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Educational Reading Packet*

We Are the Medicine™

Prioritizing Possibilities for Flourishing Amid Adversity Through Collective Self-Awareness, Relationships, Restorative Practices

Healing Collective Trauma | Thomas Hubl Summit | October, 2019
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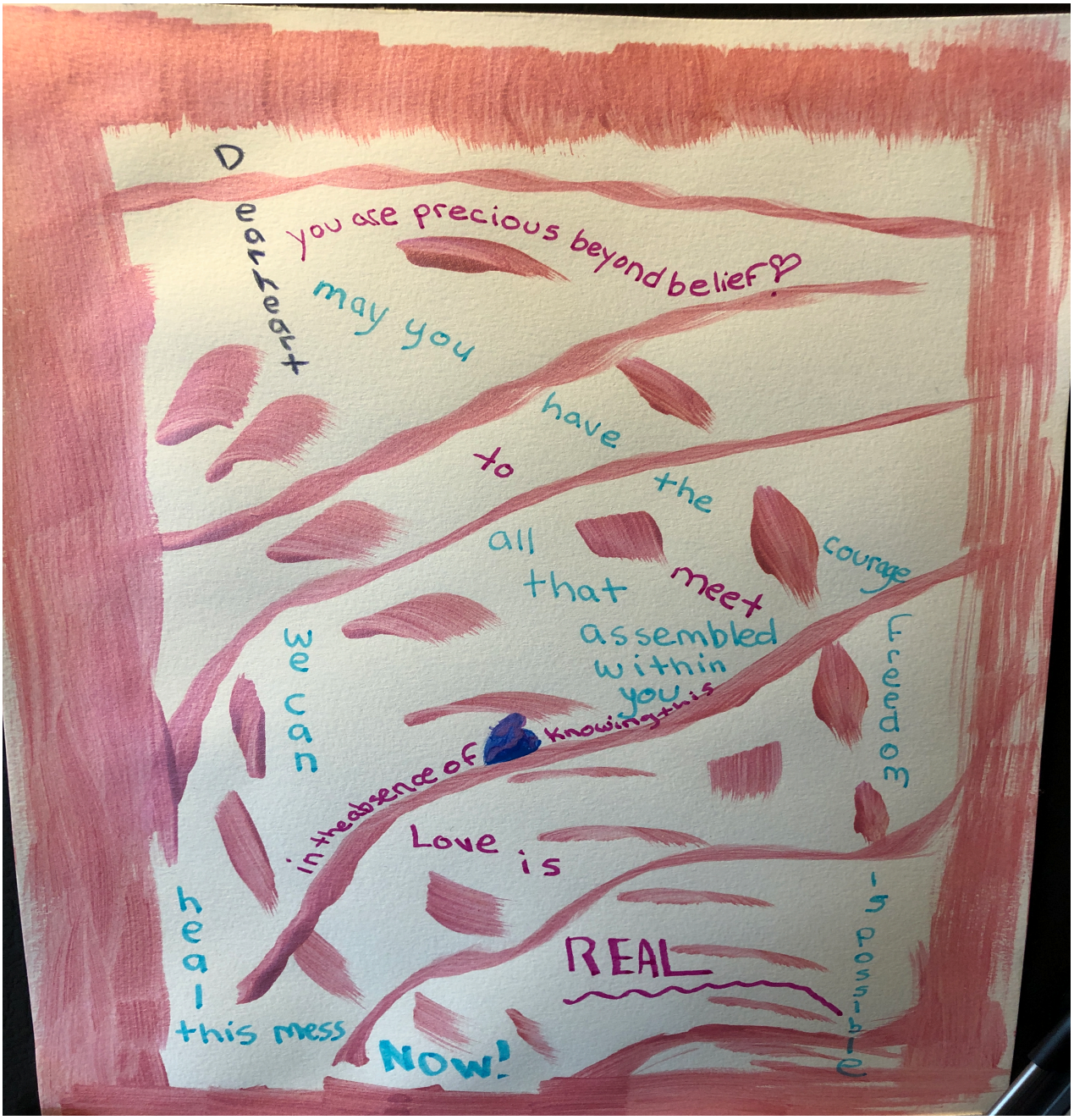

Opening Thoughts: Overview

We think of home as a safe place to "be". Yet, to be at home and safe in ourselves-to "be"-requires intimacy within. This "interoception" capacity leads to an abiding, compassionate and resonant sense of self beyond the conditions of our lives; where we experience life as an unending dance and our innate brilliance, goodness and inner compass naturally emerge.

Science shows clearly that the conditions of our early life –from before conception and all throughout childhood-are foundational to the ability to develop this abiding sense of safety. Attuned, responsive and consistently loving relationships are required. Yet, most people today carry trauma from adverse childhood experiences (ACEs) –like physical or emotional abuse or neglect, sexual abuse and family conditions like alcohol or drug abuse, parental divorce, death of a parent or violence in the home. These conditions can pass down through generations and are socially conditioned responses that both reflect and perpetuate the larger trauma held in the world. ACEs shorten lives, lead to disease and perpetuate pain. Without the buffering love brings, ACEs have a profound impact on brain and nervous system development, the formation of our identities and sense of possibility in life and even our genetic expression.

We live in a time where we are awake to the causes and effects of developmental trauma. And science shows that resilience, flourishing and thriving with adversity is possible through the restoration of intimacy with ourselves, exquisite presence and mindfulness and rewriting the book our own life from the inside out. The capacity for love and peace cannot develop in isolation. "We" are the medicine we require. Using our lived experiences as the main curriculum, this short reading packet seeks to lay out some of the science of ACEs and resilience and introduce breakthroughs in neuroscience and epigenetics that bring hope for healing and restoration no matter how old we are. The science helps us make sense of our pain and shows that not only is healing possible, but it is inevitable when we open with intention, allow ourselves to see and be seen and restore the broken relatedness we lacked. Echoing what awakened people throughout all time have taught us, we are wired for love, healing and home within a resonant self that moves with life despite the adversities we may have experienced and that are present in the world today.

SELECTED READINGS AND RESOURCES

1. Article on how childhood trauma is a biologic marker for health throughout life (Berens, Jensen, Nelson, 2017)

2. Purpose in life as a biologic marker for health (Hill and Turiano, 2014)

3. Article on assessing childhood trauma using a resilience model (Leitch)

4. Positive and Adverse Childhood Experiences Survey (PACES) for personal and professional use (Leitch, 2017)

5. Getting Your ACEs Score—1 page ACEs survey used in the US Centers for Disease Control Study (CDC)

6. Interoception skills article (Price and Hooven, 2018)

7. Mentalization skills article (Bateman and Fonagy, 2010)

8. Parent "Refrigerator Page" on implementing "whole brain child" parenting practices (Daniel Seigel)

9. National Agenda (collaboratively developed) to address ACEs and promote the social and emotional roots of well-being (Bethell, et. al. 2017)

10. Paper on ACEs, Mindfulness and Emotional, Mental and Behavioral Health Problems in Children (Bethell, Gombojav, et. al, 2016)

11. Paper on Promoting Child Flourishing Among Children with ACEs, Poverty or Special Needs (Bethell, Gombojav, May 2019)

12. Paper on Positive Childhood Experiences and Adult Mental and Relational Health, JAMA Pediatrics September 2019.

13. Some links of possible interest:

    --NPR story on promoting positive relational experiences to promote child and adult health (based on my JAMA paper came out last Monday): **https://www.npr.org/sections/health-shots/2019/09/09/759031061/positive-childhood-experiences-may-buffer-against-health-effects-of-adverse-ones**
    --Short video finterview from Stanford ChildX talk focused on We Are the Medicine platform: **https://www.youtube.com/watch?v=CqbpAHUzuB4**
    --Short article on the New Science of Thriving address ACEs and advancing social and emotional well-being and mindfulness: **https://magazine.jhsph.edu/2016/spring/forum/rethinking-the-new-science-of-thriving/index.htm**

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REVIEW Open Access

Biological embedding of childhood adversity: from physiological mechanisms to clinical implications

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Abstract

Background: Adverse psychosocial exposures in early life, namely experiences such as child maltreatment, caregiver stress or depression, and domestic or community violence, have been associated in epidemiological studies with increased lifetime risk of adverse outcomes, including diabetes, heart disease, cancers, and psychiatric illnesses. Additional work has shed light on the potential molecular mechanisms by which early adversity becomes "biologically embedded" in altered physiology across body systems. This review surveys evidence on such mechanisms and calls on researchers, clinicians, policymakers, and other practitioners to act upon evidence.

Observations: Childhood psychosocial adversity has wide-ranging effects on neural, endocrine, immune, and metabolic physiology. Molecular mechanisms broadly implicate disruption of central neural networks, neuroendocrine stress dysregulation, and chronic inflammation, among other changes. Physiological disruption predisposes individuals to common diseases across the life course.

Conclusions: Reviewed evidence has important implications for clinical practice, biomedical research, and work across other sectors relevant to public health and child wellbeing. Warranted changes include increased clinical screening for exposures among children and adults, scale-up of effective interventions, policy advocacy, and ongoing research to develop new evidence-based response strategies.

Keywords: Adverse childhood experiences, Brain development, Stress, Health promotion, Social disparities, Primary care

Background

Epidemiological studies have demonstrated that adverse childhood experiences, namely exposures such as neglect, abuse, caregiver mental illness, and family or community violence, predict poorer long-term outcomes across health and social domains. Outcomes associated with early adversity include higher risk of type 2 diabetes, obesity, ischemic heart disease, cancers, depression, addictions, and premature mortality, as well as social outcomes including unemployment and lower educational attainment [1–8]. Particularly convincing evidence comes from large birth cohorts and prospective, longitudinal life-course studies exploring predictive relationships [3, 5–9]. Meanwhile, human and animal research has provided insights into candidate molecular mechanisms by which early adversity may become "biologically embedded" in disrupted physiology [10]. Such findings support life-course models of human health describing how early physiological development interacts over time with behavior and ongoing risk environments to shape outcomes holistically [7].

Nevertheless, evidence about the pathogenic effects of childhood psychosocial adversity has not been widely applied in clinical practice or public health initiatives. Such knowledge has the potential to improve screening and intervention strategies aiming to decrease exposure to early adversity (primary prevention), limit resulting pathology (secondary prevention), and help those already suffering effects (tertiary prevention and treatment). Efforts must span the life course, involving pediatric and adult clinicians, researchers, educators, public health practitioners, families, and communities. Awareness of

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the effects of adversity can furthermore enhance investigations into the roots of human disease.

This review surveys the evidence on biological mechanisms thought to link early childhood adversity to later disease. While prior literature has predominantly described changes in one or a few physiological axes, this review summarizes changes comprehensively across body systems, offering a unified orientation for clinicians and researchers. The specific questions addressed include (1) How can often time-limited early exposures produce durable physiological changes? (2) How do such physiological changes converge to generate disease? (3) What factors underlie "differential susceptibility" to developmental adversity, and how can interventions promote resilience? Finally, we consider how answers to these questions should shape action across social sectors to promote child wellbeing and lifelong health.

Defining early life adversity

In this review, we conceptualize childhood adversity as a negative childhood experience associated with increased lifetime risk of poorer health and social outcomes. The review is limited to postnatal exposures, while separate literature covers important effects of prenatal adversity [11]. We specifically consider psychosocial adversity, namely that involving relationships (to caregivers, family, community, peers) and other social experiences interacting with psychological processes [12]. Examples of psychosocial adversities include childhood maltreatment, violence exposure, caregiver psychopathology, unstable or depriving care environments (e.g., low-quality foster or institutional care), adverse societal exposures such as crime and discrimination, and other causes of psychological stress or trauma. Various childhood adversities are prevalent globally. A recent review found that at least 44% of children in developed countries and 59% in developing countries had been victims of physical, emotional, or sexual violence or had witnessed domestic or community violence in the preceding year [13]. Caregiver poor mental health is also common, with depression currently representing the leading cause of disease-related disability globally [14].

For brevity, we refer to childhood psychosocial adversity as "early life adversity" (ELA), employing an aggregative approach to conceptualize exposures. Such an approach facilitates the synthesis of complex evidence for application, and is supported by observed dose–response effects linking cumulative early adversity to later outcomes [1, 3, 5], and by the "allostatic load" paradigm exploring pathogenic effects of cumulative all-cause stress [15]. Such aggregative approaches require complementary efforts to differentiate effects of exposures varying in nature, timing, and intensity [16]. Here, we do not specifically examine low childhood socioeconomic status (SES) as a psychosocial adversity, as poverty influences health in part via non-psychosocial pathways (e.g., increasing exposure to physical environmental hazards). Meanwhile, some families living in poverty provide safe psychosocial environments despite the challenges posed by socioeconomic disadvantage. Nevertheless, childhood adversities are strongly partitioned by SES, and shaped by inequities intertwined with poverty such as those defined by race, gender, immigration status, class, and other axes of social inequality.

Biological embedding

Biological embedding describes processes by which initially transient, homeostatic responses durably alter physiology [10]. Events early in life may be embedded preferentially due to a preponderance of sensitive periods, or windows of rapid development and heightened plasticity (responsiveness to experience). While traditionally described in neurodevelopment [16], sensitive period effects have been suggested elsewhere, including in the immune [17] and metabolic [18] systems. Epigenetic processes represent a key family of mechanisms driving embedding. Epigenetic change involves stable alteration of gene expression via mechanisms including, among others, attachment of chemical residues (e.g., methyl groups) to DNA or to molecules involved in packaging and transcriptional control (e.g., histones) [19].

Methodological challenges

A key methodological challenge is the difficulty of causal demonstration amidst social complexity. While epidemiological studies statistically explore confounding and mediational pathways, randomized controlled trials – the "gold standard" in causal inference – are often impossible or unethical. This challenge necessitates substantial use of animal models, enabling controlled experimentation and use of targeted molecular manipulations clarifying causal pathways. These models are considered in this review when potentially useful to understand human processes. An additional challenge has been the reliance on retrospective self-reporting of ELA in many studies. Such reports may agree only moderately with prospective measures, and could be more prone to bias, though both types of measures tend to predict similar disease and social outcomes [20]. We therefore focus on the direction (versus size) of effects and on physiological mechanisms, and prioritize studies using prospective, longitudinal designs.

Search strategy

We identified peer-reviewed, academic literature from multiple databases, including PubMed, Medline, and PsycINFO, using search terms specifying timing in early life (e.g., early, child*, infan*) and adverse exposures

(e.g., advers*, psychological stress, maltreat*), as well as terms for specific physiological axes as appropriate. Priority was given to more recent studies, major reviews, and prospective human studies. Cross-sectional and animal studies were included where prospective human evidence was unavailable.

Biological embedding by physiological axis

ELA has diverse effects across neural, endocrine, immune, metabolic, and gut microbial axes, as reviewed below. Table 1 summarizes key findings, while Fig. 1 provides a working conceptual model of ELA's biological embedding.

Axis 1: The brain

Human brain maturation is a protracted process beginning in fetal life and continuing into early adulthood [21]. Dramatic growth in gray and white matter occurs in the first 2 years of life, when the brain attains 80–90% of its adult volume before continuing to grow at an attenuated rate [22, 23]. Alongside growth, experience-dependent neural pruning eliminates inactive synapses. Anatomically, the brain matures "from the bottom up," beginning with primitive brainstem structures and progressing anatomically in anterior-posterior and inferior-superior directions, culminating with the prefrontal cortex (PFC). Functional development similarly progresses from basic sensory and motor capacities to subsequent language and executive functioning (e.g., cognitive control, working memory), and ultimately higher cognition [16]. Normative neurodevelopment thus enables environmental adaptation and progressively complex cognition, but leaves the brain susceptible to negative exposures for an extended period of time.

Extensive literature links ELA to pervasive, quantifiable variation in brain structure and function [15, 21, 24, 25]. Investigation has preferentially examined "stress sensitive" areas dense with glucocorticoid receptors, including limbic structures (e.g., hippocampus and amygdala) key to memory, learning, and emotion regulation, as well as the PFC, critical for higher cognition, executive functioning, and "top-down" control of lower regions [26]. Studies of adolescents and adults provide consistent evidence of smaller PFC gray matter volumes after ELA, paralleling findings from experimental animal models designed to demonstrate causality [21, 24, 25]. Smaller hippocampal volumes have been consistently observed in ELA-exposed adults, though not children, reflecting potential latent effects on a slow-developing structure. Amygdala volumetric effects are complex, including both increases and decreases, likely moderated by exposure timing and type [21, 27].

Considering potential embedding mechanisms, the "neurotoxicity hypothesis" posits that early elevation of stress mediators, particularly glucocorticoids, kills or impedes growth of neurons in stress-sensitive regions via mechanisms including oxidative damage [28]. Stress mediators potentially linked to neurotoxicity in humans include cortisol as well as inflammatory cytokines, excitatory amino acids (e.g., glutamate), and various other molecules (e.g., brain-derived neurotrophic factor (BDNF) and endogenous opioids) [29]. Oxidative stress during early neurodevelopment may also disrupt (delay or extend) neural sensitive periods [30]. Considering epigenetics, experimental animal models show altered expression of genes implicated in basic neurodevelopmental processes (e.g., cell adhesion, sensitive period closure) [31]. Human studies of ELA show genome-wide methylation changes as well as gene-specific effects on neural signaling molecules important to psychological health and neural function, for instance serotonin, glutamate, dopamine, catechol-O-methyl transferase (COMT), and BDNF [19].

Beyond excess stress, environmental deprivation may also play a role in neurodevelopmental compromise, for instance, among children in low-quality institutional care [32]. Broadly, absence of normative psychosocial stimuli (e.g., language exposure or caregiver interaction) during experience-dependent development is proposed to promote excessive synaptic pruning [33]. Indeed, children raised in depriving institutions in infancy show globally decreased cortical thickness [34], a finding possibly paralleled by reduced brain-wide dendritic arborization, spine density, and brain volume in rodent models of early deprivation (e.g., rearing in single-occupancy cages) [35]. Nevertheless, "depriving" exposures (such as caregiver absence) generally evoke potent stress responses [36] while stress mediators regulate synaptic plasticity [37], complicating efforts to discern whether the observed structural changes reflect excess pruning (versus, for instance, glucocorticoid neurotoxicity) and if these mechanisms are, in fact, independent of stress-mediated pathways.

The neurodevelopmental changes described may have far-reaching functional and health implications. Studies suggest that neural-structural changes mediate ELA effects on depression [38], while sensitive period disruption may contribute to schizophrenia and autism pathogenesis [30, 39]. Studies of ELA-associated brain functional changes show deficits in processes including emotion regulation, fear learning, and executive functioning [21]. Functional MRI studies show differences in centrally-driven reward processing that could mediate ELA-related risk of psychopathologies and substance use-related illnesses [40, 41]. Finally, disruption of central stress-regulatory structures may promote neuroendocrine disruption linked to diseases of excess allostatic load [42], as discussed below.

Table 1 Selected effects of early life adversity (ELA) on physiological functioning

Examples of physiological changes observed after ELA	Overall clinical and functional effects	Key reviews
Brain structure and activity		
Structural variation in gray and white matter 1) Changes in local/global gray matter volumes a) Some evidence for widespread, global gray matter change b) Decreased gray matter volume of PFC and hippocampus c) Complex volumetric changes in amygdala 2) Changes in local/global white matter volume and microstructure a) Complex white matter volumetric changes in frontal lobes b) Microstructural variation in various white matter tracts that may impair communication between brain regions Functional variation in brain activity and functional connectivity 3) Aberrant amygdala reactivity to emotional stimuli 4) Alterations in amygdala-PFC connectivity Altered neurotransmitter metabolism or production 5) Potential altered neurotransmitter levels/signaling involving key molecules, e.g., serotonin, dopamine, GABA, glutamate	Increased risk of: - Impairments in executive functioning (e.g., working memory, cognitive control) - Impaired emotion regulation and social functioning - Adverse effects on reward processing and stress regulation (e.g., hippocampus, amygdala, PFC) may increase risk of mood and substance use disorders	Bick & Nelson, 2016 [21] Hart & Rubia, 2012 [24] McEwen, 2013 [50] Nemeroff et al., 2016 [25]
Neuroendocrine (HPA) stress response axes		
Hyper-responsiveness 1) Enhanced ACTH and cortisol response to stress/stimulation 2) Evidence of impaired GR-mediated feedback inhibition Hypo-responsiveness 4) Blunted HPA response (ACTH and cortisol) to stress/stimulation 5) Heightened ACTH response with inappropriately blunted cortisol (normal or low) Altered basal diurnal rhythms 3) Elevated, or suppressed, average cortisol/CRF 6) Complex changes to diurnal cortisol rhythms (e.g., lower morning and flatter decline, or higher morning and steeper decline)	- Both HPA hyper- or hypo- reactivity are characteristic patterns generating excess "allostatic load," linked to cardiovascular disease, metabolic syndrome, accelerated cellular aging, and various psychopathologies - Downstream effects of aberrant cortisol levels (e.g., neurotoxicity, heightened inflammation, metabolic dysregulation) may drive pathology across other axes	Doom & Gunnar, 2015 [36] Heim & Binder, 2012 [87]
Autonomic functioning		
1) Complex patterns of sympathetic- or parasympathetic-predominant imbalance of reactivity to acute stress, with alterations in responsiveness and counter-regulatory control 2) Elevated or decreased sympathetic or parasympathetic basal tone	- Both parasympathetic- or sympathetic-predominant autonomic imbalances are linked to diseases of elevated "allostatic load" (discussed above)	Alkon et al., 2012 [55] El-Sheikh et al., 2009 [56]
Immunity and inflammation		
1) Systemic immune suppression (e.g., impaired cellular immunity) 2) Chronic basal inflammation (e.g., elevated CRP, TNF- α, IL-6) 3) Heightened inflammatory reactivity	- Chronic inflammation linked to increased cardiometabolic and other disease risk - Immunosuppression linked to impaired control of infectious/neoplastic threats	Slopen et al., 2012 [66] Baumeister et al., 2016 [67]
Metabolism		
1) Impaired peripheral glucose handling with insulin resistance 2) Altered fat metabolism with dyslipidemia	- Heightened risk of type 2 diabetes, obesity, hyperlipidemia, or other metabolic disease	Maniam et al., 2014 [70]
Microbiome functioning (emergent evidence, animal models only to date)		
1) Transient microbiome perturbations after stress in infancy linked to aberrant immune development 2) Possible durable microbiome changes in adults after early stress	- May contribute to inflammation, immune-suppression, and/or neurodevelopmental risk	O'Mahony et al., 2015 [74]

PFC prefrontal cortex, *ACTH* adrenocorticotropic hormone, *GR* glucocorticoid receptor, *CRF* corticotropin releasing factor, *CRP* C-reactive protein, *TNF* tumor necrosis factor, *IL-6* interleukin-6, *HPA* hypothalamic-pituitary-adrenal

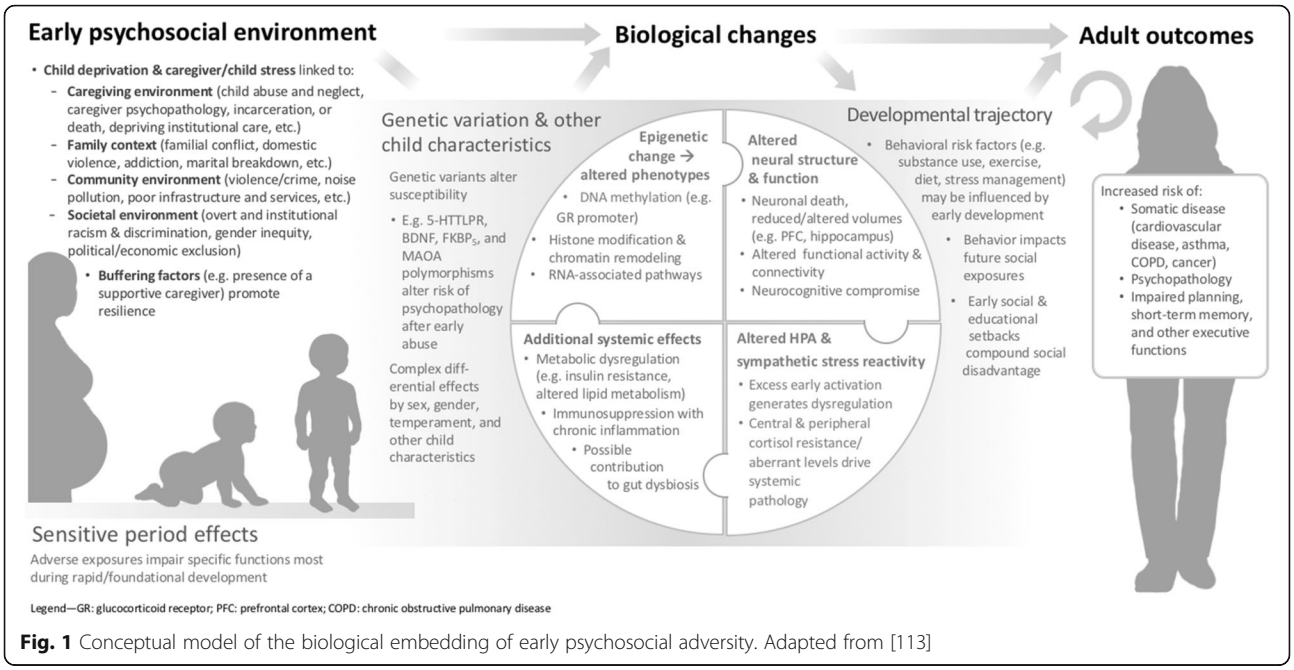

Fig. 1 Conceptual model of the biological embedding of early psychosocial adversity. Adapted from [113]

Axis 2: Neuroendocrine stress regulation

ELA broadly impacts stress reactivity as controlled by the hypothalamic-pituitary-adrenal (HPA) and autonomic (sympathetic/parasympathetic) axes. Both axes are under central control by corticolimbic structures, including the PFC, hippocampus, and amygdala [29], and involve common molecular mediators (e.g., corticotropin-releasing factor (CRF), an HPA hormone and autonomic neurotransmitter) [43], suggesting potentially overlapping embedding pathways.

HPA axis

In response to stress, hypothalamic CRF stimulates pituitary adrenocorticotropic hormone (ACTH) release and, in turn, adrenal cortical secretion of glucocorticoids—principally cortisol in humans and corticosterone in many animal species. Glucocorticoids trigger diverse systemic homeostatic responses while exerting negative feedback on the axis. In human studies and animal experimentation, ELA consistently predicts HPA dysregulation generally persisting into adulthood, including patterns of hyper-reactivity, suggesting potential acquired resistance to glucocorticoid negative feedback [29], or hypo-reactivity, suggesting possible attenuated stress sensitivity or exaggerated axis suppression [44]. Differential patterns of dysregulation may reflect variation in factors including timing and type of ELA [45], genotype [46], current age [29], and concurrent psychopathology [47]. Importantly, HPA hyper- and hypo-reactivity both represent prototypical patterns associated with excess allostatic load, and both predict human stress-related chronic illnesses, including cardiovascular, metabolic, and psychiatric diseases linked epidemiologically to ELA [15, 29, 48]. Glucocorticoid dysregulation may also promote oncogenic tumor cell microenvironments (in part via pro-inflammatory effects, as discussed below), fostering growth, migration, invasiveness, and angiogenesis [49], thus potentially contributing to observed links between ELA and cancers [7].

Considering potential mechanisms of HPA changes, animal models of early stress have demonstrated altered expression of the glucocorticoid receptor (GR) (involved preferentially in axis downregulation) and receptors for CRF, ACTH, and other key molecules [50]. In particular, altered serotonin signaling in rats receiving unfavorable maternal care has been shown to induce hypermethylation (silencing) of the GR promoter and related genes [51]. Similar GR hypermethylation was subsequently demonstrated in hippocampal tissue [52] and peripheral lymphocytes [53] of humans maltreated in childhood. Other epigenetic changes shown in animals include genes controlling other key stress-related receptors (e.g., for CRF) and hormones (e.g., CRF, AVP, ACTH, and cortisol), as well as in neurotransmitters/neuropeptides in stress-regulatory brain regions [54].

Autonomic axis

In response to stress, amygdala signaling initiates sympathetic activation via the brainstem, terminating in adrenergic signals to end organs (e.g., liver, heart, digestive tract, and pancreas) and induction of adrenal medullary epinephrine/norepinephrine release producing the prototypical “fight or flight” response. The parasympathetic branch exerts countervailing control, and dynamic

sympathetic-parasympathetic balance shapes overall stress physiology [55]. Experimental animal models and observational human studies have consistently linked ELA to autonomic dysregulation, including both hyper- and hyporesponsiveness of sympathetic or parasympathetic pathways. Imbalance in either sympathetic- or parasympathetic-dominant directions again represent manifestations of excess allostatic load and predict stress-related diseases, including heart disease, obesity, type 2 diabetes, cancers, and psychopathologies [55]. Pathology associations may differ by pattern of autonomic imbalance. Several studies, for instance, found that attenuated sympathetic reactivity correlated with antisocial behavior with callous-unemotional traits in ELA-exposed boys, while heightened reactivity correlated with antisocial behavior without callous-unemotional traits [56]. Such findings remain exploratory, and the direction of causal links, if present, is unclear. Among few studies specifically examining mechanisms of autonomic changes, one found that volumetric changes in the amygdala, hippocampus, and PFC statistically mediated autonomic changes as well as risk of psychopathology [57]. Overlapping regulation by corticolimbic structures and core molecular mediators (e.g., CRF) suggests that some HPA-related alterations may also impact autonomic functioning.

Axis 3: Immune functioning

Innate and adaptive immune responses work jointly to control exogenous (e.g., microbial) and endogenous (e.g., necrotic/neoplastic) threats in processes dependent upon inflammatory mediators. When chronically elevated, however, inflammatory mediators contribute to immunosuppression as well as oxidative stress and cytotoxicity [58]. ELA has been linked in human studies and animal experimentation to chronic inflammation [59] and low-level immunosuppression, including impairment of mucosal immunity in children [60] and cellular immunity (e.g., poorer control of latent viral infection) in adolescents [61] and adults [62]. Important work has characterized a "pro-inflammatory phenotype", involving exaggerated cytokine response to bacterial challenge and progressive glucocorticoid receptor desensitization, among ELA-exposed individuals [63]. Considering potential mechanisms, acquired peripheral glucocorticoid resistance may attenuate cortisol's anti-inflammatory effects [18]. Meanwhile, genome-wide analysis in ELA-exposed individuals has shown increased expression of genes controlling not only cortisol output, but also the activity of key inflammatory mediators like NF-κβ and interleukin-6 (IL-6) [64], with potential antecedents including developmental programming of monocytes for excessive inflammatory responses [18, 65]. Finally, emerging research posits that ELA-related gut dysbiosis may contribute to chronic inflammation, as discussed below.

Health implications of immunosuppression include compromised control of infection and other threats. Meanwhile, inflammatory mediators linked to ELA (e.g., IL-1, IL-6, TNF-alpha, CRP, and fibrinogen) are implicated in risk of cardiovascular and metabolic disease [17, 66, 67]. Inflammation is also a proposed mechanism mediating ELA effects on later depression, age-related diseases [3], neurodevelopmental changes [40], cancers [49], and other systemic effects discussed. Considering cancer risk in particular, immunosuppression impairs control of latent oncogenic viruses [68], while inflammation further promotes oncogenic tumor microenvironments in conjunction with stress mediators, as discussed above [49].

