Factors for improving short- and long-term health outcomes for children who have experienced adversity and trauma

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FACTORS FOR IMPROVING SHORT- AND LONG-TERM HEALTH OUTCOMES FOR CHILDREN WHO HAVE EXPERIENCED ADVERSITY AND TRAUMA

by

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ABSTRACT

This thesis is comprised of a comprehensive literature review focused on identifying factors that protect children from early adversity and a proposed intervention and accompanying program evaluation intended to improve health outcomes for traumatized children. The literature review summarizes the impact and prevalence of adverse childhood experiences and provides evidence for a hypothesized mechanism by which ACEs damage health: ACEs induce neuroendocrine changes while simultaneously predisposing children to engage in health risk behaviors. This literature review identifies and documents evidence for five modifiable resilience factors to improve the long- and short-term health outcomes for children who have experienced early adversity. They include improving parenting, enhancing social support, supporting maternal mental health, teaching self-care skills, and fostering understanding of trauma. The thesis proposes a pilot trauma-informed medical home (TIMH) designed to leverage the identified modifiable resilience factors for a group of pediatric patients in CPS custody at a large urban pediatric practice. The thesis includes an evaluation plan to formatively and summatively gain insight into TIMH’s effectiveness and enable program improvement.
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LIST OF ABBREVIATIONS

AAP .......................................................... American Academy of Pediatrics
ABC .......................................................... Attachment and Bio-Behavioral Catch-Up
ACA .......................................................... Affordable Care Act
ACE .......................................................... Adverse Childhood Experience
ALSPAC ................................................. Avon Longitudinal Study of Parents and Children
BMC .......................................................... Boston Medical Center
BMI .......................................................... Body Mass Index
BRFSS ......................................................... Behavioral Risk Factor Surveillance System
CBT .......................................................... Cognitive Behavioral Therapy
CD-RISC .................................................. Connor-Davidson Resilience Scale
COPD ......................................................... Chronic Obstructive Pulmonary Disease
CPP .......................................................... Child Parent Psychotherapy
CPS .......................................................... Child Protective Services
EIFC ......................................................... Early Intervention Foster Care
EMR .......................................................... Electronic Medical Record
ED .......................................................... Emergency Department
FTE .......................................................... Full-Time Equivalent
GPA .......................................................... Grade Point Average
H&P .......................................................... History and Physical
Hgb .......................................................... A1C Glycated Hemoglobin
HPA .......................................................... Hypothalamic Pituitary Axis
IEP............................................................. Individualized Education Program
IRB.............................................................. Institutional Review Board
JAMA......................................................... Journal of the American Medical Association
JH........................................................................ John Henryism
MD ........................................................................ Medical Doctor
MTO...................................................................... Moving to Opportunity
NP ......................................................................... Nurse Practitioner
OR......................................................................... Odds Ratio
PA ........................................................................ Physician Assistant
PCP .......................................................................... Primary Care Provider
PEDS-ES..................................................... Pediatric Emotional Distress Scale Early Screener
PTSD............................................................... Post-Traumatic Stress Disorder
RCT........................................................................ Randomized Controlled Trial
SAM................................................................... Sympathetic Adrenomedullary
SDQ ...................................................................... Strengths and Difficulties Questionnaire
SES..................................................................... Socioeconomic Status
STD ..................................................................... Sexually Transmitted Disease
STEPP............................................................. Screening Tool for Early Predictors of PTSD
TESI-C ........................................................ Traumatic Events Screening Inventory for Children
TESI-PRR .................................................... Traumatic Events Screening Inventory for Parent Report
TIC ......................................................................... Trauma-Informed Care
TF-CBT........................................................ Trauma-Focused Cognitive Behavioral Therapy

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TIMH ................................................................. Trauma-Informed Medical Home
TSE ................................................................. Traumatic and Stressful Event
UCLA ............................................................... University of California at Los Angeles
WCC ................................................................. Well-Child Care
YRBSS ............................................................. Youth Risk Behavior Surveillance System
INTRODUCTION

Background

Traumatic experiences in childhood change the body and mind. When a child experiences neglect at the hands of a caregiver, loses a parent to illness, death, or incarceration, or experiences bullying, social exclusion, and discrimination, there are enduring consequences for the health trajectory of that child over the life course. During childhood, those who have experienced adversity are at higher risk for obesity, asthma exacerbations, multiple hospitalizations and visits to the emergency room, academic and behavioral problems at home and at school, and trouble fitting in with peers. In adolescence and early adulthood, they are more likely to be diagnosed with mental illnesses and more at risk for adopting health risk behaviors such as substance use, smoking, and promiscuity or unprotected sexual relations. In later years, these same children are more likely to suffer from chronic diseases as well as ongoing complications from substance use and mental illness.

This thesis will employ a broad definition of adverse childhood experiences (ACEs). It will expand upon the definition employed by Slopin et al. in their review of adversity and cardio-metabolic risk factors: “any type of stressful experience or material hardship that is not considered to be a normative part of child development,” to also include any experience that leads to symptoms of acute or post-traumatic stress (See Appendix A for more on ACE definitions). Hand in hand with the risks these children experience, this thesis focuses on cultivating “resilience,” defined here as good mental and physical health despite the assails of early adversity.
In 1998, Felitti et al., under the auspices of Kaiser Permanente, and Anda et al., of the Centers for Disease Control, published the Adverse Childhood Experiences study, which revolutionized the understanding of the relationship between childhood trauma and long-term health outcomes. Cronholm et al. built on this scholarship by expanding the original set of ACEs to include several types of adversities common in diverse, non-white, lower-socioeconomic level communities. This work, and much subsequent scholarship, has firmly established the connection between early life trauma and mental and physical illnesses starting in childhood and extending throughout the lifespan. 

Ungar defines five dimensions of adversity to include the severity, chronicity, ecological complexity, attributions of causality (by the child), and the contextual and factors that influence the child’s exposure to the risk. Research supports the hypothesis that adult health outcomes are influenced by the cumulative incidence of adverse childhood experiences, although differences in risk are appreciated by chronicity, severity, and type of childhood traumas.

**Statement of the Problem**

Pediatric primary care is the right place to deliver interventions in primary and secondary preventative care to protect children from the long-term health impacts of childhood adversity. However, there is a gap in the research regarding evidence-based screening and interventions for traumatized children to improve short and long-term health outcomes in the pediatric primary health care setting. This dearth of evidence about what works in pediatric primary care prevention for trauma sequelae is despite documented short- and long-term health risks of trauma and documented high prevalence and incidence in the
pediatric population. To protect children exposed to toxic levels of stress from childhood adversity, it will be important to identify those modifiable resilience factors that are associated with improved health outcomes for traumatized children. Clinicians then can develop responsive interventions. Cronholm et al express the urgency to change: “Recognizing childhood adversity as a dominant driver of future health, clinicians and public health officials will need to move beyond existing measures of physical and mental health and embrace the model of trauma-informed care that attempts to understand how life events are tied to one’s current clinical presentation.”

Hypothesis

An intervention consisting of trauma-informed comprehensive medical and psychosocial care delivered in a primary pediatric medical home for vulnerable children who have been exposed to high levels of adverse childhood experiences will result in improved short- and long-term health outcomes for these children.

Objectives and Specific Aims

The objective of this research project is to determine if a comprehensive trauma-informed patient-centered medical home in a pediatric primary care clinic can interrupt the chain of events between childhood adversity and short- and long-term negative health impacts. The physical and behavioral healthcare offered in this setting, as well as the integration with and referral to community-based resources will be informed by the research on modifiable resilience factors to childhood adversity. The project will pilot a trauma-informed medical home (TIMH) with children who have experienced significant
adversity—those patients of a large urban city hospital pediatric practice newly in Child Protective Services (CPS) custody.

Specific aims include:

- Identify and intervene in ongoing unsafe situations for targeted children;
- Identify and treat post-traumatic stress disorder (PTSD) and any other chronic health problems;
- Assess baseline resilience and increase it by addressing parenting, social support, maternal psychopathology, self-care skills, and understanding of trauma;
- Measure and normalize biomarkers of stress reactivity;
- Screen for and reduce health risk behaviors;
- Improve academic engagement of targeted children through neuro-psych testing, individualized education programs (IEPs), and educational advocacy.
Introduction

This literature review will lay the groundwork for the trauma-informed medical home intervention proposed in chapter 3. First, it will present evidence regarding the prevalence of ACEs and summarize the research about their health impacts. Then it will outline mechanisms through which ACEs could negatively impact mental and physical health. This will lead to an exploration of the two proposed mediating processes: neuroendocrine dysregulation and adoption of health risk behaviors. The second section delves into the literature on the definition and components of resilience to childhood adversity, focusing on five modifiable resilience factors: parenting practices, social support, identifying and treating maternal psychopathology, self-care skills, and understanding the impact of trauma through trauma education. The final section of the review will present an approach to preventive care in light of what is known about ACEs and their health impacts, focusing on medical homes, trauma-informed care, screening for ACEs, and barriers to accessing care for families who have experienced trauma.

ACEs and Health: Prevalence of ACEs

The prevalence of ACEs differs by the definition employed and the population surveyed, but most estimates cluster around 40%-70% for one ACE and between 10% and 30% for three or more ACEs. A 2014 national study using data from the 2011-12 National Survey of Children’s Health of 95,677 parents found a prevalence of 46% of children aged 0-17 years old suffering at least one of the eight defined adverse childhood experiences in the original Kaiser ACE survey and 11% experiencing more than three.
ACEs, as reported by their parents. When Cronholm et al. surveyed for conventional ACEs alongside a set of expanded ACEs they developed in a socioeconomically and racially diverse low-income group of 1,784 adults in the Philadelphia area, they found very high rates of conventional ACEs (household-focused) and expanded ACES (community-focused), with significant overlap between the two. Eighty-three percent (82.8%) reported at least one ACE (conventional and expanded).

Since exposure to adversity appears to increase in urban, racially and ethnically diverse, low-income communities, the same demographics for whom the community-based ACEs are more common, a definition of ACEs that includes events outside the home is appropriate. (See Appendix A for more about what comprises an ACE.)

**ACEs and Health: Health Outcomes of Antecedent ACEs**

There is a graded dose-response association between early adversities and risk for poor health outcomes including, but not limited to, asthma, ischemic heart disease (IHD), stroke, obesity, diabetes, chronic obstructive pulmonary disease (COPD), auto-immune disease, depression, anxiety, conduct disorder, substance use disorder, and sexually transmitted diseases (STDs). Not only are those with ACEs sicker, they have lower overall satisfaction with their lives, have less access to medical and mental healthcare, use more expensive healthcare, and die as many as 20 years earlier. In a retrospective cohort study, Dube et al. found robust evidence across four consecutive birth cohorts spanning much of the 20th century (1900 to 1978) that ACEs were associated in a dose-response relationship with deleterious health outcomes (depression, suicidality, smoking, multiple sexual partners, STDs, and alcoholism). Gilbert et al.
found a linear dose-response relationship between the number of ACEs experienced and each of the chronic health problems included in their study (Diabetes, myocardial infarction, frequent mental distress, coronary heart disease, stroke, asthma and disability). A 2014 meta-analysis of 41 studies of child maltreatment and risk of obesity found that abused children were at a significantly greater risk of developing obesity over the course of their lives (Odds Ratio (OR)=1.36). Interestingly, the study found preliminary support for an incubation period between exposure to the abuse and development of obesity. This incubation period hypothesis suggests an enduring effect of trauma on physiology and behavior, which, if borne out in further research, highlights the need for intervention post-trauma to prevent long-term health consequences.

