involved in the assessment.

The child is given a lunch break after the morning session, at which time the team reconvenes in order to report findings and to plan for the afternoon session. The team discusses the child’s functioning, performance during activities, and interaction with clinicians. It is through this clinical observation that sensory processing disorders, language impairments, attachment concerns, and behaviors are also considered in the context of the child’s reported history and of the known traumatogenic factors that affect children’s performance. This process is central to the transdisciplinary assessment. Strategies for working with the child are offered, especially if the child had difficulty regulating and attending to morning testing demands. Priorities for the afternoon session are established (i.e., focus on pragmatic language, attachment assessment, and audiometry). In addition, consultation for the psychosocial interview is provided to the social work clinician. Of paramount importance is gauging the child’s ability to continue with the assessment process and then readjusting the focus of the afternoon session accordingly.

The psychosocial interview and structured observations comprise the final phase of the assessment, after which the team meets again. The child’s performance and interaction are discussed, and all team members from all disciplines are encouraged to offer their observations and insight into the child’s overall performance. It is in this meeting that the process of synthesizing all the testing information begins, starting the process of framing disparate testing results into a comprehensive understanding of the child. Understandably, the observations over a full day assessment are qualitatively different from those generated by a series of shorter sessions. Typically, the child’s demeanor and interaction with the clinician change over the course of the day, and if the child has difficulty regulating cognitive, emotional, or behavioral control, this becomes clear by the end of the assessment. The goal of the post-assessment meeting is to revisit referral concerns regarding the child and to gain a new understanding of a child’s behavior from a trauma-informed perspective. Immediate concerns related to safety issues, medical needs, or other issues are identified by the team, and contact with the referring worker or family is made to facilitate necessary services promptly.
**Detailed Description of Assessment Components**

The assessment process is deconstructed in this section so that each component is delineated separately for instructional purposes. Assessment sections include:

- Cognition
- Development (speech/language, sensory, memory, visual processing)
- Affect and behavior
- Family observations
- Determination of traumatic impact
- Medical evaluation

This deconstruction is an artificial separation, as the assessment process involves considerable overlap and integration of specific domains. Each subsection that follows first includes the rationale for obtaining the assessment, including the empirical base, in order to contextualize why the area is assessed and what functions the clinicians are seeking to observe throughout the assessment process. This is followed with a description of relevant tools and methods used towards a sample of children utilizing tools, such as CTAC specific to neurodevelopmental function, where the information is then presented.

1. **Cognitive Assessment**

An individual's intellectual capacity is clearly associated with functional performance across multiple domains and for this reason it is the first test administered during a CTAC assessment. The CTAC model uses the Kaufman Brief Intelligence Test, 2nd edition (K-BIT 2), which is a brief measure of intellectual capacity normed for ages 4 to adulthood. The nonverbal score reflects nonverbal and abstract reasoning, as well as the ability to integrate information and experiences. K-BIT 2 results correlate well with more comprehensive instruments such as the Wechsler Intelligence Scale for Children, 4th edition, but the K-BIT 2 takes less time to administer. Reliability coefficients specific to this sample of children (aged 6-16) range from .79 to .95 (M = .90), with the lowest value specific to reliability for 6-year-olds on the nonverbal subscale. Verbal scores reveal fund of knowledge, verbal reasoning, and language conceptualization. The K-BIT 2, in combination with neurodevelopmental and psychosocial assessment, is usually manageable for children who have problems with attention and self-regulation, which constitutes the majority of children referred to CTAC. Further, the K-BIT 2 is a viable tool for social workers and other non-psychology professionals working with traumatized children.

The K-BIT 2 instrument is administered by a clinician to the child immediately after greeting the child and a brief period of rapport building. Administration typically takes less than a half hour. Results of the K-BIT 2 help clinicians determine the extent to which the child may find language or visual processing tasks challenging or whether maintaining attention may require adaptations to the testing environment to optimize the child's potential, during the administration period.

2. **Developmental Assessment**

*The Pediatric Early Elementary Examination, 2nd edition (PEEX 2)* and *The Pediatric Examination of Educational Readiness at Middle Childhood, 2nd edition (PEERAMID 2)* explain measures of developmental functioning. These are standardized neurodevelopmental and neurobehavioral assessments available for children and adolescents between
the ages of 6-8 years (PEEX 2) and 9-14 years (PEERAMID 2). Reliability values are not available for these tests because they do not yield an overall score; rather, they generate a narrative description of a child's neurodevelopmental profile. Each subtest is made up of 5 or more experiential activities, ranging from paper-and-pencil activities to copying clinician finger movements, as well as responding orally to clinician questions regarding short passages read aloud. Tests are typically administered to the child by 2 clinicians in an assessment room, and are administered according to a standardized manual in order to meet standards of reliability. The instruments are subdivided into 5 sections:

1. Fine motor
2. Language
3. Gross motor
4. Memory
5. Visual processing

Within each domain, 2 tasks below age norms indicate a moderate delay for that specific domain, and 3 or more tasks below age norms indicate a major delay for that domain. Areas of function that are comprehensively assessed include attention, memory, neuromotor function, visual—spatial processing, temporal-sequential function, and higher level cognition. The full PEEX/PEERAMID battery of tests takes about 1 ½ hours to administer. Rationale for assessment and specifics for each area, along with additional tools, are detailed below in Table 2-1. In addition to these assessments, there is also a set of instruments used to determine developmental status among infants, toddlers, and preschool-age children.