Axis 4: Metabolic health

Interest in metabolic embedding of ELA stems from epidemiological [1, 69] and clinical [70] studies linking ELA to obesity, dyslipidemia, and type 2 diabetes, raising questions about possible causal pathways. While research directly linking ELA to altered development of metabolic physiology remains emergent (versus clear indirect impacts via, e.g., chronic inflammation [3]), potential loci of embedding are multiple. Feeding-related regulation involves, among other networks, dopaminergic reward pathways under top-down control by the PFC, and hypothalamic nuclei integrating nutrient signals to induce hunger or satiety, and systemic shifts between catabolism and anabolism [71]. Peripheral energy homeostasis involves an interplay of anabolic (e.g., insulin) and catabolic (e.g., cortisol, glucagon, epinephrine/norepinephrine) signals promoting increased glycemia and tissue insulin resistance.

Considering mechanisms of potential ELA effects, chronic inflammation, as well as excess catabolic signaling in those with hypercortisolemia, are proposed to drive metabolic dysfunction. Preliminary models also posit that ELA may durably alter hepatic expression of cortisol-activating and -metabolizing enzymes, enhancing tissue-level insulin resistance even in those who later suppress hypercortisolemia [70]. Furthermore, a previous study linked ELA to altered central reward processing promoting excess food intake in some individuals [72]. Additional work is needed to explore the hypothesized pathways.

Axis 5: The microbiome

The gut microbiome represents the collective genome of nearly 100 trillion commensal microorganisms, including over 1000 bacterial species. Dysbiosis, a pathogenic disruption of gut microbial composition or host-microbe interactions, is implicated in diseases including obesity, type 2 diabetes, and depression [73]. While genetically influenced, gut microbial composition responds to

factors including stress, diet, infection, drugs, and toxins, making the gut a potential mediator between environment and disease. Various previous studies have suggested profound microbiome effects on neuroendocrine and immune function, such that dysbiosis could compound ELA-related changes including cortisol dysregulation and chronic inflammation [73–77]. Furthermore, growing literature on the "gut-brain axis" describes microbial influence on neural development and functioning [78]. Pathways of influence may include microbial vagus nerve activation, neural signaling by microbial metabolites or molecular patterns, heightened inflammation with downstream neural effects, and induction of epigenetic changes [77, 79, 80]. In animal experimentation and some small human studies, dysbiosis has also been shown to impact relevant brain and behavioral parameters, including cortisol regulation, depressive and anxious symptomatology, and social functioning [77, 79].

Whether ELA itself produces dysbiosis is a question of ongoing interest [74]. A study in rodents found that infant maternal separation durably altered fecal microbiota and increased later inflammatory reactivity [81]. Work in monkeys, meanwhile, found that transient dysbiosis triggered by infant maternal separation predicted durable immune dysfunction, supporting the possibility of early microbiome effects on development in other axes [82]. If human research replicates such findings, the health implications may be considerable.

Interactive effects across axes

The above evidence illustrates how ELA-related physiological changes generate feed-forward synergies; for instance, if glucocorticoid toxicity compromises brain regions tasked with stress regulation [29], or stress-related inflammation further disrupts neural, gut microbial, and metabolic axes to compound HPA dysregulation and further inflammation [83]. Meanwhile, brain functional changes (e.g., altered executive functions and reward processing) may shape health-related behaviors and ongoing social risk exposures [84]. Synergistic effects of ELA thus produce wide-ranging physiological changes marked by aberrant neural function, endocrine activity, chronic inflammation, immunosuppression, insulin resistance and, potentially, dysbiosis. These changes are substantially mediated by altered development of stress-response systems; when acute, activation of these systems generates adaptive changes across body systems (e.g., immune, metabolic, cardiovascular) to address threats. However, chronic or excessive activation contributes to the pathogenic physiological "wear and tear" described within the allostatic load paradigm [15, 29]. In full, ELA-induced changes may mediate epidemiological links to key diseases, including, among others, obesity, dyslipidemia, type 2 diabetes, atherosclerosis, asthma, thromboembolic events (myocardial infarction, stroke), cancer onset and progression, as well as addictions, psychopathology, and adverse social outcomes [1–6, 18].

Differential susceptibility to adversity

Despite described trends, outcomes among ELA-exposed individuals are markedly diverse. A rich literature describes this apparent differential susceptibility to adversity, as selectively reviewed in Table 2 and recommended as further reading [85, 86]. Some observed modifiers of ELA effects include genetics [25, 87–89], child sex and/or gender [19, 90, 91], exposure features (e.g., timing, nature, and intensity) [21, 25], and the presence of other risks or protective factors [36]. Of note, substantial literature suggests that nurturing caregiving is a particularly powerful protective factor mitigating ELA associations with physiological parameters, including elevated allostatic load [92, 93], inflammation [94], cortisol reactivity [95], and cellular aging [96]. Considering neurodevelopment, a prospective study found that caregiving behaviors mediated the association of early childhood socioeconomic stress with hippocampal volumetric change [97]. Such studies suggest that caregiving quality critically shapes psychosocial risk trajectories and developmental effects.

Clinical, research, and public health applications

The evidence linking ELA to lifelong health is substantial, with important implications for clinical practice and public health summarized in Table 3. We highlight four recommendations in particular. First, we suggest that screening for ELA should become a routine part of clinical care for children and adults. This aspect of the "developmental history" can provide information about a patient's risk of major pediatric and adult diseases, facilitating social support, protective intervention, and/or decisions about disease screening and prevention.

Second, screening for ELA must be matched by investment in scale-up of known effective interventions promoting health by addressing ELA. Considerable evidence suggests that caregiving-focused interventions, for instance, may mitigate the physiological effects of ELA. Some parameters improved by caregiving-focused interventions in longitudinal research include ELA-associated chronic inflammation [98], telomere shortening (accelerated genetic aging) [99], and gray matter volumetric changes [100]. Similarly, cortisol reactivity appears to be sensitive to caregiver-targeted interventions and to psychological support interventions with ELA-exposed individuals [101]. Scale-up investments must include quality monitoring and ongoing assessment of impact at scale. Assessments must disaggregate effects by population

Table 2 Selected effect modifiers

Modifier	Examples of findings	Further reading
Genetic variability	• Genetic polymorphisms found to moderate associations between ELA and various outcomes; Specific examples of outcomes impacted with implicated genes include:	
	o Emotional and neuroendocrine stress reactivity: 5-HTTLPR	Lester et al., 2006 [86]
	o Inflammatory response to stress: 5-HTTLPR	Fredericks et al., 2010 [88]
	o Common forms of psychopathology, including depression, ADHD, and substance addiction: NR3C1, CRHR1, OXTR, 5-HTTLPR, HTR3A, DRD2, MAOA, BDNF, COMT o Atherosclerosis risk: MAOA	Nemeroff et al., 2016 [25] Heim & Binder, 2012 [87] Zhao et al., 2013 [89]
Child sex and gender	• Complex sex differences in HPA and autonomic dysregulation after early stress observed in animals and humans	Essex et al., 2013 [19]
	• Differential effects of maternal vs. paternal stress on boys vs. girls leads some to posit ELA effect moderation by socially embedded gender roles	
	• Genetic moderators of the effects of ELA may be sex and/or gender specific o Meta-analysis found stronger effect of MAOA genotype on psychopathology in boys o Different polymorphism on the 5-HTTLPR gene have been linked with increased risk of depression following ELA in males vs. females	Kim-Cohen et al., 2006 [90] Brummet et al., 2008 [91]
Other child characteristics	• Pre-existing health conditions, e.g., prematurity, poor physical health status, etc. alter social and physiological consequences of ELA	Doom & Gunnar, 2015 [36]
	• Child temperament, sensitivity to the environment, and emotion processing are associated with risk for psychopathology and may affect the ways in which children respond to adversity	Lester et al., 2006 [86]
Exposure characteristics	• Characteristics of the exposure, including type (e.g., sexual, physical, emotional abuse, or neglect), chronicity, and intensity, modify associations with physical and mental health outcomes	Nemeroff et al., 2016 [25]
	• Exposures occurring during early sensitive periods can have heightened impacts on specific developmental domains leading to "timing effects"	Bick & Nelson, 2016 [21]
Social context and caregiving	• Family structure and stability, birth order, caregiver stress and social support, community and societal context may modify effects of specific adversities	Doom & Gunnar, 2015 [36]
	• Presence of a dependable, supportive caregiver may "buffer" children from effects of otherwise adverse environment	
Cumulative occurrence	• Dose-response relationship between number of adversities and health and social effects are observed in large epidemiological studies	Felitti et al., 1998 [1] Danese et al., 2009 [3]

ADHD attention deficit hyperactivity disorder, *HLA* hypothalamic-pituitary-adrenal, *ELA* early life adversity

subgroups, for instance, as defined by culture, SES, religion, race, or ethnicity, to identify diverse needs [102].

Third, investigators must continue to test new intervention strategies to prevent or reduce the physiological effects of ELA. New approaches should be ever more accurately targeted (e.g., based on genotype-dependent response variation), scalable, effective, and evidence based, making use of the rich literature on biological embedding. In particular, novel approaches are needed to reach the most vulnerable families often least impacted by existing strategies [102]. Efforts should be aided by ongoing development of biomarkers of ELA [103], which can be used to track intervention effects and optimize timing and targeting. Additional research priorities include better characterization of ELA-microbiome links, and consistent use of prospective ELA measures.

Finally, we recommend that practitioners across multiple social sectors recognize ELA as a common soil giving root to various manifestations of poor health over the life course, and better align strategies to advance child welfare and public health. Disease prevention paradigms must move beyond proximal focus on risk behaviors (e.g., diet, substance use) for specific diseases towards life-course models accounting for early influences on lifelong health. Efforts require coordination

Table 3 Proposed clinical implications of reviewed findings

Practitioner activity	Recommendations	Recommended resources
Understanding disease etiology and risk	Consider how ELA contributes to a patient's risk of common health problems, e.g.: • Mental health disorders: Depression, anxiety, substance use disorders, post-traumatic stress disorder, psychosis • Cardiovascular disease: Ischemic heart disease, hypertension, atherosclerosis • Metabolic pathology: Obesity, type 2 diabetes, dyslipidemia, metabolic syndrome • Neoplasm: Breast, liver, lung cancers	Results of major epidemiological studies assessing health effects of ELA [1–6] Further reading suggested throughout
Screening	• Screen for ELA history • Assess social service and protection needs • Consider ELA history when assessing risk and screening for ELA-related diseases or developmental needs	Adverse Childhood Experiences Questionnaire [1] WHO Adverse Childhood Experiences International Questionnaire [104] American Academy of Pediatrics Resilience Project Clinical Screening Tools [105]
Intervention	*General practice* Provide access to: • Mental healthcare • Early prevention and treatment for other ELA-related diseases • Social services and poverty alleviation • Violence response and prevention interventions *Pediatric practice* • Family and caregiver support programs • Early development interventions • Services to prevent or respond to ELA exposures, including child protection services	WHO Preventing Child Maltreatment guide [106] WHO mhGAP Intervention Guide [107] Interventions resources to support healthy child development from Frontiers of Innovation – Center on the Developing Child at Harvard University [108]
Transforming care models	Adopt best-practices from "medical home models" to support ELA-exposed patients, including strategies promoting: • Patient- and family-centered wraparound care • Cultural competency • Enhanced access and follow-up	National Center for Medical Home Implementation Tools & Resources [109]
Advocacy	Incorporate evidence on ELA into advocacy relating to: • Access to mental health services • Poverty alleviation, criminal justice reform, and violence prevention • Fair parental leave and high-quality child care • Immigration and refugee policies protecting children and families	WHO guidance package on Advocacy for Mental Health [110] United Nations Children's Fund policy advocacy and children's rights tools [111] Children's Defense Fund policy campaign resources [112]

ELA early life adversity, *WHO* World Health Organization

across health, social services, education, justice, child protection, and other sectors to improve alignment around children's needs. Among others, relevant priorities might include improving access to mental health services, childcare, and parental leave, expanding family poverty programs, seeking immigration and criminal justice practices that avoid separating children from nurturing caregivers, and addressing racial inequities impacting children.

Conclusions

The findings reviewed here explore various biological mechanisms that may explain links between adverse childhood experiences and disease. These insights can inform efforts to improve health across the life course. As the emergence of novel tools, such as biomarkers of early adversity, drives a new wave of intervention research, strong collaboration is needed between medical and public health practitioners, families, and communities based on a deep appreciation for the effects of early adversity. The understanding of the physiology of biological embedding, as explored here, supports those leading practice-transforming efforts.

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Interoceptive Awareness Skills for Emotion Regulation: Theory and Approach of Mindful Awareness in Body-Oriented Therapy (MABT)

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Emotion regulation involves a coherent relationship with the self, specifically effective communication between body, mind, and feelings. Effective emotion regulation involves the ability to accurately detect and evaluate cues related to physiological reactions to stressful events, accompanied by appropriate regulation strategies that temper and influence the emotional response. There is compelling evidence demonstrating links between poor or disrupted awareness of sensory information, or interoceptive awareness, and difficulties with emotion regulation. This paper presents a framework, based on psychological and neurobiological research, for understanding how interoceptive awareness facilitates regulation and an integrated sense of self, and thus contributes to health and well-being. A mind-body therapeutic approach called mindful awareness in body-oriented therapy (MABT), uniquely designed to teach fundamental skills of interoceptive awareness, is described. MABT develops the distinct interoceptive awareness capacities of identifying, accessing, and appraising internal bodily signals that are identified in physiological models as the critical components of interoception for emotion regulation. The explanatory model is that the development of these key interoceptive capacities improves sensory (physical and emotional) awareness, reduces distress, and improves regulation. Strategies for teaching and learning interoceptive awareness are not well-developed in mindfulness or psychotherapeutic approaches, particularly important for people who may have difficulty attending to interoceptive awareness due to stress, chronic pain or trauma. To address this issue, MABT provides an individualized protocol for scaffolding interoceptive awareness through a combination of psychoeducation and somatic approaches explicitly addressing difficulties with interoceptive processing. Clinical vignettes are included to provide exemplars of this approach and to highlight key components of the therapeutic process. Results from research are also included to highlight the acceptability, safety, health outcomes, and possible mechanisms underlying the MABT approach.

Keywords: interoception, awareness, emotion, regulation, therapy

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INTRODUCTION

Emotion theory and understanding have undergone notable shifts as the field of emotion science has developed. Such shifts in theoretical perspectives often appear to travel along a particular continuum that leans toward either body-oriented or mind-oriented explanations. At one end of the continuum it is bodily cues and sensations that are the key source and explanation for emotional experience, at the other it is cognitive processes. Are emotional feelings pre-conscious, arriving fully formed and physically coherent, and then later interpreted by the mind to be named and understood? Or is it the case that cognitive interpretations of the self and context trigger emotional responses that will organize and energize an emotional response, with consciousness of bodily cues and feelings following?

Early science of emotion pointed to a bodily source: a patterned emotional response in the service of survival. The evolutionary model was subsequently modified in embodied theories of emotional experience (James, 1890; Schachter and Singer, 1962) to include the important roles of awareness and interpretation of bodily cues. With a shift, the 20th century saw an emphasis on the role of mind in determining emotion responses, and furthermore in articulating treatment such as cognitive therapy for emotional pain and dysfunction. As theories have shifted between being more bodily-oriented vs. more cognitively-oriented, there has been increased integration and elaboration of the separate perspectives (Izard et al., 1984). Scientists who followed found that locating the origins of organized emotional response in the body provided a foundation for more nuanced and complex models of emotion response and regulation augmented by cognitive activities such as appraisal and sensitivity to internal signals (Damasio, 1999, 2005). Embodiment theorists in philosophy and anthropology wrote about 'bringing the body back' into conceptualization of the self (Evans et al., 1991; Csordas, 1994), a view supported recently in neuroscience by interoception models (Craig, 2015) that indicate how the body and mind interact in complex ways to influence each other as they are expressed and understood as emotion.

Interoception is the perception of sensations from inside the body and includes the perception of physical sensations related to internal organ function such as heart beat, respiration, satiety, as well as the autonomic nervous system activity related to emotions (Vaitl, 1996; Cameron, 2001; Craig, 2002; Barrett et al., 2004). Much of these perceptions remain unconscious; what becomes conscious, i.e., interoceptive awareness, involves the processing of inner sensations so that they become available to conscious awareness (Cameron, 2001). There are multiple processes involved in interoception, reflected in conceptual variations of interoceptive awareness across disciplines (Khalsa and Lapidus, 2016; Khalsa et al., 2018), the evolving state of the science, and the emergence of transdisciplinary models to address conceptual and measurement questions (Farb et al., 2015; Khalsa et al., 2018). Importantly to this paper, there is empirical evidence of the connection between interoceptive awareness and regulation of emotion (Craig, 2015). Such research links a lack of interoceptive awareness with emotion disorders (Paulus and Stein, 2010; Khalsa and Lapidus, 2016); and has opened new avenues for working with difficult to treat or intractable emotional disorders, such as depression, post-traumatic stress disorder (PTSD) and substance use disorder (SUD) (Farb et al., 2015). In addition, research on the neurobiological effects of stress has identified neural and physiological changes subsequent to adversity and trauma that influence emotional experience and internal emotion-related processes and awareness (Evans and English, 2002; Lupien et al., 2006; Ellis et al., 2011, 2013; Taylor et al., 2011). For example, physiologic adaptations to persistent or traumatic stress include both autonomic hyper and hypo arousal (for a review, see Taylor et al., 2011). Thus, converging trends in therapeutic practice and neuroscience invite reconsideration of the body, pointing to its central role in emotional experience and regulation.

The purpose of this paper is to present a framework of emotion regulation that highlights the integrative role of interoceptive awareness and ability. Interoceptive awareness is key to identifying internal physiological processes related to affective feeling, and by so-doing is a means of integrating bodily sensations, cognitive processes, and emotional feeling (Craig, 2015). Hence, interoceptive awareness is a window to emotional experience, as well as potentially providing access to important mechanisms of emotion regulation (Khalsa and Lapidus, 2016). This paper has two distinct sections. The first section presents a framework, based on psychological and neurobiological research, for understanding how interoceptive awareness facilitates regulation and an integrated sense of self, and thus contributes to health and well-being. The second section presents a mind-body therapeutic approach called mindful awareness in body-oriented therapy (MABT), uniquely designed to teach interoceptive awareness skills to increase capacity for emotional regulation, expression, and understanding.

SECTION I: CONCEPTUAL FRAMEWORK RELATING INTEROCEPTIVE AWARENESS AND EMOTION REGULATION

Models specific to interoception and stress response (Schulz and Vogele, 2015), neurobiology (Paulus, 2007), and physiology (Craig, 2002) converge to pinpoint interoception as central to emotion experience and regulation. The stress response system (SRS) directs and organizes a complex sequence of physiological activities to respond to stress and thus ensure homeostatic balance for the organism. The detection, interpretation and behavioral integration of these internal activities involve interoception. In particular, this information from the body has, as well, a necessary and central role in emotion experience and regulation (Garfinkel and Critchley, 2013). We describe a framework for understanding how interoceptive ability contributes to emotional awareness and regulation.

Interoception

Interoception involves the bi-directional communication between bodily sensation and multiple levels of cortical

oversight, a process by which information about invisible internal physiological states are communicated to cognitive centers in the brain in order to support physical and emotional well-being, including effective response to stress via emotional awareness and regulation (Craig, 2003; Critchley and Garfinkel, 2017). Interoception can be seen as a precursor and even a blueprint for emotion response (Damasio, 1999). Sensations from the body underlie most if not all of our emotional feelings, particularly those that are most intense, and most basic to survival (Craig, 2002). It has a role in survival, supporting regulated response to sensations related to bodily integrity (e.g., sensations of hunger, temperature, and pain) as well as emotion sensations directed at social integration (e.g., positive emotion, affection, and intimacy) and physical survival (e.g., fear and anger/aggression). Interoceptive awareness – the ability to identify, access, understand, and respond appropriately to the patterns of internal signals – provides a distinct advantage to engage in life challenges and on-going adjustments (Craig, 2015).

Emotion Regulation

Regulated emotion is attuned and adapted to relevant psychosocial and physical circumstances, optimizing opportunities to function in a restorative and growth-oriented manner (Porges, 2011). This involves marshaling an adaptive, appropriate emotional response that organizes behavior and benefits an individual, attuned to internal personal cues as well as external circumstances (Blair and Raver, 2012). On the other hand, emotion dysregulation involves an emotional response that is out of proportion, erroneous or inappropriate with respect to the stimulus, and ineffective for achieving overall and consistent well-being. There may be benefits to a dysregulated response (e.g., intense aggression may remove the irritant), however, inappropriate or intensity of emotional sensations and responses distinguish dysregulation as problematic to overall health. In its most intense and persistent manifestations, dysregulated emotion can be characteristic of diagnosable anxiety, depression, and aggressive disorders as well as PTSD.

At a deeper level, emotion regulation involves a coherent relationship with the self, specifically effective communication between body, thoughts, and feelings. It implies tolerance and understanding of signals from the body and the related cognitive attributions. It also implies having the capacity to positively manage challenging sensations and related behavioral responses, such as behaviors or decisions to moderate, suppress or change signals toward a desired end. From an embodiment perspective, the accurate detection and evaluation of cues related to physiological reactions is accompanied by appropriate regulation strategies that temper and influence the emotional response. Optimally, emotional regulation confers benefits in terms of health, well-being, social connection, and competence with life tasks.

Stress Response System (SRS), Interoception and Emotional Regulation

Being responsive to interoceptive information allows an individual to be aware of an emotion cue early, and therefore to process, interpret and strategize at the onset of stressful events. There is a complex relationship between interoception and stress (Schulz and Vogele, 2015) as both processes reflect the neurological communication between the central nervous system (CNS) and peripheral nervous system (PNS), which is critical to mobilizing the organism for homeostasis and survival, and both are shaped by key interactions with the environment. For these systems, the bi-directional communication between the CNS and PNS involves interoception, perception, and processing of internal bodily states that are transmitted to brain, and involves activated stress processes that are transmitted from the CNS to the peripheral system as well as to metabolic and immunologic functions via neural and endocrine pathways.

General stress models, such as the Allostatic Load model, posit that a stressful environment leads to a dysregulation of the SRS (Del Giudice et al., 2011; Ellis et al., 2011). The SRS codes and filters information from the environment to prepare the body to respond to threats to its equilibrium. The SRS involves several subsystems (SNS; PNS; HPA) each with patterns of response to stress, constituting a primary integrative pathway through which psychosocial environmental factors are transmuted into behavioral, autonomic and immunologic adaptation, or pathology. Dysregulation of the SRS is typically initially reflected in hyper-responsivity and causes wear and tear on physical, mental, and emotional regulatory systems (Del Giudice et al., 2011; Ellis et al., 2011; Blair and Raver, 2012). However, over time, the SRS system may become down-regulated and hence *less* sensitive and responsive to cues, marked by insensitivity to internal states and their causes. Both hyper and hypo sensitivity affects the relationship with the body and emotions: hyper vigilance is associated with overly reactive responses and negative, possibly inaccurate, interpretations; conversely buffered responsivity is less informed and engaged, and therefore less likely to respond when responding is called for. Hence, the excessive and/or unrelenting demands from a difficult environment can get 'under the skin' and change a person's physiological response to stress (McEwan and Seeman, 2003; Lupien et al., 2006; Taylor et al., 2011; Ellis et al., 2013). Such exposure to constant stress and the changes described can lead to decreased interoceptive ability that may be a reflection of the noted difficulties in detecting, tolerating, and interpreting cues.

Schulz and Vogele (2015) present a model that integrates stress response and interoception, suggesting that undue stress affects interoceptive awareness by altering the intensity of the internal cues as well as their perception and interpretation. Thus, stress may influence multiple levels of interoceptive process. Stress and trauma affect the strength of signals at the most basic levels of interoception, as well as the ability to 'access' or tolerate the disturbance, which in turn compromises accurate interpretation of sensations and related decisions regarding behavior. Schulz and Vogele focus their arguments on psychological disorders directly influenced by uncomfortable sensations emanating from the body (e.g., rapid heart rate leading to anxiety; dissociation). In addition, we suggest that their argument for maladaptive emotional response can be applied to dysregulated emotional patterns that have documented associations with maladaptive stress responses such as suicide behaviors, depression and anger

management disorder (Hooven et al., 1995; Briere and Jordan, 2009; Anestis et al., 2011).

The Adaptive Calibration Model (Del Giudice et al., 2011; Blair and Raver, 2012; Ellis et al., 2013) allows that the benefits of upregulated or down-regulated stress may be momentarily adaptive. However, difficulty arises when the response that is adaptive to difficult environments remains 'set' even when the environment is changed. Set points represent a long-term calibration of the SRS during early life events, resulting in consequential patterns of autonomic and HPA responsivity that are sustained long after the events that precipitated them, and possibly long after they are adaptive (Del Giudice et al., 2011; Pluess, 2015). For instance, the individual with a more reactive, open response to stress, developed in a supportive, safe environment, will be at a disadvantage if they continue to be sensitive and reactive in an adverse situation. There is a 'sweet spot' in regulation, between being sufficiently buffered so not to be overwhelmed, but still engaged with the environment (Ogden, 2009). This is the therapeutic window where affect is both tolerable and helpful, i.e., affective responses between hyper and hypo arousal.

For a highly responsive individual, the SRS amplifies the signal coming from the environment and maximizes the chance an individual will be modified by that experience; the costs may include being hypersensitive to social criticism or becoming interrupted or overwhelmed by minor challenging events (Blair and Raver, 2012; Pluess, 2015). On the other hand, chronic stress may result in lower tolerance for physiological response, solidifying a strategy at the physiological level to buffer and defend the organism from activation of the SRS, such as physiological 'set points' that buffer signals and protect the organism (Del Giudice et al., 2011; Ellis et al., 2013). The tasks and challenges of coping with a difficult environment can shape the capacity to attune oneself to bodily signals, and even affect the shape and size of those signals themselves. From a survival perspective, it may be preferable to be buffered from an onslaught of environmental insults and the resulting cues to respond, thus protecting the organism from mounting undue, ineffective and eventually deleterious stress responses. By and large, an environment with 'normal' or common stressors may lead to moderate and somewhat adaptive buffering of external cues, whereas a nurturing, facilitative environment may render one more 'open' to the environment, more in tune with bodily sensations, and more likely to adaptively respond to stimuli (Del Giudice et al., 2011). The downside to buffering is that the capacity to maintain awareness, notice feelings and interpret feelings may likewise be compromised, and may remain so long after the need for protection is resolved. Similarly, an individual open to the effects of their environment may have less ability to withstand prolonged or dramatic difficulties and frustrations when they are encountered.

Implications for Intervention

The work we have presented thus far places physiologic cues at the center of emotion regulation theory and research, and, by logical extension, places the body at the center of intervention approaches designed to address emotion regulation. Such an intervention approach is particularly relevant for individuals who experience undue stress, physical or psychological pain or trauma. Implicit in models of both emotion regulation and stress described above is the importance of attending to the ways daily stressors, large and small, impact body–mind communication, specifically the ability to attend to and interpret internal signals of stress-related emotion.

Therapeutic approaches designed to re-shape the response to environmental cues to make physiologic responses more knowable, accessible and tolerable, and thus available to aid in regulation, will have to work with the client to adjust their 'set points' in ways that facilitate optimal emotional responding within a general set of current and relevant environmental expectations. Thus therapeutic work directed toward emotional tolerance may expand the therapeutic window, or the sweet spot, between hypo and hyperarousal. Such activities gently nudge the client toward greater interoceptive awareness and emotional regulation by incrementally moving them toward therapeutic goals in a safe and conscious manner.

SECTION II: MINDFUL AWARENESS IN BODY-ORIENTED THERAPY

In this section, we present the MABT approach, explicitly designed for teaching and learning interoceptive awareness. MABT was developed by co-author Cynthia Price in the 1980s in response to the need to integrate somatic and emotional awareness work within body-oriented therapy practice. Drawing from Focusing (Gendlin, 1981), an experiential psychotherapeutic approach that involves attention to the "felt sense" to enhance sensory awareness of emotional experience, the MABT approach teaches interoceptive awareness using the combination of manual (touch-based), mindfulness, and psychoeducational approaches.

Mindful awareness in body-oriented therapy develops the distinct interoceptive awareness capacities of identifying, accessing, and appraising internal bodily signals (Cameron, 2001) that are identified in physiological models as the critical components of interoception for regulation (Craig, 2003). An incremental or staged process for teaching these interoceptive awareness skills is used in the MABT approach (see explanatory model, **Table 1**). Integral to the development of interoceptive awareness is the development of mindfulness, specifically the capacity to be in, and maintain attention to present-moment experience with an attitude of openness, curiosity, and self-compassion (Kabat-Zinn, 1990; Bishop et al., 2004). Mindfulness increases tolerance of one's thoughts and feelings, particularly uncomfortable ones, and facilitates the unlinking of uncomfortable observations from scripted unregulated responses.

While MABT and other mindfulness approaches involve both bottom–up and top–down processes (Taylor et al., 2010), MABT is unique in its strong focus on bottom–up learning processes involving a focus on sensation guided by the use of touch to support learning interoceptive awareness. Linked to emotion regulation, interoceptive awareness is affected by one's

TABLE 1 | Mindful awareness in body-oriented therapy (MABT) explanatory model.

Interoceptive awareness component	MABT key processes	Related health outcomes
Awareness	Body literacy	Improved sensory awareness
Access	Training Interoceptive awareness exercises	Reduced distress and improved well-being
Appraisal	Mindful body awareness practice	Improved regulation and resilience

previous experiences of stress – suggesting that interoceptive processes are one way in which stress can alter the capacity to tune into emotion and hence regulate emotion (Schulz and Vogele, 2015). Even if there is some ability to access interoceptive awareness, the capacity to maintain awareness, or move back and forth between cognitive oversight and bodily awareness may be undeveloped. The gentle, coached MABT approach is thus used to facilitate learning, and also helps to build trust and comfort with the material, slowly increasing sensitivity to internal states and awareness of complex internal responses that can shape awareness, self-understanding, decision making processes, and behavior that underlie regulation. MABT research in community settings demonstrates the feasibility, acceptability, and safety of MABT (Price, 2005, 2006; Price et al., 2007, 2012, 2013; Price and Crowell, 2016). These studies involved samples with co-occurring conditions and extensive trauma histories, highlighting the acceptability of MABT teaching processes among highly distressed populations. This section describes each of the MABT stages and includes a clinical example of the therapeutic processes involved.