In addition to the physical health problems, there are the mental health consequences of adversity, including emotional and behavioral problems, depression, anxiety, PTSD, and dissociative disorders. Lifetime mental illness rates are much higher among those with a history of childhood adversity, and like with physical ailments, they increase in a dose-response relationship with childhood adversity. Sugaya et al., in a 2013 representative national study of 43,093 adults who experienced childhood physical abuse, showed that the abused were significantly more likely to suffer from PTSD (OR=4.01), mood disorder (OR=3.12), generalized anxiety disorder (OR=3.10), or substance use disorder (OR=2.60). Traumatic experiences before the age of 12 have three times the risk of later traumatic childhood experiences of causing PTSD symptoms.
Childhood adversity and trauma start to affect health early in life, in terms of illnesses requiring treatment, behavioral problems, and subjective assessments of health and well-being.\textsuperscript{28,32–34} Lanier et al. studied the risk of pediatric hospitalizations among a sample of over 10,000 low-income children using a matched comparison design ("maltreated" and "not maltreated") and found a 73\% increased risk of hospitalization for asthma among the maltreated and more than double the risk of hospitalization for non-asthma cardiovascular or respiratory ailments and infections for the maltreated cohort.\textsuperscript{32} Suglia et al. found that childhood adversity was significantly associated with obesity in five year-old girls, but not boys, using a composite indicator of childhood adversity. For both genders, obesity was significantly associated with externalizing behavior problems and lack of sleep.\textsuperscript{33} Slopen et al., using data from over 4,000 children participating in the Avon Longitudinal Study of Parents and Children (ALSPAC) in England, reported that externalizing and internalizing behavioral symptoms were associated with cumulative adversity at both ages seven and eleven.\textsuperscript{28} Flaherty et al. found a graded relationship between ACEs and a composite subjective health measure "poor health" at 14 years old.\textsuperscript{34}

The exact number of adverse or traumatic experiences that tips a child into a poor health outcome remains undetermined. Many researchers find that four or more adverse experiences in childhood are associated with the highest levels of adult dysfunction.\textsuperscript{13,15} Looking specifically at children, Margolin, Gordis and others report evidence of developmental compromise with three or four traumatic experiences.\textsuperscript{12–14,19}
**ACEs and Health: Proposed Mechanism by Which ACEs Damage Health**

In order to successfully intervene in this public health crisis, it is important to understand the mechanism by which trauma is causing negative health outcomes. A promising model is to focus on twin mechanisms of health damage: 1) neuroendocrine dysfunction and 2) adoption of health risk behaviors. There is significant evidence to support both of these intermediary outcomes resulting from childhood trauma. At the same time, there is evidence that these two independently, if not in an interactive fashion, lead to negative health impacts.6,8,10,11,15,21,26,27,35–42 (See Figure 1.) Dong et al. propose a pathway between childhood trauma and ischemic heart disease that is concordant with this model: “The chain of events begins with childhood exposure to abuse, neglect, and household dysfunction, which lead to the development of unpleasant affective states, depression and anger/ hostility, as a result of long-term effect of physiological response to stress. Attempts to cope with these stresses may also lead to the adoption of risk behaviors, such as smoking, overeating, and physical inactivity.”6

Repetti et al. characterized families in which there is overt family conflict and deficient nurturance as “risky families.” In a review of the literature, they show that children in these vulnerable families develop deficits in social abilities and emotional regulation as well as have perturbations in neuroendocrine function via sympathetic-adrenomedullary (SAM) reactivity, hypothalamic-pituitary-adrenocortical (HPA) reactivity, and serotonergic function. Children reared in “risky” families also engage in health-threatening behaviors such as smoking, substance use, and promiscuous sexual behavior at higher rates than peers from healthy families.10
The neuroendocrine system is not mature at birth. The first five years are a time of rapid brain growth, stress system maturation, and affect regulation.\textsuperscript{13,21} During a stress response, heightened levels of cortisol operate to counteract arousal and down-regulate the stress response via the HPA axis. This paradoxical behavior partially explains the combination of elevated cortisol in acute stress and depressed cortisol in chronic stress. Chronic elevations in cortisol predispose people to rapid emotional fight/flight/freeze responses over the slower HPA axis responses, which are normal to hypoactive.\textsuperscript{27} By two years of age, normally developing children display the mature cortisol patterns of peaking within 30 minutes of awakening in the morning and steeply declining levels until bedtime, when levels are near zero. Blunted morning levels and a shallow slope to the end of the day, termed hypocortisolism, is a marker of chronic stress and developmental risk.\textsuperscript{26} Young children will show elevated salivary cortisol with maternal separation.
Children in full-day childcare show elevations in cortisol beginning in the late afternoon, after several hours away from parental care, until the age of five or six. The most severe neurological impacts of child maltreatment are from neglect, not abuse.\textsuperscript{27}

During development, cortisol influences the levels and activity of several other neurotransmitters; as a result, cortisol perturbations affect emotional and cognitive development broadly. Excessive cortisol has been found to interfere with myelination, decrease the number of dendritic spines, delay audio and visual information processing, and decrease the volume of the hippocampus.\textsuperscript{21} There are also impacts on the pre-frontal cortex.\textsuperscript{20,27} PTSD is also associated with hippocampal atrophy and memory deficits.\textsuperscript{20} Systemically, too much cortisol increases the risk of inflammation-mediated disease and autoimmune processes.\textsuperscript{21}

The graded dose-response relationship between early adversity and poor health outcomes is consistent with other research about the neuroendocrine responses to toxic stress in childhood. The National Scientific Council on the Developing Child has categorized three levels of stress that affect children’s development: positive, tolerable and toxic.\textsuperscript{9,43} Positive stress is defined by moderate and short-term physiologic arousal in response to normative experiences such as minor frustration or injury. Tolerable stress is an activation of the child’s stress response system significant enough to trigger architectural changes of the brain via hippocampal atrophy and cortisol-mediated neuronal death, but nonetheless able to modified by adaptive coping in the context of supportive relationships. Examples of such stressors might include death of a loved one or homelessness. When the tolerable stress is over, the child can recover neurologically.
With toxic stress, the child is exposed to intense, frequent, and long-term activation of the physiologic stress response in the absence of supportive relationships, preventing the child from returning to a non-stressed baseline and recovering neurologically. Risk factors for toxic stress include chronic abuse and neglect, severe maternal depression, and violence in the family. Toxic stress is purported to permanently alter brain architecture, affecting physiology by modifying immunity and organ systems, and promoting a more reactive stress response that makes the individual more vulnerable to stress-related disease processes.\textsuperscript{8,20,43} That said, there is ample evidence that children’s cortisol regulation is responsive to psychosocial interventions.\textsuperscript{44}

When children experience early adversity, they are more prone to engage in health risk behaviors throughout their lives. Substance use, risky sexual practices, academic failure, and poor relationships with peers are significantly associated with early adversity.\textsuperscript{15–17,19,45} Margolin and Gordis note that childhood abuse may exaggerate adolescent’s natural tendency to engage in risk-taking and escape behaviors such as running away and experimenting with drugs and premature sexual activity.\textsuperscript{14} Behavioral problems, such as the externalizing and internalizing behavioral problems known to be associated with ACEs, independently predispose children to engage in substance abuse as adolescents and adults.\textsuperscript{35} Lynskey and Fergusson found that adolescents who misuse alcohol were much more likely to engage in risky sexual practices including promiscuity and unprotected sex. This relationship was largely non-causal, but rather mediated by common the risk of childhood adversity.\textsuperscript{46} Other researchers report that in both rat and primate models early maternal separation results in increased spontaneous alcohol
consumption. Looking at a population of women inmates in Norway, Friestad et al. show a clear association between the number of childhood ACEs and the risk of subsequent suicide attempts and substance abuse. Dube et al. examined smoking and its relationship to early adversity among a sample of approximately 5,000 adults using the Texas Behavior Risk Factor Surveillance System. Compared to those with no early adversity, adults who experienced childhood abuse and early household dysfunction were 90% more likely to be smokers.

Poor interpersonal relationships are a common result of early adversity as well as health risk behavior. Collishaw et al. found that almost half of those reporting child abuse in a longitudinal study had been rated as having had significant abnormalities in adolescent peer interactions, which continue into adulthood. Children exposed to violence in particular may have trouble with peers due to developmental interruptions with attachment and sensitization to others’ anger. At the same time, families affected by violence are often isolated, offering a dearth of positive social relationships after which children can model their own. Since quality friendships have been found to enhance resilience in traumatized children, this difficulty with peers can be a vicious cycle.

Children with ACEs are more at risk of academic failure than those without, again a poor outcome in itself as well as a contribution to poor health outcomes in the future. From the earliest school experiences, children with multiple ACEs are at a significant disadvantage. Much scholarship has identified a relationship between exposure to violence and lower academic performance, increased truancy, and lower rates of high school graduation. Streeck-Fischer and Van der Kolk report that 29% of children
exposed to violence have learning difficulties.\textsuperscript{20} Bethell et al. find that those with two or more ACEs are more than 2.5 times as likely to repeat a grade in school and significantly less likely to respond affirmatively to the prompt “usually or always engaged in school.”\textsuperscript{50} Jimenez et al. re-analyzed data from Princeton’s Fragile Families Study, a nationwide longitudinal birth cohort study of 5,000 poor, urban, majority ethnic and racial minority, predominantly female-headed households, looking at kindergarten performance as it relates to ACEs.\textsuperscript{16,19} The 12\% of the sample who had experienced three or more ACEs was significantly more likely to be rated by the teacher as having below average language, literacy, and math skills, attention problems, social problems, and aggression. Those with three or more ACEs were more than twice as likely to have below average math and literacy skills and more than three times as likely to have attention and social difficulties than their peers with no ACEs.\textsuperscript{19}

There is likely a complex interplay between neuroendocrine perturbations and health risk behaviors mediated by the psychological impact of trauma. Trauma changes social and emotional development and expression, comprising a psychological response to the traumatic experience. Neuro-endocrine dysfunction may increase unhealthy behaviors such as emotional eating and risk-taking behavior at the same time that some health risk behaviors may constitute self-medication for untreated mental illness. Obesity provides a good example for the model: neuro-endocrine dysregulation from toxic stress is associated with increased consumption of nutrient-dense food while childhood adversity is linked to increased rates of disordered eating behaviors. At the same time, depression, a known psychological impact of ACEs, independently puts people at higher
risk of obesity.\textsuperscript{30}

Allostasis is the process of returning to homeostasis given an environment of chronic stress. Both behavioral and physiologic changes in the body occur to help the child return to a baseline, which may not be adaptive in the long-term.\textsuperscript{14,21,41} The allostatic load is the cumulative physiologic effect of the activation of the neuroendocrine stress response from catecholamines and glucocorticoids without a recovery period, a concept which may be useful for understanding the enduring impact of trauma over the life course.\textsuperscript{10} Ramey et al. describe the risk of allostatic load as follows, “Allostatic load is the ‘‘wear and tear’’ on body systems from adjusting to chronic and acute stress…Early findings showed that allostatic load in middle-age groups significantly predicted morbidity and mortality in old age.”\textsuperscript{41} Allostatic load may be a key modifiable risk factor to prevent long-term damage to traumatized children’s health.

\textbf{Resilience: Definitions and Manifestations in Childhood Adversity}

Resilience can be defined as a process of adaptation to the experience of adversity.\textsuperscript{9} Wingo et al., in a 2010 study of the cognitive correlates of resilience, define resilience as inextricably linked to adversity. A more specific definition of resilience is the maintenance of healthy psychiatric function despite exposure to risk in the form of childhood adversity or trauma.\textsuperscript{25} A 1990 review on childhood sexual abuse and resilience found that between 20\% and 40\% of those exposed display no adverse health outcomes or resilience.\textsuperscript{52} Ungar stresses the importance of the child’s environment in contributing to resilience when he describes resilience not as a simple characteristic of a child or a “measure of their personal invulnerability,” but rather as a “combination of the capacity
of the individual child and capacity of their social and physical ecologies to enable culturally meaningful and protective coping.” Lynch and Cicchetti describe a compatible model of an ecosystem of adversity and resilience surrounding the child. They note that the continuous interactions between children and their environments (“contexts”) present opportunities for change; in other words, changing children’s environments can bolster resilience and alter developmental and health trajectories.