**Speech/Language Assessment**

Speech-language pathologists (SLPs) have considerable exposure to traumatized children and the complexity of their neurodevelopmental, social/emotional, and behavioral impairments. A recent study noted that preschool children who had been exposed to traumatizing violence were more than 7 times more likely to be referred to speech-language pathology services than children who had not been exposed. Traumatized children often have delays in grammar and vocabulary comprehension and production.

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<th>Test</th>
<th>Method</th>
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<tr>
<td>Early Intervention Developmental Profile (EIDP)</td>
<td>Criterion Referenced</td>
<td>Provides qualitative, observation based development across 6 domains including perceptual/fine motor, cognition, language, self-care, social emotional, and gross motor.</td>
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<tr>
<td>Revised Knox Preschool Play Scale</td>
<td>Criterion Referenced</td>
<td>Provides qualitative descriptions of play development across 4 domains including space management, material management, pretense/symbolic, and participation.</td>
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<tr>
<td>Beery Buktenica Test of Visual Motor Integration</td>
<td>Standardized</td>
<td>Screen for visual-motor deficits that can lead to learning, neuropsychological, and behavior problems.</td>
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</table>
Conversational skills, receptive and expressive syntactic skills, and semantic skills, including difficulties with multiple word and sentence meanings. Katz reviewed research that was conducted from 1975 to 1992, finding that both physically abused and neglected children evidenced language delays and disorders, with those of neglected children being more severe. In retrospective studies examining the effects of complex trauma on the social communication and language skills of children aged 6–16 years, data showed that this population had significant deficits in receptive and expressive language skills. At the sound, word, and sentence levels of communication, difficulties were exhibited in the areas of phonological awareness, expressive vocabulary, complex sentences formulation, as well as in comprehending, remembering, and following verbal instructions. The CTAC assessment examines language functioning through the use of the PPEX/PEERAMID expressive and receptive language sections and the Hyter Pragmatic Protocol, which is described in detail in the following section.

**Social Communication and Pragmatic Language**

Complex trauma disrupts brain development and functioning, including functions that support communication and social interactions. Several neurological structures interact to facilitate social communication, defined as the ability to make sense of social situations and function effectively within them. Structures relevant to social communication function to: (1) support the perception of socially relevant input (e.g., thalamus), (2) link socially relevant input to emotional and cognitive processes (e.g., amygdala, right somatosensory, orbitofrontal, and cingulate cortices), and (3) produce conscious control or regulation of goal-directed behaviors (e.g., prefrontal cortex). Consequently, assessing the social communication and pragmatic language skills of children affected by complex trauma is critical for understanding this population, explaining their needs, and developing effective intervention strategies.

The Hyter Pragmatic Protocol and the Pragmatic Protocol Revised, which include procedures reported in the extant literature, are used to examine discourse level processes, including examining a range of discourse genres, social cognitive skills, and executive functions. At the discourse level of communication, children with significant histories of complex trauma have exhibited difficulties with narrative discourse (i.e., story retelling) and social cognitive skills including intention reading, both of which have implications for daily functioning and academic success. Psychometrics for reliability and validity are not yet available, but the empirically-based protocol does have strong face and content validity. The Pragmatic Protocol is appropriate for multidisciplinary administration, but is overseen by the speech or language team member. Pragmatics are typically administered after the morning session and following the child's lunch break. For younger children, toy props are used to act out some of the items on the Pragmatic Protocol in order engage the child's imagination during the activities while the understanding of social communication is being tested. The Pragmatic Protocol typically takes from 15 to 30 minutes to administer.

**Assessment of Sensory Processing**

**Sensory processing** involves the detection, registration, and modulation of sensory modalities and, ultimately, the organization of sensory information by the central nervous system to allow for an adaptive response that is meaningful and relevant to a given situation. It is hypothesized that children who demonstrate sensory processing disorders experience errors in the interpretation of sensory information at both a subcortical and cortical level. The lack of habituation and adaptation to sensory input results in chronic expressions of poorly organized, maladaptive responses. Sensory modulation, 1 of 3 sensory processing typologies refers to the action that takes place in the central and
autonomic nervous system in response to internal and external sensory stimuli. A disorder in sensory modulation occurs when there is difficulty in the grading of responses to the quality or nature of the stimulus as well as the quantity of sensory stimuli, resulting in maladaptive responses. There are 3 subtypes within sensory modulation dysfunction (SMD), including sensory overresponsivity (SOR), sensory underresponsivity (SUR), and sensory seeking (SS). Sensory deprivation or any form of maltreatment or neglect may produce either sensory over-responsivity, a persistent fear response and constant hyperarousal, or a dissociative, under-responsive "surrender" response. Henry, Sloane, and Black-Pond reported that children who had prenatal exposure to alcohol along with postnatal abuse had severe neurodevelopmental deficits in language, memory, visual processing, motor skills, attention, and behavior. Archishon reported significant sensory modulation and sensory discrimination disorders among the same population. It is evident that the severity of trauma on sensory processing behaviors varies, ranging from the absence of signs and symptoms to significant dysfunction that interferes with daily life. It is essential, therefore, to include a measure of sensory processing status in trauma assessment to ensure that those who are experiencing these problems are identified and provided necessary support.