LEARNING INTEROCEPTIVE AWARENESS: MABT PROCESSES AND CLINICAL EXAMPLES

Awareness

To access awareness of inner body sensation one needs to know how to perceive internal sensations. The ability to do so, however, can be unfamiliar or challenging. This is often due to avoidance of sensations (often characterized as being defended from feeling), or due to derealization/depersonalization, a type of dissociative response that is very common among those with high stress or chronic pain (Zaman et al., 2015), as well as among those with a history of trauma (Herman, 1997; Frewen et al., 2008). Often there is little to no knowledge on the client's part that there are sensations that could be brought into awareness, as the patterns of conscious attention are so strongly set. Thus there can be multiple types of barriers to overcome that all require the development of fundamental skills of awareness. MABT begins by teaching the clients to identify body sensations, this is called *body literacy*, the ability to identify and articulate sensory experience. The naming of sensation is secondary to experiencing sensations, and the complex and nuanced awareness that sensation conveys may be unnamed, particularly when first encountering new sensory experiences. However, the ability to identify and describe sensation is fundamental for interoceptive awareness as it provides a pathway for relating or associating to the body, and thus facilitates perceived linkages between experiences of sensation (i.e., links between physical and emotional awareness, for example increased muscular tension and anger) and linkages between sensation and environmental triggers.

In MABT, body literacy is taught by asking the client what is noticed in response to physical pressure on an area where there is expected sensation, for example an area of physical tension or apparent discomfort. Physical pressure, through client self-touch or by the therapist on an area of the body (e.g., top of shoulder), can be used to guide client awareness to body sensation. Reflective listening techniques and follow-up questions are used to promote finer descriptions of sensory experience. When a client has difficulty finding words to describe sensation, the therapist provides a list of options to see if any match the client's experience and may also describe what he or she feels tactilely; this models body literacy and can help to teach the client how to engage in the process.

Clinical Example

A client receiving his first session MABT session will be asked about where he holds tension in his body. He says he holds tension in his shoulders. During body literacy training, the therapist will put moderate pressure on the top of the client's shoulders and ask the client to describe how his shoulders feel. The client says that his shoulders feel "fine." It is not uncommon, particularly individuals who avoid attention to sensation, to reply without answering the question due to the unfamiliarity of identifying and articulating sensory awareness. The therapist repeats the question with more specificity by asking the client how his shoulders feel in the area being pressed. The client replies that his shoulders feel "tight." The therapist uses reflective listening, repeating the client's words to promote deeper attention to the sensation by the client, and then asks if he can describe the tightness – for example the quality of the tightness (e.g., ropey, knotty, etc.). The client, responds saying, "hmm... I guess the tightness actually has a sharpness to it – like a burning sensation." He then adds, "I never realized how much my shoulders hurt. The longer I pay attention, the more aware I am of how the tightness travels up into my neck and also down between my shoulder blades." He spontaneously takes some deep breaths and then says "I really don't like feeling this way – which is why I decided to come see you. I'm just holding on to too much stress, I think." The therapist says, "You think you're holding on to too much stress. . ." The client says, "Yea – I work too much and I don't know how to let go. I can get pretty worked up." The therapist says, "You just took a couple deep breaths a minute ago and I noticed that your shoulders relaxed a bit. Did you notice that too?" The client: "Not in my shoulders, but I feel a little more relaxed overall." The therapist: "Good noticing and I'm glad to hear that."

The therapist continues in the session to ask the client to describe sensation in various places (back, arms, legs, etc.) in

order to help the client to attend to sensory awareness and to increase awareness of where he holds tension and what that feels like. The take-home practice focuses on the client practicing this on his own, for example putting pressure on his neck and shoulders and noticing the related sensations in his body. He is encouraged to take deep breaths if the area feels tight and to notice how his body and his shoulders feel when he focuses on breathing deeply. Being more aware of sensation – and the quality of sensation (reflected in how one might describe it) – helps the client to pay attention to bodily experience and may stimulate self-awareness and behavior change (i.e., self-care). In this clinical example, the client came into the 2nd session saying that his take home practice (which he did twice daily, once at work and once after arriving home in the evening) helped to keep the tension from increasing throughout the day and that he was in a better mood in the evenings. He said, "I didn't realize that my body can tell me how I'm feeling! I guess I need to learn to listen to it more. . ."

The identification of sensory awareness is used in all aspects of subsequent interoceptive training and practice, as it is the fundamental perception of sensation. The ability to identify sensations is also necessary for engaging in the other aspects of interoceptive awareness (access, sustained attention, and appraisal). Verbally identifying and describing sensory experience facilitates awareness of the links between physical and emotional sensations and the internal cues related to one's individual responses to stress. Importantly, participant verbalization of sensory experience in the sessions ensures that the therapist is informed about client experience and this helps the therapist to guide the educational and therapeutic process.

Integral to MABT, is a take-home practice. At the end of each session the client/therapist collaboratively come up with the home practice for the interim week based on the session (what was learned), what is most helpful for the client, and what can be feasibly practiced (see **Table 2** MABT Key Components). Client self-touch is used to facilitate the ability to engage in interoceptive awareness at home. Practice is critical for integration of interoceptive awareness skills into daily life. With practice, the client can develop comfort bringing mindful attention to the body and be responsive to interoceptive signals, thus facilitating the recalibration of the SRS maladaptive 'set-points' that underlie regulation.

TABLE 2 | MABT key interoceptive training processes.

Awareness – stage 1 Body literacy	Access – stage 2 Interoceptive awareness exercises	Appraisal – stage 3 Mindful body awareness practice
Identify body sensations	Breath flow exercise	Capacity to sustain awareness
Articulate body sensations	Tissue softening exercise	Noticing internal shifts
	Internal body attention practice	Re/appraisal based on experiential awareness and insight
Take home practice	Take home practice	Take home practice

Accessing

The next step in the development of interoceptive awareness is learning to bring attention to inner body experience. This involves learning to focus attention *inside* the body. Since this is often an unfamiliar concept, we teach multiple strategies to provide different experiences and pathways for accessing interoceptive experience. These strategies include: (a) attending to and feeling the sensation and flow of exhaled breath through the body, (b) using intention to feel the softening of areas of muscular tension, and (c) bringing attention to a specific area of internal body (e.g., inside chest, shoulder girdle, abdomen, etc.) We begin with exercises that focus on the movement of breath (strategy a) and intentionally attending to softening in an area that is holding tension (strategy b). These exercises, directed by the therapist, create the initial experience of *feeling* internal sensation, similar to the mindfulness meditation practice of attending to the sensations of breathing. Then, we teach the client to bring mindful attention inside a specific internal space in the body (strategy c). To do this, the therapist provides verbal and tactile guidance to promote the client's mindful attention to a specific area of the inner body; typically we start with the upper chest as it is a relatively easy area to access and then move to areas that may be more problematic for the client (e.g., an area of discomfort). For all these initial accessing strategies, the therapist assesses whether or not the client is successful in bringing attention to the regions of the body and processes used (e.g., flow of breath), and whether more instruction is needed. This assessment thus guides the therapist's teaching strategies and attention to potential challenges the client may experience in learning to access interoceptive awareness. These various exercises often become well-used strategies for self-care that are incorporated into daily life to facilitate self-care and regulation, as found in numerous MABT studies highlighting the frequent use of MABT skills in daily life and the perceived helpfulness of these skills/practices (Price, 2005; Price et al., 2011, 2012; Price and Smith-DiJulio, 2016).

Clinical Example

The ability to access interoceptive awareness varies greatly from person to person; for some it is relatively easy and little guidance is needed and for others, it can take training and practice. This example is of a client for whom access is challenging and describes the process of disengagement and reengagement that is typical in the learning process with clients for whom the SRS system is downregulated, reflecting a lack of awareness and tolerance for experiencing internal states. The client is a 40-year-old woman with chronic low back pain and depressed mood. She naturally avoids and distracts herself from her pain as much as possible as a coping mechanism to help her function throughout the day. In the past she took pain management classes that were also focused on distraction techniques. She is coming to MABT sessions to learn new ways to relate to pain because her pain levels have remained constant and her ability to manage the pain has decreased, causing her to feel easily irritated, depressed, and to increase use of pain medications. She describes herself as someone who puts others first and has trouble taking time for

herself or to attend to her emotional needs; that she is just focused on getting through the day and taking care of her family.

It is the client's 4th MABT session. In prior sessions she has been introduced to various exercises focused on accessing interoceptive awareness. In this session the aim is to facilitate her ability to bring her awareness into her low back region to increase interaction with, and gain information about, this region of the body that is the source of her pain and likely related to her depressed mood.

To start, the therapist and client talk together for 20 min about how the client is feeling and about her experience with the MABT home practice. On this particular day the client describes her back pain as moderate, and says she is coping well and managing her work and family life. She describes her success in using deep breathing to help her relax and reduce the build-up of tension throughout the day. However, she feels tentative about using breath to target the painful areas of her low back as she is afraid that this will cause spasms and increased discomfort. To assist her with bringing attention to her low back, the therapist asks the client to lie prone on the treatment table and places her hands around (one hand in back and one hand in front) the area of the client's low back, to provide the physical focus for the client's mindful attention. The therapist then offers verbal coaching to guide the client's attention inward to the area of her low back. The client, after multiple tries, is able to bring her attention to the space inside her torso. But each time, as her attention comes toward her lower back region, she finds herself thinking about something else. The therapist asks her to notice where in her body this shift "out" occurs. The client is able to identify disengagement from mindful attention at the point just below her lower thoracic spine – a bit above the primary location of her pain. In response, the therapist moves her hands to up to the lower thoracic region and asks the client to see if she can rest her attention there. The client is then able to maintain her focus in her body. She relaxes, and the therapist notices a deepening of attention or presence in this area of the body. The therapist asks the client what she notices, and the client describes the sensation in this area of her back as "achy." The therapist suggests that the client simply continue to attend to this area of her body for a little longer. The client is able to be present with her sensory experience in her back for many more minutes and as she does so, she feels her throat tighten and tears come to her eyes. The therapist asks what she is noticing, and she says "I just feel so sad." At this point her attention shifts out of her body and she opens her eyes.

The therapist encourages the client to stay with the feelings of sadness and the client is able to do so, crying quietly with her eyes closed. The client explains that she is remembering her brother who died 2 years ago, shortly after the birth of her second child, and how sad she is that he is no longer alive. She says that she's not had a chance to really mourn: "I feel like I just need cry and let him go. I miss him so much."

When they move to sit in chairs toward the end of the session, the client reports that the achiness in her back has subsided and she feels stronger somehow. She says that she hadn't been aware of how much sadness she was holding inside. She says, "I feel like I've been doing my best to just keep going after he died. But I think I just didn't want to feel how bad it hurt to have him gone." She reflects further on when her pain started and continues: "I've been trying my best to ignore my back pain and here I am remembering my brother and how much I miss him." She wonders out loud about whether her avoidant coping style may further distance her from knowing how she feels about aspects of her life. The client and therapist discuss the challenges of accessing and staying connected to inner experience. The client is encouraged that she was able to bring her inner attention to her lower back without feeling panicky. She realizes that she has not had this experience before and that having the firm touch of the therapist helped her to stay calm and refocus her attention whenever she noticed herself thinking about other things. Intrigued by the new sensory information that suggests a relationship between the sad feelings, the memory and loss of her brother, and her back pain, she is eager to practice this process at home as it did not trigger anxiety (like she experienced in practicing targeted breathing). The therapist asks her if she feels comfortable exploring the sadness on her own and she says she does. Collaboratively they develop a take home practice for the week involving a similar process of bring her attention to her lower back, using a small towel under her back (in lieu of touch) to help focus her attention there.

This clinical vignette is an example of how accessing interoceptive awareness can facilitate engagement with sensations, and links between sensations, that were not previously in awareness and that can be important to increase self-understanding and recovery (in this case, the need to acknowledge, attend to and accept her grief). The somatization of this client's emotional pain, experienced as back pain, reflect the complex physiological and psychological interactions that can occur with a prolonged maladaptive stress response – in this case presenting as depression.

A number of therapeutic elements were critically important for this client to successfully engage in accessing interoceptive awareness. The first was trust in the client/therapist relationship ∼ which was built by the therapist listening carefully to the client's experience. The therapist knew from earlier communication that the client could easily feel anxious about encountering her pain. The therapist did not push the client to interoceptively access the area of her low back when it was clear that the client would have difficulty sustaining awareness in this area. Second, it was important to stay within the "therapeutic window" (i.e., stretching into new places without becoming overwhelmed). The therapist assessed that the client was unable to stay connected and to access interoceptive experience below the region of her thoracic spine. In response, the therapist moved her hands and thus the 'targeted area' for interoceptive awareness shifted to the region of the body closest to the back pain that the client could *successfully access*. Third, facilitating the client's ability to interoceptively re-engage (after disengaging or coming "out" of connection with the body) involves the therapist's ability to assess presence in the body. This is a critical skill needed to teach interoceptive or mindful body awareness practices using MABT, as it allows the therapist to consistently gauge whether the client is attending to inner bodily experience. In this vignette, the therapist assessed disengagement (also known as 'mindwandering') (Smallwood and Schooler, 2006) and where

in the body disengagement occurred. The therapist accomplished this by noticing when the client's attention was no longer in her body, typically experienced as an energetic shift that is reflected in a tangible change in tissue quality. The therapist can confirm this by asking the client about her experience. As shown in this vignette, the client was aware her shift "out" of the body. The therapist then facilitated the client's ability to notice where in the body disengagement occurred, and to "catch" this happening in the moment so that the client learns to refocus attention and reengage in interoceptive access and awareness processes. Learning to return attention to the body is critical for successful engagement in accessing and sustaining interoceptive awareness, and typically improves with practice, and the concomitant ability to tolerate uncomfortable sensations ∼ reflecting a reduction in buffering or protection that underlie SRS set-points. In this example, the client accessed her inner body and noticed the kinesthetic sensation of achiness and with increased presence, the sensation of sadness. The interface with this new but intriguing material, combined with an increased sense of well-being, invoked the client's curiosity and motivated engagement in take-home practice even when, as in this case, accessing interoceptive awareness presented potential challenges requiring time, skill, and patience.

Sustaining Awareness

The ability to sustain awareness of inner body sensations in critical for receiving, i.e., noticing or being aware, of sensory information. MABT sessions thus build on the body literacy and access skills already learned, by coaching clients in the practice of maintaining awareness and learning to deepen their attentive presence in the body, as exemplified above. MABT research indicates that individuals are able to increase their capacity to sustain awareness as they receive more coaching and practice in mindful body awareness (stage 3 of the intervention process) (Price and Graham, 2016). Importantly, the ability to sustain awareness is associated with increased awareness of physical and emotional states and the links to behavior and environmental and/or interpersonal stressors (Price and Graham, 2016). Results from this same clinical trial also demonstrate that exposure to stage three of MABT is associated with greater improvements in interoceptive awareness, emotion regulation, and reduced affective distress compared to those who are exposed to only MABT stages 1 or 2, demonstrating the importance of sustained mindful attention and appraisal processes in the MABT approach (Price et al., 2017).

Also, it is in the state of sustained mindful attention that individuals most commonly experience new awareness or insight about themselves or a situation (for example, the new awareness of sadness in vignette above). Insight is understood as a change in consciousness that includes a shift in understanding (Kounios and Beeman, 2014), a psychological process thought to inform well-being in meditation practice (Dahl et al., 2015). Such shifts self-understanding often include new awareness of the links between physical and emotional sensations, involving metacognitive awareness processes (Fernandez-Duque et al., 2000) that underlie cognitive appraisal of bodily experiences (e.g., back pain and grief in vignette above), and appear to be critically important for insight, integration of interoceptive experience into self-understanding (i.e., sense-of-self), and the ability to better regulate emotion (Mehling, 2016; Khalsa et al., 2018).

Reappraisal

Cognitive reappraisal involves reevaluation of a situation or experience such that our response to the situation or experience is altered (Gross, 2001) and when positive, stressful events or experiences can be reconstrued as meaningful or growthful (Lazarus and Folkman, 1984). Developing the capacity for interoceptive awareness is thought to facilitate positive and adaptive reappraisal processes (Garland et al., 2015), a critical aspect of emotion regulation (Webb et al., 2012). In MABT, the therapist coaches the client to attend to the array of possible accessible sensory experiences in order to facilitate appraisal and reappraisal processes. This includes noticing whether shifts in internal experience occur during the session, and noticing the sensory qualities of these shifts. At the end of the session the client is asked to verbally review the session highlights to facilitate cognitive integration of the session material. This review process also facilitates cognitive reappraisal of session experiences in ways that further motivate continued use of interoceptive awareness practices and integration into daily life (Price and Smith-DiJulio, 2016).

Clinical Example

The client is a single woman in her late 30s. She has a history of childhood sexual trauma, and has had extensive psychotherapy to aid in her recovery. She works in an extremely stressful job as an executive at a large company. Easily overwhelmed, she finds herself often anxious and extremely stressed about work demands. The client sought MABT because she her elevated stress was triggering recurrent body memories related to her abuse; these memories were interfering with her sleep and her comfort with intimacy with others. Her sense of disconnection from her body was heightened and she wanted to explore a more somatic therapeutic approach for her self-care.

It is the client's 6th MABT session. She has a high level of emotional awareness, and is quite facile at accessing interoceptive awareness. However, her practice of MABT skills has been limited, in part due to her long work days and in part due to her long-time pattern of avoiding sensory material as a strategy to protect or buffer her from uncomfortable emotions. At the beginning of this session, the therapist guides her through a seated body scan and the client reports noticing a feeling of heaviness in her abdomen, an area that is often uncomfortable when she is anxious or feeling fearful. The therapist and client agree to focus on interoceptive attention to the client's abdominal region during the session. The therapist and client continue their therapeutic work on the massage table. The therapist has her hands on either side of the client's abdomen – one on the front and one on the back – and is able to assess through changes in the client's tissue quality when the client has successfully dropped her attention into, or accessed, her abdominal region. The therapist asks simple guiding questions to facilitate client attention to the sensations within her abdomen. The client initially notices that her abdominal region feels small and closed. The therapist

asks if she is aware of any other sensations. The client says that she is aware of the heaviness she mentioned during the body scan. The therapist asks how she would describe the heaviness. At this point the client's attention immediately shifts out of presence in her body. She fidgets on the table and says "I'm not in there anymore." The therapist asks what she's noticing now and the client says she was thinking about some work event. The therapist asks if she'd like to try again and after hearing "yes," she coaches her again through the process of returning her attention to her abdominal region. The therapist then coaches the client to sink her attention deeply into the heavy sensation in her abdomen; suggesting that she simply be with herself in this small space, to maintain her attention there without needing to do or change anything. The client is able to maintain attention in her abdominal area for a sustained period (about 15 min). The therapist checks in during this time, asking what is noticed. The client replies, indicating that the space is changing, while maintaining mindful presence in her body. The therapist asks if she can describe how it is changing. The client says that it is bigger and feels somewhat lighter. The therapist, using reflective listening, repeats "it is bigger and lighter." There is a long pause, after which the client continues by adding, "and there is some yellow, like a stream of sunshine coming in from the side." The therapist asks what else she is noticing. The client, after a long pause responds, saying, "I feel very peaceful." The client then adds that it's been a long time since she's felt so calm inside. The therapist asks her to notice the entire state of her internal body in this experience of calm and peace. The client responds by saying she feels a sense of continuity from her head to her feet; a sense of being whole. She continues noticing her interoceptive experience and says, in a surprised voice, "I have no worries, it is as though my entire being is calm." After a couple more minutes, the therapist asks her to maintain this state of calm as she slowly returns from this deep internal place of attention, taking her time to open her eyes.

Once seated, they review the client's experience to facilitate the client's cognitive integration of the material. The therapist asks the client to notice how her body is feeling while seated, and the client's most immediate response is that she feels light and relaxed, that her abdomen feels no heaviness inside – just 'normal' and good. She continues to reflect on her experience. She looks up at the therapist she says with tears in her eyes that she is amazed that she was able to stay connected inside for so long – and that this experience gives her a new sense of herself and a new sense of hope. In response to the therapist asking her about what she means by "hope," she replies: "I really want to feel I can continue to feel my body as a safe place; to not feel so anxious and off-center especially when I'm triggered." The therapist asks her to again notice and to make a strong mental note of her bodily experience of calm and safety, pointing out that this is an important experience of wholeness and safety, one that is not easily accessible when she is feeling anxious and so all the more important that she know that this is possible for her and that she has the capacity to come back to this peaceful and 'whole' experience of her body.

As this example illustrates, to support the client's *appraisal* of interoceptive awareness, MABT is focused on providing the client with individualized training to gain sufficient comfort and skill accessing interoceptive awareness and sustaining awareness to facilitate noticing experiential shifts during mindful awareness practice. These can be profound fundamental shifts in sense-of-self, as in this case involving both positive physical and emotional shifts that reflect recalibration of the SRS set-points. The client's experience of somatic well-being and embodiment is a significant shift that facilitates trust of her body (i.e., connecting to her body and her emotions can feel safe). Such a positive experience can motivate an individual to engage in further therapeutic work and can lead to further access to, and development of, inner resources for daily life and increased emotion regulation.

MABT Description Summary

The vignettes illustrate the processes involved in learning interoceptive awareness through MABT. As described, skills are taught incrementally to develop, access, sustain, and appraise interoceptive awareness. As a therapeutic approach, however, MABT is more than simply a strategy for learning interoception. Like other therapeutic approaches, MABT can be provided as the primary modality or in conjunction with other therapeutic or intervention approaches. Thus in clinical care, once basic interoceptive awareness skills are learned, the related therapeutic processes unfold not in a step-by-step linear fashion, but in a way that resembles an ever deepening spiral of awareness, access/sustained attention, and appraisal processes. As illustrated in **Figure 1**, awareness facilitates access, generating deeper awareness, and out of this comes appraisal, which can lead to new awareness and insight. Using MABT skills in daily life to support self-care and bodily connection contributes to the development of life-long practices that promote well-being, embodiment, and emotion regulation.

The MABT learning and therapeutic trajectories vary by individual, thus the teaching and coaching processes must align with the needs of the client. As described, there can

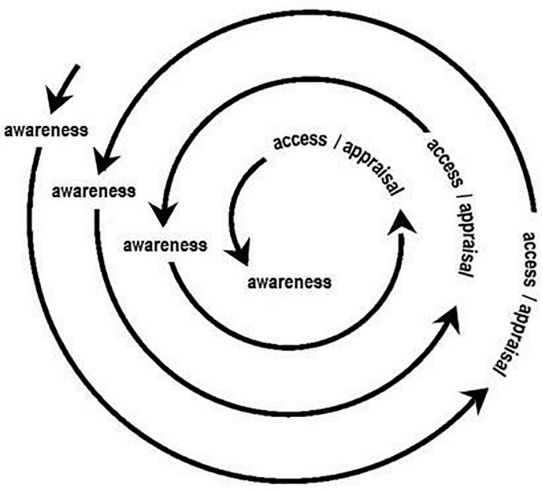

FIGURE 1 | Unfolding interoceptive awareness processes in MABT.

be multiple challenges or barriers to bringing attention to the body. These include difficulty knowing where to bring ones attention, the tendency to engage in thinking vs. feeling, a lack of vocabulary to identify or express sensation, not knowing *how* to bring attention into the body, unfamiliarity with maintaining mindful (i.e., present-moment and compassionate) attention in the body, and anxiety related to encountering uncomfortable physical or emotional sensations. Every person has their own ease or challenges learning these skills. Because being with oneself on the inside is inherently an experience of deep self-connection, the client's sense of safety is paramount. For this reason, an individualized coaching approach allows the therapist to appropriately pace and vary the teaching strategies to support the learning processes and needs of each client. Also, attending to inner bodily sensations can be experienced as a vulnerable activity, particularly if there are challenges involved that touch on feelings of failure due to having trouble engaging in the skills being taught (especially if there is high experiential avoidance), or feelings of fear due to anxiety about contact with unpleasant sensations or emotions (especially if dissociative coping patterns are well-developed). In these types of instances, when engaging in interoceptive awareness can be destabilizing, it is critically important that the therapist has the skills to help the client return to a more stable place, normalizing their experience and serving as a guide to compassionately support the client's process involving both staying within the 'therapeutic window' for any therapeutic work and also recognizing if or when the client may not be ready to pursue this type of therapeutic work. It is thus also important that the therapist has the skills and support to negotiate any related transference and countertransference experiences that may emerge (Pearlman and Saakvitne, 1995; Blackburn and Price, 2007).

In MABT research our experience and findings show that development of interoceptive awareness skills comes more easily to those with familiarity and comfort attending to physical and emotional experience. Nonetheless, research findings from studies with individuals who have with little prior sensory awareness such as populations with chronic illness (HIV) (Price et al., 2013), female veterans with comorbid chronic pain and PTSD (Price et al., 2007), and women in treatment for SUDs who have extensive histories of interpersonal trauma (Price et al., 2012, 2017; Price and Smith-DiJulio, 2016) highlight the accessibility of MABT, and that this relatively brief intervention (delivered once/week across 8 weeks) individuals with little prior sensory awareness can learn interoceptive awareness skills and related practices to increase their ability to emotionally regulate, to manage symptoms of stress, and support their well-being. MABT research demonstrates increased interoceptive awareness skills and concomitant improvements in emotion regulation (self-report and psychophysiology) and reductions in psychological distress for those who receive MABT compared to control and active control conditions (N = 187) (Price et al., 2017), suggesting that interoceptive awareness may be the key underlying mechanism supporting these improved health outcomes.

These study findings have important clinical implications, including the potential application of interoceptive awareness training for various health conditions, and the potential for interoceptive awareness skills to be taught and integrated within multiple clinical disciplines (e.g., nursing, social work, psychology, massage therapy, physical therapy, occupational therapy, medicine), settings (e.g., clinics, hospitals, service agencies), and health care conditions (e.g., mental health, chronic pain, chronic illness, and palliative care). The use of touch-based approaches for teaching interoceptive awareness skills, as outlined in this paper, requires appropriate licensure and skills to establish and maintain safety, as well as appropriate training and skills for working with mental health concerns. Relatedly, MABT can be modified so that client self-touch is used in situations which, or by clinicians for whom, touch is not appropriate. It is important to point out that MABT is not specific to those who have difficulties with emotion regulation or for those with serious physical or mental health challenges. Life is inherently stressful (Ellis et al., 2013), and having tools and increased capacity for interoceptive awareness for emotion regulation is useful for most everyone.

Mindful awareness in body-oriented therapy has many features that overlap with mental health approaches that include a focus on mindful attention to the body (such as Hakomi, Sensorimotor Therapy, and Somatic Experiencing). Critically, MABT is primarily focused on teaching therapists *how* to develop client interoceptive awareness skills and thus offers a unique and highly relevant complementary training for therapists in multiple disciplines as well as for psychotherapists interested in incorporating this focus in their practice, whether they have trained in the body-centered approaches like those mentioned above, or in more conventional psychotherapeutic approaches (e.g., cognitive behavior therapy).

OVERALL SUMMARY

Individual ability to detect interoceptive signals may be influenced by stress and adverse life experiences that negatively affect willingness, tolerance, interest, and practice with attending to the language of the body. People who have experienced undue stress, chronic pain, or trauma may have ceased to trust or listen to their bodily cues, making it difficult for them to predict their emotional responses and to regulate them. Furthermore, such stress histories appear to affect the magnitude of the interoceptive response, complicating how this important internal information is accessed, processed, and interpreted. The emphasis in MABT on mindful attention to inner body awareness, or interoceptive experience, reconnects the individual to deep bodily states of equilibrium, helping to override and rescript maladaptive stress responses and automatic patterns. The integrated learning processes involved in MABT meld mindfulness practice with active, hands-on coaching, teaching clients to tune-in to the subtleties of physiological sensation and developing interceptive awareness capacity and related appraisal processes. These interoceptive awareness skills facilitate optimal emotional responding and the individual's ability to process and interpret feelings, or to plan ahead and strategize at the onset of small cues before becoming overwhelmed or entering an

unmanageable situation, thus recalibrating the SRS and providing clients with self-care skills critical for emotion regulation.

AUTHOR CONTRIBUTIONS

CP and CH made substantial contributions to the conception, writing, final approval and agree that they are both accountable for the contents of this manuscript.

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SPECIAL ARTICLE

Mentalization based treatment for borderline personality disorder

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Mentalizing is the process by which we make sense of each other and ourselves, implicitly and explicitly, in terms of subjective states and mental processes. It is a profoundly social construct in the sense that we are attentive to the mental states of those we are with, physically or psychologically. Given the generality of this definition, most mental disorders will inevitably involve some difficulties with mentalization, but it is the application of the concept to the treatment of borderline personality disorder (BPD), a common psychiatric condition with important implications for public health, that has received the most attention. Patients with BPD show reduced capacities to mentalize, which leads to problems with emotional regulation and difficulties in managing impulsivity, especially in the context of interpersonal interactions. Mentalization based treatment (MBT) is a time-limited treatment which structures interventions that promote the further development of mentalizing. It has been tested in research trials and found to be an effective treatment for BPD when delivered by mental health professionals given limited additional training and with moderate levels of supervision. This supports the general utility of MBT in the treatment of BPD within generic mental health services.

Key words: Mentalization, borderline personality disorder, attachment, psychotherapy

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Borderline personality disorder (BPD) is a complex and serious mental disorder characterized by a pervasive pattern of difficulties with emotion regulation and impulse control, and instability both in relationships and in self-image (1). It represents a serious public health problem, because it is associated with suicide attempts and self harm, both of which are consistent targets of mental health services. Recurrent suicidal behaviour is reported in 69-80% of patients with BPD, and suicide rates are estimated to be up to 10% (2).

BPD is a common condition that is thought to occur globally with a prevalence of 0.2-1.8% in the general population (3). Higher prevalence rates are found in clinical populations. Moran et al (4) found a prevalence rate of 4-6% among primary care attenders, suggesting that people with BPD are more likely to visit their general practitioner. Chanen et al (5) reported a prevalence rate of 11% in adolescent outpatients and 49% in adolescent inpatients. The highest prevalence has been found in people requiring the most intensive level of care, with a rate of 60-80% among patients in forensic services (6,7).

The high prevalence and increased suicide rate in patients with BPD make an unassailable argument that effective treatment needs to be developed and that treatment has to be widely available. Whilst a number of treatments for BPD have been shown to be moderately effective in randomized controlled trials, it remains of considerable concern that most of them require extensive training, making them unavailable to most patients. Mentalization based treatment (MBT) was developed with this in mind. It requires relatively little additional training on top of general mental health training, and has been implemented in research studies by community mental health professionals, primarily nurses, with limited training given modest levels of supervision.

WHAT IS MENTALIZATION?

The term mentalization grew out of the Ecole Psychosomatique de Paris and to some extent was operationalized by developmental researchers investigating theory of mind (8). It was first used by Fonagy in 1989 (9) in a broader way and has since been developed in relation to understanding a number of mental disorders.

Mentalization, or better mentalizing, is the process by which we make sense of each other and ourselves, implicitly and explicitly, in terms of subjective states and mental processes. It is a profoundly social construct in the sense that we are attentive to the mental states of those we are with, physically or psychologically. Given the generality of this definition, most mental disorders will inevitably involve some difficulties with mentalization. In fact, we can conceive of most mental disorder as the mind misinterpreting its own experience of itself, thus ultimately a disorder of mentalization. However, the key issue is whether the dysfunction is core to the disorder and/or a focus on mentalization is heuristically valid, i.e. provides an appropriate domain for therapeutic intervention.