Multiple authors identify similar personal and cognitive traits as associated with resilience: high self-esteem, internal locus of control, external attributions of blame, optimism, determination in the face of obstacles, cognitive flexibility and reappraisal ability, social competence, and the ability to face fears. Furthermore, the child’s understanding of trauma may mediate the negative impact on the child. Researchers have found that in low to moderate risk environments, increased self-efficacy and internal locus of control were associated with relatively lower rates of depression.

Neurocognitive associations with resilience include non-verbal memory, a potential proxy for emotional learning and processing of emotional information. Non-verbal memory deficits are associated with major depressive disorder and PTSD both.

Not only does the experience of trauma necessarily precede identification of resilience, but the appearance of resilient traits in a child is inversely associated with the quantity of traumatic experience. If resilience is conceptualized as the shield protecting children from toxic stress, the shield gets battered and worn down from use. In their sample of primarily poor, urban African Americans with high self-reported rates of childhood trauma, Wingo et al. found that the resilient had both fewer and less severe
lifetime experiences of childhood physical, sexual and emotional abuse. Nurius et al. describe this catch-22 as follows, “Higher ACE scores were associated with poorer adult conditions, including low [socioeconomic status] (SES), high adult adversity, and diminished resilience resources, each of which influenced psychological well-being. These life conditions illustrate chains of risk in which one set of adversities tends to lead to another.”

Recent research has shed light on a paradoxical phenomenon related to resilience of particular relevance to health outcomes: the “John Henryism” (JH) hypothesis, which states that high-effort coping styles defined by hard work and determination by those at relative socio-economic disadvantage are associated with elevated blood pressure. Brody et al. tested and found evidence for the JH hypothesis in an innovative longitudinal study of 452 rural African American youth. Those 11-13 year-olds rated most highly in psychosocial competence by teachers were found, at age 19, to be less likely to be depressed or use drugs, more likely to attend college, but had significantly greater allostatic load than their peers who were rated as less psychosocially competent. This phenomenon underscores the need conceptualize resilience-building efforts at the family and community level rather than the level of individual personal traits.

**Resilience: Modifiable Resilience Factors**

It is plausible that fostering resilience in vulnerable children and their families would have a health protective effect. Identifying and enhancing those aspects of resilience that are modifiable, understanding that trauma itself, past, and ongoing, will counteract these efforts, could safeguard children. This review will focus on five modifiable resilience.
factors: parenting, social support and peer relationships, treating maternal mental health problems, self-care skills, and understanding of trauma. While the intended beneficiary is the child, the appropriate target for resilience-building efforts extends to the family and caregivers tasked with raising the child. See Table 1 for a summary of these modifiable resilience factors. These five factors are by no means the only modifiable resilience factors, but the evidence supporting their association with the proposed intermediates (neuroendocrine dysregulation and health risk behaviors) and eventual health outcomes of adversity is strong. The Center for the Study of Social Policy promotes a research-informed approach to strengthen families, foster healthy child development and prevent child maltreatment which identifies protective factors for families that target very similar components of the child’s environment including: parental resilience and knowledge of parenting, social connections, and support for children’s socio-emotional competence.\textsuperscript{59} Clearly the most important modifiable resilience factor is reducing children’s exposure to toxic stress, but this literature review is focused on secondary prevention.

**Table 1. Modifiable Resilience Factors**

<table>
<thead>
<tr>
<th>Resilience Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parenting</td>
<td>Responsive parenting and good parental relationships foster resilience. The HPA axis normalizes in traumatized children when parenting improves.</td>
</tr>
<tr>
<td>Social Support</td>
<td>Friendship, supportive relationships, and increased social capital are associated with resilience.</td>
</tr>
<tr>
<td>Maternal Mental Health</td>
<td>Maternal mental health problems are associated with risk for trauma; identifying and treating them may protect children.</td>
</tr>
<tr>
<td>Self-Care Skills and Routines</td>
<td>ACEs are associated with poor sleep, nutrition, and exercise habits. Teaching children self-care skills and using consistent routines at home fosters healthy development.</td>
</tr>
<tr>
<td>Trauma Understanding</td>
<td>Educating children and families about trauma in pediatric settings and through trauma-focused interventions builds resilience.</td>
</tr>
</tbody>
</table>
Resilience: Parenting as a Modifiable Resilience Factor

Responsive parenting builds resilience in children. Gunnar et al. examined the relationship of maternal sensitivity, evaluated by researchers at two, four, and six months of age, to cortisol levels in toddlers immediately following routine vaccinations (a stressor). Their results support the role for maternal nurturance as a protective factor in maintaining normal neuroendocrine function. Mothers rated low in sensitivity during infant medical exams had toddlers with higher cortisol responses to vaccinations.27

The Attachment and Bio-Behavioral Catch-Up (ABC) intervention was the subject of multiple randomized control trials (RCT). Researchers implemented a manualized parenting intervention (delivered by parenting coaches) with mother and infant dyads referred to CPS for neglect before the age of two. They found normalization of treatment group salivary cortisol in the morning and an appropriate slope down to bedtime three months post-intervention, a normalization that did not occur with the control group. Researchers then conducted a follow-up three years later and found enduring effects of the intervention on salivary cortisol levels for the treatment group and significant difference (p<.05) from the control group.20,22,26,40,49,52,60,61 Bick and Dozier have also conducted the intervention with dyads of foster mothers and infants and found increases in maternal sensitivity to her foster infant from pre- to post-intervention that significantly exceeded those seen in the control group.62

Especially for younger children, parent-child interactions and relationships have a profound effect on resilience.20,22,26,40,49,52,60,61 Collishaw et al. summarize the literature about the protective effect of parenting on abused and neglected children: “the more
sensitive, caring, and safe the home environment, the more adaptive the outcome will be.”

Streeck-Fischer and Van der Kolk write: “having a caregiver who makes a deep commitment to the welfare of the child is probably the greatest source of resilience.”

Savage-McGlynn et al. reanalyzed ALSPAC data focusing on infants experiencing maternal post-partum depression at eight months of age. Thirty-two percent (32%) of the over 1,000 eight-month-olds with depressed mothers were denoted as resilient at 11 years old, displaying fewer indications of emotional and behavioral problems on the Strengths and Difficulties Questionnaire (SDQ) than the mean for the ALSPAC 11 year-olds not exposed to maternal depression at eight months. The study found that the best correlate of resilience at 11 was a composite indicator of mothers’ positive feelings about their own ability to be parents at eight and 21 months post-partum. In other words, a woman’s belief that she is doing a good job parenting her child, regardless of the veracity of this, fostered resiliency in the child.

Collishaw et al. analyzed a follow-up data set to the Isle of Wight study. The original study was conducted in 1964 with a cohort of 9-10 year-olds, who were seen again at 14-15 years old and then again in mid-life at 44-46 years old. Collishaw’s team looked at those members of the community sample that had experienced physical and sexual abuse in childhood (10.3%) and evaluated whether or not they had any evidence of psychopathology in mid-life. Those who had reported no mental illness by age 46 were categorized as resilient. They also looked at self-rated health, quality of adult relationships, and involvement in the criminal justice system. Forty-four percent (44%) of those who had been abused showed resilience, with lower rates of self-rated health
problems, better interpersonal relationships, and less criminality than the control group. Those who rated at least one of their parents as “very caring” on the validated Parent Bonding Instrument were significantly more likely to be resilient in mid-life (61.5% vs. 20% who rated neither parent as such).\textsuperscript{49}

Dozier et al. explored the impact of foster care on infants and toddlers and elucidated the role of caregiver behavior in augmenting resilience through enabling healthy attachment.\textsuperscript{20,22} Infants in the first year of life placed into foster care with a stable caregiver will return to baseline neuroendocrine function and form a stable attachment.\textsuperscript{22} Forming a stable attachment in the second year of life in foster care is more difficult, but up the age of 20 months, children will develop healthy attachments in the context of nurturing foster care. In contrast, they report that when infants are placed with non-nurturing foster caregivers, they are likely to develop disorganized attachment, a significant risk for later psychopathology. Similarly, children removed from orphanages have consistently been shown to have perturbations of the HPA axis that normalize with adoption by a stable caregiver by three years later.\textsuperscript{26,27} Fisher looked at the abuse histories that predict low morning cortisol in preschoolers removed from their homes into CPS custody within the last month (35-40% have low am cortisol) and found that the most significantly associated factor was a history of caregiver neglect.\textsuperscript{27} Dozier et al. urge that rather than see parenting as a significant risk factor for long-term negative health outcomes for children, practitioners should recognize that parenting is the single greatest lever to improve outcomes for young children who have experienced adversity.\textsuperscript{22}
Resilience: Social Support as a Modifiable Resilience Factor

As children who have experienced adversity age, the factors that enhance resilience change. Social support in the form of peer and non-caregiver relationships are significantly associated with resilience, especially in adolescence. This literature review also groups social support for parents and children through individual relationships and through neighborhood and community resources under the broader resilience factor of social support.

Collishaw et al identified a strong relationship between peer support and resilience. Those adolescents who were rated by researchers as having normal peer relationships were resilient to the trauma of childhood abuse at much higher rates, controlling for abuse severity. Thirteen percent (13%) of those adolescents without normal peer relationships were resilient in mid-life compared to 52.6% of those with normal peer relationships in adolescence. Egeland et al. examined mothers who had themselves been abused as children and identified factors associated with “breaking the chain of abuse.” The natural history of child maltreatment is that approximately 20% of mothers who were abused as children will go on to abuse their own children. Those mothers abused as children who had received consistent emotional support from a non-abusive adult (non-parent) during childhood were significantly less likely to abuse their own children.

Social resources continue to modify health outcomes from ACEs into adulthood. Nurius et al. report that a strong sense of community among adults with prior ACEs is the most closely associated with reduced health impacts in adulthood of all the examined
buffering or resilience factors. They measured adult self-rated well-being along with missed days of work for mental health reasons. If study participants had a strong sense of community, they displayed similar psychological functioning in adulthood across lower and higher levels of ACEs. In contrast, a lack of social support was significantly associated with poor mental health in adulthood among those with ACEs.  

Social capital is an important factor in the health of fragile or high-risk families. Dauner et al. studied the temporal relationship between perceived levels of social capital and perceived health in as part of Princeton’s Fragile Families Study. The study’s longitudinal design allowed researchers to assess social capital at a point in time and then assess perceived health four years later. With the exception of social participation, all of the other measures of social capital at the earlier time were associated with significantly better self-rated health of mothers. Maguire-Jack and Showalter look more specifically at the relationship between social cohesion, defined as “connectedness and solidarity” of neighbors, and child maltreatment. They find that higher levels of social cohesion are associated with lower levels of some types of neglect, but have no association with physical abuse.64

From 1994-8, there was a rare large-scale social experiment with longitudinal randomized controlled design called Moving to Opportunity (MTO), whose results shed light on the complexity of social support as a factor in resilience. Poor families with children, predominantly non-white, were given vouchers to move into low-poverty neighborhoods (treatment group) and compared to a control group who stayed in high-poverty neighborhoods. The long-term health outcomes for these children were split
along gender lines. Adolescent boys, randomized at ages 0-8, in the long-term follow-up of the treatment arm had significantly higher rates of major depression (OR 2.2), PTSD (OR 3.4), and conduct disorder (OR 3.1) than their counterparts in the control group. Adolescent girls, in contrast, were significantly less likely than control group girls to suffer from depression and conduct disorder. Using qualitative data, Kessler et al. explain this difference by positing that girls and boys have a different social experience in the low-poverty neighborhood and that girls have relatively more adaptive social skills that enable them to profit from the social environment of the lower poverty neighborhood.65

In contrast, the MTO study did show reductions in body mass index (BMI), extreme obesity and diabetes for the female heads of household of those families that moved to lower poverty neighborhoods compared to those in the control group. This shows a positive health impact of the social environment, not necessarily mediated by social cohesion or connectedness.66

**Resilience: Maternal Mental Health as a Modifiable Resilience Factor**

Yet another way to modify risk for children suffering from adversity is to screen for, identify, and treat maternal psychopathology, which has been found to be harder to treat when the mother herself has a history of trauma.67–69 Depressed mothers are less responsive to and more punitive and rejecting of their infants, who are likely to suffer cognitive, social, and emotional deficits as a result.61 Chemtob et al., using 97 primary care visits of preschoolers, sought to identify maternal depression and PTSD and associate these with the mothers’ self-reported abuse of her children and the number of potentially traumatic events a child has experienced. PTSD in the mother was associated
with an average of five potentially traumatic events per preschooler, maternal comorbidity with PTSD and depression with 3.2 potentially traumatic events, and maternal depression alone with 1.2 potentially traumatic events. The more severe the maternal depression, the higher was the risk of child physical abuse and neglect.