The CTAC assessment utilizes the fine motor/graphomotor, gross motor, and visual processing subtests of the PEEX/PEERAMID, as well as clinical observation by the occupational therapy team member throughout the assessment day. The Sensory Profile, a caregiver-completed instrument, is used to measure sensory functioning in the areas of taste, vestibular, tactile sensitivity, auditory filtering, sensory seeking, and low energy. The Sensory Profile has been normed on children ages 3 to 17 years, with and without disabilities. Factorial validity has been established with a 9 factor solution. The Short Sensory Profile takes approximately 10 minutes to complete. Overall, sensory processing testing and observation allow conclusions in each of the 3 typologies: sensory modulation, sensory based motor, and sensory discrimination.

Memory

Impairments with memory functions have the potential to impact performance in all other developmental domains as well as with social communication and social cognition. Understanding a child's memory processes is critical to understanding the way in which the child processes and responds to their environment, and is a vital part of the CTAC assessment. The PEEX/PEERAMID is used to assess memory functions including visual and auditory registration, word retrieval, short-term memory, and active working memory. In addition to the scores on testing items, clinicians observe the child attempting to use these memory skills through interaction with the clinician and other adults during the assessment day.

Visual Processing

Visual processing includes the ability to use basic functions of vision such as saccadic eye movements, visual tracking, pursuit, fixation, and localization to explore a stimulus and make cognitive level decisions about the quality of the stimulus. The quality of the stimulus includes form-related factors such as color, direction, size, shape, and texture as well as visual-spatial relationships. The ability to replicate a simple to complex design, measured in paper-pencil tasks, is dependent on these functions. Visual processing is assessed through the administration of relevant sections of the PEEX/PEERAMID along with clinical observation of basic visual functioning, with areas assessed including visual problem-solving, visual-spatial relations, pattern recognition, and visual registration. Additionally, the Beery-Buktenica Developmental Test of Visual-Motor Integration (VMI), a child-completed instrument administered by the clinician, is used for addition for preschoo consistency, been establish having the teh shokes. Thi ar eincdil are observe documented.

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a combination of caregiver interview and standardized behavioral questionnaires to identify areas of emotional and behavioral concern related to self-regulation impairments across environments. The Child Behavior Checklist (CBCL), both parent and teacher versions, and the ADHD Rating Scale (home and school), are the primary tools to identify observed emotional and behavioral functioning. The Alexithymia Scale for Children and, more recently, the Children's Alexithymia Measure also capture parents' observations of behaviors associated with alexithymia. The psychosocial interview and children's self-rating scales for depression and anxiety are used to understand the child's perceptions and emotional experience. The instruments used for behavioral or emotional status are listed in Table 2-2 below. Additional instruments, not listed, may be employed if specific cases warrant use of other instruments (e.g., screening for Asperger's syndrome, autism, executive functioning issues).

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<tr>
<th>Measure</th>
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<tr>
<td>Achenbach Child Behavior Checklist (CBCL); Teacher Report Form (TRF) for ages 1½ to 18 years</td>
<td>Caregiver/teacher-completed: A widely used standardized measure of children's behaviors and emotions based on caregiver (CBCL) or teacher (TRF) observation. Internal consistency, measured by Cronbach's alpha, ranges from .78 to .97, and the reliability of most scales is high, ranging from .82 to .94.</td>
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<tr>
<td>ADHD Rating Scale—Home and School Versions for ages 4 to 18 years</td>
<td>Caregiver/teacher-completed: An instrument completed by caretakers or teachers rating the frequency of behaviors consistent with ADHD diagnostic criteria. Normed percentages are derived from ADHD Inattentive, ADHD Hyperactive, and ADHD combined domains.</td>
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<tr>
<td>Children's Alexithymia Measure for preschool children and older</td>
<td>Caregiver-completed: This instrument measures difficulty in expressing feelings. Factorial validity has been established in a 1-factor model.</td>
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<td>Multidimensional Anxiety Scale for Children (MASC) for ages 8 to 19 years</td>
<td>Child-completed: The MASC is a 39-item instrument completed by the child, typically after the psychosocial interview, addressing the major dimensions of anxiety (physical symptoms, harm avoidance, social anxiety, separation/panic). Intraclass correlation coefficients show sufficient stability. Factorial validity is established with excellent fit in a 4-factor model. Discriminant validity was established showing a correct classification rate of .87 and a kappa of .74.</td>
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<td>Children's Depression Inventory (CDI) for ages 7 to 17 years</td>
<td>Child-completed: The CDI is a 27-item instrument that assesses depression symptoms on 2 scales—emotional problems and functional problems. Reliability studies have found it acceptable for screening but not diagnostic purposes. Concurrent, discriminant, and predictive validity have been established.</td>
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4. Family Observations
CTAC has increasingly incorporated observations of children with their caregivers, both resource (foster or relative caregivers) and biological (parents and siblings), into the assessment process. Seeking to address attachment and relational concerns, CTAC has included both structured and unstructured methods of observation during the assessment process. As children adjust and establish rapport with the examiner over the course of the day, clinicians and team members are able to informally observe the range of a child's interactions with evaluators, other staff, and the adults who bring them to the assessment. While there are advantages and disadvantages to conducting assessment over 1 full day, one gain is the ability to observe shifts in a child's affect and relational comfort with others throughout the day.