While mentalizing theory is being applied to a number of disorders (e.g., post-traumatic stress disorder (10), eating disorders (11) and depression (12)), in a number of contexts (e.g., inpatient, partial hospital, and outpatient facilities), and in different groups of patients (e.g., adolescents, families, substance abusers), the treatment method is most clearly organized as a therapy for BPD (13). It is only in this condition that clear empirical support with randomized controlled trials (14,15) is available.

In BPD, a fragile mentalizing capacity vulnerable to social and interpersonal interaction is considered a core feature of the disorder. If a treatment is to be successful, it must either

have mentalization as its focus or at the very least stimulate development of mentalizing as an epiphenomenon.

The failure of adult mental processing in borderline states had been apparent to most clinicians, but none had identified the primary difficulty as a loss of mentalizing arising from early development. The simple basic suggestion we made was that representing self and others as thinking, believing, wishing or desiring did not arrive at age 4 as a consequence of maturation, but rather was a developmental achievement that was profoundly rooted in the quality of early object relations. Its predictable vulnerability to disappearance under stress in borderline conditions was seen as an appropriate focus for psychodynamically oriented psychological intervention, even though concerns had been expressed over many decades about the use of psychodynamic therapy in the treatment of BPD. These began as long ago as 1938, when an American psychoanalyst, Adolph Stern, identified a group of patients, now considered to have had BPD, who did not respond to classical psychoanalytic treatment (16). He later described modifications of psychotherapy for his borderline group that remain relevant today (17).

THE DEVELOPMENT OF MENTALIZING

Mentalizing theory is rooted in Bowlby's attachment theory and its elaboration by contemporary developmental psychologists, whilst paying attention to constitutional vulnerabilities. There is suggestive evidence that borderline patients have a history of disorganized attachment, which leads to problems in affect regulation, attention and self control (18,19). It is our suggestion that these problems are mediated through a failure to develop a robust mentalizing capacity.

Our understanding of others critically depends on whether as infants our own mental states were adequately understood by caring, attentive, non-threatening adults. The most important cause of disruption in mentalizing is psychological trauma early or late in childhood, which undermines the capacity to think about mental states or the ability to give narrative accounts of one's past relationships. Building on the accumulating evidence from developmental psychopathology, the mentalization theory of BPD first suggests that individuals are constitutionally vulnerable and/or exposed to psychological trauma; second, that both these factors can undermine the development of social/cognitive capacities necessary for mentalization via neglect in early relationships (20), especially where the contingency between their emotional experience and the caregiver's mirroring is non-congruent (21); third, that this results in an hypersensitive attachment system within interpersonal contexts; and fourth, that this leads to the development of an enfeebled ability to represent affect and effortfully control attentional capacity (22).

Given the known continuity of attachment styles over time, residues of attachment problems of childhood might be expected to be apparent in adulthood. The adult attachment literature in relation to BPD has been reviewed by Levy (23). While the relationship between BPD diagnosis and a specific attachment category is not obvious, there is little doubt that BPD is strongly associated with insecure attachment (only 6-8% of BPD patients are coded as secure). It appears that early attachment insecurity is a relatively stable characteristic of BPD patients, particularly in conjunction with subsequent negative life events (24).

MENTALIZATION BASED TREATMENT

The focus in treatment of BPD needs to be on stabilizing the sense of self and helping the patient maintain an optimal level of arousal in the context of a well-managed, i.e. not too intense and yet not too detached, attachment relationship between patient and therapist. The patient with BPD is exquisitely sensitive to all interpersonal interactions. So, the therapist needs to be aware that therapy, an interpersonal interaction, inevitably will provoke anxiety related to loss of a sense of self and that the ensuing emotional experiences will rapidly threaten to overwhelm the patient's mental capacities, leading to escalating emotions and inability to accurately understand others' motives. Psychiatrists and other mental health professionals also need to be aware of this sensitivity if they are to avoid iatrogenic interactions with patients with BPD. Inpatient hospital admission, for example, is an intense emotional experience for all patients and, unless carefully managed, will make patients with BPD worse by overstimulating their attachment processes. This overstimulation in treatment may account for the poor long-term outcomes of patients with BPD when unmodified intensive treatments were offered (25).

Patients with BPD have a vulnerability in regulating emotional responses and generating effective strategies for controlling their thoughts and feelings, which challenges their capacity for thinking about their own actions in terms of subtle understandings of their thoughts and feelings. They slip into what superficially could be described as a kind of mindless state, both in relation to others and to themselves. Of course, the story turns out to be more complicated than this, because these incapacities, palpable at certain times, are not always evident. But, at moments of emotional distress, particularly distress triggered by actual or threatened loss, the capacity for mentalization is most likely to apparently evaporate. The question is how this understanding and the clinical observations can usefully be translated into a therapeutic approach that could be helpful given the prevalence and severity of this clinical problem within a public healthcare system.

To this end, we defined some core underpinning techniques to be used in the context of group and individual therapy and labeled them MBT (13,26). Only three important aspects of treatment will be considered here, namely the aim of interventions, the therapeutic stance, and mentalizing the transference.

Aims of interventions in MBT

The initial task in MBT is to stabilize emotional expression, because without improved control of affect there can be no serious consideration of internal representations. Although the converse is also true, identification and expression of affect are targeted first because they represent an immediate threat to continuity of therapy as well as potentially to the patient's life. Uncontrolled affect leads to impulsivity, and only once this affect is under control is it possible to focus on internal representations and to strengthen the patient's sense of self.

The aim and the actual outcome of an intervention are more important in MBT than the type of intervention itself. The primary aim of any intervention has to be to re-instate mentalizing when it is lost or to help to maintain it in circumstances when it might be lost or is being lost. Any intervention that succeeds in these aims may be used in MBT. As a result of this, MBT takes a more permissive approach to interventions than most other therapies, giving it a plurality in terms of technique which might account for its popularity and appeal to practitioners from different schools as well as the limited amount of training required before practitioners begin using it in their everyday practice. We do not ask that practitioners learn a new model of therapy from the beginning, but that they modify their current practice focussing on mentalizing rather than behaviours, cognitions, or insight. We do, however, ask that they undertake to develop a particular therapeutic stance and implement a series of steps to try to engage the patient in a process of mentalizing, firstly using some generic psychotherapy techniques such as empathy, support and clarification, and then moving on to other interventions specifically designed to "stress" the attachment relationship within controlled conditions, which includes a focus on the patient-therapist relationship through "mentalizing the transference".

Therapeutic stance

The therapist's mentalizing therapeutic stance should include: a) humility deriving from a sense of "not-knowing"; b) patience in taking time to identify differences in perspectives; c) legitimizing and accepting different perspectives; d) actively questioning the patient about his/her experience – asking for detailed descriptions of experience ("what questions") rather than explanations ("why questions"); e) careful eschewing of the need to understand what makes no sense (i.e., saying explicitly that something is unclear). An important component of this stance is monitoring one's own mentalizing failures as a therapist. In this context, it is important to be aware that the therapist is constantly at risk of losing his/her capacity to mentalize in the face of a non-mentalizing patient. Consequently, we consider therapists' occasional enactments as an acceptable concomitant of the therapeutic alliance, something that simply has to be owned up to. As with other instances of breaks in mentalizing, such incidents require that the process is "rewound and the incident explored". Hence, in this collaborative patient-therapist relationship, the two partners involved have a joint responsibility to understand mental processes underpinning events both within and without therapy.

Mentalizing the transference

We caution about the use of transference interpretation in the treatment of BPD because it assumes a level of mentalizing capacity of the patient that he/she often does not possess. This may have led to the suggestion that we "specifically eschew transference interpretation" (27). We do not. In fact we specifically employ transference interpretation, give indicators about when it can be used and carefully define six essential components. But equally we caution practitioners firstly about the commonly stated aim of transference interpretation, namely to provide insight, and secondly about genetic aspects, such as linking current experience to the past, because of their potential iatrogenic effects.

Our first step is the validation of the transference feeling, that is establishing the patient's perspective. Of course this is not the same as agreeing with the patient, but it must be evident to the patient that the therapist has at least understood his/her point of view. The danger of the genetic approach to the transference is that it might implicitly invalidate the patient's experience. The second step is exploration. The events which generated the transference feelings must be identified. The behaviours that the thoughts or feelings are tied to need to be made explicit, sometimes in painful detail. The third step is accepting enactment on the part of the therapist. Most experiences of the patient in the transference are likely to be based on reality, even if on a very partial connection to it. Mostly this means that the therapist has been drawn into the transference and acted in some way consistent with the patient's perception of him/her. It may be easy to attribute this to the patient, but this would be completely unhelpful. On the contrary, the therapist should initially explicitly acknowledge even partial enactments of the transference as inexplicable voluntary actions that he/she accepts agency for, rather than identifying them as a distortion of the patient. Drawing attention to such therapist components may be particularly significant in modeling to the patient that one can accept agency for involuntary acts and that such acts do not invalidate the general attitude which the therapist tries to convey. Only then can distortions be explored. Step four is collaboration in arriving at an interpretation. Transference interpretations must be arrived at in the same spirit of collaboration as any other form of interpretive mentalizing. The metaphor we use in training is that the therapist must imagine sitting side-by-side with the patient, not opposite. They sit side-by-side looking at the patient's thoughts and feelings, where possible both adopting the inquisitive stance. The fifth step is for the therapist to present an alternative per-

spective and the final step is to monitor carefully the patient's reaction as well as one's own.

We suggest these steps are taken in sequence and we talk about mentalizing the transference to distinguish the process from transference interpretation, which is commonly viewed as a technique to provide insight. Mentalizing the transference is a shorthand term for encouraging patients to think about the relationship they are in at the current moment (the therapist relationship) with the aim to focus their attention on another mind, the mind of a therapist, and to assist them in the task of contrasting their own perception of themselves with how they are perceived by another, by the therapist or indeed by members of a therapeutic group.

Whilst we might point to similarities in patterns of relationships in the therapy and in childhood or currently outside of the therapy, the aim of this is not to provide the patients with an explanation (insight) that they might be able to use to control their behaviour pattern, but far more simply to highlight one other puzzling phenomenon that requires thought and contemplation, part of our general therapeutic stance aimed to facilitate the recovery of mentalization which we see as the overall aim of treatment.

EFFECTIVENESS OF MENTALIZATION BASED TREATMENT

Our initial study of MBT (14) compared its effectiveness in the context of a partial hospital program with routine general psychiatric care for patients with BPD. Treatment took place within a routine clinical service and was implemented by mental health professionals without full psychotherapy training who were offered expert supervision. Results showed that patients in the partial hospital program showed a statistically significant decrease on all measures, in contrast with the control group, which showed limited change or deterioration over the same period. Improvement in depressive symptoms, decrease in suicidal and self-mutilatory acts, reduced inpatient days, and better social and interpersonal function began after 6 months and continued to the end of treatment at 18 months.

The 44 patients who participated in the original study were assessed at 3 month intervals after completion of the trial using the same battery of outcome measures (15). Results demonstrated that patients who had received partial hospital treatment not only maintained their substantial gains, but also showed a statistically significant continued improvement on most measures, in contrast with the control group of patients who showed only limited change during the same period. Because of continued improvement in social and interpersonal function, these findings suggest that longer-term rehabilitative changes were stimulated.

Finally, an attempt was made to assess health care costs associated with partial hospital treatment compared with treatment within general psychiatric services (28). Health care utilization of all patients who participated in the trial was assessed using information from case notes and service providers. Costs were compared 6 months prior to treatment, during 18 months of treatment, and at 18-month follow-up. No cost differences were found between the groups during pre-treatment or treatment. During the treatment period, the costs of partial hospital treatment were offset by less psychiatric inpatient care and reduced emergency department treatment. The trend for costs to decrease in the experimental group during follow-up was not duplicated in the control group, suggesting that specialist partial hospital treatment for BPD is no more expensive than general psychiatric care and leads to considerable cost savings after the completion of 18-month treatment.

All patients who participated in the partial hospital treatment trial have now been followed up 8 years after initial randomization (29). The primary outcome for this long-term follow-up study was number of suicide attempts. However, in the light of the limited improvement related to social adjustment in follow-along studies, we were concerned to establish whether the social and interpersonal improvements found at the end of 36 months had been maintained and whether additional gains in the area of vocational achievement had been made in either group. Patients treated in the MBT program remained better than those receiving treatment as usual, but, although maintaining their initial gains at the end of treatment, their general social function remained somewhat impaired. Nevertheless, many more were in employment or full time education than the comparison group, and only 14% still met diagnostic criteria for BPD compared to 87% of the patients in the comparison group who were available for interview.

A further randomized controlled trial of MBT in an outpatient setting (MBT-OP) has recently been completed. One hundred thirty-four patients were randomly allocated to MBT-OP or structured clinical management representing best current practice. Substantial improvements were observed in both conditions across all outcome variables. Patients randomized to MBT-OP showed a steeper decline of both self-reported and clinically significant problems, including suicide attempts and hospitalization (30).

Further research studies are underway, including randomized controlled trials on patients with substance use disorders and patients with eating disorders. A partial replication study of the original partial hospital trial has also been completed by an independent group in the Netherlands, showing that good results are achievable within mental health services away from the instigators of the treatment.

CONCLUSIONS

MBT may not be radically different from other forms of intervention widely practiced by psychotherapists and other mental health professionals in the various contexts in which individuals with BPD are being treated. We claim no originality for the intervention. MBT represents the relatively

unadulterated implementation of a combination of developmental processes readily identified in all our histories: a) the establishment of an intense (attachment) relationship based on attempts to engage the patients in a process of understanding their mental states, and b) the coherent re-presentation of their feelings and thoughts, so that patients are able to identify themselves as thinking and feeling in the context of powerful bonds and high levels of emotional arousal. In turn, the recovery of mentalization helps patients regulate their thoughts and feelings, which then makes relationships and self-regulation a realistic possibility.

Although we would claim to have identified a particular method that makes the delivery of this therapeutic process possible, we make no claims of uniqueness. Many situations can likely bring about symptomatic and personality change by this mechanism and hence our permissiveness of technique. The goal of further research is to identify increasingly effective and cost-effective methods for generating change in this excessively problematic group.

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Purpose in Life as a Predictor of Mortality across Adulthood

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Abstract

Having a purpose in life has been nominated consistently as an indicator of healthy aging for several reasons including its potential for reducing mortality risk. The current study sought to extend these findings by examining whether purpose promotes longevity across the adult years, using data from the longitudinal MIDUS sample (mean age = 46.92 years, *SD* = 12.94). Proportional hazard models demonstrated that purposeful individuals lived longer than their counterparts during the 14 years after assessment, even when controlling for other markers of psychological and affective well-being. Moreover, these longevity benefits do not appear to be conditional on either the participants' age, how long they lived, or whether they had retired from the workforce. In other words, having a purpose appears to widely buffer against mortality risk across the adult years.

Accruing evidence suggests that finding a purpose for your life may add years to it. Indeed, studies have found that purposeful older adults experience a diminished mortality risk in American samples (Krause, 2009), even when controlling for known predictors of longevity (Boyle, Barnes, Buchman, & Bennett, 2009). Moreover, these benefits are not culture-specific, as work has demonstrated similar effects in a Japanese sample with respect to a sense of *ikigai*, or a "life worth living" (Sone, Nakaya, Ohmori, et al., 2008). However, these studies have focused on late middle age and older adults (all samples had mean ages > 60 years), leaving the need to examine whether similar findings exist for younger adults.

It is valuable to investigate whether the longevity benefits of purpose extend across the adult years for at least three reasons. First, individuals face very different mortality risks across adulthood, and it is uncertain whether purpose serves to help "buffer" individuals against those associated with early mortality. Second, with the onset of retirement comes increased health risks (Moon, Glymour, Subramanian, Avendaño, & Kawachi, 2012), and thus purpose may prove more beneficial later in life by combating the loss of life structure and organization that employment provides. Third, having a purpose suggests that one has committed to a set of clear goals for life (e.g., Hill, Burrow, Brandenberger, Lapsley, & Quaranto, 2010; McKnight & Kashdan, 2009). Given that the content or character of individuals' goals differs with age and the amount of perceived time remaining in life (e.g.,

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Lang & Carstensen, 2002), it is of interest to examine whether purpose imbues similar longevity benefits even in the face of potential changes to goal structures.

The current study examined whether purpose imbues similar longevity benefits for young, middle, and older adults, using data from the Mid-Life in the United States (MIDUS) sample (age range: 20–75 years). First, we sought to replicate past findings suggesting that purpose in life predicts longevity, and to increase their generalizability by using a younger sample. Second, we extended this work by controlling for psychosocial variables known to correlate with purpose, in order to demonstrate that the effects were unique to purpose. Third, we tested two interaction effects that examine possible developmental fluctuations in the influence purpose has on longevity across the 14-year follow-up of the study. Toward this end, we tested both age at death and retirement status as potential moderators. Taken together, these tests allow us to better understand whether purpose influences mortality risk similarly across developmental and life structural boundaries.

Method

Sample

Participants were drawn from the Midlife in the United States survey (MIDUS), a national longitudinal study of health and well-being (for review see Brim, Ryff, & Kessler, 2004). Beginning in 1994–95, 7,108 participants were recruited from a nationally representative random-digit-dialing sample of non-institutionalized adults between the ages 20–75 (M = 46.92 years, *SD* = 12.94). We employed the full archived data file available to researchers, where recruitment was based on the study's original goals. Once they consented to the study, participants complete a phone questionnaire as well as a self-administered questionnaire completed at home. To be included in the current analysis, participants needed to complete demographic information, such as age, sex, race, education, work status, as well as the purpose in life scale. Comparing participants with missing versus full data (N = 6,163) revealed that participants with missing data were significantly younger ($t = 10.19$; $p < .05$), were more likely to be male ($\chi^2 = 17.03$; $p < .05$), retired ($\chi^2 = 22.16$, $p < .05$), and had lower levels of education ($t = 6.48$; $p < .05$).

The sex distribution was generally balanced with 52% being female. Education was coded based on the highest level obtained as of 1995–96. A 12-point scale was constructed ranging from 1 (no schooling or some grade school) to 12 (professional degrees such as Ph.D. or M.D.). Given that 91% of the sample identified as Caucasian (white), a dummy variable was constructed to contrast whites against all other races in the analyses. Retirement status was assessed by asking participants, "As of right now, are you retired?"; 14% reported being currently retired.

Purpose in Life

Purpose in life was captured by three questions from the psychological well-being scale (Ryff, 1989; Ryff & Keyes, 1995). Participants used a Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree) to provide answers to the following items: "Some people wander aimlessly through life, but I am not one of them"; "I live life one day at a time and

don't really think about the future"; and "I sometimes feel as if I've done all there is to do in life" (M = 5.50; SD = 1.21; range = 1–7; α = .36).

Other Psychosocial Variables

Three additional psychosocial variables were added to the models to examine the unique influence of purpose in life. Having positive relations with others was assessed using three additional items from the psychological well-being scale. Using the same Likert scale, participants responded to the following questions: "Maintaining close relationships has been difficult and frustrating for me"; "People would describe me as a giving person, willing to share my time with others"; and "I have not experienced many warm and trusting relationships with others" (M = 5.40; SD = 1.36; range = 1–7; α = 0.59). Positive and negative affect was captured with 12 total questions (Mroczek & Kolarz, 1998). Participants used a Likert scale ranging from 1 (All of the time) to 5 (None of the time) to answer the following questions for positive affect: "During the past 30 days, how much of the time did you feel: cheerful, in good spirits, extremely happy, calm and peaceful, satisfied, and full of life?" (M = 3.39; SD = 0.73; range = 1–5; α = 0.91). For negative affect: "During the past 30 days, how much of the time did you feel: so sad nothing could cheer you up, nervous, restless or fidgety, hopeless, that everything was an effort, and worthless?" (M = 1.54; SD = 0.62; range = 1–5; α = 0.87). Responses were coded so that higher scores indicated more positive or negative affect.

Our selection process for covariates was informed by three primary directives. First, we focused on variables known to correlate with purpose in life, to rule out some of the most meaningful and likely alternative explanations. While previous work has examined the role of purpose on mortality, unique from negative emotionality (Boyle et al., 2008), the current work is novel in controlling for both positive and negative emotions concurrently. In addition, no research to our knowledge has examined whether purposeful individuals live longer while controlling for other aspects of psychological well-being. Along this front, we focused on positive relations with others, because some have suggested that pursuing one's purpose in life necessitates the inclusion of others (Damon, 2008). Second, again to focus on likely alternatives, we chose those correlates of purpose that are known influences on longevity. Previous reviews have outlined the potential associations between mortality risk and positive affect (Pressman & Cohen, 2005), negative affect (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002), and social relationships (Holt-Lunstad & Smith, 2012). Third, in explaining the potential role of purpose on longevity, previous research has tended to focus on explanations involving physical health or disability, with mixed results (Boyle et al., 2008; Krause, 2009). As such, we focused instead on emotional and psychological well-being, to increase the relative novelty of the current investigation.

Vital Status

Mortality data on participants was obtained through a National Death Index (NDI) search through January 2010. Survival time with delayed entry consisted of each participant's age at entry into the study (i.e., age at MIDUS 1) and the age the participant died. Due to reasons of confidentiality, only the month and year of death were provided to MIDUS investigators. Participants that were still alive at the end of the follow-up were censored and their age at

this point was utilized. The mean survival time for decedents was 8.01 years (*SD* = 3.90; range = 2 months to 14 years).

Data Analysis

A series of proportional hazards models (Cox, 1972) were conducted to examine the association between purpose in life and mortality risk using SAS statistical software (SAS Institute Inc., 2002–2004). For the time metric, a delayed entry method was employed which utilizes both age at baseline data and attainted age over the follow-up period. This technique is beneficial because it only includes participants in the 'risk set' that actually have a risk of dying at a certain point during the follow-up. For example, when examining the hazard of dying at age 40, any participant older than 40 at baseline (i.e., when they completed the MIDUS 1 questionnaire) would be removed from the analysis and not included in this specific risk set.

To examine whether the effects of purpose were constant across all ages of adulthood, we conducted three tests to assess the proportionality of the purpose variable. First, the most definitive test of proportionality is to examine the significance of a purpose by death-age interaction included in the proportional hazard model. A significant interaction would indicate non-proportionality and the hazard of dying could be plotted against death-age to illustrate how the hazard of dying associated with purpose in life varies as a function of time. Using a delayed entry method in the time metric is especially important when investigating death-age interaction effects because it removes individuals from the risk set who are not young/old enough or alive to be included in the calculation of the hazard of dying during a specified time. Thus, this method allows for a more nuanced estimation of the hazard of dying at a given age and allows for an estimation of more intra-individual/ longitudinal change in the effects purpose has on mortality risk.

We also assessed proportionality of purpose effects by estimating martingale residuals (Lin, Wei, & Yang, 1993) based on 1000 random simulations that compare the observed residuals for purpose against the simulated residuals for purpose. If the residuals display markedly different patterns the Kolmogorov-Smirnov type test would be statistically significant ($p < 0.05$) and would also provide evidence of non-proportionality. Lastly, Schoenfeld residuals were estimated by computing the difference between the values of purpose for each person who died minus the expected value for each person who died. If the correlations between the Schoenfeld residual and death-age are significant, there would be additional evidence of non-proportionality.

Results

Over the 14-year follow-up, 569 participants died (approximately 9% of the sample). Broken down by age group, 8 died between 28–39 years of age, 38 between 40–49, 93 between 50–59, 156 between 60–69, 194 between 70–79, and 80 died at age 80 or beyond. Tests of differences between survivors and deceased showed that the deceased were significantly older ($t = 29.28$; $p < .05$), more likely to be male ($\chi^2 = 9.82$; $p < .05$), less educated ($t = 7.88$; $p < .05$), less likely to be employed ($\chi^2 = 547.53$, $p < .05$), but did not differ in race ($\chi^2 = 0.45$; $p = .49$). Importantly, deceased individuals scored lower on purpose

in life (t = 10.65; p < .05) and positive relations with others (t = 3.13, p < .05), but did not differ on positive or negative affect (both p's > .05).

Results from the proportional hazards model are presented in Table 1. All predictors were standardized before entry for ease of interpretation. Model 1 presents the model results without any moderation. By including baseline age as a covariate, the effect of age is removed as it is absorbed into the unspecified baseline hazard. Thus, the model is accounting for the strong baseline age differences in mortality risk (HR = 2.03) so that the effects of purpose are net of baseline age effects, as well as the other covariates included in the model. Results replicate the previous work, demonstrating that purpose predicted a lower mortality risk (HR = 0.85, CI: 0.78–0.93) net of covariates. In other words, for every one standard deviation increase in purpose, the risk of dying over the next 14 years diminished by 15%.[1]

Since Model 1 basically represents the 'averaged effect' of purpose across all death-ages included in the 14 year follow-up period, we next examined whether the hazards of purposelessness (or benefits of purposefulness) differed across the follow-up by including the purpose by death-age interaction term (Model 2). This interaction failed to reach significance (HR = 1.00, CI: 1.00–1.01, p = 0.32). Additional analyses confirmed the pattern of proportionality since the martingale residuals did not show a pattern of marked deviance as indicated by the non-significance of the Kolmogorov-Smirnov type test (p = 0.70. Likewise, all correlations between the Schoenfeld residuals and death-age were non-significant. In other words, purpose attenuated the risk of mortality relatively proportionally for younger, middle, and older adults across the 14-year follow-up period.

Finally, we investigated the role of purpose during retirement by including a purpose by retirement status interaction term in the model. Results are presented in Model 3. This interaction also failed to reach significance (HR = 1.00, CI: 0.97–1.03, p = 0.97). Therefore, again purpose appears to hold similar benefits across different adult groups.

Discussion

Recent research has focused on whether finding a purpose may promote greater longevity (Boyle et al., 2009; Krause, 2009; Sone et al., 2008). The current study added to this literature in four important ways. First, we again demonstrate that purpose predicts greater longevity in adulthood, using a more representative sample across adult ages allowing for greater generalizability. Second, we show that the benefits of purpose cannot be explained by indicators of psychological and affective well-being, underscoring the unique role that purpose may play in this process. Indeed, even when selecting variables known to be relevant for understanding mortality risk in general and in this sample, we find that the benefits of purpose hold true. Third, from a theoretical perspective we find that endorsing a strong purpose in life continues to have meaningful reductions in the risk of dying and that maintaining a stronger purpose in life can be equally important during younger ages as it is

[1]We performed the same analysis separately for each of the purpose in life items. Two items were marginal predictors of mortality (HR: 0.95 (CI: 0.90–1.01) and HR: 0.96 (CI: 0.92–1.00), both p's < .09), and the third was a significant predictor (HR: 0.95 (CI: 0.91–1.00), p < .05). Therefore, the results were similar across all single-item purpose indicators.

at much older ages. Fourth, our results suggest that the benefits of purpose are not conditional on retirement status.

These findings suggest the importance of establishing a direction for life as early as possible (see also Hill, Burrow, & Sumner, 2013). Similarly, research has demonstrated that increasing goal commitment during college can have effects on well-being into middle adulthood (Hill, Jackson, Roberts, Brandenberger, & Lapsley, 2011). However, it remains a question for future research whether the pathways by which purpose influences mortality risk fluctuate across the adult years, given that the risk factors for early mortality differ greatly from those present in older adulthood.

The current study is limited in key respects that should serve as directions for future work. First, our sample was predominantly white, limiting our ability to examine the effects of purpose across racial and ethnic groups. However, previous work does suggest that the longevity benefits associated with purpose are not conditional on race (Boyle et al., 2009). Second, it would be valuable to include a more comprehensive measure of purpose in life, to improve the reliability of the construct. That said, the predictive value of the brief measure is now clear given the current and previous (Ryff & Keyes, 1995) findings. Moreover, in line with past work (Boyle et al., 2009; Sone et al., 2008), purpose continued to predict mortality risk even when looking at the single indicators (see footnote). Third, while the current sample was not ideal for testing potential mediators, such tests may be possible in the future with additional assessments, and a longer timeframe for the study.

In conclusion, the current study adds significantly to the literature, underscoring the potential for purpose to influence healthy aging across adulthood. As such, this work points to the need for further investigation on why finding a purpose may add years to your life. For instance, given the link between purpose and agency (Hill et al., 2013), it may be important to examine daily physical activity and goal achievement as pathways linking purpose to healthy aging. Therefore, just like a purpose, the current study should provide researchers with a direction on where to go, rather than providing a final endpoint or conclusion.

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Table 1

Predicting mortality risk from purpose in life, control variables, and the age by purpose interaction.

	Model 1	Model 2	Model 3
Predictors	***Hazard Ratio (CI)***	***Hazard Ratio (CI)***	***Hazard Ratio (CI)***
Age	2.03* (1.51–2.71)	2.02* (1.51–2.71)	2.02* (1.51–2.71)
Sex (Male)	1.50* (1.26–1.78)	1.49* (1.25–1.77)	1.50* (1.26–1.78)
Minority (Other)	1.19 (0.87–1.62)	1.19 (0.88–1.63)	1.19 (0.87–1.62)
Education	0.88* (0.81–0.96)	0.88* (0.81–0.96)	0.88* (0.81–0.96)
Retirement	1.28* (1.02–1.59)	1.27* (1.02–1.59)	1.45 (0.19–11.19)
Positive Relations	0.97 (0.88–1.06)	0.97 (0.88–1.07)	0.97 (0.88–1.06)
Positive Affect	0.96 (0.86–1.07)	0.96 (0.86–1.07)	0.96 (0.86–1.07)
Negative Affect	1.09 (0.99–1.22)	1.09 (0.98–1.21)	1.09 (0.98–1.22)
Purpose	0.85* (0.78–0.93)	0.67 (0.41–1.08)	0.85* (0.78–0.93)
Age x Purpose	-	1.01 (1.00–1.01)	-
Retire x Purpose	-	-	1.00 (0.97–1.03)
−2 LL	7680.00	7679.00	7680.00
AIC	7698.00	7699.00	7700.00

Note:

* indicates $p < .05$.

CI indicates a 95% confidence interval around the hazard ratio. Purpose, positive relations with others, positive affect, and negative affect were all standardized prior to entry.

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Health and Justice

STUDY PROTOCOL Open Access

Action steps using ACEs and trauma-informed care: a resilience model

Laurie Leitch

Abstract

This paper 1) discusses two important contributions that are shaping work with vulnerable and under-resourced populations: Kaiser Permanente's (1998) Adverse Childhood Experiences Study (ACE) which includes the impact of adverse experiences in childhood on adult health and health behaviors and the more recent advent of what has come to be known as Trauma-Informed Care (TIC), programs which incorporate knowledge of the impact of early trauma into policies and programs. 2) Despite many positive benefits that have come from both contributions there are unintended consequences, described in the paper, that have an impact on research and program evaluation as well as social policies and programs. 3) Three key neuroscience concepts are recommended for inclusion in Trauma-Informed Care programs and practices in ways that can enrich program design and guide the development of practical, resilience-oriented interventions that can be evaluated for outcomes. 4) Finally, a resilience-oriented approach to TIC is recommended that moves from trauma *information* to neuroscience-based *action* with practical skills to build greater capacity for self-regulation and self-care in both service providers and clients. Examples from criminal justice are used.