Using short depression and PTSD screening tools for parents of pediatric patients and referring them to effective treatment could both serve as primary prevention of ACEs (namely maltreatment and exposure to trauma) and mitigate the harms from ongoing maltreatment and trauma by identifying and appropriately treating at-risk children. Dubowitz et al. conducted an RCT of a screening tool for detecting caregiver depression, intimate partner violence, substance use, and stress, and found that those pediatricians trained in using the screening tool were both doing significantly more screening for these maternal outcomes and feeling significantly more competent in their capacity to effectively address these issues as far as three years post-intervention.

**Resilience: Self-Care Skills and Routines as a Modifiable Resilience Factor**

Self-care and consistent routines are key ingredients in understanding resilience from early childhood adversity. Adults who have experienced ACEs are less likely to have healthy sleep, nutrition, and physical activity habits, an important factor enhancing resilience to this same adversity. Nurius et al. found that study participants with high ACE scores who demonstrated healthy sleep and exercise habits were no more likely to miss work for mental health problems than were those with lower ACE scores.

Consistent routines in the household are essential for establishing feelings of safety in young children, and form the basis for learning to care for themselves.
Cohen et al. note the importance of teaching self-care skills in pediatric primary care to the families of traumatized children. She writes of healthy sleeping and eating patterns, as well as exercise and relaxation techniques as instrumental in reversing the effects of toxic stress. The physiological hyper-arousal that accompanies PTSD in children is often responsive to age-appropriate breathing and muscle relaxation techniques that can be taught in the pediatric office.

The Early Intervention Foster Care program (EIFC) is an intervention for preschoolers in foster care that derives from the “treatment foster care” model, where both foster child and foster parent are targeted. EIFC employs an approach to teach caregivers how to create an environment with consistent, stable caregiving and predictable routines. In an initial pilot study of EIFC, researchers found improvements in child behavior, reductions in foster parent stress and improved parenting, as well as concordant changes in the neuroendocrine activation of the children, as evidenced by changes in salivary cortisol that had the EIFC group coming to resemble the un-traumatized community control while the regular foster care cohort maintained blunted cortisol and high cortisol variability. The EIFC intervention was subsequently the subject of a five-year RCT showing significant increases in permanent placements for the treatment group over the control group, 90% vs. 64%.

**Resilience: Trauma Understanding as a Modifiable Resilience Factor**

The final lever that will be examined here to enhance resilience to pediatric trauma is education about the nature of toxic stress and children’s response to toxic stress. Streeck-Fischer and Van der Kolk note that children who have experienced chronic stress and
trauma rarely spontaneously speak of their experiences and tend to have little insight about the relationship between their experiences and how they feel and act.\textsuperscript{20}

Several psychotherapy approaches show the positive impact of trauma education on children’s mental health outcomes.\textsuperscript{13,72,74–76} The Child-Parent Psychotherapy (CPP) intervention aims to reduce maladaptive behaviors, foster developmentally appropriate interactions, and help the parent and child together create a trauma narrative.\textsuperscript{72} Ghosh-Ippen et al. tested this model with a diverse group of 75 preschoolers (and their mothers) who had been exposed to domestic violence. Those children who received CPP and who had experienced four or more traumatic and stressful life events (TSEs) showed significantly greater reductions in depression and PTSD symptoms and behavior problems than their counterparts in the comparison group. After treatment, those with four or more TSEs were significantly less likely to be diagnosed with PTSD than their counterparts in the comparison group (5\% vs. 55\%).\textsuperscript{13} Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) is an extensively studied treatment modality comprised of several components: psycho-education about trauma, parenting skills, relaxation techniques, emotional expression and regulation, coping cognitively, creating a trauma narrative, trauma exposure, and ensuring safety and future positive development.\textsuperscript{76} Dorsey et al. cite six RCTs that show TF-CBT is more effective in reducing symptoms of PTSD and depression and behavior problems than non-CBT interventions, citing enduring benefits of the treatment at six months, one year, and two years post-treatment.\textsuperscript{76} Cohen et al. show that a group of sexually abused children in an RCT trialing TF-CBT vs. a child-centered psychotherapy comparison were half as likely as the
comparison group to meet the criteria for PTSD at the end of the intervention (21% vs. 46%), had significantly lower levels of depression symptoms and behavior problems, and higher rates of interpersonal trust.\textsuperscript{75}

Pediatric providers can and should identify children in need and refer them to trauma-informed mental health treatment. But they can also teach families of children who have experienced trauma about the natural course of recovery from trauma, symptoms of PTSD, and sources of resilience. The pediatrician can thus normalize children’s and families’ distress while providing encouragement about the potential for healing.\textsuperscript{72} Bair-Merritt and Zuckerman, in a 2016 commentary in JAMA, also recommend universal education for parents and caregivers about the impact of past trauma on parenting practices.\textsuperscript{77} This anticipatory guidance may lead to increased understanding on the part of children and their caregivers, understanding which has the potential to increase resilience by modifying children’s self-esteem, internal locus of control, and attribution of blame, all cognitive traits associated with resilience. At the same time, as families learn about PTSD and symptoms of emotional distress in their children, they will be more likely to seek help for them.\textsuperscript{72}

**Preventive Pediatric Care and ACEs**

Well-child care (WCC) is the backbone of pediatric care, tasked with screening for and addressing a diverse array of social, developmental, and health needs, and constituting the vast majority of medical care received by children. Studies have shown that WCC as currently implemented leaves many of these needs unmet, with developmental and preventive screenings and behavioral healthcare needs chief among the care left un-
provided. Due both to the greater complexity of their needs, and the relatively lower access to care, poor children and children with ACEs are more likely to fall through the cracks. Many experts in pediatric care design recommend greater reliance on non-physicians to complete screenings, offer anticipatory guidance, at the same time as implementing innovative service delivery models such as group visits.\textsuperscript{78,79} Coker et al conducted an RCT of an innovative model using a Parent Coach to deliver health education, developmental assessment and guidance, and psychosocial screenings during WCC visits for 251 majority Medicaid-insured infants and toddlers. They found the most dramatic and significant impacts of the intervention in psycho-social screening (23-point difference between intervention and control) and Emergency Department (ED) utilization (10.4\% of intervention vs. 21.6\% of control with $\geq 2$ ED visits).\textsuperscript{79}

Felitti, in a 2009 Commentary in Academic Pediatrics, wrote: “Although none of us is yet experienced in devising appropriate primary prevention on the necessary large scale, the need is clear, the opportunities are major, and no one will be in line ahead of the pediatricians who take on this important preventive work. As was demonstrated in the ACE Study, what happens in childhood—like a child’s footprints in wet cement—commonly lasts throughout life. Time does not heal; time conceals.”\textsuperscript{38} The Affordable Care Act (ACA) promises increased integration of mental and behavioral health care into the primary care model, an integration that is vital to successfully addressing childhood adversity.\textsuperscript{45,80}
Preventive Pediatric Care: Patient-Centered Medical Home

The Bright Futures guidelines, which delineate preventive services and screenings that insurance must cover under the ACA (co-authored by the Federal Maternal and Child Health Bureau and the AAP), recommends a “family-centered medical home model.”50 The evidence is unequivocal about the benefits to vulnerable pediatric patients from patient-centered medical homes. Asarnow et al., in a 2015 Journal of the American Medical Association (JAMA) article, published the results of a meta-analysis of 35 RCTs comparing integrated medical and behavioral health care for pediatric patients to standard care. They found a small, but significant, effect size for the whole group of trials included in the meta-analysis. Particularly effective were those trials that were “treatment” in nature vs. “preventive” and those that employed a “collaborative care” approach, where collaborative care is defined as “team-based care in which [primary care providers] (PCPs), care managers, and mental health specialists work together to evaluate, treat, and monitor patient progress.”80 Asarnow et al. found a 73% and 66% likelihood, respectively, that a randomly selected child treated in a “collaborative care” model and “treatment” model would have a better outcome than a child in the standard care comparison group.80 There is evidence that this benefit holds in research about the most vulnerable children. Raphael et al. in a cross-sectional retrospective analysis of claims data looked specifically at the healthcare utilization rates for a sample of 240 low-income children with chronic diseases. They found that kids with a PCP had significantly lower rates of Emergency Department (ED) usage and fewer hospitalizations. At the same time, those pediatric practices who self-rated as more “patient-centered” had lower ED usage
and hospitalization rates for these chronically ill children.\textsuperscript{81} Bethell et al. found that children who had more than two adverse experiences were significantly less likely than children with no ACEs (43.5\% vs. 61.4\%) to receive their medical care in a family-centered medical home.\textsuperscript{50}

**Preventive Pediatric Care: Trauma-Informed Care**

Not only is it important to consider the content of care pediatric patients receive, but it is also important to consider the way in which providers offer treatment. Trauma-Informed Care (TIC) is an approach that enables traumatized patients and families to get more out of preventive health care.\textsuperscript{82} Bloom and Farragher, in their 2013 book *Restoring Sanctuary*, review the research about what allows traumatized individuals to benefit from treatment. They cite research showing that 60\% of a therapeutic outcome is determined by the behavior of a provider. Specifically, 30\% of the therapeutic outcome derives from a provider’s ability to be empathetic, warm, and non-judgmental; the other 30\% under the provider’s control is split evenly between “offering hope that life will get better” and “providing people with an explanation of their difficulties” and a viable method for resolving them.\textsuperscript{43} The Substance Abuse and Mental Health Administration (SAMSHA), a division of the US Department of Health and Human Services, has defined a trauma-informed approach as one which: “Realizes the widespread impact of trauma and understands potential paths for recovery; recognizes the signs and symptoms of trauma in clients, families, staff, and others…; responds by fully integrating knowledge about trauma into policies, procedures and practices; and seeks to actively resist re-traumatization.”\textsuperscript{83} Trauma-informed care in a family-centered pediatric practice will
enhance care quality by meeting the needs of the many children and families who have suffered ACEs as well as supporting providers in the difficult work of caring for traumatized children. To implement trauma-informed care in a pediatric setting, providers would need to screen for adversity, as well as resilience, family functional capacity, and neuropsychological deficits with an eye toward ensuring a safe experience for children, families, and staff.

**Preventive Pediatric Care: Screening for Trauma**

Despite the very high prevalence and incidence of pediatric trauma and the long-term negative health impacts from untreated pediatric trauma, pediatric primary care is not currently consistently screening for and treating childhood adversity. By intervening early, pediatricians can alter the life course of their patients. Results of an AAP survey of 300 non-trainee practicing pediatricians show that only 2% screen for ACEs and more than three quarters (76%) were not familiar with the original ACE study.