To attain more qualitative information about a caregiver's and child's interaction style, the Marschak Interaction Method (MIM) is often administered. The MIM is a structured observation technique that is designed to assess the quality and nature of the relationship between a child and each of his or her caretakers. This method involves assessment of how the child responds to the parent's efforts to provide nurturing responses, structure the environment and set appropriate expectations and limits, engage the child while being attuned to the child's response and needs, and to provide challenges appropriate to the child's current development level. A modified version of The Strange Situation is also utilized with very young children, consisting of structured observation of a child's reactions following separation and reunion with their caregivers.

For children in out-of-home placements, and when parental rights are intact, biological parents are invited to participate in an interview in which they provide their perceptions and concerns about their child. Observations of noncustodial parents and their children, during supervised visits or on a separate assessment day, are arranged when possible, especially when there is a desire for attachment recommendations or when a best-interest decision is pending for the child. It is also desirable to observe the child interacting with siblings.

5. Determination of Traumatic Impact
Traumatic impact includes the broad range and persistence of psychological, relational, behavioral, and physiological/somatic manifestations following the experience of overwhelming and threatening events, both directly and indirectly experienced. To determine the impact of trauma, it is first necessary to understand the nature of a child's exposure to potentially traumatizing events and at what age these were experienced. Behavior is purposeful and, in the context of a traumatizing event, often survival-based; therefore, a child's functioning must be considered as a product of their need to adapt to the environment that threatened their attachments and/or safety. Research demonstrates that, behaviorally and emotionally, the experience of trauma increases children's vulnerability to stressors, including the potential for severe reactivity to even mild stressors. The capacity to solve problems (e.g., executive functioning) may disintegrate, resulting in disorganized states, extreme helplessness, confusion, withdrawal, or rage. The experience of trauma may also manifest as over-compliance and resistance to change, or aggression and oppositional defiant disorder, all of which further reduce the potential for positive social and academic outcomes. Most commonly, the impact of trauma is limited to the identification of symptomatology associated with traumatic stress responses or PTSD. As PTSD is a diagnosis based on the symptoms associated with adults who experienced single trauma, combat, or rape, children often do not meet full criteria, yet are exhibiting chronic dysfunction across multiple domains of functioning. This is why CTAC utilizes a combination of tools that
include both observed and self-reported emotional and behavioral reactions associated with traumatic stress and the range of traumatogenic states resulting from eroticization, loss and betrayal, stigmatization, powerlessness, loss of body integrity, dissociative coping, destructive behavior, attachment disturbances, and self-blame.70

Instruments used to identify traumatic impact are listed in Table 2.3. Finally, in addition to rating scales, the child interview, as well as observations of child and caregiver, all provide the foundation to understand how a child’s development of skills and their working model of world and self have been impacted.

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<th>Measure</th>
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<tr>
<td>Child-completed:</td>
<td>This is a widely used self-report measure of posttraumatic distress and related psychological symptoms in children. Chronbach's alpha range from .82 to .89 for the clinical scales. Validity scales have been developed. Convergent and discriminant validity have been established, as has construct validity.</td>
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<tr>
<td>Caregiver-completed:</td>
<td>The CSBI rates the frequency of sexual behavior in children. Scores are achieved in 3 areas: developmentally related sexual behavior (DRSB), sexual abuse specific items (SASI), and a total score. The alphas for the total scale is .92; for the subscales it ranges from .71 to .93 across age groups. Through multiple empirical studies, convergent, discriminant, and construct validity have been established.</td>
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<tr>
<td>Caregiver-completed:</td>
<td>The CDC is a 20-item measure of dissociative behaviors. Chronbach’s alpha is .86, and concurrent validity with clinician-completed measures has been established. The CDC can discriminate between types of dissociative disorders in children.</td>
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6. Medical Evaluation
A pediatrician, who specializes in behavioral pediatrics, pharmacology, and FAS/traumatized children, also serves as part of the CTAC team. Forty percent of the children over the age of 6 referred for assessment at CTAC have been diagnosed with ADHD. Of children aged 6 and over, 53% entered the CTAC assessment with a mental health diagnosis, and for children aged 9 and over, 68% had at least 1 mental health diagnosis. Thus, pharmacological consultation is frequently offered as a formal recommendation following the assessment. Children frequently arrive at the assessment carrying multiple serious mental health diagnostic labels (eg, bipolar disorder, schizo-affective disorder, schizophrenia), which underscore the complexity of a child’s dysfunction but also indicate the frustration of caregivers and professionals attempting to understand the traumatic impact and find appropriate interventions. These diagnostic labels may be reinforced by, or result from, the biological parents carrying similar diagnoses. However, biological parents who themselves may be trauma survivors are examples of the well-known “cycle of trauma” which silently pervades adult mental health facilities and frequently leads to overriening on aggressive psychotropic drug treatment for assumed serious mental illness. This narrow frame of reference also contributes to the commonly encountered and adole evidence through f overlap A descripit the conf it impo child well for FASD encephalof and preneurodevelopneulsequelaea, neuromot Although brain dev and magr exposure that of tr it is kno substance of fetal alc traumatic in the field impact of fail to cor traumatic brain dev diagnostic includes a recommenda physical h

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Chapter 2: Neurodevelopmental Impact of Child Maltraitment

Encountered use (and overuse) of powerful psychotropic drugs in traumatized children and adolescents. This does not imply that traumatized children are never candidates for the judicious use of medication. However, in our experience the extremely limited evidence base for medication use in traumatized children desperately needs bolstering through further clinical and basic science research.