Keywords: Neuroscience, Neuroplasticity, ACE study, Trauma Informed Care (TIC), Resilience, Self-regulation skills

Background

The work of clinicians and other service providers who design and implement programs for vulnerable populations has been greatly enhanced by the incorporation of two building blocks of understanding: Kaiser Permanente's (1998) Adverse Childhood Experiences study (ACE) and the growing use and refinement of a values-based orientation to individuals that draws upon ACE findings called Trauma-Informed Care (TIC).

The ACE study and TIC have generated important strides in helping service providers as well as clients better understand the impact of distressing and traumatic events on a wide range of health indicators and behaviors. Incorporating findings from the ACE study into TIC can reduce the pathologizing of symptomatic behavior by viewing symptoms as normal reactions to abnormal experiences (Evans and Coccoma 2014; Van der Kolk 2014), foster screenings for trauma history during intakes (Harris and Fallot 2001), shape staff practices that strengthen relationships between providers and clients, enhance personal safety, create a sense of welcome and respect in service delivery spaces (Elliott et al. 2005; Harris and Fallot 2001) and inspire delivery of preventive services to vulnerable individuals and families as early as possible.

There are, however, unintended consequences that can be seen in the ways that the ACE study and Trauma-Informed Care have shaped research and service delivery. This article presents a brief overview of these two important contributions and discusses the unintended consequences that can influence practices and programs to the detriment of the very individuals they intend to serve. Recommendations are discussed that include: incorporating key neuroscience concepts into TIC, the use of neuroscience-based self-regulation skills for staff and clients, and a specific framework for designing information gathering processes including research and evaluation as well as client intakes. The framework includes attention to protective experiences and characteristics and promotes research and evaluation design in a way that explicitly is intended to create a rhythm or pattern of questioning that enhances resilience and decreases distress and potential re-traumatization.

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Methods

The paper presents a rationale for expanding TIC to include key neuroscience concepts that can contribute to intake and evaluation processes and skills-based interventions. The intent is translational science that describes the movement of science information into social services and then expands that science from enriched information to concrete skills-based action.

The Adverse Childhood Experiences (ACE) study

From 1995 to 1997 Kaiser Permanente's Health Appraisal Clinic, in collaboration with Centers for Disease Control and Prevention, implemented one of the largest studies ever conducted on the origins of risk factors that have negative health and social consequences and the cumulative incidence and influence of psychological and physical abuse including: neglect, sexual abuse, witnessing violence, exposure to substance abuse, mental illness, suicidal behavior, and imprisonment of a family member (independent variables) on dependent variables that were measures of both mental health (depression, suicidality) and physical health (heart disease, cancer, chronic lung disease, skeletal fractures, liver disease, obesity) and health-related behaviors (alcoholism, drug abuse, smoking, high numbers of sexual partners) and poor self-rated health (Felitti et al. 1998).

The ACE questionnaire was constructed using selected questions from published surveys (American Journal of Preventive Medicine 2017). Prior to the survey there had been little study of the relationship between early childhood adverse experiences and adult medical problems and behaviors (Felitti et al. 1998).

The ACE survey data was collected by mail from two waves of a sample of 17,000 adult members of Kaiser's Health Maintenance Organization in San Diego, California between 1995 and 1997. The sample size itself was impressive. The release of the study findings was shocking to many when they showed the extent to which adverse childhood events negatively shaped future social and physical health outcomes, including life expectancy.

Perhaps less surprising, the findings showed that the more negative events a child experienced the higher the likelihood s/he had as an adult of suffering an array of health and behavior problems including alcoholism, chronic pulmonary disease, depression, illicit drug use, liver disease, adolescent pregnancy and many more (Centers for Disease Control and Prevention 2014a, b). Further, adults with the highest level of ACEs had a life expectancy 20 years less than those without high levels of ACEs. The study sample did not consist primarily of low-income minority adults, a demographic often found to be "at risk." It was mainly comprised of white, middle and upper income employed people; people who might be expected to have had more stable childhood environments because of parents' employment and income.

The original ACE study has generated more than 70 scientific articles, scores of conference presentations, and has shaped the design of research and as well as social programs. It is beyond the scope of this article to present a comprehensive review of the studies of the ACE survey, but ACEs Too High (2017) provides a list of ACE studies by year.

Studies using the ACE questionnaire have expanded beyond Kaiser's sample of white, HMO patients to include, for example, special populations such as children of alcoholics (Dube et al. 2001), and children with an incarcerated parent (Geller et al. 2009) and have found higher prevalences of ACEs than in the original Kaiser sample.

ACE Studies of justice-involved populations (Baglivio et al. 2014; Messina and Grella 2006; Miller and Najavits 2012; Reavis et al. 2013) including juvenile justice-involved youth (Dierkhising et al. 2013) are raising awareness of the association of early childhood trauma and offender behaviors and needs, as are studies of justice-involved samples that include a focus on childhood trauma without using the ACE questionnaire (Wolff and Shi 2012). The studies consistently find elevated rates of childhood trauma in incarcerated populations and offender groups. For example, the Reavis et al. study (2013) of incarcerated males found ACE scores above 4 to be four times higher than in a normative male population.

By bringing attention to the powerful impact that negative childhood experiences have on future health and functioning, the ACE study demonstrates the importance of gathering information early in the lives of children and their families and designing early intervention programs that target violence and neglect. It also points to the importance of collecting trauma histories from clients and highlights the essential role of prevention in program design. A particularly important contribution the Ace survey has made to offender and incarcerated groups is to emphasize the importance of trauma-targeted interventions in jails and prisons as well as in diversion programs.

The ACE study has inspired other large-scale, risk-oriented CDC-sponsored health surveys such as The Family Health History and Health Appraisal Questionnaires and The Behavioral Risk Factor Surveillance System (BRFSS) that focus on childhood maltreatment and household dysfunction. The BRFSS is now conducted by telephone in all 50 states, the District of Columbia and 3 U.S. territories, making it the "largest continuously conducted health survey in the world" (CDC 2014b).

Trauma Informed Care (TIC)

Drawing on the ACE survey findings and those of many other childhood trauma studies, an orientation to service

delivery has gained momentum that uses childhood trauma as a lens to understand the range of cognitive, emotional, physical, and behavioral symptoms seen when individuals enter systems of care. TIC comes from a values base of client safety and empowerment as well as an orientation to strong working alliances between clients and providers. DeCandia and Guarino (2015) have written a comprehensive review of the history and ongoing development of the TIC orientation.

The Substance Abuse and Mental Health Services Administration (SAMHSA 2015) has defined four main points defining Trauma-Informed Care:

1) Realizing that trauma has a widespread impact on individuals, families, groups, organizations, and communities and has an understanding of paths to recovery;
2) Ability to recognize the signs and symptoms of trauma in clients, staff, and others in the system;
3) Integration of trauma knowledge into policies, programs, and practices;
4) Seeks to avoid re-traumatization

SAMHSA's involvement in explicating TIC has raised awareness about the importance of a values-oriented approach to policies, practices and programs that help depathologize problemmatic behaviors. It offers strategies for creating service delivery climates of empathy and respect in work with individuals and families who have experienced traumatic events.

More recently, the contribution of neuroscience research has made its way into the social and behavioral health arenas by informing practitioners across disciplines about the impact of early trauma on the brain. Neuroimaging techniques such as magnetic resonance imaging (MRI) offer new understanding and validation of the impact of early traumatic events by focusing on brain development. Bridging the gap between academic studies and more popular publications, trauma-oriented, neuroscience-based information focuses on the neurobiology of distressing events and the subsequent detrimental impact they can have on social functioning (Child Welfare Gateway 2009). Early trauma has been found to cause changes in certain structures in the brain as well as alterations in chemical activity and these changes can result in heightened reactivity and impaired relational capacity (Phillips and Shonkoff, 2000).

Due, in part, to the varying attitudes about mental health disorders as well as mistrust of diagnostic labels Trauma Informed Care orientations have not been easily incorporated across cultures (Evans and Coccoma 2014). Studies assessing outcomes of TIC have also been lacking. A search of the literature for evaluation studies of TIC found one (Clark et al. 2008) that was a comparison of "consumer" attitudes toward social services that used a TIC orientation in the design of space and service delivery (called the "integrated condition") and clients receiving care as usual. The analysis found that clients who received the "integrated condition" were more likely to report that services were trauma informed and that relationships with the service providers were more positive and characterized by respect for cultural identity. While the authors emphasize that the results are not predictive of treatment outcomes such as reduction of symptoms the positive experiences, particularly with the providers, can be a first step in healing.

There are risk assessment models currently in use in correctional facilities that do not explicitly focus on traumatic experience. The Risk, Need, Responsivity Model (RNR), for example, is an intervention that tabulates risk/needs factors as well as other attitudes and behaviors considered criminogenic (Andrews 2006). Unfortunately, the RNR model does not incorporate current neuroscience research that indicates the reactivity, impulsivity, and need for excitement that can result from early or even recent trauma. Instead, individuals with these symptoms are labeled in the RNR model as having an antisocial personality pattern (Bonta and Andrews 2007). Neuroscience research on the adolescent brain describes the drive for intense experience without regard for future consequences that so often characterizes adolescents to be the result, not of characterological or personality deficits, but of the mix of a combination of an increased number of dopamine receptors and surges in sex hormones (Steinberg 2014). Since so many incarcerated individuals are sentenced for crimes committed during adolescence it is important that neuroscience contributions become more widely incorporated in courtrooms and correctional facilities.

One probable reason for the lack of outcome studies that focus on symptom reduction in TIC-specific interventions is that TIC, as it currently exists, is primarily a set of information and values about working with individuals who have experienced trauma. This is an important framework that has promoted better working alliances and an empowerment focus but has not provided enough intervention-oriented guidance that would allow for outcome evaluation.

Unintended consequences

The awareness brought by the ACE study and subsequent studies of early childhood trauma have been important and the benefits of incorporating Trauma-informed Care into services have shaped the environments in which services are delivered and heightened attention to the imperative to build client-provider relationships that build trust and a sense of empowerment. However, there are some serious issues that also arise with the attention they

have brought by their focus on the impact of traumatic events. These issues are discussed below.

1. Over-attention to the negative

The ACE study and many, not all, of the studies that flow from it have a sole focus on the negative experiences of childhood. And the ACE survey of negative events was limited in the scope of types of adverse experiences it included. No data was collected in the ACE survey on protective or strength-oriented factors that may have been part of the lives of those in the sample. The consequence of attention to risks and problems to the omission of resilience and protective factors is a lopsided understanding of clients and this view becomes a limiting factor that can shape intakes, service delivery and research.

The powerful impact of the ACE study has generated other surveys that are also limited to risk factors. The CDC's Behavioral Risk Factor Surveillance System (BRFSS) (2014a, b), for example, which is conducted throughout all 50 states in the U.S., the District of Colombia, as well as three territories, asks only one question that could be considered even slightly positive. Question 32b on the Women's Version of BRFSS asks, "How many close friends or relatives would help you with your emotional problems or feelings, if needed?" This could be considered positive because it asks about close friends or relatives. Unfortunately, the question is oriented toward having a problem. A different version of the question or a separate question could be, "How many close friends or relatives do you have supportive relationships with?"

No matter how vulnerable a person or family is they also have strengths, they have dreams for the future, they have bounced back from challenges. It is not that the exclusion of strength-based or resilience information is an intentional omission in so many programs. It is that the Trauma Orientation seems to create a single-point focus that overrides or edges out an inclusion of and attention to strength-based information in many research studies and other information-gathering programs.

A factor that contributes to this Trauma Orientation in intakes is that most social service workers are in organizations that are under-resourced in terms of time and staff. This time/staff squeeze contributes to an urgency to get "to the heart of the matter," which is the problematic events that have happened or are still happening to a client. And, clients are expecting that focus. But, the true "heart of the matter" is the resilience that a person retains in the face of many challenges. Those factors that contribute to resilience are the factors it is important to know about. They have shaped resilience and can help amplify it when enlisted during service delivery.

Inclusion of strength-based questions is important in many ways: 1) It allows the person responding to the form or interview to feel known in more ways that just the negative events of life and the corresponding problems; 2) it gives a fuller picture to staff so that the likelihood of "armoring," the hard shell that workers can develop when faced with client problems that seem insurmountable, is diminished and a sense of manageability increases; 3) it increases the likelihood that the strengths can be used during the service delivery process; 4) in research it provides richer understanding of the relationship between the independent and dependent research variables and can increase the explanatory power of the analysis. For example, in the ACE study not all individuals with higher ACE scores experienced the many health risks, some didn't. It would be helpful to know if the reason for the difference is the protective factors in their early lives. How many protective factors, or which ones, diminish the effect of adverse experiences? Those factors, unfortunately, were not collected.

The type of protective questions that could enrich the ACE survey includes, "In your childhood was there a person or persons in your family who took a positive interest in you?" Or "Did some people in your family look out for and support each other sometimes?" Or "Were there some things as a family you enjoyed doing together?" They would include questions beyond the family since they, too, can contribute to resilience: "In your childhood was there a person or persons outside the family who supported you? Motivated you? Seemed to appreciate your strengths?" Questions such as these can be interspersed with questions about adversity (Leitch 2015).

Fortunately, more recent risk assessment instruments move beyond a Trauma Orientation to include positive or protective factors (Rains and McLinn 2013). Thompson (2010), in a doctoral thesis, discusses the history of and theoretical models guiding resilience-oriented surveys, including definitional issues and domains. And, some surveys have moved beyond an exclusive focus on family experiences to include a much richer focus that captures school and community experiences as well. For example, The Annie E. Casey Foundation's Evidence2Success Youth Experience Survey (2013) outlines key risk and protective factors specifically developed for assessment and intervention by communities. The survey includes risk questions such as, "How wrong do your parents feel it would be for you to smoke marijuana?" and, "How many times have you changed homes since kindergarten?" and, "In the past year (12 months), how often have you been treated badly because of your race?"

Examples of protective questions include: "Do you share your thoughts and feelings with your mother (or the person who is like a mother to you)?" and, "How

often do your parents (or caregivers) tell you they're proud of you for something you've done?" and, "In the past year how many of your best friends have participated in clubs, organizations, or activities at school?" The Evidence2Success is an example of a survey that focuses on the ecology of a child's life; including questions and statements about school and community relationships in addition to a family focus.

Collecting resilience information in addition to adverse experiences can increase the richness of studies measuring the impact of program interventions. It can guide analyses that examine the mediating effect of protective factors on adverse events. It can refine analyses by examining whether there are "windows of opportunity" when protective factors have a larger impact or whether there differential effects of some protective factors (e.g., family factors, community factors, peer factors). And, when attrition from a study or program is reduced because participants feel better understood there will be a more reliable understanding of what should be replicated in program design and a far better knowledge base about the characteristics of clients that appear associated with better or worse outcomes.

2. Ethical issues

In collecting data from anyone, but particularly from individuals who are vulnerable, it is essential to pay attention to the potential for re-traumatization during information gathering. The method of data collection and the content of the items are dimensions of human subjects protection that must be considered.

The ACE survey and the BRFSS, are both large surveys that collect only trauma-specific data, and are not administered face-to-face. The ACE survey was collected by mail and the BRFSS as a telephone survey. What is the effect on research participants when only questions about risk factors (spanking, suicidal thoughts, sexual abuse, etc.) are the focus? If a respondent is upset after receiving the ACE form by mail or the BRFSS call who would know? Is there a follow-up call if the information triggers intense feelings and memories? Is there a procedure for checking back with respondents to find out?

SAMHSA guidelines emphasize avoiding the re-traumatization of clients (SAMHSA 2015). Institutional Review Boards (IRB) must consider the potential for re-traumatization when only emotionally charged questions are used in a mail or telephone survey. No information on follow-up with respondents could be located on this important human protections issue. Research is needed that examines the impact of trauma-oriented surveys on respondents, including on sample attrition.

3. Relationship and manageability

It can be a challenge to attract and maintain vulnerable individuals in services who are not court-ordered. Clients might present once and not return or, after a telephone intake, they may not come in for an initial session. Over-attention to negative symptoms and the exclusion of positive qualities and protective events that characterizes so many intake processes may be a contributing factor.

For example, if a teen client has been a run-away since age 10, trafficked for sex since she was 12 years old, raped numerous times, bears the tattoos of "pimp ownership" on the back of her neck, and is alternately hostile and withdrawn a worker can feel anxious, overwhelmed, and even adversarial. As mentioned earlier, neurobiological studies of childhood trauma highlight the relational difficulties of many trauma survivors. And these relational challenges can be seen in the ways a trafficked teen presents during intake and early services.

When the intake form for an agency working to engage sex-trafficked teens in services was changed to include questions about positives, workers began to feel a sense of hope and believed the teens were more likely to return for a second meeting (Leitch and Snow 2010). An example of a question asked in the revised intake to build more complete knowledge of the teen was, "If your good friend was here with us today and I asked her what she likes best about you, what would she say?" Questions like this one can change the quality of the exchange, decrease suspicion and hostility, and remind both the client and the worker that she is more than a sex-trafficked person with multiple arrests.

Bessel van der Kolk (2014) highlights the need to look at the *ecology* of lives as a richer way to understand individuals, moving beyond an over- focus on the negative. When the emotionally challenging details of the traumatic experiences, which are required in order to convict a sex-trafficking perpetrator, can be balanced with strength-oriented questions about the teen trust and safety can slowly be built and worker overwhelm and defensive amoring decreases. These, in turn, can enhance the stability of both the teen and provider.

4. Generating and reinforcing dysregulation

Another compelling reason for intentionally weaving strengths into both research and practice comes from what neuroscience research has found about the human nervous system and its powerful role in the regulation of physical, emotional, and cognitive functioning (Cozolino 2002; van der Kolk 2014).

Information gathering processes can be developed in a way that mimic the rhythm of the Autonomic Nervous System when it is in a healthy, regulated balance. This means creating a rhythm of calming and activating questions throughout the process: ask a few questions that generate Parasympathetic calming followed by a couple of questions that might be activating, followed by a

calming question, and so on. Workers can learn to track the patterns of activation and calming by noticing such sensory details as breathing, muscle tension or relaxation, facial coloration, posture and gestures. This sensory information can help guide the decision to shift from activating to calming questions and decrease the potential for dysregulation.

5. Information is not enough

Sensitivity to the impact of traumatic events that flows from TIC, while helping to reduce pathologizing and enhance relationship, does not always help workers know what to *do* beyond that. Another way to describe this is that TIC provides information on the kinds of experiences that result in dysregulation and the corresponding array of symptoms but usually does not provide enough specificity about how the mind-body system is designed to respond to threat and fear (as well as the potential for resilience). This limits service providers' ability to design trauma and resilience-informed interventions that link the mind and the body that can decrease reactivity. Particularly lacking are interventions that use practical skills to promote the capacity for self-regulation. An essential building block of wellbeing as well as mastery and dignity is knowing how to modulate your own reactivity. This is true for providers as well as clients.

6. Lack of neuroscience-based information in understanding trauma

Too few interventions that are designed for rehabilitating offenders, who are often susceptible to poor impulse control and the corresponding attitudes and behaviors, have incorporated recent research from neuroscience about the impact of trauma on the mind-body system. When these symptoms and behaviors are viewed from a neurobiological lens that highlights how the human nervous system is wired to respond to threat and fear the use of negative labels decreases and the focus is on finding ways to bring the nervous system back into balance.

The incorporation of neurobiological knowledge facilitates the design of skills-based interventions suitable across cultures and with groups that may stigmatize or not have access to or willingness for counseling, since all humans, regardless of culture, gender, race/ethnicity, are wired similarly in their response to perceived threat and fear. These interventions target regulation of the nervous system rather than putting a primacy on insight and emotion. (Levine 1997; Ogden et al. 2006; Leitch et al. 2009; van der Kolk 2014). Cognitions and emotions are included in these approaches but are secondary.

Further evolution of TIC can be greatly enriched by the incorporation of findings from neuroscience research that currently are absent in most approaches. Expanding the TIC knowledge base enables the design of a wider more culturally-sensitive range of intervention, including teaching self-regulation skills for use in self-care as well as peer-to-peer. Three of these key concepts from neuroscience that could enhance TIC are described below.

a. Autonomic Nervous System (ANS)

Information about the Autonomic Nervous is a core element in understanding of how the mind-body system responds to threat and fear as well as how to amplify resilience. Like many aspects of nature that have rhythms and cycles, the human body also has them. One rhythm in particular that is accessible to intervention and extremely potent in its influence on health and wellbeing is the rhythm between the two branches of the Autonomic Nervous System (ANS), the Sympathetic and Parasympathetic branches.

With the advent of increasingly sophisticated fMRI techniques and interpretation of results the past decade there has seen increasing information about the ANS and its two branches. They work in a rhythm with each other; most simply put, the Sympathetic is the activator and the Parasympathetic is the calmer. When the two are in an optimal rhythm or balance the individual can be responsive to life events rather than reactive to them. When the ANS is in a healthy balance, which can be called the Resilient Zone, there is access to a conscious system of information processing in which stress chemicals do not block access to the cortex, or thinking part of the brain. This promotes better capacity for problem-solving and strategic thinking in stressful situations rather than reactivity (Roozendael, McEwen, & Chartarji (2009) as well as the ability to engage in pro-social behaviors. Figure 1 below illustrates ANS rhythm when it is in the balance:

The Autonomic Nervous System (ANS) influences all of the organs in the body (Schmidt and Thews 1989). That is one reason why distressing events, such as those from the ACE study, are associated with mental and physical health problems. When stressful, distressing, and traumatic events bounce an individual out of the Resilient Zone the dysregulation that occurs can lead to

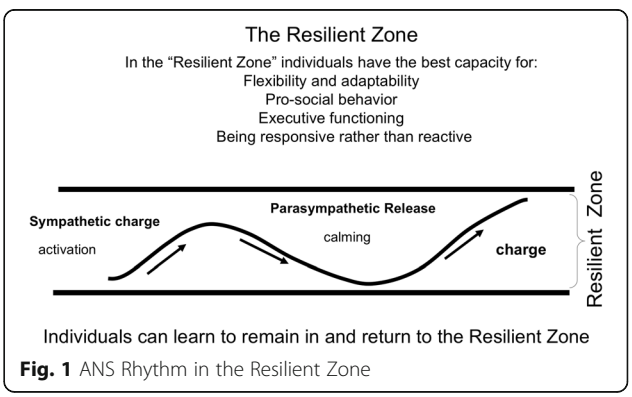

Fig. 1 ANS Rhythm in the Resilient Zone

physical, emotional, cognitive, and behavioral symptoms that affect health and well-being in many negative ways (Scaer 2005; van der Kolk 2014).

And, when individuals experience a repetitive or cumulative series of negative experiences it can "wire in" the dysregulated rhythm (Scaer 2005), leaving them reactive and stuck in a state of either hyperarousal (being bumped above the Resilient Zone) or hypoarousal (stuck below the Resilient Zone) or oscillation between the two extremes as the nervous system attempts to find balance Fig. 2.

The graphic above shows the disrupted rhythm of the ANS and examples of what can happen when someone is stuck on "high" or "low." In addition to the symptoms in the chart that can result from being outside the Resilient Zone, stress has an impact on memory. Neurochemicals such as adrenalin, which are generated in response to perceived threat, help to etch a distressing or traumatic event into memory. However, "high arousal disconnects brain areas necessary for proper storage and integration of information" (van der Kolk 2014:176). The result can be fragmented and distorted memory.

Intake processes, courtroom testimony, evocative and intense interventions such as Prolonged Exposure Therapy, and research questionnaires that focus only on adverse experiences and symptoms have the potential to bump people into states of reactivity. Neuroscience research has shown that when individuals are in these states of dysregulation memory, concentration, and attention are negatively affected (Lutz et al. 2008).

The implications of this information should be considered in courtrooms where the legal process is designed to be adversarial. It can help understand why a rape survivor, when under cross-examination, may change details in the story of what happened, have trouble identifying the accused, and describing other specifics of a crime that shape jury decisions.

Behavior is also shaped by physiological reactivity. There tends to be a decrease in pro-social behaviors such as collaboration and kindness in individuals when bounced outside the Resilient Zone since those usually require full cognitive capacity and the corresponding ability to *respond* rather than *react* to life events. When ANS rhythm is outside the Resilient Zone there can be increases in such behaviors as substance abuse, self-harming, family violence, poor school and work performance, bullying, and social disengagement, to mention only a few.

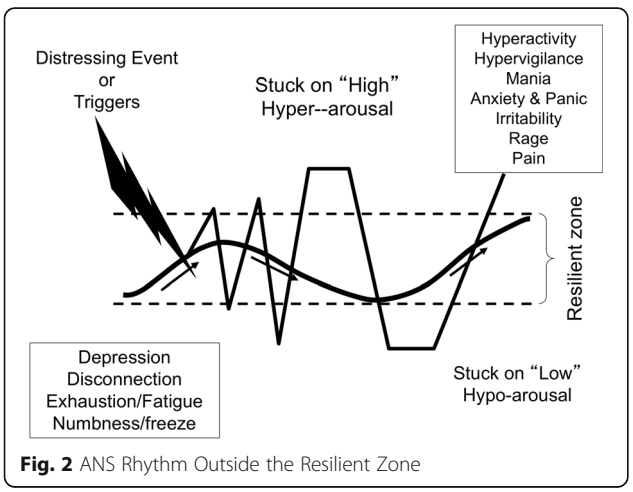

Fig. 2 ANS Rhythm Outside the Resilient Zone

Graphics like the two above help clients and caregivers understand the reason for their responses to stress, distress, and trauma. The information, which can be referred to as neuroeducation because of its focus on education about the neurobiology of threat, fear, and resilience, can be useful in motivating individuals to pay attention to the body's signals of distress and calming and to motivate practice of self-regulation skills. It becomes a way for those who have been cut-off from the body's signals of distress to pay attention at this essential sensory, "bottom-up" level and use skills to return to balance.

The graphics can be shared with individuals (clients and staff) and used in creating resilience-oriented policies, programs, and, most importantly, actions. The information in the graphics can be used in work with clients, work teams, and communities to provide a rationale for the use of self-regulation skills.

Neuroeducation helps individuals understand what was happening in the nervous system when they reacted to a threat in a way that got them into trouble. It focuses on biology rather than pathology. The neuroeducation can also motivate individuals to learn and practice skills-based approaches to self-regulate so their reactivity diminishes and they have a deeper "Resilient Zone" due to neuroplasticity. Inside the Resilient Zone there is greater potential for pro-social behaviors such as collaboration, empathic responses, future-oriented planning, etc.

b. The fast and slow systems of information processing

A second important concept from the neuroscience labs that can amplify the contribution of TIC is that every individual is wired with defensive responses (Fight, Flight, Freeze, and Tend and Befriend) that can be automatically and unconsciously triggered by even the *perception* of threat. This appraisal of threat takes place initially below the level of consciousness and is entirely subjective. What one person would perceive as threatening another might perceive as an exciting challenge. And, because individuals are quite elegantly wired to maximize survival, the brain has two processing speeds that function to make sense of in-coming information and to take action in behalf of survival: the "fast system" and the "slow system" (Kahneman 2013).

In the fast system, problem-solving processes are blocked by neurochemicals in order to save valuable

seconds and increase survival chances. If, for example, a speeding car jumps the curb and comes at someone on the sidewalk the time to think about escape options may result in injury or death. Instead, the individual is automatically launched into flight mode, instantly leaping out of the way. This is the fast system in action, protecting survival.

However, fast system processing can cause problems when an individual is triggered by an event from the past. For example, if a correction officer is triggered (due to his own previous trauma) by the sound of a scuffle behind him and instinctively goes into a defensive response of fight by hitting a handcuffed prisoner, that fast system of processing can result in career-risking behavior. And, if nearby officers go into fast system processing and shut down, they can be deemed "psychologically" unprepared and also be subject to disciplinary action.

In the slow system the threat is unconsciously appraised as manageable and cortical thinking is not blocked by neurochemicals. Conscious problem-solving and decision-making can then occur from inside the Resilient Zone. Perceived threat generates fast system processing and *reactivity* (Kahneman 2013). In some cases the fast system of processing protects survival but in other situations it leads to risky or shame inducing behaviors.

Neuroeducation about the fast and slow systems of processing can help reduce acute distress in, for example, a Correction Officer who is filled with shame because he froze during a lethal situation and his buddy was badly wounded as a result. It can help understand why a police officer may have shot 16 times at a youth who was running away. The information does not release individuals from the need to take responsibility for the impact or outcome of these fast-system actions; but it can help understand the neurobiological dynamic behind the action and reduce the labeling of the behavior as characterological.

And, when neuroeducation is channeled into action it can change organizational practices. For example, by using neuroeducation, the process leading up to invasive body-checks with incarcerated people can be redesigned in a way that decreases the likelihood of the prisoner going into fast system reactivity that gets him or her into additional trouble.

c. Neuroplasticity and self-regulation

Another neuroscience finding that can contribute to a shift from information to action in TIC is the ability of the brain to change. In the past, the belief was that the brain was fully developed by early adulthood. It is now broadly recognized that the brain is able to change over the lifespan, for better or for worse (Doidge 2007). And, what neuroscience has shown makes the difference in whether the plasticity change is beneficial or not is how and to what we pay attention.

Neuroplasticity, can be enlisted in building pro-social behavior as well as emotional and physical well-being by skills that teach self-directed attention. New neurons are generated (neurogenesis) and reinforced (neuroplasticity) during learning and practice; and a key element of learning comes from attention (Citri and Malenka 2008). Self-directed attention practices, including but not limited to various forms of meditation, have been found in hundreds of studies to promote improved health, compassion and collaboration, and a range of other well-being indicators (Grossman et al. 2004; Jacobs et al. 2011).

A key driver of neural connectivity that can enhance neuroplasticity in ways that deepen resilience has been found to be the monitoring and training of attentional focus (Lutz et al. 2008; Tang et al. 2007; Tang et al. 2014). The majority of studies showing ways to enhance connectivity using attention-based networks comes from meditation studies. Understanding the neural mechanisms underlying attentional practices has been steadily growing. However, a limitation in the research is the lack of studies that discriminate between different forms of attention-based practice (Chiesa 2012) whether in a meditation-based model or in attention training, like the self-regulation skills training proposed in this paper, that don't require meditation. Like meditation, self-regulation skills train attention and teach people how to redirect and sustain attention in particular ways that can be used prior to and during challenging events as well as practiced over time to build deeper nervous system balance via neuroplasticity.

Self-regulation skills do not focus on insight or clinical interpretation (Levine 1997; Ogden et al. 2006; Leitch et al. 2009). The skills rely on the individual directing attention to patterns of activation and calming in the body. The focus is on the rhythm of the Autonomic Nervous System as reflected in such sensory experiences as, for example, quality of breath, heart rate, and muscle tension and relaxation patterns. When activation goes outside the Resilient Zone particular skills are used to return to the Resilient Zone and to reinforce the experience of balance.

The two primary objectives of self-regulation skills are 1) to have a practical, immediate way to manage and reduce states of distress and activation that can be used independently as well as in clinical intervention and 2) to use neuroeducation to help understand symptoms and behaviors and to motivate practice of the skills in order to utilize neuroplasticity to wire-in greater resilience and decrease the power of stressors to trigger reactivity. The skills explicitly incorporate strengths and protective factors in the process of self-regulation and generate a sense of mastery and efficacy. They can be used for provider self-care as well as in work with clients. They can also be used peer-to-peer.