Screening for childhood adversity makes sense. The U.S. Preventative Task Force recommends screening for common diseases with significant morbidity, for which accurate screening and effective treatment are available. Childhood adversity is a common condition, causes significant morbidity and mortality, and is eminently treatable once identified. There are easy-to-use validated screening tools for trauma and resilience. (See Appendix B) And yet, the vast majority of children with emotional and behavioral problems, many of which may be due to trauma, go unidentified and untreated. Bright Futures endorses also screening for caregiver depression, substance use, and intimate partner violence as a best practice because these caregiver variables
have the greatest association with adversity for children. Barriers to identification and treatment of trauma in primary care pediatrics include a perceived lack of time, lack of training, lack of reimbursement, and a reluctance to experience the discomfort that may come from discussing trauma and parenting with caregivers and children alike, especially when children are in the room. Cohen et al., in their article on identifying, treating, and referring pediatric trauma put simplicity in the forefront when they recommend that clinicians ask during each regular visit: “Since the last time that I saw you, has anything really scary or upsetting happened to you or your family?” For children under eight, they recommend the correlate question to be asked of the caregiver. If the answer to the question is affirmative, clinicians can then proceed with a more detailed screening instrument.

**Preventive Pediatric Care: Evidence-Based Interventions to Enhance Resilience**

There is agreement that clinicians need to offer evidence-based interventions that have been proven to successfully address the needs of traumatized children. Some interventions for traumatized children have shown promising impacts on short-term outcomes and even on the two mechanisms posited to lead to long-term health outcomes, but there is not yet enough longitudinal research to determine their impact on the long-term health measures of interest. The Perry Preschool Project (1962-1965) was an early education intervention for low-income African American preschoolers deemed to be at high risk of school failure, which was the subject of a longitudinal, RCT and showed durable impacts. At the age of 40, intervention participants were 46% less likely to have served prison time, had 42% higher monthly incomes, and had completed high school at a
rate 44% higher than control group participants. Studies of this caliber and scope are missing from the evidence base for interventions to mitigate childhood adversity. In a 2008 review article, Cohen et al. summarize the evidence base on interventions for traumatized children by identifying five common features of effective evidence-based treatments for ACEs using the acronym DROPS: D for developmentally and culturally sensitive; R for resilience-based; O for overcoming avoidance and mastering trauma; P for parent-inclusive; and S for skills (self-care) and safety focused. Please see Appendix C for five interventions that have been evaluated to increase resilience in traumatized children.

Many interventions target children in CPS custody who are at higher risk than even other children with early adversity of short, intermediate, and long-term negative behavioral and health impacts. Pears and Fisher hypothesize that this may be due to the fact that in addition to the sustained risk of childhood maltreatment, they have also experienced separation and loss of biological families or initial caretakers. Looking specifically at the under-five population in foster care, there are very high rates of prenatal exposure to teratogens, inadequate nutrition, early neglect, and abuse. One study found that more than 80% of foster children under the age of five had emotional or behavioral health problems and fully half had both. Mothers of children involved in CPS are also more likely to suffer from depression; Chemtob et al. report that fully 46% of mothers of CPS-involved preschoolers experience major depressive disorder. The original Kaiser ACE study revealed that if an individual reported one ACE, there was a 52% chance of having three or more additional ACEs. As Nurius et al. observe,
“Childhood adversities tend to be interrelated, creating layered stress, exert damage to various aspects of the developing brain, foster maladaptive health and behavioral habits, and be associated with limited protective relationships." Offering these children trauma-informed care in a medical home will not only respond to the greatest medical, mental health, and developmental needs, but will provide insights about how to infuse trauma-informed care into broader pediatric clinical populations.

**Preventive Pediatric Care: Barriers to Engagement**

Families of traumatized children often face significant barriers to engagement in interventions designed to help their children. Barriers to engagement in interventions include negative perceptions of mental health services, especially negative past experiences with mental health providers; family stress; and lack of social support for receiving behavioral health services. Having a history of trauma or maltreatment, belonging to a cultural or ethnic minority group, and having non-biological caregivers are all independent predictors of premature treatment disengagement. Engagement interventions, such as McKay’s which focuses on establishing collaborative relationships with the family, need to be included in any program for traumatized families.
METHODS

Study Design

This chapter will propose a trauma-informed medical home (TIMH) for children who have recently entered CPS custody. This intervention will be piloted in an urban medical center pediatric practice, providing wrap-around services for the study participants and trauma-informed training for all pediatric staff. The pilot project will then be evaluated formatively and summatively to provide preliminary evidence of effectiveness and enable ongoing quality improvement. Beyond providing data about the effectiveness of this particular piloted intervention, the program evaluation should also shed light on the needs of traumatized children in a pediatric primary care setting and on the barriers to successfully meeting those needs and ultimately preventing short- and long-term health sequelae of trauma. See Table 2 for a comparison of the TIMH to usual care and Appendix D for a logic model of the TIMH.

The evaluators will be guided by the following four main questions:

1) Are children in the pilot TIMH physically and mentally healthier than when they entered the program?

2) Are children more resilient than when they entered the program?

3) What are the experiences of children and families enrolled in the program?

4) How does the mental and physical health of the pilot participants compare to that of the comparison group participants?

Program evaluators will collect several different types of data to answer these questions as well as to make mid-course corrections in program implementation.
<table>
<thead>
<tr>
<th>Service Area</th>
<th>Trauma-Informed Medical Home</th>
<th>Usual Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Health Care</td>
<td>• History and Physical (H&amp;P)</td>
<td>• H&amp;P</td>
</tr>
<tr>
<td></td>
<td>• Provider trained in TIC</td>
<td></td>
</tr>
<tr>
<td>Behavioral Health Care</td>
<td>• Integrated</td>
<td>• Separate</td>
</tr>
<tr>
<td></td>
<td>• Trauma-Informed, team-based, engagement-focused</td>
<td>• Usually not trauma-informed</td>
</tr>
<tr>
<td>Trauma/Resilience Screening</td>
<td>• Comprehensive screening</td>
<td>• Trauma/resilience screening rare</td>
</tr>
<tr>
<td></td>
<td>• Referral and integrated case management with screening results</td>
<td></td>
</tr>
<tr>
<td>Anticipatory Guidance Provided</td>
<td>• Anticipatory guidance re: trauma impacts and recovery; self-care skills, mental health treatment; age-appropriate risk reduction, and parenting</td>
<td>• Anticipatory guidance re: age-appropriate risk reduction and parenting</td>
</tr>
<tr>
<td>Case Management</td>
<td>• Integrated team-based case management with regular follow-up</td>
<td>• Usually none provided at the PCP office</td>
</tr>
<tr>
<td>Referrals to Community-Based Services</td>
<td>• Relationships and communication with community-based service providers ongoing</td>
<td>• Referrals are made, but there is no ongoing communication with service providers or attempt to surmount obstacles to accessing services</td>
</tr>
<tr>
<td></td>
<td>• Community Navigator with knowledge of community resources helps families trouble-shoot and overcome obstacles</td>
<td></td>
</tr>
<tr>
<td>Parenting Support</td>
<td>• Trauma-informed</td>
<td>• Not usually offered except for brief conversations during well-child visits</td>
</tr>
<tr>
<td></td>
<td>• Integrated into care</td>
<td></td>
</tr>
<tr>
<td>Peer Support</td>
<td>• Trauma-informed</td>
<td>• Not usually offered</td>
</tr>
<tr>
<td></td>
<td>• Integrated into care</td>
<td></td>
</tr>
<tr>
<td>Educational Advocacy</td>
<td>• Educational testing, IEPs, educational advocacy</td>
<td>• Not usually offered</td>
</tr>
</tbody>
</table>

Table 2. Trauma-Informed Medical Home vs. Usual Care
Study Population and Sampling

The study population will be comprised of the first 100 children in the patient panel at Boston Medical Center (BMC) who are newly committed to CPS custody. The first 50 of those 100 children who are able to participate will be enrolled in the pilot TIMH. The next 50 children will be the comparison group and will receive routine care.

Recruitment

Program staff will recruit 50 TIMH pilot participants from among the BMC pediatric panel newly mandated to CPS custody. At the required comprehensive medical check-up within 30 days of CPS custody, TIMH staff will present the program to patients and their caregivers and seek consent to enroll. The next 50 children mandated to CPS custody will be invited to be enrolled in the comparison group and receive standard care beginning with the required medical check-up. Caregivers of the comparison group will be asked for consent to collect data about their children for the purposes of the study. Exclusion criteria include complex physical and cognitive disabilities, non-English speaking children and caretakers, and children who are institutionalized. If the program is able to hire enough Spanish/English bilingual staff, the program will accept Spanish-speaking families. Siblings will be included as well as children in all types of home-based guardian arrangements.

Intervention: Trauma-Informed Medical Home

The trauma-informed medical home will be based in a BMC pediatric practice. At the heart of the TIMH is a team of professionals who will work together to meet the comprehensive healthcare needs of the 50 children who will comprise the pilot patient
group. Throughout the implementation of the pilot, the team will work closely together in both a formal meeting structure (weekly integrated case management meetings reviewing each child bi-monthly) and an ad-hoc cooperation as team members identify needs that can be addressed by one another.

**Staffing: The Team**

The team will be comprised of a pediatric healthcare provider, a clinically based Parent Coach, a psychotherapist, two social workers, a community navigator, and a school psychologist. Please see Table 3 for a summary of required staffing and Appendix E for more details regarding each role.

**Table 3. TIMH Staffing**

<table>
<thead>
<tr>
<th>Job Title/Credentialing/Full Time Equivalent (FTE)</th>
<th>Role</th>
</tr>
</thead>
</table>
| Pediatric Healthcare Provider (MD, PA, or NP) 1 FTE | • Initial H&P and sick visits  
• Medical Care Plan  
• Participates in weekly case management meetings |
| Parent Coach (BA) 1 FTE | • Psychosocial screenings at WCC visits  
• Anticipatory guidance re healthy development, trauma impacts and recovery; self-care skills, mental health treatment; age-appropriate risk reduction and parenting |
| Psychotherapist (Psychologist, Psychiatrist) 1 FTE | • Offers individual trauma-informed therapy  
• Runs peer support groups and parenting workshops  
• Participates in weekly case management meetings |
| Social Worker (LICSW) 2 FTE | • Weekly communication with families and on-call to families (caseload up to 25)  
• Chairs weekly case management meetings  
• Runs peer support groups and parenting workshops  
• Individual trauma-informed therapy as needed  
• Trauma and resilience screening |
| Community Navigator | • Refers and facilitates access to appropriate |
(BA)  
1 FTE  
community-based services  
• Participates in weekly case management meetings

School Psychologist  
(Licensed educational psychologist)  
1 FTE  
• Performs neuro-psych testing at intake  
• Writes and communicates IEP to school  
• Liaises with school to ensure IEP implementation  
• Serves as resource to families on educational issues  
• Participates in weekly case management meetings

Phase 1: Training in Trauma-Informed Care

The TIMH Team will receive training in TIC. Specifically, training will include screening for trauma in pediatric patients and how to treat patients who have experienced trauma. The team will learn how to impart the skills of judgment, communication, cognitive, emotional management, safety, leadership, grieving and imagination to children who have lived through trauma. At the same time, they will learn to create a space that is safe for children to learn these skills. All training will be inspired by the Sanctuary model and offered to the staff in retreats. Space and resources will be made available for staff who themselves may have experienced trauma.

Phase 2: Comprehensive Needs Assessment

The first phase of the intervention will involve an in-depth needs-assessment so as to target the most appropriate services the TIMH has to offer to each child: comprehensive medical exam within 30 days of CPS custody; trauma/resilience screening, caregiver screening for depression and PTSD, and social needs assessment with the Social Worker; and assessment of educational needs and neuro-psych testing with the School Psychologist. After all assessments are complete, the full team will meet for the first integrated case management meeting for that child, during which team members will
collaborate to develop an appropriate comprehensive care plan, which will also include mental health referrals in the community for caregivers if appropriate. See Table 4 for a summary of all initial assessment activities for TIMH pilot participants and menu of services.