**Overlapping Impact of Prenatal and Postnatal Traumatic Experience**

A description of assessment on the impact of trauma on children must recognize the confounding impact of prenatal alcohol exposure. Delineation of this impact is important because of the known comorbidity of trauma and FAS/FASD in the child welfare system. Of the children assessed by CTAC, 63% did not meet criteria for FASD, 33% met criteria for FAE/partial FAS or sentinel physical findings/static encephalopathy, and 4% met criteria for fetal alcohol syndrome (n=1411). Both trauma and prenatal alcohol exposure have a predictable and measurable impact on a child’s neurodevelopmental functioning. These 2 phenomena typically share phenotypic sequelae, including deleterious impact on executive function, language, cognition, neuromotor function, and sequential or organizational skills.

Although each phenomenon independently inhibits or precludes healthy, expected brain development, the presence of both further increases the likelihood for delays and magnifies the impact. Understanding this confounding effect of prenatal alcohol exposure is essential when attempting to distinguish its developmental impact from that of traumatic exposure. Even when prenatal alcohol exposure is not confirmed, it is known that 75% of these traumatized children have experiences of parental substance abuse in the parental home. Therefore, assessing for the potential presence of fetal alcohol exposure is critical when considering the neurodevelopmental impact of traumatic exposure to children and adolescents. This is critical, as currently most experts in the field of traumatic stress are apparently unaware of the important simultaneous impact of prenatal alcohol exposure. Conversely, FASD thought leaders consistently fail to consider the well-described neurodevelopmental and neurobehavioral impact of traumatic stress. There is a clear need to consider these 2 critical influences on child brain development both separately and together when discussing clinical presentation, diagnostic formulation, and neuroscience implications; therefore, the CTAC assessment includes a brief physical examination and a fetal alcohol evaluation. Conclusions and recommendations regarding needs due to traumatic impact are made in the context of physical health and the results of the fetal alcohol evaluation.

**Summary of Research Findings**

Over the course of 11 years, CTAC has completed comprehensive neurodevelopmental assessments on over 2600 children. Although the primary purpose of trauma assessment is to facilitate understanding and meet the needs of an individual child from a trauma perspective, the citation collective assessment data can provide a snapshot of typical neurodevelopmental, behavioral, and emotional characteristics of this population of children. Below, descriptive data and statistical analyses of relationships between neurodevelopmental status and emotional/behavioral presentation are provided. Results are deconstructed into the various assessment components for ease of presentation. Note that the data presented throughout represent children of different ages depending on the instruments used, with age ranges indicated accordingly. Children under 3 years old are not represented in these data for purposes of brevity.

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Dissemination of assessment results has been approved by Western Michigan University’s Human Subjects Institutional Review Board.
Cognition
As shown in Table 2-4, traumatic exposure has a significant deleterious impact on children's intellectual capacity. For verbal intellectual capacity, nonverbal, and composite, mean IQ drops with level of clinically determined traumatic exposure. The most dramatic difference is between those children who have not had clinically determined traumatic experiences and those whose experiences have been moderate to severe in terms of traumatic impact. As shown in Table 2-5, children with reduced developmental performance have statistically significantly lower IQ scores (note that children diagnosed with PADD or FAS were excluded from this analysis, as fetal alcohol exposure is a known confounding factor, and the larger sample size allowed for the omission of this group). However, lowered scores and performance in both areas are inversely associated with increased levels of traumatic exposure; as level of traumatic exposure increases, not only does cognitive potential decrease, as already noted, but developmental performance also decreases. Whether trauma more strongly impacts the cognitive capacity or the availability of the cognitive capacity in regard to performance remains a topic for further research.

Table 2-4. Intellectual Capacity (Mean K-BIT IQ Scores) by Level of Traumatic Impact* on Children Ages 4 and Older (n=1012)

<table>
<thead>
<tr>
<th>Trauma Index</th>
<th>Vocabulary</th>
<th>Matrices</th>
<th>Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within age expectations n=42</td>
<td>97.83</td>
<td>100.00</td>
<td>99.10</td>
</tr>
<tr>
<td>Moderate concern n=288</td>
<td>91.80</td>
<td>94.47</td>
<td>93.95</td>
</tr>
<tr>
<td>Significant concern n=682</td>
<td>89.64</td>
<td>92.63</td>
<td>90.59</td>
</tr>
</tbody>
</table>

*Traumatic impact is determined through clinical judgment based on intensity, duration, and relational involvement of maltreatment events as well as the presence of protective factors.