Neuroplasticity is a hidden asset in human potential. It can be accessed by an individual's conscious or

unconscious patterns of attention. An old adage says, "Where your attention goes, energy flows, and that's what grows." Knowledge about neuroplasticity has been an underutilized mechanism of positive change in most social services approaches, both for provider self-care and in work with others. Developing self-regulation skills that can be practiced independently by providers and clients alike can decrease reactivity and increase slow system processing in addition to building a sense of mastery and self-control.

Using ACE findings and neuroscience: moving from information to action

The neuroscience concepts above help shed light on how cumulative adverse childhood experiences can maintain the brain in a threat-oriented mode which, over time (through neuroplasticity), can wire in a level of physiological reactivity; a reactivity that can last throughout adulthood, creating physical and emotional health problems and repeatedly cause problematic behaviors. A vicious cycle is put in place and reinforced. This reinforcement process has been described as the body re-setting itself in a way that the world is experienced as a dangerous place (van der Kolk 2014).

The prison system is an example of the ways undigested trauma from early childhood experiences can join with the conditions of harshness and violence in many of our U.S. prisons and contribute to reinforcing a cycle of reactivity in both Correction Officers and prisoners. The correctional system is rife with challenges to the health and well being of Correction Officers (COs) as well as prisoners. Suicide rates of COs are more than double that of police officers as well as for the national average (Steele 2009) and their average life expectancy is 59 years old (Cheek and Miller 1982; Steele 2009). How much is due to adverse childhood experiences? How much is due to our system of incarceration, which can create a culture of violence in which both the imprisoned and those in charge of them must operate in a perpetual state of hypervigilence and wired-in reactivity? Practices throughout the criminal justice process can benefit from information from neuroscience as well as the skills that are based on this information to create environments and approaches that enrich rather than deplete the ability of both COs and inmates to self-regulate as a core practice. Practical self-regulation skills that are based on neuroscience research belong in police and CO training academies, and with other first responder groups as a tool to build resilience and decrease reactivity during stressful situations.

Conclusion

The ACE Study and Trauma-Informed Care have made a strong and positive contribution to understanding the powerful role and negative health effects of adverse events in childhood. The effects of early negative childhood experiences are found to carry on throughout adulthood, even affecting life expectancy. The two contributions have helped sensitize service providers to the risk factors that shape behaviors and health, have helped policy makers and service providers shift away from a characterological lens of human behavior to one that recognizes the impact of early and traumatic experiences, and have highlighted the importance of early childhood prevention programs and family support.

The unintended consequences, however, have contributed to an over-focus on negative events to the neglect of protective and positive factors. This over-focus, while not characterizing all policies and programs, is still too common, nevertheless. It has shaped research as well as social programs. During service delivery, collection of the adverse details about people's lives is often *necessary but it is not sufficient*. A focus on individuals' strengths and competencies is essential. And, Trauma-Informed Care is also *necessary but not sufficient.* Policy makers and providers must know what to do with the information, what actions are needed. Action-oriented interventions will facilitate evaluation studies of outcomes. This will advance the field of TIC.

Current neuroscience-based information ("neuroeducation") has an important role to play in the field of criminal justice including 1) redesigning information gathering processes to decrease re-traumatization, 2) decreasing the use of labels such as "anti-social" that do not take into account the neurobiological effects of trauma on the nervous system, 3) the incorporation of self-regulation skills training for providers and clients, and 4) facilitating outcome evaluations of trauma and resilience oriented skills-based programs. Drawing on neuroeducation about nervous system activation and calming as well as slow and fast systems of information processing can decrease the potential of both data collection and social programs to re-traumatize clients and research subjects and can help reinforce nervous system stabilization.

Practical skills, based upon key concepts from neuroscience can, as a next step, move Trauma-Informed Care beyond *information* to *action* by building the capacity for self-regulation. Greater attention to strengths and protective factors as well as challenges can reorient the way that researchers and practitioners collect information, design interventions, conduct data analyses, and support the dignity and trust of clients.

Using non-clinical, skills-based approaches individuals (clients as well as service providers) can learn to assess the state of their nervous systems and direct their attention using practical skills that promote self-regulation and deepen resilience. And, researchers can adapt the idea of reinforcing a Resilient Zone nervous system

rhythm when designing the patterns of questions in surveys and interviews.

The increased attention to traumatic experiences from the ACE study and the expansion of attention in more recent surveys to collect protective factors as well as risk factors has offered an essential understanding about the power of experience to affect health, behavior, and well being. When that knowledge is combined with neuroscience-based skills, trauma informed approaches will move from information to measurable action.

Competing interests

The author declares there are no competing interests.

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Adverse Childhood Experience (ACE) Questionnaire

Finding your ACE Score ra hbr 10 24 06

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household **often** …
   Swear at you, insult you, put you down, or humiliate you?
   or
   Act in a way that made you afraid that you might be physically hurt?
   Yes No If yes enter 1 _____

2. Did a parent or other adult in the household **often** …
   Push, grab, slap, or throw something at you?
   or
   Ever hit you so hard that you had marks or were injured?
   Yes No If yes enter 1 _____

3. Did an adult or person at least 5 years older than you **ever**…
   Touch or fondle you or have you touch their body in a sexual way?
   or
   Try to or actually have oral, anal, or vaginal sex with you?
   Yes No If yes enter 1 _____

4. Did you **often** feel that …
   No one in your family loved you or thought you were important or special?
   or
   Your family didn't look out for each other, feel close to each other, or support each other?
   Yes No If yes enter 1 _____

5. Did you **often** feel that …
   You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?
   or
   Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
   Yes No If yes enter 1 _____

6. Were your parents **ever** separated or divorced?
   Yes No If yes enter 1 _____

7. Was your mother or stepmother:
   Often pushed, grabbed, slapped, or had something thrown at her?
   or
   Sometimes or often kicked, bitten, hit with a fist, or hit with something hard?
   or
   Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
   Yes No If yes enter 1 _____

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?
   Yes No If yes enter 1 _____

9. Was a household member depressed or mentally ill or did a household member attempt suicide?
   Yes No If yes enter 1 _____

10. Did a household member go to prison?
    Yes No If yes enter 1 _____

Now add up your "Yes" answers: _____ This is your ACE Score

Note to service provider:

PACES (Positive and Adverse Childhood Experiences Survey) is a brief questionnaire designed as an alternative to the ACE Survey. It includes questions about protective factors. These protective factor questions are interspersed with the items from the ACE Survey in a way that can help to decrease the potential for re-traumatization, maintain a balance between activating and calming questions, and help provide a richer understanding of the client's family experiences.

PACES was developed as an example of how questionnaire construction can be done in a way that gathers information needed for delivery of trauma intervention/prevention services and also highlights client resilience. Since PACES is not a standardized questionnaire, questions can be changed to better fit the agency needs. It is the interspersing of protective questions that highlight client resilience that the questionnaire demonstrates.

Introducing PACES to a client

To the Individuals in Our Practice Seeking _____Care:

The families that each of us grows up in as well as our early childhood experiences can have an effect on our parenting/behaviors/health/well being. Most of us have some memories of our early life that are positive…people who cared about us, positive experiences that made us confident, etc. But there are also childhood experiences that are harmful to children and can continue to affect us even as adults.

Here at _____ it helps us understand how to better support you during our work with you to know some of the positive experiences and also the hard things you experienced during childhood. For example, parents who didn't have enough to eat as children tell us that it is hard to know how much their child should eat at any given age.

We also know that events that happen when you get older can also have an effect on how easy it is to bounce back after distressing experiences.

On the form below are some questions about your own early experiences. The questions mostly focus on your family experiences. Your answers to these questions can help us know how to support you and they can also help us better understand others and the services that would be helpful for our clinic to offer.

Thank you for sharing this information. It will be kept confidential and will be used to help us help you as well as to develop services that can benefit many other individuals as well. It is completely ok to skip items or to decide not to fill out this questionnaire. It will not affect your ability to receive services from our agency.

Screening Questionnaire: date:_____

P.A.C.E.S

Before your 18th birthday:

1. Was there an adult in your family who took an interest in you in a positive way? Y N

2. Was there someone in your family that really seemed to understand the good things about you? Y N

3. Not including spanking did any adult in your home ever physically hurt you (by hitting, kicking, etc)? Y N

4. Did anyone in your home often swear at you, insult you, put you down or humiliate you? Y N

5. Was there an adult outside the family who took an interest in you? Y N

6. Did anyone at least 5 years older than you sexually abuse you, including unwanted touch? Y N

7. Did your family look out for each other and support each other most of the time? Y N

8. Did you often or very often feel that no one in your family loved you or thought you were special? Y N

9. Were there groups you belonged to outside your family that made you feel good about yourself? Y N circle any that made you feel good: school club team, gang church other

10. Did you often or very often feel you didn't have enough to eat, had to wear dirty clothes, or were left alone or with other young children without an adult in the house? Y N

11. Did any adults that lived with you use drugs or get drunk in front of you so much that they couldn't care for your needs? Y N

12. Did you experience death of a parent, abandonment, or divorce? Y N

13. If hard things were happening in your life did you have positive ways to help yourself feel safe or better? Y N

14. Was there violence in your house such as hitting, throwing things, kicking, threatening with a weapon such as gun or knife? Y N

15. Did anyone in your home get arrested or go to jail/prison? Y N

16. Did your family have things they liked to do together? Y N

17. Was anyone in your home depressed, mentally ill or suicidal? Y N

18. Was there someone in your home who gave you guidance or good advice? Y N

19. Was there someone at home who paid attention to how you were doing in school? Y N

20. Did you have physical activities that you regularly did? Y N

Refrigerator Sheet:
The Whole-Brain Child
by Daniel J. Siegel and Tina Payne Bryson

Introduction

- **Survive AND thrive:** Watch for ways to take the difficult parenting moments when you're simply trying to *survive*, and turn them into opportunities for your children to *thrive*.
- **Integration → Health and success:** The brain performs at its best when its different parts work together in a coordinated and balanced way. An integrated brain results in improved decision-making, better control of body and emotions, fuller self-understanding, stronger relationships, and success in school.
- **The River of Well-being:** The more integrated our kids are, the more they can remain in the river of well-being, avoiding the bank of chaos on one side, and the bank of rigidity on the other.

Chapter 1: Integrating the Left and Right Brain

- **Left + right = clarity and understanding:** Help your kids use both the logical left brain and the emotional right brain so they can live balanced, meaningful, and creative lives full of connected relationships.
- **What You Can Do: Helping your child work from both sides of the brain**
    - *Connect and Redirect:* When your child is upset, connect first emotionally, right brain to right brain. Then, once your child is more in control and receptive, bring in the left-brain lessons and discipline.
    - *Name it to Tame It:* When big, right-brain emotions are raging out of control, help your kids tell the story about what's upsetting them. In doing so, they'll use their left brain to make sense of their experience and feel more in control.

Chapter 2: Integrating the Upstairs Brain and the Downstairs Brain

- **Be patient with the upstairs brain:** Unlike the primitive downstairs brain, which is intact at birth, the sophisticated upstairs brain is "under construction" during childhood and adolescence. Plus, it's especially vulnerable to being "hi-jacked" by the downstairs brain, especially in high-emotion situations. So don't expect your children to make good decisions all the time, or to remain in control of their emotions and actions.
- **What You Can Do: Helping develop and integrate your child's upstairs brain**
    - *Engage, don't enrage:* In high-stress situations, engage your child's upstairs brain, rather than triggering the downstairs brain. Don't immediately play the "Because I said so!" card. Instead, appeal to your child's higher-order thinking skills. Ask questions, ask for alternatives, even negotiate.
    - *Use it or lose it:* Provide lots of opportunities to exercise the upstairs brain so it can be strong and integrated with the downstairs brain and the body. Play "What would you do?" games and present them with dilemmas. Avoid rescuing them from difficult decisions.
    - *Move it or lose it:* When a child has lost touch with his upstairs brain, a powerful way to help him regain balance is to have him move his body.

Chapter 3: Integrating Memory

- **Make the implicit explicit:** Help your kids make their implicit memories explicit, so that past experiences don't affect them in debilitating ways. By narrating past events they can look at what's happened and make good, intentional decisions about how to handle those memories.
- **What You Can Do: Helping your child integrate implicit and explicit memories**
    - *Use the remote of the mind:* After a painful event, a child may be reluctant to narrate what happened. The internal remote lets her pause, rewind, and fast-forward a story as she tells it, so she can maintain control over how much of it she views.
    - *Remember to remember:* Help your kids exercise their memory by giving them lots of practice at remembering. In the car, at the dinner table, wherever: help your kids talk about their experiences, so they can integrate their implicit and explicit memories.

Chapter 4: Integrating the Many Parts of Myself

- **The Wheel of awareness:** Sometimes our kids get stuck on one particular point on the rim of their wheel of awareness, and lose sight of the many other parts of themselves. We need to give them mindsight, so they can be aware of what's happening in their own mind. Then they can choose where they focus their attention, integrating the different aspects of themselves and gaining more control over how they feel.
- **What You Can Do: Introducing your child to the wheel of awareness**
    - *Let the clouds of emotion roll by:* Remind kids that feelings come and go. Fear and frustration and loneliness are temporary states, not enduring traits.
    - *SIFT:* Help your children pay attention to the Sensations, Images, Feelings, and Thoughts within them. They can't understand and change their inner experiences until they are first aware of what's going on inside.
    - *Exercise mindsight:* Mindsight practices teach children to calm themselves and focus their attention where they want.

Chapter 5: Integrating Self and Other

- **Wired for "we":** Watch for ways to capitalize on the brain's built-in capacity for social interaction, especially by being intentional about creating positive mental models of relationships. Parents and other important caregivers create children's expectations about relationships that will affect and guide them throughout their lives. Help them develop mindsight, which offers them insight into themselves as individuals, and empathy for and connection with those around them.
- **What You Can Do: Helping your child integrate self and other**
    - *Enjoy each other:* Build fun into the family, so that your kids enjoy positive and satisfying experiences with the people they're with the most.
    - *Connect through conflict:* Try not to view conflict as merely an obstacle to avoid. Instead, use it as an opportunity to teach your kids essential relationship skills, like seeing other people's perspectives, reading nonverbal cues, and making amends.

Prioritizing Possibilities for Child and Family Health: An Agenda to Address Adverse Childhood Experiences and Foster the Social and Emotional Roots of Well-being in Pediatrics

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ABSTRACT

OBJECTIVE: A convergence of theoretical and empirical evidence across many scientific disciplines reveals unprecedented possibilities to advance much needed improvements in child and family well-being by addressing adverse childhood experiences (ACEs), promoting resilience, and fostering nurturance and the social and emotional roots of healthy child development and lifelong health. In this article we synthesize recommendations from a structured, multiyear field-building and research, policy, and practice agenda setting process to address these issues in children's health services.

METHODS: Between Spring of 2013 and Winter of 2017, the field-building and agenda-setting process directly engaged more than 500 individuals and comprised 79 distinct agenda-setting and field-building activities and processes, including: 4 in-person meetings; 4 online crowdsourcing rounds across 10 stakeholder groups; literature and environmental scans, publications documenting ACEs, resilience, and protective factors among US children, and commissioning of this special issue of *Academic Pediatrics*; 8 in-person listening forums and 31 educational sessions with stakeholders; and a range of action research efforts with emerging community efforts. Modified Delphi processes and grounded theory methods were used and iterative and structured synthesis of input was conducted to discern themes, priorities, and recommendations.

RESULTS: Participants discerned that sufficient scientific findings support the formation of an applied child health services research and policy agenda. Four overarching priorities for the agenda emerged: 1) translate the science of ACEs, resilience, and nurturing relationships into children's health services; 2) cultivate the conditions for cross-sector collaboration to incentivize action and address structural inequalities; 3) restore and reward for promoting safe and nurturing relationships and full engagement of individuals, families, and communities to heal trauma, promote resilience, and prevent ACEs; and 4) fuel "launch and learn" research, innovation, and implementation efforts. Four research areas arose as central to advancing these priorities in the short term. These are related to: 1) family-centered clinical protocols, 2) assessing effects on outcomes and costs, 3) capacity-building and accountability, and 4) role of provider self-care to quality of care. Finally, we identified 16 short-term actions to leverage existing policies, practices, and structures to advance agenda priorities and research priorities.

CONCLUSIONS: Efforts to address the high prevalence and negative effects of ACEs on child health are needed, including widespread and concrete understanding and strategies to promote awareness, resilience, and safe, stable, nurturing relationships as foundational to healthy child development and sustainable well-being throughout life. A paradigm-shifting evolution in individual, organizational, and collective mindsets, policies, and practices is required. Shifts will emphasize the centrality of relationships and regulation of emotion and stress to brain development as well as overall health. They will elevate relationship-centered methods to engage individuals, families, and communities in self-care related to ACEs, stress, trauma, and building the resilience and nurturing relationships science has revealed to be at the root of well-being. Findings reflect a palpable hope for prevention, mitigation, and healing of individual, intergenerational, and community trauma associated with ACEs and provide a road map for doing so.

KEYWORDS: adverse childhood experiences; agenda; child health; crowdsourcing; family engagement; Medicaid; medical home; National Survey of Children's Health; pediatrics; resilience; self-care; social determinants of health; well-being

ACADEMIC PEDIATRICS 2017;17:S36–S50

DECADES OF DISCOVERY and advocacy now compel action to address the effects of childhood social and emotional experiences to promote healthy development and well-being early and across life.[1–4] In recent years, an array of foundational initiatives have advanced understanding about the centrality of attuned, positive, and safe, stable, and nurturing relationships (SSNRs) and healthy attachment between children and primary caregivers to healthy brain, social, emotional, cognitive, and physical development and well-being throughout childhood and adulthood.[5–8] We are now seeing a convergence of theoretical, empirical, and applied evidence from a range of scientific disciplines, which has unleashed an unprecedented focus on SSNRs, resilience-building, and child development. These disciplines encompass the fields of neuroscience, attachment, human development, stress physiology, polyvagal theory, epigenetics, psychology, mind-body interventions, resilience, well-being, and related research.[4,9–12] Integration of research findings across these and other disciplines directly link disruptions in early life attachment and social and emotional experiences to child stress, well-being, and costly and chronic physical, mental, and social health problems throughout life.[13–18] Knowledge regarding this link has existed for decades, and now rapidly accumulating findings point to effective approaches to transform and heal negative effects of adversity and promote resilience and thriving despite adversity.[4,7,10,19,20] Since at least 1998, agendas set forth for children's health services research and policy have prioritized a focus on children's family context and related social determinants of health.[21,22] However, it is only more recently that our knowledge, understanding, interest, and political will are converging to create the critical mass needed to translate these longstanding priorities for child and family health and resilience into innovation and action.

The now 20-year-old Adverse Childhood Experiences (ACEs) study led by the Centers for Disease Control and Prevention (CDC) and Kaiser Permanente (Kaiser)[16–18] itself built on decades of previous research documenting effects of stress and childhood trauma.[12,20,23] This groundbreaking study further documented the importance of attachment, parenting, and teaching children and adults skills to be aware of and regulate the stress and emotions associated with adverse experiences.[5,6] The ACEs study catalyzed research on individual, family, and community trauma and factors enabling or impeding SSNRs and environments in childhood. By extension, the ACEs study fostered efforts in public health and medicine to address developmental trauma and proactively promote nurturing family relationships, resilience, and social and emotional skills among children and families.[9,24–28] Resilience research and discoveries of neuroplasticity and epigenetics help explain the wide variation in the effect of ACEs and trauma, highlighting the capacity to heal, build resilience, and buffer effects through nurturing relationships and environments and self-care.[10,11,19,29–31] The concept of ACEs and its related research is of great relevance to pediatrics and children's health services yet poses many issues and challenges. The field-building and agenda-setting effort summarized in this paper was launched to further strengthen the capacity of researchers, clinicians, and policymakers to effectively address ACEs and promote resilience, nurturing relationships, and environments in pediatrics and children's health services[32]—with the understanding that collaboration across sectors is essential to these aims, including with education, child welfare, social services, public health, juvenile justice, and business sectors.[33–37]

Planning for this effort began in Spring 2013 with an analysis of first-ever available national and state level ACEs, resilience, and family functioning data from the 2011–12 National Survey of Children's Health (NSCH).[38] Building on more narrow assessments of reported child maltreatment in the United States,[39] analysis of the NSCH showed that nearly one-half of all US children and youth,[40,41] two-thirds with public insurance, and three-quarters with emotional, mental, or behavioral diagnoses experienced 1 or more of 9 ACEs, similar to those evaluated in the CDC/Kaiser study (http://www.childhealthdata.org/browse/survey/results?q=2257&r=1).[42] These findings are consistent with the unprecedented rates of emotional, mental, and behavioral health problems among US children and youth and concomitant NSCH findings that fewer than 47.7% of school-age children in the United States meet basic criteria for flourishing (http://www.childhealthdata.org/browse/survey/results?q=2480&r=1). Empirical analyses confirmed a marked, negative population-wide effect of ACEs on child development, physical, mental, emotional, and behavioral health and school engagement with consistent effects across racial and income groups. We also documented promising population-based findings that many children flourish despite multiple ACEs when family, community, and health care-related protective factors are present and they have opportunities to learn and develop resilience. We also found that these factors are differentially prevalent across subgroups of children and geographic areas.[42] These findings paralleled growing evidence about the importance of trauma-informed and trauma-responsive care and specific strategies and approaches to prevent and heal from the effects of ACEs (see the Supplementary Appendix; http://www.cahmi.org/wp-content/uploads/2015/01/ACEs-Supplement_National-Agenda-Technical-Appendix_04-04-17.pdf). NSCH findings and this expanding evidence base imbued a hopeful tone for our efforts. This hope for prevention and healing is essential for translation and was the motivation and basis for engaging the pediatric research, practice, and policy communities to identify goals and priorities for addressing ACEs and promoting resilience and well-being of children, youth, and families in children's health services.

Previous foundation-building efforts enabled this work, including the 2012 American Academy of Pediatrics policy statement on early life adversity, the CDC's Essentials for Childhood initiative, the Robert Wood Johnson Foundation's National ACEs Summit (May 2013), and launch

of the *ACEs Connection* online resource in 2012.[33,37,43] Two overarching questions framed methods for this agenda: 1) "What should be the priority goals for a national ACEs and child well-being research, policy, and practice action agenda?," and 2) "What are priority research issues and short-term actions to ensure children's health services effectively address ACEs to promote child resilience and well-being?"

METHODS

The framework and logic model guiding the agenda-setting process is summarized in Figure 1. Grounded theory and modified Delphi process methods were used. Early work established consensus among key stakeholders on the core scientific premises making ACEs, toxic stress, trauma, positive health, and resilience critical to address in children's health services. The agenda process comprised 8 core activities. These activities are summarized in Figure 1 (second column) and detailed further in the Supplementary Appendix (http://www.cahmi.org/wp-content/uploads/2015/01/ACEs-Supplement_National-Agenda-Technical-Appendix_04-04-17.pdf). The 8 methods and activities used to iteratively engage stakeholders and define the priorities were:

(1) Stakeholder meetings to assess needs, goals, and priorities (4 meetings; n = 136);
(2) Online crowdsourcing of goals and priorities with 10 stakeholder groups using Codigital/Collective Insight software (Codigital Limited, London, UK)[44] (4 rounds; 10 groups; n = 136; Table 1);
(3) Literature, environment, and measurement methods scan (5228 publications scanned, 300 in-depth reviews, 200 website reviews; 40 key informant interviews);
(4) Foundational research and production of related data resources using the 2011–12 NSCH (2 data briefs; 2 policy/white papers; 3 journal publications; 2 magazine/press articles; design of methods to create county/city-level child and youth ACEs and resilience data)[40–42,45–50];
(5) In-person focus groups and roundtable listening sessions (8 forums conducted at national research, policy, and practice-community conferences; approximately 125 participants);
(6) Commissioned research and policy articles, including the development of this special issue of *Academic Pediatrics*, and an August 2016 *JAMA Pediatrics* publication[51];
(7) Education and engagement presentations and workshops (31 sessions between May 2013 and December 2016; approximately 3000 participants overall; feedback informed agenda);
(8) Participatory action research partnerships to learn about and build the field, including the collaborative design, dissemination and evaluation of state, county, and city data-in-action infographics (http://childhealthdata.org/docs/default-source/local-area-synthetic-estimates/adverse-childhood-experiences-among-baltimore-maryland-s-children.pdf?Status=Master) and trainings and facilitating inclusion of ACEs and protective factors data into news publications, policy forums, and

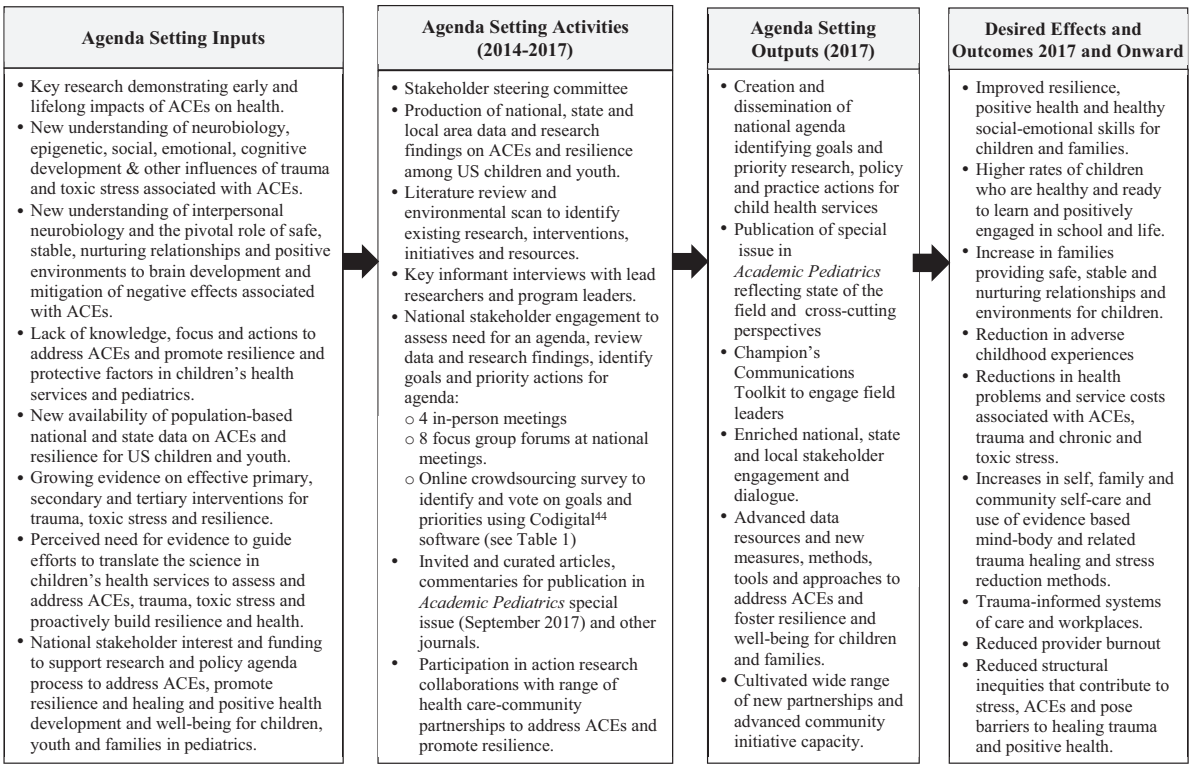

Figure 1. *Prioritizing Possibilities to Address Adverse Childhood Experiences (ACEs) and Foster the Roots of Child Well-being Project logic model.*

Table 1. Description of Crowdsourcing Modified Delphi Process (Using Codigital Software[44])

Focus Question	Phase I	Phase II	Phase III		Totals	Highlights
	Goals and Requirements for Agenda	Priority Issues and Needs	Priority Issues and Needs	Priority Issues and Needs		
Invitations, n	22	90	375	327	814	49% of all responses were from health services researchers and pediatric providers. The remainder of respondents were from other stakeholder groups.
Participants (not all unique), n*	13	30	127	80	250	
Ideas proposed (not all unique), n**	47	42	172	102	363	
Exchanges to edit and rank ideas, n (average per idea)	426 (9.06)	665 (15.8)	1737 (10.1)	744 (7.30)	4185 (2.45)	
Response rate, %†	59.1	33	34.3	29.8	39	

*Some individuals participated in more than 1 phase.
**Top 20 ideas were rotated into new rounds for further editing and ranking.
†Response rates were as high as 84% for family leaders and 73.4% for state policy and program leaders to a low of 18.2% for federal agency and program leaders.

national reports like Americas Health Rankings (www.americashealthrankings.org/learn/reports/2016-annual-report).

This effort was publicly launched as a purposeful partnership between the Child and Adolescent Health Measurement Initiative and AcademyHealth in Spring 2014, 1 year after formative research and engagement efforts took place.[32] Approximately 500 individuals participated and comprised 79 distinct agenda-setting and field-building activities. Since its inception, national dialogue, research, policy, and initiatives related to ACEs and child resilience significantly expanded and evolved, and have continue to do so.[37,51] As such, this agenda is viewed as a "living" resource that provides a high-level synthesis of findings from our process to date and will be evolved over time. This summary paper is enriched by a Supplementary Appendix that provides more in-depth details on our field-building activities, processes, resources, and recommendations.

RESULTS

Synthesis of information and input received led to 4 overarching agenda priorities to address ACEs and promote child well-being in children's health services. Four specific areas of research arose as priorities critical to address to advance these agenda priorities. Finally, we identified 16 short-term actions and recommendations, each of which leverages existing research, policy, and practice systems and structures. Agenda priorities and critical areas for short-term research and action are summarized in the following sections as well as in Figure 2 and Table 2.