**Phase 3: TIMH Menu of Services**

Children in the TIMH pilot group will be offered a menu of services customized to their individual needs and designed to address the “whole child.” Physical and behavioral healthcare will be integrated, along with referrals to community-based services for children and their caregivers, and parenting workshops and peer support groups. The Parent Coach, as a non-physician health educator and clinical care provider, will enable better preventive care at annual WCC visits by highlighting developmental and psychosocial concerns for the pediatric health care provider, who will also see the patient, and addressing parent concerns. The integrated case management structure will enable the development of an Action Plan for each child, whose progress will be monitored by the entire multi-disciplinary team bi-monthly. Each week, the team will meet once and cover approximately five children, so that each child is discussed about every two months. Not all services will be appropriate for each child; similarly, over time, different services may be appropriate for a given child. In addition to regular trauma-informed medical care by a designated PCP, TIMH services will include: Parent Coach screening and anticipatory guidance at WCC visits, psychotherapy, parenting workshops and support, facilitated peer support groups, educational advocacy, and community referrals. See Appendix F for more detail about services.
Table 4. Needs Assessment and Treatment Menu of Interventions

<table>
<thead>
<tr>
<th>Phase 2: Comprehensive Needs Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
</tr>
<tr>
<td>Physical Health</td>
</tr>
<tr>
<td>Mental Health</td>
</tr>
<tr>
<td>Psychosocial Needs Assessment</td>
</tr>
<tr>
<td>Social Needs</td>
</tr>
<tr>
<td>Resilience</td>
</tr>
<tr>
<td>Educational Needs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 3: TIMH Menu of Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychotherapy</strong></td>
</tr>
<tr>
<td>Parenting Workshops and Support</td>
</tr>
<tr>
<td>Facilitated Peer Support Groups</td>
</tr>
<tr>
<td>Educational Advocacy</td>
</tr>
<tr>
<td>Community-based Referrals</td>
</tr>
</tbody>
</table>
Study Variables and Measures

Program evaluators will collect data to answer the evaluation questions and monitor ongoing program implementation. Process indicators will be collected on a continuous basis from the electronic health record of each participant as well as a program database to determine how many children have received which services. See Table 5 for process indicators.

Table 5. Process Indicators

<table>
<thead>
<tr>
<th>Domain</th>
<th>Variable</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment/Service Provision</td>
<td>• # enrolled</td>
<td>• Program database</td>
</tr>
<tr>
<td></td>
<td>• # with Action Plans</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• # receiving each service</td>
<td></td>
</tr>
<tr>
<td>Physical Health care</td>
<td>• # receiving annual check-up</td>
<td>• Electronic medical record</td>
</tr>
<tr>
<td></td>
<td>• #/type of preventive screenings performed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• # of sick visits</td>
<td></td>
</tr>
<tr>
<td>Behavioral Health Care</td>
<td>• # receiving psychotherapy. (# of sessions)</td>
<td>• Program database</td>
</tr>
<tr>
<td></td>
<td>• # enrolled in peer support groups</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• # enrolled in parenting workshops</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• # of caregiver referrals for behavioral health care</td>
<td></td>
</tr>
<tr>
<td>Educational Advocacy</td>
<td>• % with neuro-psych testing completed</td>
<td>• Program database</td>
</tr>
<tr>
<td></td>
<td>• # of IEPs written</td>
<td>• Phone calls to schools</td>
</tr>
<tr>
<td></td>
<td>• # of IEPs sent to appropriate school</td>
<td></td>
</tr>
<tr>
<td>Wrap-around Services</td>
<td>• #/type of community referrals made for families</td>
<td>• Program database</td>
</tr>
</tbody>
</table>
Outcome indicators will be collected from focus groups and interviews with children and their families; as well as from children’s scores on assessments of resilience, PTSD, and health risk behaviors; quarterly diurnal cortisol levels; children’s quarterly report cards (voluntarily shared with the program); and the number and nature of hospitalizations and emergency department visits annually. See Table 6 for outcome measures.

**Table 6. Outcome Indicators**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Variable</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Health</td>
<td>• # of hospitalizations and ED visits (with associated diagnosis) annually</td>
<td>• Electronic medical record</td>
</tr>
<tr>
<td></td>
<td>• BMI annually</td>
<td>• CPS data</td>
</tr>
<tr>
<td></td>
<td>• Glycated hemoglobin (Hgb A1C) annually</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Diurnal salivary cortisol (quarterly for pilot, annually for comparison)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• # of reported instances of abuse and neglect annually</td>
<td></td>
</tr>
<tr>
<td>Mental Health</td>
<td>• Score on UCLA PTSD scale (semi-annually for pilot, annually for comparison)</td>
<td>• Program database</td>
</tr>
<tr>
<td></td>
<td>• Score on YRBSS annually</td>
<td>• Focus groups and interviews</td>
</tr>
<tr>
<td></td>
<td>• Self-reported well-being</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Caregivers reports of child well-being</td>
<td></td>
</tr>
<tr>
<td>Resilience</td>
<td>• CD-RISC score annually</td>
<td>• Program database</td>
</tr>
<tr>
<td></td>
<td>• Self-reports on characteristics of resilience</td>
<td>• Focus groups and interviews</td>
</tr>
<tr>
<td>Educational Achievement</td>
<td>• Data on attendance and disciplinary actions</td>
<td>• Report cards provided quarterly (if available)</td>
</tr>
</tbody>
</table>
Data Collection

The comparison group children will provide baseline CD-RISC, UCLA PTSD assessment scores, and YRBSS (if over the age of 11) scores, diurnal cortisol levels, and annual number of hospitalizations and ED visits at the CPS-mandated 30-day check-up and again at subsequent annual check-ups. Investigators will collect this same baseline data from TIMH participants. Additionally, they will collect several other types of data from pilot group participants. See below for details:

- **Focus groups and Interviews:** Researchers will conduct three focus groups with six to eight participants each after one year of program operation and five to ten individual interviews. Questions for the participants will center around their perceptions of their (their children’s) safety and ongoing experiences of trauma, overall well-being including mental and physical health, access to basic needs and social services, indicators of resilience, symptoms of PTSD, quality of relationships with family and friends, and parenting. Focus groups will be with: parents/caregivers of children under the age of five; school age children; and adolescents. Interviews will be with children (if over the age of 12) or their caregivers (if under 12) selected by program staff as most at-risk.

- **Validated Instruments:** Researchers will assess all pilot participants with the CD-RISC, UCLA PTSD, and YRBSS (if over the age of 11) scales at baseline and then again each six months after program enrollment. Comparison group participants will be assessed at baseline and then again at annual check-ups.
• **School Data:** Evaluators will collect school attendance and disciplinary actions by quarter for each pilot participant, provided the child and his/her caregiver consent to provide this data.

• **Lab and EMR Data:** Evaluators will measure morning and evening salivary cortisol for three consecutive days for all pilot participants quarterly. Comparison group participants will be assessed at baseline and then again at annual check-ups. In both cases, families will be provided with labeled containers and instructions and children will “spit and freeze” and bring the specimens to visits. Both pilot and comparison group participants will have annual BMI and Hgb A1C measures.

• **Health Care Utilization Data:** Evaluators will collect data on the number of hospitalizations and ED visits for children in both the TIMH pilot and the comparison group.

• **CPS Data:** Evaluators will collect data on the number of confirmed instances for abuse and neglect from CPS for children in both the TIMH pilot and the comparison group.

In addition to these outcome measures, researchers will continuously collect data about process indicators (see Study Variables and Measures) to identify implementation challenges and progress as the program is rolled out.

**Data Analysis**

The four evaluation questions will guide analysis (see Table 7). At the same time, process measures will be analyzed compared to program planning to understand whether the program is using services in the way that they intended. Evaluators will describe data
through means and frequencies and review statistics on a monthly basis and feed data back to program administrators for their use to modify the program. Qualitative outcome data from focus groups and interviews will be analyzed for themes. Outcome measures will be compared between the comparison and TIMH pilot groups to give a preliminary indication of whether the intervention is benefitting participants. No causality can be inferred due to the evaluation design; however, evaluators will control for known socio-demographic confounders. At the same time, evaluators will examine serial data from the pilot group to learn how children’s PTSD symptoms, resilience, academic engagement, cortisol levels, and healthcare utilization are changing with time. These changes cannot be attributed to program participation due to the design of the study, but may hint at possible associations between program participation and positive outcomes to be further elucidated in later work. Collecting data about these pilot participants will respond to a real need in the field to better understand the baseline and changing health characteristics of traumatized children as well as their responses to this type of resilience-building intervention in a pediatric primary care setting.
Table 7. Data Analysis to Answer Evaluation Questions

<table>
<thead>
<tr>
<th>Are children in the pilot TIMH physically and mentally healthier than when they entered the program?</th>
<th>Lab and EMR Data</th>
<th>Validated Instruments</th>
<th>Focus Groups/Interviews</th>
<th>School Data</th>
<th>CPS data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic Health and Obesity</td>
<td>X (A1C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(BMI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroendocrine Activation</td>
<td>X (Cortisol)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalizations and ED visits</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD Symptoms</td>
<td>X (UCLA)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Risk Behaviors</td>
<td>X (YRBSS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Engagement</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuse/Neglect</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Are children more resilient than when they entered the program?</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Resilience Characteristics</td>
<td>X (CD-RISC)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-care Skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>What are the experiences of children and families enrolled in the program?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parenting Support</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Peer Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Educational Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Mental Health Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Social Services Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>How does the mental and physical health of the pilot participants compare to that of the comparison group participants?</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Metabolic Health and Obesity</td>
<td>X (A1C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(BMI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroendocrine Activation</td>
<td>X (Cortisol)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalizations and ED visits</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD Symptoms</td>
<td>X (UCLA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Risk Behaviors</td>
<td>X (YRBSS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuse/Neglect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Timeline and Resources

The pilot program will be rolled out over a year and evaluation activities will be co-occurring. Enrollment will be ongoing, with the expectation of reaching the target participation of 50 children by one year. The comparison group will be full by 18 months into the intervention. See Table 8 for proposed timeline. Data collection of process and outcome measures will be ongoing while focus groups/interviews will be held one year into the program. Investigators will analyze all data and submit a formative and summative one-year evaluation report based on the first year’s data, and then annually thereafter.

Table 8. Proposed Timeline

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff training (Phase I)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Begin enrollment in TIMH pilot and comparison groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Needs assessment and service provision for enrolled children (Phases II and III)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Evaluation Activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Document staff training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ongoing data collection for process/outcome measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct focus groups and interviews</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyze data collected and write year 1 formative/summative evaluation report</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Institutional Review Board

The study protocol will be submitted to the Institutional Review Board (IRB) for full Board Review.
CONCLUSION

Summary and Discussion

The evidence is unequivocal that early life adversity has multiple and diverse health impacts over the life course, from asthma exacerbations, increased hospitalizations, and obesity in childhood to substance abuse, risky sexual practices, and mental illness in adolescence, to metabolic syndrome, COPD, and anxiety and depression in adulthood. Toxic stress, common to all childhood adversity, causes health-damaging changes in the brain, psyche, and behavior of children that persist long after the traumatic event.

Resilience protects children from the harmful consequences of trauma. Far from being inherent to the child, resilience results from a complex interplay between the child’s natural temperament, knowledge, and skills, past experiences, social supports, and cultural and societal resources. Honing in on those aspects of resilience in a child’s ecosystem that are modifiable allows for design of interventions to safeguard a child against past and ongoing adversity. The literature has ample evidence for five such factors, by no means the only modifiable resilience factors: parenting, social support, maternal mental health, self-care skills, and understanding of trauma. And while there is not yet an evidence-based health-focused resilience-building intervention for traumatized children, many interventions have shown promise in enhancing resilience in this target population.