Table 2-5. Association of Global Developmental Functioning and Level of Traumatic Exposure with Intellectual Potential (Mean IQ Scores)* (n=246)

<table>
<thead>
<tr>
<th>Development</th>
<th>Trauma</th>
<th>Vocabulary</th>
<th>Matrices</th>
<th>Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or mild developmental concern</td>
<td>Significant trauma</td>
<td>Mean 105.72</td>
<td>106.34</td>
<td>106.97</td>
</tr>
<tr>
<td></td>
<td>concern</td>
<td>n=29</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Moderate or major developmental concern</td>
<td>None or moderate trauma</td>
<td>Mean 96.20</td>
<td>93.50</td>
<td>94.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n=10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Significant trauma</td>
<td>Mean 90.19</td>
<td>91.29</td>
<td>89.63</td>
</tr>
<tr>
<td></td>
<td>concern</td>
<td>n=207</td>
<td>207</td>
<td>206</td>
</tr>
</tbody>
</table>

*Children diagnosed with fetal alcohol spectrum disorders/fetal alcohol syndrome were not excluded for this analysis.  
1 There were none in the sample with "none or mild developmental concern" and "none or moderate trauma concern." The large majority of CTAC-sampled children have experienced moderate or significant trauma.
DEVELOPMENT

Language
CTAC data indicates that children with histories of traumatic experiences had significant defects in receptive and expressive language skills, as shown in Table 2-6 and Table 2-7.

Table 2-6. Moderate to Major Receptive Language Delays with Trauma Exposure Measured by the PEEX/PEERAMID, n (%)

<table>
<thead>
<tr>
<th></th>
<th>n=768</th>
<th>No Trauma</th>
<th>Moderate Trauma Concern</th>
<th>Significant Trauma Concern*</th>
</tr>
</thead>
<tbody>
<tr>
<td>None to mild receptive language delays</td>
<td>7 (3.1)</td>
<td>78 (35.0)</td>
<td>138 (61.9)</td>
<td></td>
</tr>
<tr>
<td>Moderate to major receptive language delays</td>
<td>17 (3.1)</td>
<td>128 (23.5)</td>
<td>400 (73.4)</td>
<td></td>
</tr>
</tbody>
</table>

*p = .001

Table 2-7. Moderate to Major Expressive Language Delays with Trauma Exposure Measured by the PEEX/PEERAMID, n (%)

<table>
<thead>
<tr>
<th></th>
<th>n=765</th>
<th>No Trauma</th>
<th>Moderate Trauma Concern</th>
<th>Significant Trauma Concern*</th>
</tr>
</thead>
<tbody>
<tr>
<td>None to mild expressive language delays</td>
<td>8 (3.0)</td>
<td>86 (32.3)</td>
<td>172 (64.7)</td>
<td></td>
</tr>
<tr>
<td>Moderate to major language delays</td>
<td>16 (3.2)</td>
<td>120 (24.0)</td>
<td>363 (72.7)</td>
<td></td>
</tr>
</tbody>
</table>

*p = .048

Sensory Processing
As seen in Figure 2-1, children assessed at CTAC do not differ significantly in their scores on several areas of the Sensory Profile but deviate notably in areas of underresponsiveness (i.e., sensory seeking) and auditory filtering. This finding indicates that the majority of these maltreated children have a demonstrated neurological need for organized, precise sensory challenges to help regulate outcome. They also exhibit difficulty filtering out auditory stimuli. Together, these sensory differences manifest as hyperactivity and inattention, as is shown in Table 2-8 and Table 2-9. Data from scores on the Sensory Profile indicate differences in some areas between normative or typical performance and the sample of children assessed at CTAC (see Figure 2-1). For this section, children who meet criteria for FASD and for FAS were excluded from the data, as prenatal alcohol exposure confounds the effects of trauma on sensory processing.

Memory
Impairments with memory functions have the potential to impact performance in all other developmental domains as well as with social communication and social cognition. Understanding a child's memory processes is critical to understanding the way in which the child processes and responds to their environment, and it is a vital part of the CTAC assessment. The PEEX/PEERAMID is used to assess memory functions including visual and auditory registration, word retrieval, short-term memory and active working
Sensory Profile Differences of CTAC Children Ages 3 to 12 Years

Figure 2-1. Sensory Profile Differences of CTAC Children Ages 3 to 12 Years. *n=255.

Table 2-8. Child Behavior Checklist (CBCL) Norms and Differences for Sensory Seeking

<table>
<thead>
<tr>
<th>Externalizing*</th>
<th>Under-responsive/Sensory Seeking</th>
<th>n</th>
<th>Mean CBCL</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within norms</td>
<td>13</td>
<td>59.77</td>
<td>9.400</td>
<td>2.607</td>
<td></td>
</tr>
<tr>
<td>Differences</td>
<td>26</td>
<td>73.04</td>
<td>6.678</td>
<td>1.310</td>
<td></td>
</tr>
<tr>
<td>CBCL aggressive behavior*</td>
<td>12</td>
<td>61.75</td>
<td>5.879</td>
<td>1.697</td>
<td></td>
</tr>
<tr>
<td>Differences</td>
<td>27</td>
<td>74.15</td>
<td>10.364</td>
<td>2.033</td>
<td></td>
</tr>
</tbody>
</table>