PRIORITY 1: TRANSLATE THE SCIENCE OF ACEs, RESILIENCE, AND NURTURING RELATIONSHIPS

Agenda activities revealed cross-cutting support and a sense of urgency for rapid and widespread training about the often called paradigm shifting "science of ACEs" (ACEs characteristics, evolution, prevalence, and effects) as well as a new "science of thriving."[35,52–57] This new science of thriving integrates research demonstrating the substantial untapped potential for positive health, resilience, and flourishing despite adversity and pointed to what several viewed as a new wave of public health and health care that moves beyond risk reduction and disease management to the purposeful promotion of positive health that addresses the social and emotional roots of well-being, all of which mandate individual, family, and community engagement and self-care.[58] Widespread agreement emerged that sufficient scientific, epidemiologic, and clinical evidence exists to prioritize the design of targeted and tailored strategies to translate the science of ACEs and thriving in children's health services.[37,45,52,59–61] Little disagreement arose that ACEs represent a risk factor that meets standard epidemiologic criteria for causal inference[62] and that important gaps in knowledge exist in children's health services.[60,63]

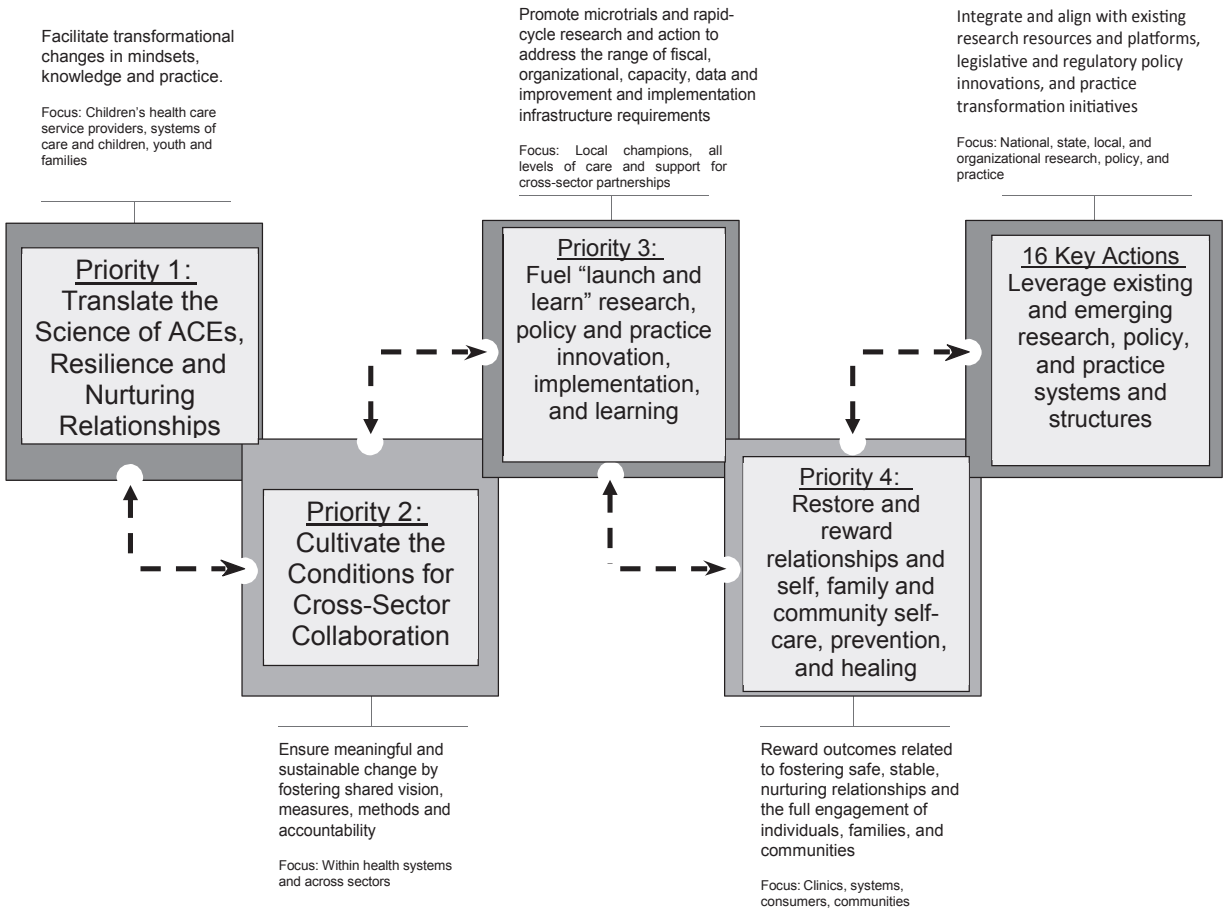

Figure 2. *Four priorities and 16 key actions for a children's health services research and policy agenda to address adverse childhood experiences and foster resilience, nurturance, and the relational roots of well-being. ACEs, adverse childhood experiences.*

Specific translation needs prioritized in this agenda include:

- Coordinated education, awareness-building, and training for health services providers, funders, parents, and families, and other child-serving sectors to establish a common language and personalized understanding about the science of ACEs and thriving as well as strategies for prevention and healing.
- Changes in clinical practice, insurance coverage, and payment[27] that complement traditional diagnosis and medical treatment norms to allow for holistic methods that address the cross-cutting social, emotional, stress, and resilience-related common causes (and remediation) of what have typically been viewed as separate risks (eg, different types of ACEs) and health conditions (eg, different mental and behavioral problems).
- Training and partnerships with nontraditional providers with skills to prevent ACEs, facilitate healing effects of ACEs-related trauma, toxic and chronic stress, and cultivate resilience and related social and emotional skills.[10,30] This might include professionals in parenting education and mindfulness-based, mind-body, and other trauma healing and prevention methods[6,25,42,64] that rely on individual, family, and community engagement, rather than use of traditional medical interventions.

Priority 2: Cultivate the Conditions for Cross-Sector Collaboration to Incentivize Action and Address Structural Inequalities

Participants called out evidence linking higher ACEs prevalence as well as reduced capacity to mitigate the effects of ACEs to structural inequalities like poverty, discrimination, quality of schools, housing, and neighborhoods, opportunities for employment, and access to health care and related services. Children's health services providers can play an important coordinating and advocacy role to establish and link children and families to community resources to address these structural factors.[65] Doing so will require effective collaboration and partnerships within and between child and family health-related systems (eg, medical and behavioral health) as well as across sectors, including between health services and public health, schools, social services, criminal justice, business, and more.[5,36,55,56,66,67]

Input across the many sectors involved in the agenda-setting process supported the view that pediatric providers are a linchpin for engaging and facilitating necessary action, especially as it relates to educating families, identifying risks, promoting positive family relationships, coordinating and linking to resources, and advancing skills to develop SSNRs, resilience, and positive health, even in

Table 2. Sixteen Short-Term Research, Policy, and Practice Opportunities to Address ACEs and Promote Child and Family Well-being

A. Priority opportunities to leverage existing policy driven systems, structures and innovation platforms
   1. Prioritize EPSDT and prevention: advance approaches to integrate ACEs, healthy parenting, and positive health development topics into federal and state EPSDT standards, policies, and initiatives in alignment with Bright Futures guidelines. Integrate care across settings.
   2. Focus hospital community benefits strategies: integrate ACEs and positive health topics into hospital community benefits standards and community needs assessments partnership efforts. Make available local area data on ACEs, resilience, protective factors, and other social determinants. Enable easy access to methods and metrics to monitor effects on child and family health, and utilization and costs of care at the community level.
   3. Establish enabling organization, payment, and performance measurement models: advance trauma-informed and positive health-oriented payment reform, accountability measurement, and integrated systems efforts in existing and emerging practice innovation models. Design, test, and evaluate models and promote shared measurement related to ACEs and positive health promotion across range of child health programs.
   4. Advance and test Medicaid policy implementation: develop and demonstrate models for addressing ACEs, promoting resilience, and healthy parenting in the context of addressing other social determinants of health in Medicaid. Ensure research methods and metrics are integrated throughout innovation efforts to show effect, and scale methods as they evolve. Foster innovation in: 1) eligibility and enrollment, 2) benefits, coverage, and coding, 3) contracting, costs, and performance measurement, 4) capacity, continuing education requirements, and credentialing, and 5) communication and coordination.
   5. Inform and track legislation to accelerate translation: formulate recommendations for, and track and evaluate effects of specific federal, state, and local legislation, regulations, and related actions to address ACEs. Ensure ACEs and childhood trauma is considered in health policies.

B. Priority opportunities to leverage existing and evolving practice transformation efforts
   1. Leverage medical/health home and social determinants of health "movement": leverage existing primary care medical home demonstrations and efforts to address social determinants of health in pediatric practices, hospitals, and other settings. Integrate ACEs into other screening, assessment, and education efforts using a relationship-centered approach. Test methods addressing Medicaid innovations at the practice implementation level, ensuring evaluation for cost benefits and cost-effectiveness.
   2. Enable, activate, and support child, youth, and family engagement: evaluate and advance efforts to engage children, youth, and families in driving measurement and improvement efforts. Optimize face to face time in health care encounters to enable relationship-centered education and support through the use of pre-visit education and engagement tools and strategies.
   3. Build effective peer/family to peer/family support capacity: design and evaluate use of nontraditional "providers" like peer to peer, family to family, and other community health workers.
   4. Empower community-based services and resource brokers: create and evaluate effect of "through any door" models for educating and engaging parents, youth, and families and leveraging existing and emergent community-based services and resources related to trauma, healing, and resilience. Innovate around effective methods to educate and engage families as partners.
   5. Leverage existing commitments and focus areas in child and family health: integrate trauma and resilience-informed knowledge, policies, and practices into existing initiatives, including early childhood systems, childhood obesity, school health, and social and emotional learning. Focus on spread of best practices for parenting and trauma-informed education, coaching, and trauma healing and resilience-building interventions.

C. Leverage existing research and data platforms, resources, and opportunities
   1. Optimize existing federal surveys and data: coordinate and optimize national, state, and local research, policy, and practice innovation efforts using relevant data from the federal surveys that can inform, monitor, and build knowledge on ACEs prevention and positive health development. Establish targeted follow-back and longitudinal studies to understand variations and effect of health care and related policies. Include/maintain inclusion of ACEs and resilience variables in the NSCH and into NHIS and MEPS to promote medical expenditures effects studies.
   2. Optimize state surveys: facilitate efforts to enhance availability and access to ACEs, resilience, and positive health-related data on children, youth, and families in state-led surveys like the Behavioral Risk Factor Surveillance Survey, the Youth Risk Behavior Surveillance Survey, and the Pregnancy Risk Assessment Monitoring System.
   3. Liberate available data: expedite and expand the use of existing ACEs, resilience, and related data for research, policy, and practice to remove barriers to using available data and facilitate easy and "lay person" access to data findings to support national, state, and local efforts in a real time context. Ensure technical assistance, training, and education is provided to ensure valid use of data and curate "data in action" efforts to engender action.
   4. Build crowdsourcing, citizen science, and N of 1 methods: take advantage of newer NIH policies to allow data collected through crowdsourcing and citizen science methods that engage individuals and communities in self-led learning and healing around ACEs, resilience, and flourishing. Formulate and establish methods to engage individuals, families, and communities in real time and self-led learning and healing related to the prevention and mitigation of effects of ACEs. Explore launching direct to public e-summits to fast-track public education and engagement about ACEs and testing of self-care practices to assess feasibility, effectiveness, and success factors. Focus on the spread of evidence-based and promising parenting and trauma-informed education, coaching, and trauma healing and resilience-building interventions appropriate for interactive, self-guided learning platforms, and integration into existing community-based self-help programs addressing substance abuse, mental health, parenting education, weight management, and physical fitness.
   5. Integrate common elements research modules for longitudinal studies: construct common elements research and common metrics evaluation modules for ready use in existing or emerging longitudinal studies related to enable a focus on prevention and mitigation of the effects of ACEs and promotion of safe, stable, nurturing relationships, positive health, and well-being. Formulate research questions and measurement and analytic methods to append to/integrate into existing longitudinal and birth cohort studies to address key questions about prevention, risk, and mitigation of effects associated with ACEs as well as to test alternative measurement, prevention, and healing methods. Embed common methods, metrics, and coordinate analysis across deployments of research modules to facilitate learning and build knowledge.
   6. Link to collaborative learning and research networks: advance ACEs, resilience, and positive health-related research aims and methods into existing and emerging learning and research networks sponsored by public and private sector agencies, such as the numerous Collaborative Innovation and Improvement Networks and the child health-focused National Improvement Partnership Network.

EPSDT indicates early and periodic screening, diagnostic, and treatment; ACE, adverse childhood experience; NSCH, National Survey of Children's Health; NHIS, National Health Interview Survey; MEPS, Medical Expenditures Panel Survey; and NIH, National Institutes of Health.

the face of ACEs.[5,59,60,68–70] However, even the most effective ACEs assessment and education process to prevent ACEs and promote resilience and positive health in pediatrics will falter if not bordered by a community system that shares these goals and does its part to address ACEs and promote well-being. The input received specifically highlighted the need to:

- Cultivate a shared vision and financing approaches that enable collaboration within health care and between health care and other sectors.
- Establish shared accountability measures and the capacity to share data across child and family health-serving programs and providers.[71]
- Adopt a self-healing ethic among partnerships. The very relationship skills and trauma-healing that children and families require also need to be cultivated among the individuals facilitating and essential to the success of collaborative efforts.[36,72–75]

Priority 3: Fuel "Launch and Learn" Research, Innovation, and Implementation Efforts

The literature review, environmental and measurement scans, expert meetings, and interviews conducted through this project revealed substantial evidence, innovation, and promising methods and models to address ACEs and promote healing and positive health as well as approaches for engaging partners to establish shared mindsets and collaboration. However, as noted by pioneers in this field, translating the science into policy and practice requires an "era of experimentation."[1,45] Existing science, feasible models and methods, and strong partnerships are necessary, but insufficient. At this formative stage of discovery and implementation, an enduring and purposeful infrastructure to continuously foster innovation, respond to learning, and support scaling of innovations as they emerge is also needed.[76,77] As such, perhaps the most pressing need emerging for this agenda is to establish a purposeful research, policy analysis, technical assistance, and funding assistance infrastructure that enables innovation and real-time learning, improvement, and implementation. As emphasized in a recent National Academies of Science report on fostering innovation,[77] understanding the nature, determinants, and effects of innovation is therefore essential and itself occurs through the lived experience of engaging in innovation. Therefore, funding and intervention designs must allow for real-time learning about the dynamics of innovation and the capacity to iteratively adjust intervention models to optimize learning and effects.[76] Traditional funding that requires specification and adherence to specific methods before funding and measurement and evaluation methods that are fully separate from the process of innovation do not support these goals. Four key capacities for enabling and supporting innovation and implementation were emphasized:

A "Living" Evidence Synthesis and Dissemination Engine

Existing evidence synthesis (eg, National Childhood Traumatic Stress Network, Agency for Healthcare Research and Quality Evidence-Based Practices) and communications and dissemination platforms related to ACEs and resilience (eg, ACEs Connection) should be leveraged to optimize the effectiveness of children's health services providers and systems. Tailored efforts specific to pediatrics and child health are needed and require the continued synthesis of evidence to drive and guide trauma-informed/responsive and resilience-promoting care across children's health systems, in partnership with other sectors and systems.

Innovation and Rapid-cycle Learning Platforms

Efforts should be made to leverage the many existing child health-related learning networks and develop and maintain new networks of teams of families, providers, policymakers, program staff, system leaders, and community service providers to advance innovation and robust cross-sector learning and engagement. Priority focus areas in the short term should be on strategies to build the workforce and methods to assess and address ACEs and promote positive health in primary care, hospital, and community-based settings.

Open Source Training, Data, and Tools

Open source education, hands-on technical assistance, data, tools, and training focused on common needs to advance progress in policy and practice are essential to reduce barriers to learning at this formative stage. Such efforts might involve development of free massive open online courses, quick links to assessment tools and education materials, and scripts and models for coding and assessing service needs, etc. The nature and scale of change and lack of existing financial incentives and infrastructure requires open source strategies that promote consistency as well as economies of scale, and that are highly tailored for specific contexts, populations, and capacities. Dedicated resources and infrastructure funding will be required to ensure continuity, accountability, continued improvement, and sustainability of such assistance.

Engage and Empower Champions

Proactive efforts are needed to foster and support efforts of champions at every level of pediatrics, from system leaders, family leaders, students, trainees, and community partners to advocate, educate, innovate, and document learning in the field. A coordinated train-the-trainer capacity is needed as are mechanisms to curate and share models and learning related to advancing ACEs science, prevention, and healing across a range of settings and systems where children and families receive care.

Priority 4: Restore and Reward Safe and Nurturing Relationships and Self, Family, and Community-Led Prevention and Healing

More than any other, the centerpiece theme for this agenda-setting process was the importance of establishing widespread and concrete understanding about,

commitment to, and skills to advance SSNRs and environments to promote healthy child development and well-being. Participants called out the need to build a caring capacity to ensure ACEs are addressed in a relationship-centered and family-centered manner oriented toward promoting positive health and resilience while simultaneously scaling evidence-based interventions and conducting rapid-cycle testing of promising interventions related to coping with adversity and healing trauma.[68–70,72,73,78] Summarized as "restoring relatedness," this theme was specifically tied to scientific findings on the importance of the felt experience of safety and trust in primary relationships, including with service providers who seek to foster such relationships. This is important because scientific findings are clear that methods for building awareness and healing trauma, chronic stress, and the neurobiological effects that can result from ACEs are innately relational and therefore dependent on the proactive and positive engagement of individuals, families, and communities, which requires trust. Identifying relationships and self-care as central pillars for the agenda supported what came to be called a "We Are the Medicine" platform during input sessions and presentations associated with the ACEs and resilience agenda-setting process. Specifically, a national agenda to address ACEs must:

- Advance training, financing, metrics, and methods to build a caring capacity and to inform and reward for focusing on establishing and restoring SSNRs.
- Engage self, family, and community in self-care as the driving factor to prevent and heal the trauma associated with ACEs and to proactively improve stress and emotion regulation skills essential for the health and well-being of all children, families, and communities.[59,68,72,75]

Priority Areas for Research

Four research areas critical to advance agenda priorities emerged as priorities in the short term. These are as follows.

Clinical Protocols

Research to specify and test family- and youth-centered methods to assess and discuss ACEs and foster essential self-care, resilience, and relationship skills in clinical encounters and other settings.[7]

Outcomes and Costs

Research to evaluate the effects of alternative clinical and self-care interventions, including effects on health outcomes, utilization, and costs of health care.

Capacity-Building and Accountability

Research to define and cultivate provider, health care system, and community-based core competencies, and the training, payment, and accountability models effective in establishing these competencies.

Provider Self-Care

Research to assess the need for and effects of provider, service team, and program leader self-care related to ACEs, resilience, and relationship skills on quality of care and other outcomes.

Further input related to these central research issues is summarized in the Discussion section and reflects the nature of some of the conflicting views and/or areas lacking clarity that inform research in these areas.

Key Short-Term Research, Policy, and Practice Opportunities and Actions

Sixteen key opportunities and actions were identified to advance the 4 agenda priorities and foster research in the 4 priority areas noted above. Five policy, 5 practice-related, and 6 research infrastructure-related recommendations are summarized in the following sections and in Table 2. Each leverages emerging research, policy, and practice systems and structures.

Priority Opportunities to Leverage Existing Policy-Driven Systems, Structures, and Innovation Platforms

Prioritize early and periodic screening, diagnostic and treatment, and prevention.—Maintain early and periodic screening, diagnostic, and treatment policies and enrich these to integrate ACEs, parenting, and family relationships, and positive health development topics into federal and state early and periodic screening, diagnostic, and treatment[79,80] standards, policies, and in prenatal, well-women, well-child, and well-adolescent care visits. Ensure alignment with Bright Futures guidelines and those related to family-centered and culturally competent care.[81] Foster common element approaches across care settings (eg, clinical, home visiting, community services, early care, schools) to mainstream best practice health promotion and trauma healing methods.

Focus hospital community benefits strategies.—Innovate to integrate ACEs and positive health topics into hospital community benefits standards-related community needs assessments and partnership efforts.[35,36,55] Support these efforts by making local area data on ACEs, resilience, protective factors, and other social determinants of health available, enabling easy access to learning about best practice methods and supporting common evaluation metrics and methods to monitor effects on child and family health outcomes, utilization, and costs of care at the community level.

Establish enabling organization, payment, and performance measurement policies.—Advance trauma-informed and positive health-oriented payment reform, accountability measurement, and integrated systems efforts in existing and emerging practice innovation models (eg, Centers for Medicare and Medicaid Accountable

Health Communities[82] and Pediatric Alternative Payment Models) as well as through the range of maternal, child, youth, and family health programs like the Title V Maternal and Child Health Block Grants program, Title IV child welfare programs, Head Start/Early Head Start, Healthy Start, and school health and wellness programs.[59,66,67,71] Design, test, and evaluate models and promote shared measurement related to ACEs and positive health promotion.

Advance and test Medicaid policy implementation.—Develop and demonstrate models for addressing ACEs, promoting resilience, and healthy parenting in the context of addressing other social determinants of health in Medicaid.[28] Ensure common-elements research methods and metrics are integrated throughout innovation efforts to demonstrate effects and scale methods as they evolve. Specifically, foster innovation in important areas in which states have discretion. These include: 1) eligibility and enrollment; 2) benefits, coverage, and coding[83,84]; 3) contracting, costs, and performance measurement[85,86]; 4) capacity, continuing education requirements, and credentialing for traditional as well as nontraditional providers[73,87]; and 5) communication and coordination to reduce unnecessary repeated assessment, consistent educational messages, and best practices for addressing needs in partnerships with children and families.[88]

Inform and track legislation to accelerate translation.—Formulate recommendations for, track and evaluate effects of specific federal, state, and local legislation, regulations, and related actions to address ACEs and trauma prevention and healing, ensuring that child, youth, and family needs and requirements are considered and advanced and a developmental trauma focus is included. Proactively ensure ACEs and childhood trauma is considered in health policies. Partner in efforts to formulate policy platforms, such as the Trauma-Informed Care for Children and Families Act (2017), which is the first comprehensive piece of legislation introduced in Congress seeking to infuse brain science related to ACEs and child and youth health into government policies and programs.[89]

Priority Opportunities to Leverage Existing and Evolving Practice Transformation Efforts

Leverage medical/health home and social determinants of health "movement".—Leverage existing primary care medical home demonstrations and related efforts to address social and emotional determinants of health in pediatric practices, hospitals, and other settings to fully integrate approaches to assess for, educate about, and address ACEs and promote SSNRs in families and communities.[7,69,83,87] Conceptualize assessing for ACEs as a relationship-centered approach[75,88] to promote population-wide learning, and establishing conversations to discern and gain buy-in and community and family ownership for specific strategies to promote resilience, healing, and prevention. Where possible, fully integrate into other screening, assessment, and education efforts using a relationship-centered approach.[72] Test methods addressing Medicaid innovations listed previously at the practice implementation level, ensuring evaluation for cost-benefits and cost-effectiveness.

Enable, activate, and support child, youth, and family engagement.—Evaluate and advance efforts to engage children, youth, and families by including them in measurement and improvement efforts.[78] Optimize face to face time in health care encounters to enable effective relationship-centered education and support related to ACEs and positive health using innovations like previsit education and engagement tools and models.[90]

Build effective peer/family to peer/family support capacity.—Design and evaluate use of nontraditional "providers" like peer to peer and family to family supports as well as community health workers and others trained to promote healthy parenting, stress management, trauma healing, and building resilience.

Empower community-based services and resource brokers (eg, early childhood programs like Head Start, Help Me Grow, Healthy Start, Healthy Steps, school health, youth, and after school programs).—Create and evaluate the effects of "through any door" models for educating and engaging parents, youth, and families, and leveraging existing and emergent community-based services and resources related to trauma, healing, and resilience. Innovate around effective methods to educate and engage families as partners.

Leverage existing commitments and focus areas in child and family health.—Integrate trauma- and resilience-informed knowledge, policies, and practices into existing initiatives and movements, including preventing repeat hospitalizations, complex chronic condition care, early childhood systems, childhood obesity, school health, and social and emotional learning in schools. Focus on the spread of evidence-based and promising parenting- and trauma-informed education, coaching, and trauma-healing and resilience-building interventions into existing child and family focused community-based self-help programs, such as those addressing substance abuse, mental health, parenting education, weight management, physical fitness, chronic disease management, and related self-care programs.

Leverage Existing Research and Data Platforms, Resources, and Opportunities

Optimize existing federal surveys and data.—Coordinate and optimize design and national, state and local research, policy, and practice innovation efforts using relevant data from the federal surveys (eg, NSCH, National Health Interview Survey, Medical Expenditures Panel Survey) that can inform, monitor, and build knowledge on ACEs prevention and positive health development. Establish targeted follow-back and "follow-forward" panel studies anchored to these surveys to understand variations and effects of health care and related policies. Include/maintain inclusion of ACEs, resilience, and protective factors in the NSCH and into the National Health Interview Survey and Medical Expenditures Panel Survey to promote effects of medical

expenditures studies. Conduct a robust follow-back study on the basis of the NSCH to examine positive deviance and variations in outcomes across similar levels of ACEs risk, and advance knowledge on opportunities to promote well-being despite ACEs, and preventing ACEs.

Optimize state surveys.—Facilitate efforts to enhance availability and access to ACEs, resilience, protective factors, and positive health-related data on children, youth, and families in state-led surveys like the Behavioral Risk Factor Surveillance Survey, the Youth Risk Behavior Surveillance Survey, and the Pregnancy Risk Assessment Monitoring System.

Liberate available data.—Expedite and expand the use of existing ACEs, resilience, and related data for research, policy, and practice to remove barriers to using available data and facilitate easy and "lay-person" access to data findings to support national, state, and local efforts in a real-time context. Ensure technical assistance, training, and education is provided to ensure valid use of data and curate "data in action" efforts to engender action.

Build crowdsourcing, citizen science, and N of 1 methods.—Take advantage of newer National Institutes of Health policies to allow data collected through crowdsourcing and citizen-science methods that engage individuals and communities in self-led learning and healing around ACEs, resilience, and flourishing.[91,92] Advance community-based, citizen science, and N of 1 research platforms that fast-track learning about "what works for whom" and enable rapid discovery and spread of knowledge. Explore launching direct-to-public e-summits to fast-track public education and engagement about ACEs and testing of self-care practices to document feasibility, effectiveness, and success factors. Focus on the spread of evidence-based and promising parenting and trauma informed education, coaching, and trauma-healing and resilience-building interventions appropriate for interactive, self-guided learning platforms and integration into existing community-based self-help programs, as noted above.

Integrate common-elements research modules for longitudinal studies.—Construct common elements research and common metrics evaluation modules for ready use in existing or emerging longitudinal studies related to enable a focus on prevention and mitigation of effects of ACEs and promotion of SSNRs, positive health, and well-being. Formulate research questions and measurement and analytic methods to append to/integrate into existing longitudinal and birth cohort studies to address key questions about prevention, risk, and mitigation of effects associated with ACEs as well as to test alternative measurement, prevention, and healing methods. Embed common methods and metrics, and coordinate analysis across deployments of research modules to facilitate learning and build knowledge.

Link to collaborative learning and research networks.—Advance ACEs, resilience, and positive health-related research aims and methods into existing and emerging learning and research networks sponsored by public and private sector agencies, such as the numerous Collaborative Innovation and Improvement Networks[93] and the child health-focused National Improvement Partnership Network.[94]

Limitations

Because of the broad reach of implications of ACEs across disciplines and sectors, our project sought to balance the real tension presented by the multifactorial, multisector nature of forces resulting in and preventing ACEs, while narrowing the aperture of the project's lens enough to focus sharply on the importance of the current opportunity afforded by the transforming roles of pediatric and children's health providers and health systems to identify, prevent, and ameliorate the effects of ACEs and promote child and family well-being in their communities.

This article provides only a high-level summary of agenda priorities and recommendations. It should be noted that saturation regarding the identification of new ideas and priorities occurred during initial rounds of synthesis of input, suggesting a high degree of common views. Likewise, areas where disagreement existed also emerged early in our efforts. Although this summary captures the range of priorities set forth, space limitations prevent important in-depth descriptions, delineation of priorities, or careful discussion regarding issues around which considerable debate or lack of clarity exist. Commissioned articles, reports, and data resources developed through this effort and the Supplementary Appendix further elaborate on our findings.

Discussion

Findings from this field-building and agenda-setting process support the growing focus on ACEs and healthy child and youth development now present across many sectors. Findings emphasize the central role of positive family relationships, the possibilities for promoting resilience and protective factors and establishing community partnerships focused on addressing ACEs as a distinct social determinant of health. The 4 overarching priorities, 4 priority research areas, and 16 short-term opportunities and actions that emerged are meant to contribute to what are now increasingly common efforts in children's health to translate the sciences related to ACEs and thriving into research, policy, and practice. Overall, the perspectives and priorities emerging from this field-building and agenda-setting process were consistently shared across individuals and groups participating in the process. However, 3 areas reflected in the summary of findings previously mentioned were a subject of substantial debate and require further discussion: 1) assessment, measurement, and use of language; 2) the appropriate role for providers and health systems; and 3) the importance of self-care among providers as it relates to ACEs and resilience. Highlights of these issues are summarized in the following sections.

Assessment, Measurement, and Language

Early on in our efforts the topic of clear definitions, terminology, language, measurement, and whether and how to assess and address ACEs in practice stood out as chief

concerns. For example, although most understood that ACEs assessments[71] are conducted to measure risk for chronic stress and developmental trauma, there was concern that ACEs assessment will be mistaken as a stand-alone measure of current or accumulated chronic stress or trauma. There was also confusion about how ACEs measurement differs from other social determinants of health (eg, poverty) and how best to integrate assessment methods for ACEs, other social determinants, as well as resilience and protective factors (nurturance, self-care habits) in practice.[95] Further questions emerged regarding whether ACEs assessment is meant as a proxy to document whether certain events occurred in childhood or are currently taking place for a child (which is not the goal of ACEs assessment, per se) and whether to focus assessment on parents/adults or children, or both. Substantial debate also related to use of cumulative ACEs scores versus individual ACEs topics. Some of these issues are addressed in the article by Bethell et al[71] and other articles included in this special issue of *Academic Pediatrics*.

There was interest for the design of a short consequences-based method to assess the presence of developmental trauma symptoms (or consequences) associated with a wide range of ACEs in primary care and other clinical settings. However, how this would be different from a measure of current post-traumatic or chronic stress (active ACEs vs past experiences), biologic indicators of current and accumulated stress, and mental and behavioral diagnostic instruments requires analysis. Over time, it will be essential to compare methods and assess the value of different measures and measurement methods and proper use of existing ACEs assessment tools. Clarifying the goal, value, and possible risks of ACEs assessment in practice is urgent at this juncture and requires special attention as this agenda is implemented.[96]

Also important were concerns regarding communication and language about ACEs.[97] Use of language to ensure discussions about ACEs are relationship-centered,[75] family-centered, and health-promoting was a primary issue of concern. Despite the common understanding that discussions about ACEs are specifically intended to empower individuals, foster self-compassion, and reduce any sense of shame or blame about having ACEs,[18] the lack of research documenting negative effects of ACEs assessment is not sufficient. Proactive research to confirm lack of harm and value is needed. Specific scripts and methods for discussing these topics with parents about their children are still not well studied. Because of worries about unintended iatrogenic effects of discussing ACEs with families,[96] some argued against routine ACEs assessment in pediatric practices. Finally, including measures and methods to assess positive health, resilience, and well-being along with ACEs assessment was a high priority and was framed as critical to guide positive action in primary care and triage efficient use of therapeutic resources.[49,50]

Finally, although common language about the "science of ACEs and thriving" is helpful to enable dialogue and collaboration, it is also critical to not allow natural variations in conceptualization and communication to slow or prevent action. Of note was support for such variation and encouraging open discussion and debate, which is itself a critical component to learning and fostering shared vision, collaboration, and trust in partnerships to address ACEs and promote well-being. As noted by one participant "It is more important that we feel safe to disagree about language than to get hung up on agreeing completely."