Pediatricians are ideally situated to address both primary and secondary prevention of trauma as well as to identify treatable trauma sequelae and ensure appropriate access to care. The first step is for pediatricians to begin to screen for trauma using any of a number of validated tools and assessments or simply by asking patients
and their caregivers the question: “Has anything scary or upsetting happened to you [your child] or your family since the last time I saw you?” When pediatricians provide preventive, trauma-informed care, they have the opportunity to reverse the harmful impacts of toxic stress, build resilience in children, and safeguard their health for years to come. Quality preventive care for children with ACEs will require significant change at the level of individual pediatric practices as well as the broader policy environment that determines the way in which healthcare is delivered.

**Public Health Significance**

The impacts of early adversity are so broad-reaching, and the access to care of traumatized children is often so limited, that a comprehensive wrap-around service provision model is most appropriate. The intervention proposed in this paper, the Trauma-Informed Medical Home, aims to build resilience in the most vulnerable children by enhancing each of the five modifiable elements of resilience here identified through the provision of team-based integrated high quality mental and physical healthcare. By focusing on CPS-involved children, the TIMH takes advantage of the unfortunate reality that adversity tends to cluster in individuals. Medical Homes have been found to be most beneficial when they target a specific health population, when they provide team-based care that integrates physical and behavioral healthcare, and when they are patient-centered. At the same time, the TIMH was constructed around trauma-informed care since the way in which care is provided has been found to be critical to successful treatment for traumatized children and their families. Cognizance of the barriers to engagement in such interventions, such as negative past experiences with mental
healthcare providers and difficulty with the logistics of participating in care, also needs to inform any intervention with this population.

To intervene in the lives of children experiencing adversity offers an opportunity to improve the health and well being of the next generation now and in the future. Not only is this the right thing to do, but it will also enhance national productivity and reduce spending on healthcare for chronic diseases and end-of-life care. By taking care of these children now, we can strengthen them to become the parents their children will need to protect them from early adversity.
APPENDIX A: What is an ACE?

Felitti et al. published the first ACE study, coining the term, in 1998. Using a sample of 8,506 adult members of Kaiser Permanente Health Plan, with mean age of 56.1, Felitti et al. showed a strong dose-response relationship between the extent of exposure to childhood abuse and household dysfunction and adult health. They administered a 21-item mailed survey in 1995-1996 which assessed seven types of adversity in the categories of abuse (physical, psychological, and sexual) and household dysfunction (substance abuse, mental illness, violence against the mother, and criminal activity within the household).96 They then analyzed the results of the survey in light of the prevalence of several health risk factors (smoking, physical inactivity, obesity, intravenous drug use, etc.) and leading causes of mortality (IHD, COPD, liver disease, skeletal fractures, etc.).

Cronholm et al created an expanded ACE survey including several types of adversities common in diverse, non-white, lower-socioeconomic level communities not reflected in the ACE survey developed by Kaiser. The expanded ACE survey included such experiences as having witnessed violence, felt discrimination, lived in an unsafe neighborhood, having been bullied, and having had a foster home.2 Finkelhor et al. find similarly that the Kaiser ACE survey is inadequate to represent the full range of adversity confronting modern children. In a 2012 telephone interview study of 2,030 youth aged 10-17, where they correlate reported adversities with self-reported mental distress, they find that the original scale is missing several elements associated with mental distress in youth including peer rejection, low SES, experiencing violence outside the family, and poor academic performance.36
APPENDIX B: Assessments of Risk and Resilience

Table 9. Pediatric Screening Tools for Trauma and Resilience

<table>
<thead>
<tr>
<th>Assessment (Number of Items)</th>
<th>Target Population</th>
<th>Use Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric Emotional Distress Scale-Early Screener (PEDS-ES) 21-items</td>
<td>Parent/Caregiver of children over the age of 2 years old</td>
<td>85% sensitivity and 63% specificity for PTSD with score &gt;8&lt;sup&gt;97&lt;/sup&gt;</td>
</tr>
<tr>
<td>Screening Tool for Early Predictors of PTSD (STEPP) 12 items (4 for parent, 4 for child, 4 from medical record)</td>
<td>Parent/Caregiver and child</td>
<td>88% sensitivity and 95% negative predictive value for PTSD with score &gt;4 for children and &gt;3 for parents&lt;sup&gt;98&lt;/sup&gt;</td>
</tr>
<tr>
<td>Connor Davidson Resilience Scale (CD-RISC) 10 items</td>
<td>Children &gt;10 years old through adults</td>
<td>High reliability and construct validity (resilience: mental health in spite of traumatic experiences)&lt;sup&gt;99&lt;/sup&gt;</td>
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<td>UCLA 9 item PTSD Reaction Index 9 items (for children) 6 items (for parents)</td>
<td>Child &gt;8 years old for the 9-item parent/caregiver of child &lt;8 years old for the 6-item</td>
<td>93% sensitivity and 87% specificity for PTSD with score &gt;20&lt;sup&gt;72&lt;/sup&gt;</td>
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<tr>
<td>Traumatic Events Screening Inventory for Children (TESI-C) or Traumatic Events Screening Inventory for Parent Report (TESI-PRR) 24 Items</td>
<td>Children or parents/caregivers</td>
<td>Validated to count traumatic events for children&lt;sup&gt;13&lt;/sup&gt;</td>
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The Adverse Childhood Experiences scale, originally used as a retrospective self-reporting tool for 17,000 adult members of Kaiser Permanente with an average age of 55-
57 years old about remembered events in childhood, may not be the most appropriate for the task of screening current pediatric patients for ongoing or recent trauma. The ACE scale has not been validated for this purpose. While the original ACE survey was appropriate to elucidate the relationship between early adversity and long-term mental and physical health problems, other assessments have been validated to accurately detect those distressing events of childhood that are causing harm to children now. The Traumatic Events Screening Inventory (TESI) has been validated to count potentially traumatic experiences in children, which may be important for research about trauma and its correlates. The more important question for pediatric clinical practice is whether or not there has been a potentially traumatic event, and what, if any, impacts the child is experiencing.

The Pediatric Emotional Distress Scale (PEDS), developed by Saylor et al. in 1999, is a validated 21-item screening designed to be completed by a parent/caregiver of a child over the age of two years in under ten minutes. Spilsbury et al. tested the PEDS with a population of diverse, urban two to seven year-old children who had experienced high rates of domestic and community violence. The instrument fell within previously reported parameters of acceptable internal consistency, test–retest reliability, inter-rater reliability, and convergent and discriminant validity even though it had not been previously used with a population of diverse urban children exposed to trauma primarily in the form of interpersonal violence.

Winston et al. developed The Screening Tool for Early Predictors of PTSD (STEPP) and published the assessment in JAMA in 2003. The STEPP is a 12-item
assessment, with four questions for the child, four for the parent, and four easily obtained from the medical record. With its test sample of children 8-17 years old within one month of the index trauma, the instrument had a sensitivity of .88 and a negative predictive value of .95 for diagnosing PTSD in the child.\textsuperscript{98} Despite being initially tested on children who had experienced traffic accidents, the tool retained its predictive power in a non-English speaking sample of Dutch children (8-18 years old) who had a broad range of accidental injuries. With an adjustment in cut-off scores, the STEPP had a sensitivity of .82 and a negative predictive value of .92 for PTSD in the child.\textsuperscript{102} The UCLA 9-item PTSD Reaction Index has a similarly robust sensitivity of .93 and specificity of .87 (with a score >20) for diagnosing PTSD in a child. There is a 6-item version to be filled out by parents/caregivers for children under eight.\textsuperscript{72}

Equally important is the ability to assess a child’s resilience in a pediatric office setting. The Connor-Davidson Resilience Scale (CD-RISC) is a 10-item assessment with excellent internal and external validity and good psychometric properties.\textsuperscript{54,99} The CD-RISC uses constructs assessing such correlates of resilience as optimism, perseverance in the face of difficulty, coping, and self-esteem.\textsuperscript{54} When Wrenn et al. used CD-RISC with a community sample of adults who had experienced very high rates of early adversity, they found that for each additional point on the CD-RISC 40-point scale, there was a 7% decreased risk of currently suffering from PTSD.\textsuperscript{54} Sexton et al., in a 2015 study of postpartum women with a history of childhood maltreatment, found a similar significant association between increased resilience (as assessed by the CD-RISC) and decreased rates of PTSD.\textsuperscript{103}
APPENDIX C: Five Evidence-Based Interventions to Enhance Resilience

This Appendix will examine five interventions that have been evaluated and found to have positive effects on children’s resilience. Each of these five informed the development of the TIMH.

1) ABC: A Parenting Intervention

One intervention that has been shown to have lasting effects on normalizing the HPA axis in traumatized children is the Attachment and Bio-Behavioral Catch-Up (ABC) Intervention. Researchers implemented a ten-session manualized parenting intervention with mother-infant dyads referred to CPS for neglect before the age of two. Half of the children were randomized to the intervention while the other half received a control intervention about enhancing cognitive and linguistic skills. ABC had the triple goal of increasing nurturance to distress, increasing synchronous interactions, and decreasing maternal frightening behaviors. Parenting coaches delivered the standardized ten sessions to parents and provided feedback to the parents about their interactions with their infants live and with video. Three months after the initial intervention, samples showed normalization of treatment group salivary cortisol in the morning and an appropriate slope down to bedtime, a normalization that did not occur with the control group. Researchers then conducted a follow-up approximately three years later and found enduring effects of the intervention on salivary cortisol levels for the treatment group and significant difference (p<.05) from the control group. The control group still displayed HPA axis dysfunction through lower morning salivary cortisol levels and blunted decline over the course of the day. Blunted cortisol levels, termed hypocortisolism, are
recognized as a biomarker of chronic stress.\textsuperscript{26,40} Thus it seems that the intervention was associated with a reduction in the biophysical impact of early neglect on the children who received it; whether this will lead to better health outcomes by interrupting the negative pathway mediated by neuroendocrine dysfunction is not knowable at this time. Bick and Dozier have also conducted the intervention with dyads of foster mothers and infants and found increases in maternal sensitivity to her foster infant from pre- to post-intervention that significantly exceeded those seen in the control group.\textsuperscript{62}

2) EIFC: A Treatment Foster Care Intervention

The Early Intervention Foster Care program (EIFC) is an intervention for preschoolers in foster care that derives from the “treatment foster care” model, where both foster child and foster parent are targeted.\textsuperscript{24} EIFC employs an approach called Parent Management Training (PMT) that has a strong evidence base for reducing problem behaviors in children. The program tries to create an environment in which missed developmental goals can be achieved, albeit late. This environment is one with consistent, stable caregiving and predictable routines. The principles that underlie the EIFC are positive reinforcement for pro-social behavior, consistent authoritative limit setting regarding disruptive behavior, and careful supervision. In this team-based intervention, foster parents receive some training prior to child placement, which is then followed up by support and supervision in the form of daily telephone contacts, weekly home visits, weekly support group meetings, and 24/7 on-call crisis intervention. Children are followed by a behavioral specialist who comes to the child’s home and school and runs a weekly playgroup. A family therapist teaches the same parenting skills to biological
families if the families consent. In an initial pilot study of EIFC, researchers compared ten children in EIFC to ten in regular foster care and ten in a community comparison group. They found improvements in child behavior, reductions in foster parent stress and improved parenting, as well as concordant changes in the neuroendocrine activation of the children, as evidenced by changes in salivary cortisol that had the EIFC group coming to resemble the un-traumatized community control in contrast to the regular foster care cohort who maintained blunted cortisol and high cortisol variability. Fisher et al. describe the implications as follows: “This provides initial evidence that the EIFC intervention reduces stress and physiological arousal over time in a manner that corresponds with behavioral change.” In a subsequent five-year RCT, where a treatment group was drawn from preschoolers newly assigned to foster care and the control group received standard foster care. The results of the trial showed significant increases in permanent placements for the treatment group over the control group, 90% vs. 64%.  