*P = .000

Table 2-9. Child Behavior Checklist (CBCL) Norms and Differences for Sensory Seeking

<table>
<thead>
<tr>
<th>Externalizing*</th>
<th>Under-responsive/Sensory Seeking</th>
<th>n</th>
<th>Mean CBCL</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within norms</td>
<td>13</td>
<td>59.77</td>
<td>9.400</td>
<td>2.607</td>
<td></td>
</tr>
<tr>
<td>Differences</td>
<td>26</td>
<td>73.04</td>
<td>6.678</td>
<td>1.310</td>
<td></td>
</tr>
<tr>
<td>CBCL aggressive behavior*</td>
<td>12</td>
<td>61.75</td>
<td>5.879</td>
<td>1.697</td>
<td></td>
</tr>
<tr>
<td>Differences</td>
<td>27</td>
<td>74.15</td>
<td>10.364</td>
<td>2.033</td>
<td></td>
</tr>
</tbody>
</table>

*P = .000
memory (Table 2-10). In addition to the scores on testing items, clinicians observe the child attempting to use these memory skills through interaction with the clinicians and other adults during the assessment day.

**Visual Processing**

As noted in Table 2-11, 73% of the sample of children seen at CTAC with a history of significant trauma experience moderate to major impairment in visual processing demands which will impact academic readiness and success.

**AFFECT AND BEHAVIOR**

CTAC data is consistent with other research in demonstrating the association between traumatic exposure and elevated behavior concerns. Table 2-12 shows the mean CBCL scores on all the subscales for the sample of children assessed at CTAC, noting that the normed average is 50.

Table 2-13 displays alexithymia means on a scale of 0-14 according to either none or moderate trauma compared to significant traumatic experience.

**TRAUMATIC IMPACT**

The consideration of resiliency factors that mediate traumatic impact, such as intelligence, support systems, and language development, as well as the consequence of multiple types of victimizations, and/or complex trauma are significant impact determiners. Specifically, children can be expected to demonstrate increased neurodevelopmental impairments with multiple types of exposure, and in the case of early and repeated trauma within the caregiving system, impairments in multiple domains of functioning including sensor and physiological states, attachment, affect and behavioral dysregulation (including dissociation), cognition, and self-concept (see Table 2-14). With increased appreciation of the complexity of traumatic impact, clinicians are better able to plan treatment to address not only behavior, but also the underlying deficits in skills necessary for success.

**IMPACT OF FETAL ALCOHOL EXPOSURE**

CTAC assessment data clearly demonstrates that children who have both confirmed trauma experiences and who also meet diagnostic criteria for FASD* experience more pronounced neurodevelopmental impact. For example, in Table 2-15 associations are shown between the level of overall traumatic exposure (based on clinical judgment), the presence of significant prenatal alcohol exposure, and the negative impact on intellectual capacity. Differences between no traumatic exposure/no prenatal exposure and the presence of both of these phenomena are dramatic (>0.75 of a standard deviation decrease in capacity across measured domains). The presence of either prenatal exposure or postnatal traumatic exposure also yields a statistically significant decrease in intellectual capacity across domains.

| Table 2-10. Memory Impairment According to Level of Trauma Measured by PEEX/PEERAMID, n(%) |
|---|---|---|
| N=768 | **NONE/MODERATE TRAUMA** | **SIGNIFICANT TRAUMA** |
| None or mild impairment | 63 (43.2) | 83 (56.8) |
| Moderate or major impairment | 167 (26.8) | 455 (73.2) |

*P < .001
Table 2-11. Visual Processing Impairment According to Level of Trauma Measured by PEEX/PEERAMID, n(%)  

<table>
<thead>
<tr>
<th>N=760</th>
<th>None/Moderate Trauma</th>
<th>Significant Trauma*</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or mild impairment</td>
<td>89 (38.7)</td>
<td>141 (61.3)</td>
</tr>
<tr>
<td>Moderate or major impairment</td>
<td>141 (26.6)</td>
<td>389 (73.4)</td>
</tr>
</tbody>
</table>

*p = .001

Table 2-12. Mean Child Behavior Checklist Scores for the Sample of CTAC Children Ages 6 and Older  

<table>
<thead>
<tr>
<th>N=274</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBCL Anxious/depressed</td>
<td>60.61</td>
</tr>
<tr>
<td>CBCL Withdrawn/depressed</td>
<td>62.20</td>
</tr>
<tr>
<td>CBCL Somatic complaints</td>
<td>58.54</td>
</tr>
<tr>
<td>CBCL Social problems</td>
<td>64.13</td>
</tr>
<tr>
<td>CBCL Thought problems</td>
<td>64.22</td>
</tr>
<tr>
<td>CBCL Attention problems</td>
<td>68.49</td>
</tr>
<tr>
<td>CBCL Rule breaking behavior</td>
<td>65.68</td>
</tr>
<tr>
<td>CBCL Aggressive behavior</td>
<td>68.12</td>
</tr>
<tr>
<td>CBCL Internalizing</td>
<td>60.73</td>
</tr>
<tr>
<td>Externalizing</td>
<td>66.55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>66.37</strong></td>
</tr>
</tbody>
</table>

Table 2-13. Mean Scores According to Level of Trauma Measured by the Children’s Alexithymia Measure  

<table>
<thead>
<tr>
<th>N=286</th>
<th>Alexithymia Score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or moderate trauma n=92</td>
<td>7.08</td>
</tr>
<tr>
<td>Significant trauma n=194</td>
<td>8.24</td>
</tr>
</tbody>
</table>

*p = .021
### Table 2-14. T Scores for Domains (Child Self-Report) According to Clinical Determination of Traumatic Impact Measured by the Trauma Symptoms Checklist for Children

<table>
<thead>
<tr>
<th></th>
<th>Anxiety</th>
<th>Depression</th>
<th>Anger</th>
<th>PTSD Symptoms</th>
<th>Distraction</th>
<th>Overt Dissociation</th>
<th>Fantasy Dissociation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>None or moderate Trauma</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>51.00</td>
<td>49.42</td>
<td>49.23</td>
<td>51.19</td>
<td>51.73</td>
<td>51.81</td>
<td>50.81</td>
</tr>
<tr>
<td>n</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td><strong>Significant Trauma</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>56.63</td>
<td>54.29</td>
<td>52.57</td>
<td>55.24</td>
<td>54.93</td>
<td>54.91</td>
<td>52.59</td>
</tr>
<tr>
<td>n</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>81</td>
<td>80</td>
<td>79</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>55.28</td>
<td>53.12</td>
<td>51.77</td>
<td>54.27</td>
<td>54.15</td>
<td>54.15</td>
<td>52.15</td>
</tr>
<tr>
<td>n</td>
<td>108</td>
<td>108</td>
<td>108</td>
<td>108</td>
<td>107</td>
<td>106</td>
<td>105</td>
</tr>
</tbody>
</table>

### Table 2-15. K-BIT Correlates with Traumatic Experience and Presence of Fetal Alcohol Spectrum Disorders (FASD)/Fetal Alcohol Syndrome (FAS) in Children Ages 4 to 17; n = 932

<table>
<thead>
<tr>
<th>Trauma Index*</th>
<th>FASD*</th>
<th>Vocabulary</th>
<th>Matrices</th>
<th>Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Known Trauma Concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Mean</td>
<td>98.64</td>
<td>102.46</td>
<td>100.68</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>28</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>FASD</td>
<td>Mean</td>
<td>93.38</td>
<td>94.75</td>
<td>94.08</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>13</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Moderate Concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Mean</td>
<td>93.08</td>
<td>96.68</td>
<td>96.13</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>167</td>
<td>166</td>
<td>165</td>
</tr>
<tr>
<td>FASD</td>
<td>Mean</td>
<td>89.58</td>
<td>91.00</td>
<td>90.23</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>102</td>
<td>101</td>
<td>101</td>
</tr>
<tr>
<td>Significant Concern</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Mean</td>
<td>90.72</td>
<td>93.77</td>
<td>92.14</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>372</td>
<td>371</td>
<td>372</td>
</tr>
<tr>
<td>FASD</td>
<td>Mean</td>
<td>87.84</td>
<td>91.16</td>
<td>88.48</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>256</td>
<td>255</td>
<td>254</td>
</tr>
</tbody>
</table>

### Conclusion

Neurodevelopmental effects on language, memory, sensory processing, executive functioning, and cognition, if not formally assessed, frequently remain unrecognized as primary influencers of children's emotions and behaviors. Instead, children who are exposed to multiple traumatic events are frequently referred to mental health settings as a result of emotional and behavioral disturbances that interfere in their daily functioning at home, at school, and with peers or adults, especially adults in positions of authority. Children with histories of repeated maltreatment, including abuse, neglect, exposure to
violence and disrupted attachments, often display rapidly shifting levels of brain over arousal and under arousal (which usually manifest clinically as rapid and seemingly unpredictable mood, emotional, and behavioral swings, often interpreted as symptoms of bipolar disorder), difficulty following directions and rules, and significant difficulty with self-regulation resulting in moderate to severe difficulty with mood and behavior. These same children are often diagnosed in accordance with identified internalized and externalized behaviors including anxiety, depression, inattention, hyperactivity, impulsivity, and other disruptive and oppositional behaviors. Within the context of the current DSM-IV-Text Revision, and in the absence of a diagnosis that addresses the complexity of symptoms associated with complex trauma, children may frequently carry multiple traditional mental health diagnoses that serve to describe behavioral patterns and yet betray an absence of a related understanding of the developmentally impacted adaptations to a neglectful, threatening and/or dangerous environment. With contextual understanding of the impact of early and multiple experiences of traumatic exposure, the resulting etiology of mood, relational, and behavioral disturbances is better defined as complex trauma and the subsequent, but related, proposed Developmental Trauma Disorder (DTD). Both complex trauma and the exposure criteria for DTD include early and repeated exposure to maltreatment, as well as the evidence of developmental impairments in skills necessary for self-regulation across multiple domains of functioning.

REFERENCES


33. Levine MD. *Pediatric Examination of Educational Readiness at Middle School*. Cambridge, MA: Educators Publishing Service; 1996.