3) CPP: A Psychotherapy Intervention

Another model showing positive results for traumatized young children (0-6) is Child-Parent Psychotherapy (CPP), a model where the mother-child relationship is viewed as the vehicle for healing from early trauma. CPP aims to reduce maladaptive behaviors, foster developmentally appropriate interactions, and help the parent and child together create a trauma narrative. The therapist allows parent-child interactions to guide the work, interpreting and directing interactions towards more adaptive ones, ultimately supporting parent and child in developing a better relationship.
tested this model with a diverse group of 75 preschoolers (and their mothers) who had been exposed to domestic violence. Half were randomly assigned to a treatment group and received weekly sessions of CPP with a clinical psychologist over 50 weeks. The study included a comparison group of mother/child dyads who received monthly case management and community referrals through monthly phone calls from a Ph.D-level clinician. Those children who received CPP and who had experienced four or more traumatic and stressful life events (TSEs) showed significantly greater reductions in depression, PTSD symptoms, and behavior problems than their counterparts in the comparison group. After treatment, those with four or more TSEs were significantly less likely to develop PTSD than counterparts in the comparison group (5% vs. 55%).

4) FIAP: A Comprehensive Services Model

Fostering Individualized Assistance Program (FIAP) is an intervention with solid evidence of its effectiveness for adolescents. In a randomized evaluation of the intervention, 54 children were assigned to FIAP while 77 received standard foster care. This is a wrap-around services intervention for foster children ages 7-15 who have been abused and/or neglected and who have emotional or behavioral problems. Similar to the treatment foster care approach, foster families are targeted as a unit. Case managers work with each family to identify children’s and families’ needs, and refer and coordinate services. They also serve as counselors. The oldest children in FIAP (11-15 years old) had significantly better outcomes for placement permanence and significantly lower rates of risky behaviors including running away from home, incarceration, and truancy than their counterparts in the randomized control group. Families and children in the FIAP
group reported fewer behavioral problems, an effect that was only significant for boys.\textsuperscript{22}

5) TF-CBT: A Psychotherapy Intervention

Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) is an extensively studied treatment model. Typically, the child and their caregiver complete 12-20 therapy sessions, some together and some separately. The model includes several component parts: psycho-education about trauma, parenting skills, relaxation techniques, emotional expression and regulation, coping cognitively, creating a trauma narrative, trauma exposure, and ensuring safety and future positive development.\textsuperscript{76} Dorsey et al., in a 2011 review of effectiveness of various approaches to CBT for traumatized children, cite six RCTs that show TF-CBT is more effective in reducing symptoms of PTSD and depression and behavior problems than non-CBT interventions. They note that most of these trials targeted preschool and school-age youth who had been multiply traumatized. Various follow-up studies showed enduring benefits of the treatment at six months, one year, and two years post-treatment. Cohen et al. show that a group of sexually abused children 8-14 years old in an RCT trialing TF-CBT vs. a child-centered psychotherapy comparison were half as likely as the comparison group to meet the criteria for PTSD at the end of the intervention (21\% vs. 46\%), had significantly lower levels of depression symptoms and behavior problems, and higher rates of interpersonal trust. Those in the TF-CBT group also had greater improvement among the parents self-reported depression and effective parenting practices.\textsuperscript{75}
APPENDIX D: TIMH Logic Model

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<tr>
<th>Inputs</th>
<th>Activities</th>
<th>Outputs</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td><strong>Patients:</strong> BMC pediatric patients newly under CPS custody</td>
<td><strong>Enrollment</strong> of 50 children each in pilot and comparison groups</td>
<td>• Enrollment (#)</td>
<td>• Reduced current TSEs</td>
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<tr>
<td><strong>Staff:</strong> Team including pediatrician/NP/PA, Parent Coach, psychotherapist, two social workers, a Community Navigator, and a school psychologist</td>
<td><strong>Staff training</strong> in trauma-informed care according to the Sanctuary Model</td>
<td>• Needs assessments (% of enrolled)</td>
<td>• Reduced rates of PTSD and PTSD severity</td>
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<tr>
<td><strong>Infrastructure:</strong> team-based care in BMC Pediatric practice with weekly case management meetings</td>
<td><strong>Needs assessment</strong> including trauma/resilience screening, caregiver screening for depression and PTSD, family social needs assessment, educational needs and neuro-psych testing</td>
<td>• Action Plan (% of enrolled)</td>
<td>• Increased resilience</td>
</tr>
<tr>
<td><strong>Community Relationships:</strong> with schools, local housing and social service providers, community after-school and youth development organizations, community-based trauma-focused mental health providers</td>
<td><strong>Service provision</strong> including psychotherapy, parenting workshops, peer support groups, educational advocacy, and community referrals depending on individualized Action Plan.</td>
<td>• Children matched with psychotherapist (# /avg. # of sessions)</td>
<td>• Reduced health risk behaviors among children</td>
</tr>
<tr>
<td><strong>Assessments:</strong> CD-RISC, UCLA PTSD Screen, YRBSS</td>
<td><strong>Weekly whole-team meetings</strong> to monitor progress on and make adjustments to individualized Action Plans</td>
<td>• Children enrolled in peer support groups (# /avg. # of sessions attended)</td>
<td>• Normalized cortisol among children (as proxy for normalized HPA axis)</td>
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<td>• Parents completing workshops (# /avg. # of sessions attended)</td>
<td>• Reduced emergency healthcare utilization</td>
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<td>• Children assessed for unmet learning needs (# of IEPs /# communicated)</td>
<td>• Improved school attendance</td>
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<td>• Referrals made (#/type)</td>
<td>• Reduced school disciplinary action</td>
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APPENDIX E: Staffing the TIMH

**Pediatrician (or pediatric PA or NP):** The pediatric healthcare provider will conduct the initial history and physical and form a medical care plan for the child. The pediatric provider will then see the child on an as-needed basis to provide ongoing medical care and revise and adapt the care plan. The pediatric provider will also participate in integrated case management meetings about each child.

**Parent Coach (health educator, BA/MA):** The Parent Coach will see all TIMH patients before the pediatric healthcare provider for WCC visits and the initial comprehensive medical screen mandated by CPS. The Parent Coach will conduct age appropriate developmental and psychosocial screenings, while eliciting parent/caregiver concerns. The Parent Coach will also offer age and situation-appropriate anticipatory guidance. The Parent Coach will communicate results of all screenings, parent/caregiver concerns, as well as highlight any personal observations about child and family health and well-being to the pediatric healthcare provider.

**Psychotherapist (either psychologist or psychiatrist):** The psychotherapist will offer customized behavioral healthcare to TIMH participants. The psychotherapist will have training in working with traumatized children and employing many different treatment modalities. The Psychotherapist will also run peer support groups and parenting workshops along with the Social Worker. The psychotherapist will participate in integrated case management meetings about each child.

**Social Workers (LIS CW) (Two FTEs):** The social worker’s role is multi-faceted. He/she will coordinate services to families, maintaining at least weekly communication
about the child’s and families’ needs, challenges, and circumstances. During these weekly phone calls or meetings, the social worker will trouble-shoot with families, referring to team members as appropriate, and provide emotional support to children and their caregivers. The social worker will be on-call to the children and their families should problems arise. The social worker will also run peer support groups and parenting workshops along with the psychotherapist. The social worker will chair and facilitate the integrated case management meetings about each child. The social worker will also do some clinical psychotherapy, as needed.

**Community Navigator:** The Community Navigator, a bachelor’s-level position, will be familiar with all of the resources in the community that may be helpful to families and will facilitate families’ access to these services. The Community Navigator will also participate in integrated case management meetings about each child.

**School Psychologist:** The school psychologist will conduct neuro-psych testing with each child at intake and contact the child’s school to learn of any identified learning or school-related behavior problems. The school psychologist will then write an individualized education plan (IEP) for all children who require it and work with the child’s school to see that it is implemented. The school psychologist be on-call to schools and families to trouble-shoot and assist with solving educational problems. The school psychologist will also participate in integrated case management meetings about each child.
APPENDIX F: TIMH Menu of Services

- **Psychotherapy:** The mental health team (psychologist and social worker) will determine if psychotherapy would be helpful for a child based on the initial assessment. Based on the child’s age, the availability of caregivers to participate, and mental health diagnoses, the behavioral healthcare provider will then select and implement a behavioral healthcare plan. Options include cognitive behavioral therapy (CBT), TF-CBT, and CPP. Prior to initiating treatment, the provider will carry out McKay’s engagement intervention, consisting of an initial phone call that will inform the first visit and continued focus on relationship building and engagement at the first visit.94

- **Parenting Workshops and Support:** The mental health team will offer age-specific parenting workshops for caregivers, including foster and biological parents, aimed at increasing parental support of children, secure attachment of children to caregivers, positive discipline tactics, consistent household routines, and understanding of trauma and its sequelae. These workshops will be informed by ABC and EIFC for younger children. After intake assessment, the team will identify children whose caregivers could benefit and are willing to participate.

- **Facilitated Peer Support Groups:** The mental health team will offer facilitated age-based peer support and friendship groups for school-aged and adolescent children in the TIMH pilot. These will employ a curriculum about trauma and its effects, self-care skills and healthy behaviors that children can learn and practice to mitigate the effects of trauma, and pro-social behaviors to enhance
relationships with peers. Not only will children learn skills, but they have the opportunity to make friends with children who may share many life experiences and challenges. After intake assessment, the team will identify children who could benefit and are willing to participate.

- **Educational Advocacy:** The school psychologist will conduct comprehensive neuropsych and educational testing of any of the children who he/she determines could benefit. The psychologist will then write an IEP informed by the test results and in-depth conversation with the child and his/her caregivers and liaise with child’s school to see that it is put into practice. Additionally, the school psychologist will be a resource for families and children in the TIMH who are running into academic or disciplinary problems at school. The school psychologist will advocate for the child and help the child’s school meet the child’s educational needs.

- **Community Referrals:** The Community Navigator will work closely with the Social Worker to identify and refer families to appropriate community resources, helping with perceptual and logistical barriers to accessing services, including transportation, scheduling, and past experiences with behavioral health. The services include, but are not limited to, financial assistance, food stamps, MassHealth, housing support programs, shelters, child care programs, afterschool programs, drug and alcohol treatment, violence prevention and recovery programs, and community mental healthcare providers for caregivers if initial screenings are positive for depression or PTSD. The Community Navigator will
maintain open lines of communication with community-based service providers
and families to track children’s progress and trouble-shoot any obstacles to
ongoing care that may arise.
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J Pediatr Surg  Journal of Pediatric Surgery
J Pediatr  The Journal of Pediatrics
J Trauma Stress  Journal of Traumatic Stress
JAMA  Journal of the American Medical Association
Jama Pediatr  Journal of the American Medical Association Pediatrics
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REFERENCES


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Consultant
Barr Foundation
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2009 Consultant Nellie Mae Education Foundation Boston, MA Responsible for researching and writing a background paper about disconnected youth in New England

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2006-2009 Consultant Commonwealth Corporation Boston, MA Responsible for evaluation, research, and writing for numerous quasi-public projects in workforce development

2005 Consultant Kids Count NH/The Dignitas Group Nashua, NH Responsible for data analysis and writing for the 2006 New Hampshire Kids Count Data Book

2002-2005 International Program Coordinator Alliance for the Prudent Use of Antibiotics Boston, MA Responsible for coordinating a network of doctors in 50 countries, providing technical assistance in research, public education, and public policy

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ABSTRACTS AND PUBLICATIONS