The Role of Health Care Providers and Systems

Although support to integrate ACEs knowledge and focus into pediatrics was ubiquitous, it was nonetheless common for participants to cite research noting that health care only contributes a small amount to the health and well-being of people, despite the widespread understanding about the role of ACEs-related stress on child development and health.[12,97] Overall, the appropriate role of pediatricians and children's health services providers and systems was continuously called into question. Over time it became clear that the notion that health care does not contribute a lot to well-being is largely due to viewing health care through a disease-focused lens, rather than recognizing the longstanding role of pediatrics to provide well-child care and promote healthy development. This includes current efforts to restructure primary, chronic, and hospital health care to promote population health, address health behaviors, and address social determinants of health, like ACEs. Debate about the effectiveness of well-child care and systems reforms to address social determinants of health persisted as a key theme through the project. At a minimum, studies have documented that ACEs result in higher prevalence of diseases and health problems and use of health services. As such, health care providers are essential partners in identifying and addressing ACEs and need to take childhood and family ACEs into account in well-child visits as well as in acute and chronic illness diagnosis and treatment. Overall, the appropriate role for children's health care providers requires clarification before widespread action to match interest is likely to unfold. To the extent that parenting interventions continue to prove effective[5] and pediatric providers can promote the many integrative practices relevant to preventing and addressing ACEs,[7,98] it is clear that pediatric providers will be essential partners in identifying, referring, and engendering the understanding and motivation among families to participate in these programs.

Importance of Personal Engagement and Healing Among Providers

Although largely favored, some disagreed that health care providers or system leaders should address their own ACEs and trauma and/or have direct experience with trauma-healing and positive health development interventions to play an effective role in assessing and addressing ACEs and promoting resilience and well-being in practice. For many, this was viewed as a preliminary step for effective action, because building a caring capacity, trusting

relationships, and healing conversations were viewed as essential requirements to address ACEs. For others, this was either viewed as not important or as intrusive to health care providers and professionals. Related to this theme were questions about whether or not initiating conversations about ACEs with families should take place even if providers are not familiar with or have specific resources to refer families and/or children on the basis of what is discovered during conversations about ACEs. Some emphasized that dialogue about ACEs is an intervention in itself and discovering resources in partnership with families is sufficient to recommend assessment. Others recommend avoiding any discussions about ACEs without a more specific roadmap for referral and intervention on the basis of what arises during these discussions. Finally, the high level of burnout and secondary trauma of health care professionals was a strong and recurring theme pointing to a concerted effort to advance self-care and trauma-healing among pediatric providers regardless of their own ACEs history.[72]

CONCLUSION

Research now inescapably confirms a high prevalence of ACEs in the child population in the United States, the negative influence on healthy development and well-being, and their propensity to perpetuate across generations in families. This calls for approaches in children's health services to proactively seek to prevent, recognize, and heal the trauma and toxic or chronic stress that can result from ACEs; and that doing so at a population-wide level is an imperative to prevent ACEs over time. It is widely understood that doing so requires strategies that focus on the cross-cutting structures and social and cultural factors affecting the promotion of nurturing qualities in family relationships and environments essential to promote positive health. Widespread agreement is also emerging that individual and family skills to regulate stress and emotions are now a matter of clinical care quality, health care cost reduction, population well-being, and public policy.

Success in adopting and implementing the priorities and actions set forth in this agenda are anticipated to lead to: 1) a strengthened commitment to child, youth, and family health, leading to widespread understanding about the cross-cutting relevance of healthy child development and family health to population health,[99,100] reductions in avoidable medical and social costs, and optimizing human potential and national well-being[48]; 2) effective and accepted strategies to interrupt intergenerational transmission of ACEs and stress for all ages,[70] but with a deliberate focus in the preconception, perinatal, and early life time periods to advance healthy parenting and relationships in early life and interrupt intergenerational transmission of ACEs[1,5,6,54,59,66]; 3) a commitment to a public health, population-based approach that integrates clinical strategies with cross-cutting public health efforts to address the cumulative burden of ACEs in society at large[35,55,56,67]; and 4) priority on promoting positive relationships, engagement, and self-care that put relationships at the center of healthy development and well-being across life.[6,19,68,72,73,75,101]

Although the implications for children's health services policy and practice might require seemingly daunting shifts in structures, financing, training, measurement, and an array of clinical, public health, and other practices, they are equally energizing and well under way. Since beginning the work summarized in this article, we have seen an emergence of efforts to advance whole-population and whole-person health and address social and emotional determinants of health. Rather than requiring a separate set of efforts, the agenda to address ACEs set forth in this article fits well within these endeavors and the collective attention to this issue now provides a strong foundation from which to advance effective approaches in pediatrics and children's health services.

Continued pressures on the health care system to address cost increases are creating new opportunities to rethink approaches, catalyze innovation, and spread effective methods to promote child well-being by addressing ACEs and doing so in collaboration with a broad set of diverse community partners. Overall, our findings call children's health and related services to continue to directly and earnestly recognize social and emotional determinants of health, healthy parenting, and the contexts within which children live—their families and communities. To date, our health system has rarely, if ever, adequately addressed the confluence of these factors, their effects on child and family health, and their lifelong implications for adult health and community well-being. We set forth this field-building agenda in hopes of contributing to the work at hand.

Studies estimate an average of 17 years go by before research is translated into practice.[102] In keeping with this time frame, the national child health services research and policy agenda and field-building project summarized here began 17 years after initial findings emerged from the landmark CDC and Kaiser ACEs study launched in 1996 and led by Robert Anda and Vincent Felitti.[18] It has also now been 17 years since the National Academy of Sciences released the groundbreaking *Neurons to Neighborhoods: The Science of Early Childhood Development*,[103] initiating the current focus on early life stress and environments we now see in child health. With epidemiologic evidence now documenting the high prevalence of ACEs-related stress and trauma, a focus in this area is a critical concern for any effort seeking to promote positive health and well-being of children, families, and communities. The input processes and forums conducted reveal that the accumulated research and action to date have cultivated a palpable hope for prevention, mitigation, and healing of individual, intergenerational, and community trauma associated with ACEs exposure. A link in the chain of a long line of historic and evolving work to leverage possibilities for well-being, the work summarized in this article rests on and is dedicated to this hope.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at http://www.cahmi.org/wp-content/uploads/2015/01/ACEs-Supplement_National-Agenda-Technical-Appendix_04-04-17.pdf.

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Adverse Childhood Experiences, Resilience and Mindfulness-Based Approaches: Common Denominator Issues for Children with Emotional, Mental, or Behavioral Problems

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Synopsis

US children with emotional, mental, or behavioral conditions (EMB) have disproportionate exposure to potentially traumatizing adverse childhood experiences (ACEs) (70.7% EMB vs. 46.9% non-EMB). Neuroscience, epigenetic, developmental, social, epidemiologic, and other sciences provide theoretical and empirical explanations for observed early and lifelong physical, mental, emotional, educational, and social impacts of the trauma and chronic stress that can result from ACEs. Together, these sciences point to possibilities to strengthen families and promote child resilience and school and life success using mindfulness-based, mind-body approaches (MBMB) that neuroscience and other studies show promote healthy regulation of stress, resilience, and healing from emotional trauma. This paper examines US population-based associations between prevalence of EMB, ACEs, and risk regulating protective factors that are potentially malleable using MBMB, such as child resilience, parental coping and stress, and parent-child engagement. US rates of MBMB use among children with EMB are estimated. Findings encourage family-centered and mindfulness-based approaches to address social and emotional trauma and potentially interrupt intergenerational cycles of ACEs and prevalence of EMB among children and youth.

Keywords

child and adolescent mental health; adverse childhood experiences; resilience; protective factors; parent stress; mindfulness

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Introduction

An estimated 19.8% of all US children have a chronic condition requiring more than routine health and related services. This prevalence increases to 31.6% for the nearly one fourth of US children exposed to two or more adverse childhood experiences (ACEs),[1] such as those experiences studied in the widely recognized Centers for Disease Control (CDC) and Kaiser Permanente study of adults exposed to ACEs.[2] Adapted for children and parental report, the National Survey of Children's Health (NSCH) now assesses nine types of ACEs, including serious economic hardship, witnessing or experiencing violence in the neighborhood, alcohol, substance abuse, domestic violence, mental health problems in the home, parental divorce, loss of parents to death or incarceration, and social rejection through racial and ethnic discrimination. Measured in this way, NSCH findings confirm those from the CDC/Kaiser and other studies revealing a linear, dose-response effect of ACEs across a wide range of health and social impacts. This effect is stable even in the absence of more detailed information about the occurrence, frequency, and severity of any specific event or set of experiences. Exposure to ACEs is 71% for all US children in fair or poor health. Additionally, US children exposed to ACEs are substantially and significantly more likely to repeat a grade in school and lack resilience, such as usually or always being able to stay calm and in control when faced with a challenge.[1]

Reports on the NSCH show that 70% of the 7.9% of US children ages 2-17 with attention deficit hyperactivity disorder (ADHD) have been exposed to ACEs. Less is known about ACEs prevalence and impact for US children with any type of emotional, mental, or behavioral condition(s) (EMB). Because common symptoms are shared by children exposed to ACEs and those diagnosed with EMB,[3,4] it is important to understand the prevalence of ACEs exposure among children with EMB, how these phenomena are related to each other, and to assess whether adaptations are needed in approaches to the prevention, diagnosis, or treatment of EMB in children who may also carry the social and emotional trauma and chronic stress that can result from ACEs.

Growing neuroscience, epigenetic, social, developmental, epidemiologic, resilience and other sciences are coming together to explain observed early and lifelong impacts of childhood social and emotional trauma and chronic stress that can arise from ACEs and perhaps, in turn, evolve into or contribute to EMB.[5-12] Catalyzed by this evolution of scientific understanding, and anchored in recognition of safe, stable, and nurturing relationships as a pillar for child and adult health,[13]ACEs, trauma-informed practices (a popular terminology for responding to ACEs), and intergenerational approaches are a growing focus in clinical, early care, educational, and community contexts, especially for children with EMB, for promoting trauma healing and resilience for the entire family. [14-16]

Integral to many of these approaches to addressing the emotional trauma and chronic stress that can arise with ACEs are mindfulness-based, mind-body methods (MBMB), which now enjoy growing evidence of effectiveness to promote trauma healing, resilience, and self-regulation of stress, emotions, and behavior.[17-22] This evidence has accumulated sufficiently for the American Academy of Pediatrics to have begun to develop what is expected to be a forthcoming policy statement on the use of mind–body methods in clinical practice.

Systematic reviews of research on MBMB suggest that these methods can attenuate cognitive, behavioral and emotional symptoms of conditions like anxiety, ADHD, and depression, can decrease physical pain, promote positive health behaviors and social functioning and increase school engagement and attendance. Purposeful moment-by-moment presence and self-awareness of one's breathing, body sensations, emotions, and/ or thoughts in a nonjudgmental manner (eg, mindfulness) is a common, cross- cutting component of most mind–body methods, like biofeedback, guided imagery, yoga, hypnosis, and meditation.

Showing relevance of MBMB to parents, Whitaker and colleagues assessed ACEs exposure, health outcomes, and mindfulness among adults, showing that among persons reporting three or more ACEs, those in the highest quartile of mindfulness had a prevalence of multiple health conditions two-thirds that of those in the lowest quartile.[17] Other studies conclude that regardless of the presence of trauma, youth-based mindfulness-based stress reduction (MBSR) training in primary care and other settings is effective in improving self-regulation of stress, improving mental health symptoms, lowering blood pressure, and improving overall coping.[18-22]

Although research has demonstrated that MBMBs, such as mindfulness, yoga, Tai chi, and other forms of meditative movement can be effective for general well-being and to address a wide variety of symptoms and conditions, [23-25] this paper focuses on the promising application of MBMB to children and youth with EMB, most of whom are also exposed to ACEs and may carry trauma and chronic stress owing to these experiences. Specifically, this paper aims to provide further insights into why children with ACEs may (or may not) also experience EMB with the goal to inform burgeoning efforts to both reduce EMB prevalence as well as interrupt intergenerational cycles of ACEs.[13-14] To begin, we examined associations among prevalence of EMB among US children with varying levels of ACEs and by differences in risk regulating factors hypothesized to ameliorate negative effects of ACEs, which research shows are also potentially malleable using MBMB. These factors include child resilience and factors indicative of the presence of safe, stable and nurturing family relationships, such as parental coping and stress and parent-child engagement. Rates of use of MBMB among children with EMB is estimated along with their total expenditures for conventional medical care, which may point to delayed use of MBMB that could attenuate severity and costs of care for children with EMB.

Methods

Population and Data

This study used data from the 2011–12 NSCH, the 2007 National Health Interview Survey (NHIS), the NHIS Child Complementary and Alternative Medicine (CAM) Supplement and the 2008 Medical Expenditure Panel Survey (MEPS).[26] The NSCH surveyed a representative sample of children ages 0–17 (95,677 children, with approximately 1,800 per state). Child-level household surveys were conducted with parents or guardians under the leadership of the Maternal and Child Health Bureau and implemented through the National Center for Health Statistics (NCHS). Analyses here are limited to children ages 2-17 owing to age parameters for questions related to whether a child had an emotional, mental, or

behavioral condition. Further stratification occurred where variables were only available for school-age children (ages 6-17). Data were weighted to represent the population of non-institutionalized children nationally and in each state.

Data from the 2007 NHIS and 2008 MEPS were used as the most recent available that allow linking data from the NHIS-CAM Supplement to the MEPS health care expenditures data sets to develop estimates of mind-body methods among children with EMB problems in the US. To estimate prevalence of EMB conditions and use of mind-body methods, we linked five 2007 NHIS data files (Family, Imputed Income, Person, Sample Child, and Child CAM Supplement), resulting in an integrated NHIS data file that included 9,417 sampled children. To obtain health care expenditure data for children with EMB and who used mind-body methods, we further linked this integrated NHIS file with the 2008 MEPS Full-Year Consolidated Household File, which included the NHIS sampling frame (Panel 13). The NHIS/MEPS linked file contains 2,411 sample children and were weighted to represent the US population of children ages 0-17. Weights for the NHIS/MEPS linked file were constructed adjusting the MEPS Panel 13 weights to reflect the NHIS probabilities of selection for sub-sampling of children and then, as recommended, weights were further adjusted through ranking by age, sex, race/ethnicity, and US geographic region.

Key Measures

As noted, the 2011–12 NSCH ACEs questions are based on those used in the adult CDC/Kaiser study, with modifications overseen by a federal Maternal and Child Health Bureau technical expert panel and evaluated through standard survey item testing by the National Center for Health Statistics. The NSCH included nine ACEs deemed valid for reporting by parents and guardians as outlined.[1] To evaluate associations between EMB and ACEs, an EMB variable was constructed to include whether a child have been told by a doctor or other provider that they currently have ADHD, depression, anxiety, behavior or conduct problems, autism spectrum disorder, developmental delay, or Tourette syndrome. Variables assessing protective factors were also constructed using the NSCH data and included child resilience (defined simply here as usually or always “staying calm and in control when faced with a challenge,” for children ages 6–17), engagement in school (multi-item measure), and missed school days. Variables constructed to assess hypothesized risk regulating associations between EMB, ACEs, and protective family relationship factors included parental coping, parental aggravation and stress owing to parenting, whether a child and parent do well sharing ideas and talking about things that matter, whether a child's parent knows her or his child's friends and participates in child's events and activities, and the mental health status of the child's mother.

For analyses of the NHIS and MEPS data, six health conditions or problems asked about in the 2007 NHIS were grouped together to identify children with EMB conditions or problems: (a) parent has ever been told by a health professional that child has ADHD or ADD; (b) parent has been told by a health professional that child experienced depression or phobia/fears in the past 12 months and/or (c) parent report that child experienced anxiety/stress, incontinence/bed wetting, or insomnia/trouble sleeping in the past 12 months. MBMBs included biofeedback, hypnosis, yoga, Tai chi, Qi gong, meditation, guided

imagery, progressive relaxation, deep breathing exercises, support group meeting, and stress management class (like Mindfulness-Based Stress Reduction). Total conventional medical care expenditures estimates were constructed based on standard two-part models and were adjusted for child's age, sex, race/ethnicity, income, and US region. All variables used in this study have been documented previously, and their properties and coding are presented in publicly available NSCH and NHIS variable codebooks developed by the Child and Adolescent Health Measurement Initiative.[26]

Analytic Methods

Bivariate, rate ratio analyses, chi square tests, and t tests were used in addition to multivariate logistic regression models to evaluate variations in prevalence of EMB by a child's ACEs status and to further evaluate these associations by a child's age, household income, resilience, and protective family relationship factors. Similar analyses were conducted to determine the impact of ACEs on school engagement and missed school among children with EMB, and potential mitigating impact when a child had learned and demonstrated resilience. All regression analyses controlled for child age, sex, race/ethnicity, health insurance status/type, and household income (for models not stratified by income). We used SPSS, version 22 (SPSS Inc, Chicago, IL). Unless otherwise noted, all adjusted odds ratios that we report were significant based on their 95% confidence intervals.

Results

Characteristics of US Children with Emotional, Mental, or Behavioral Conditions by Adverse Childhood Experiences Status

Children with EMB are disproportionately older, compared to children generally. This is especially true if they also experience multiple ACEs. Children with EMB are also more likely to be male, regardless of their ACEs status. Independent of their EMB status, children with multiple ACEs are more likely to live in lower income homes and have public insurance; however, those with both ACEs and EMB are especially likely to have public insurance (63.9%). Children without EMB but with multiple ACEs are 1.4 time more likely to be uninsured. (Table 1)

Prevalence of Emotional, Mental, or Behavioral Conditions by Adverse Childhood Experiences Status, Household Income, and Age of Child

Across levels of ACEs (1, 2-3, 4+), prevalence of EMB among US children ages 2-17 is 1.65 to 4.46 times higher compared to those with no ACEs. (Table 2) Consistent effects exist across child household income and age groups. Strongest effects are found for younger children (ages 2-5) and those living in households with incomes below 200% of the federal poverty level. Across four income categories, prevalence of EMB is 3.77 to 5.40 higher for children and youth exposed to four or more ACEs. Differences in the prevalence of EMB for these children are not statistically significant across income categories ($p = .33$). (Table 2). This finding remains for each of the individual conditions included in the EMB measures, with the exception of conduct or behavioral problems, which are systematically higher for lower income children with multiple ACEs compared to similar higher income children. (data not shown)

Prevalence of Emotional, Mental, or Behavioral Conditions by Adverse Childhood Experiences and Resilience Status

In this study, a single construct of resilience is measured as parental observation of whether their child is usually or always able to stay calm and in control when faced with a challenge. The presence of resilience measured in this minimal way is significantly associated with a lower prevalence of EMB, even for children with no ACEs. On average, the prevalence of EMB is 3.3 times greater when children lack this single aspect of resilience. (Table 3) Across ACEs status categories (0, 1, 2+), the prevalence of EMB is 2.64 to 3.35 times greater when children lack this aspect of resilience. (Figure 1) Only one third of US children (33.4%) and 12.8% with EMB are resilient and ACEs free. Although substantial variations exist across income categories, only 28.6% of children with EMB in the highest income category are both resilient and free from ACEs. (Figure 2) Compared to the 12.8% of children with EMB who both demonstrate resilience and lack ACEs, those without resilience and multiple ACEs are 6.6 times more likely to have an EMB (6.4% vs. 42.5%; data not shown). On the contrary, when children with two or more ACEs nonetheless demonstrate resilience, they are 2.64 times less likely to have EMB than their peers with two or more ACEs who lack resilience. (Table 3)

Prevalence of Emotional, Mental, or Behavioral Conditions by School Success Factors, Adverse Childhood Experiences, and Resilience

Children with two or more ACEs are 2.39 and 1.91 times more likely to not be engaged in school or missed more than 2 weeks of school, respectively. (Table 3) Children with EMB and multiple ACEs have 1.85 times higher rates of school engagement and are 1.32 times less likely to miss 2 or more weeks of school if they demonstrate the aspect of resilience assessed here. (Figure 3)

Prevalence of Emotional, Mental, or Behavioral Conditions by Family Protective Factors and Associations with Adverse Childhood Experiences and Resilience

Prevalence of EMB is 1.45 to 3.62 times higher when the following five family-focused protective factors assessed are missing (Table 3): (1) parent-child share ideas and discuss things that matter (rate ratio: 1.92); (2) parent has met most or all of child's friends and usually or always participates in child's events (rate ratio: 1.45); (3) parent manages stress and aggravation with parenting (rate ratio: 3.62); (4) parent copes well with parenting (rate ratio: 1.92); and/or (5) mother's mental health is excellent or very good (rate ratio: 1.82). These variations are somewhat attenuated when children have also been exposed to two or more ACEs (1.42-2.64 across the five factors), such that those with multiple ACEs are more likely to have EMB, regardless of these factors. Among family protective factors assessed, parental stress and aggravation has the biggest effect on prevalence of EMB for all children, as well as for those with multiple ACEs. For children with multiple ACEs, the effect of having parents who have met all or most of the child's friends and usually or always attend their events is somewhat stronger.

Across all five family-focused protective factors, children with EMB are 1.23 to 1.44 times less likely to live in homes where the five family-focused protective factors exist compared to children without EMB. Similarly, children with EMB and multiple ACEs are also 1.44 to

2.08 less likely to live in such homes. (Table 3) Conversely, when children with EMB and multiple ACEs live in homes with at least one family-focused protective factor, they are 1.27 to 2.05 times more likely to demonstrate resilience. These effects are greatest for children in homes where the parent and child share ideas and discuss things that really matter. (Figure 4)

Use of Risk Regulating Mindfulness-Based, Mind–Body Approaches, and Medical Expenditures

About 5% of US children age 2-17 have parents who reported their child has used the MBMB assessed in the NHIS-CAM Supplement. This increases to 14% for children with EMB and to 14.9% for children with ADD/ADHD. (Figure 5) Those with any type of EMB who use MBMB used more conventional medical care for their conditions and have 1.82 times higher adjusted total conventional medical expenditures compared to those who did not use MBMB. This effect is similar for children with ADD/ADHD (1.86 times greater adjusted expenditures) and for all children generally (2.32 times greater adjusted expenditures). These differences are statistically significant. (Figure 5)

Discussion

Findings presented herein are the first showing hypothesized associations among EMB, ACEs, resilience, and family protective factors in a population-based sample of US children and youth. In this way, results are critical to confirm more narrowly focused studies[27, 28, 29] and are useful to guide rapidly evolving efforts underway nationally to prevent and decrease the impact of EMB and ACEs and promote positive health. This includes the many efforts taking place to integrate primary care and mental and behavioral health services and in educational and other community based settings.[14, 16]

The co-occurring nature of EMB, ACEs, and school success factors, and the mediating effects of resilience, parental stress, parent-child engagement, and other family-focused protective factors are likely not surprising to many clinicians and child health leaders. The population-based findings presented here may simply confirm current understanding. Findings also raise questions about the directionality of observed effects. Specifically, because ACEs are largely a function of failures in the safety, stability, and nurturing properties of the child's relationships and environment, by their nature, ACEs challenge a child's capacity to manage stress and build resilience. In this way, lower rates of resilience and protective factors among children with ACEs are not surprising.

What is more revealing here is the relative effect of building a child's resilience and family protective factors to both attenuate the impact of ACEs that have already occurred and associations between these factors and prevalence of EMB, regardless of ACEs status. The cross-cutting attenuating effects of child resilience, parental stress management, and engagement found here suggest the importance of population-based promotion of these protective factors overall and especially for children already exposed to ACEs. MBMB methods hold promise for doing so, yet are used infrequently. When children with EMB do use MBMB, findings suggest do so after extensive use of conventional medical care approaches. This is indicated by the higher use and costs of medical care expenditures for

these children. This suggests that parents turn to MBMB only after their child's condition becomes more severe and they have sought help across a range of health care providers and pharmaceutical treatments.

Although more research is required, findings hold promise for potentially decreasing health care costs for children and their families, especially those with EMB and exposure to ACEs. Given growing evidence on the effectiveness of MBMB to attenuate symptoms associated with many types of EMB (ADHD, depression, anxiety, conduct disorders), findings from this study suggest a delayed and underuse of MBMB approaches for children.

Findings from this study emphasize the importance of resilience and the quality of the very family relationships implicated in a child's ACEs status. In this way, findings support attention to the ACEs status of parents and their own capacities to manage stress and heal from the trauma and chronic stress that can accumulate when exposed to ACEs. Findings may also lead to rethinking the sufficiency and appropriateness of predominant EMB treatment norms, such as the widespread use of pharmaceutical-based treatment plans (e.g. 68% of children with ADHD currently take medications)[27] and consider use of mindfulness and other mind-body based methods in conjunction with more comprehensive clinical approaches that address trauma.

Common, so-called, “trauma-informed” efforts specifically target the prevention and reduction of impacts from ACEs and the chronic stress and trauma that can result and impact health early and across the lifespan. Such approaches are defined, recommended, and supported by the federal Substance Abuse and Mental Health Administration (SAHMSA)[30], the federal Centers for Medicare and Medicaid Services (CMS)[31], the Administration for Children and Families[11] (ACF) and, more recently, by the American Academy of Pediatrics. In particular, although not as yet addressed by many pediatric providers,[32] ACEs are a growing consideration among pediatric clinicians who increasingly share goals to advance resilience and social and emotional well-being of children and youth. We suggest three reasons for this: (1) similarities in symptoms of many EMB diagnoses and those associated with exposure to ACEs; (2) the many undiagnosed children with untreated symptoms related to ACEs exposure; and, (3) new possibilities for prevention, healing, and treatment introduced by growing neuroscience, epigenetic, resilience, positive health, and mindfulness and mind-body related research.

A primary limitation of this study is the cross-sectional nature of the NSCH. Unfortunately, the United States does not have a longitudinal population-based study that includes information on EMB, ACEs and other variables evaluated here. Such data, including integration with medical and other services and costs of care and biologic and other environmental measurements are needed to document causal effects and better understand variations in outcomes between and within risk subgroups. In the absence of a national longitudinal study that includes such data, follow-back surveys among cohorts of children included in the 2011–12 NSCH hold promise as does the integration of ACEs and protective factors data in existing longitudinal cohort studies. Additional limitations exist to the extent that NSCH items/measures used here lack sensitivity, specificity or comprehensiveness for the concepts assessed. Generally, surveys such as the NSCH are biased in the direction of

positive reporting, suggesting that with improvement the effects observed here likely show even more marked effects of ACEs and lack of resilience and family protective factors.

Conclusions

Based on a recent United Nations report, the US ranks 26th out of 29 countries in child well-being.[33] We also lag in educational and health care system promotion of resilience and social and emotional skills especially impacted by ACEs and highlighted as critical to health of society and the world in the International Organization for Economic Co-Operation and Development.[34] Many would attribute these embarrassing results to failures to strengthen families and communities and the proactive promotion of social and emotional skills of children and all people; skills especially impacted by ACEs and effecting generations of children if not addressed.[35]

As the call for the transformation of the US health care system grows, clinicians, policymakers, educators, and system leaders are challenged to catalyze and foster a model of health care focused on the proactive pursuit of whole person, whole family, and whole population health and well-being. This paper further confirms the importance of addressing the growing prevalence of EMB, ACEs, and risk regulating protective factors that are potentially malleable using MBMB, such as child resilience, parental coping and stress, and parent-child engagement. Rates of use of MBMB among children with EMB in the United States suggest delayed and underuse of these promising methods.[36-38] Findings support integrated, family-centered, and mindfulness-based trauma-informed approaches to address social and emotional trauma and interrupt intergenerational cycles of ACEs and their contribution to EMB among children and youth.

Acknowledgments

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Abbreviations

EMB	Emotional, mental, or behavioral conditions
ACEs	Adverse childhood experiences
ADHD	Attention deficit hyperactivity disorder
NSCH	National Survey of Children's Health
MEPS	Medical Expenditure Panel Survey
NHIS	National Health Interview Survey
MBMB	Mindfulness-Based and Mind-Body Methods

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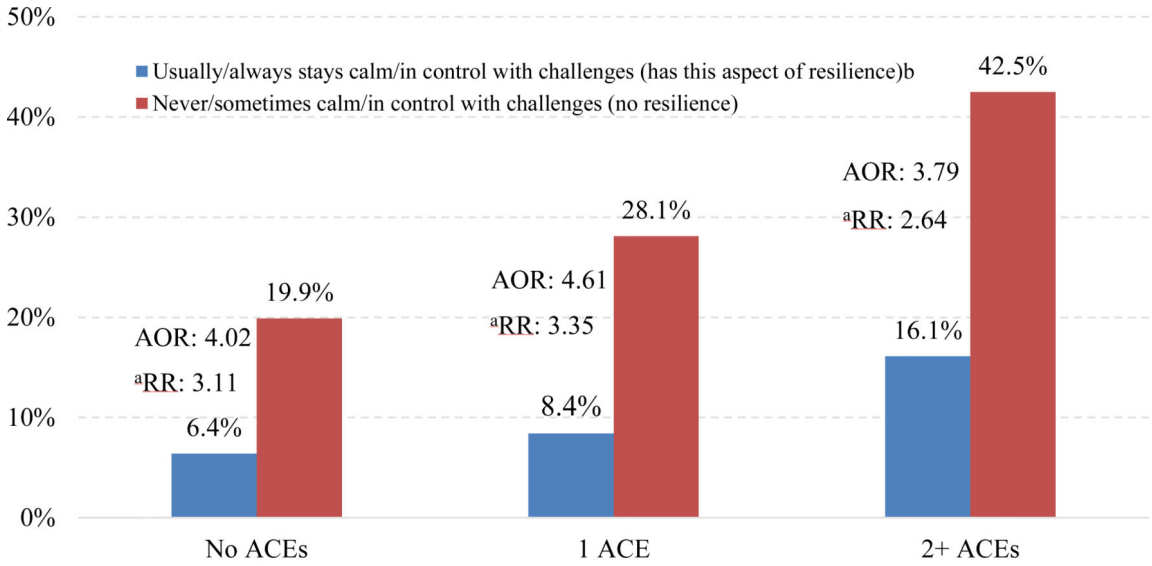
Diagnosing resilience begins with an assessment of exposure to adversity and the impact risk factors have on children's experience of wellbeing. (Michael Unger, Professor, Dalhousie University, Author: We Generation)

“Without mindfulness, there is no therapy...All growth occurs because you are in a state of mindfulness. Without mindfulness, there is no growth.” Bessel van der Kolk, Professor of Psychiatry, Boston University. Author: The Body Keeps the Score and Treating Traumatic Stress in Children and Adolescents

Key Points

- Compared with children with no adverse childhood experiences (ACEs), prevalence of emotional, mental, or behavioral conditions (EMB) is 1.65 to 4.46 times higher across ACEs levels.
- Those without resilience and multiple ACEs have nearly 11 times greater adjusted odds of having an EMB compared with children with EMB with resilience and no ACEs.
- With resilience, children with EMB and multiple ACEs have 1.85 times higher rates of school engagement and are 1.32 times less likely to miss 2 or more school weeks.
- Resilience is nearly 2 times greater among children with EMB and multiple ACEs when their parents report less parenting stress and more engagement in their child's lives.
- Attenuating effects of child resilience, parental stress management, and engagement suggest promotion of these protective factors. Mindfulness-based, mind–body methods hold promise for doing so.



[a]All rate ratios (RRs) are statistically significant at $p \leq 05$ and using multivariate logistic regression with adjustment for age, sex, race/ethnicity, household income, and insurance status/type [b]Reference category for multivariate logistic regression models. AOR: adjusted odds ratio.

Figure 1.

Prevalence of emotional, mental, or behavioral conditions (EMB) by adverse childhood experiences (ACEs) exposure and resilience status (all US children ages 6–17). Data from 2011-2012 National Survey of Children's Health

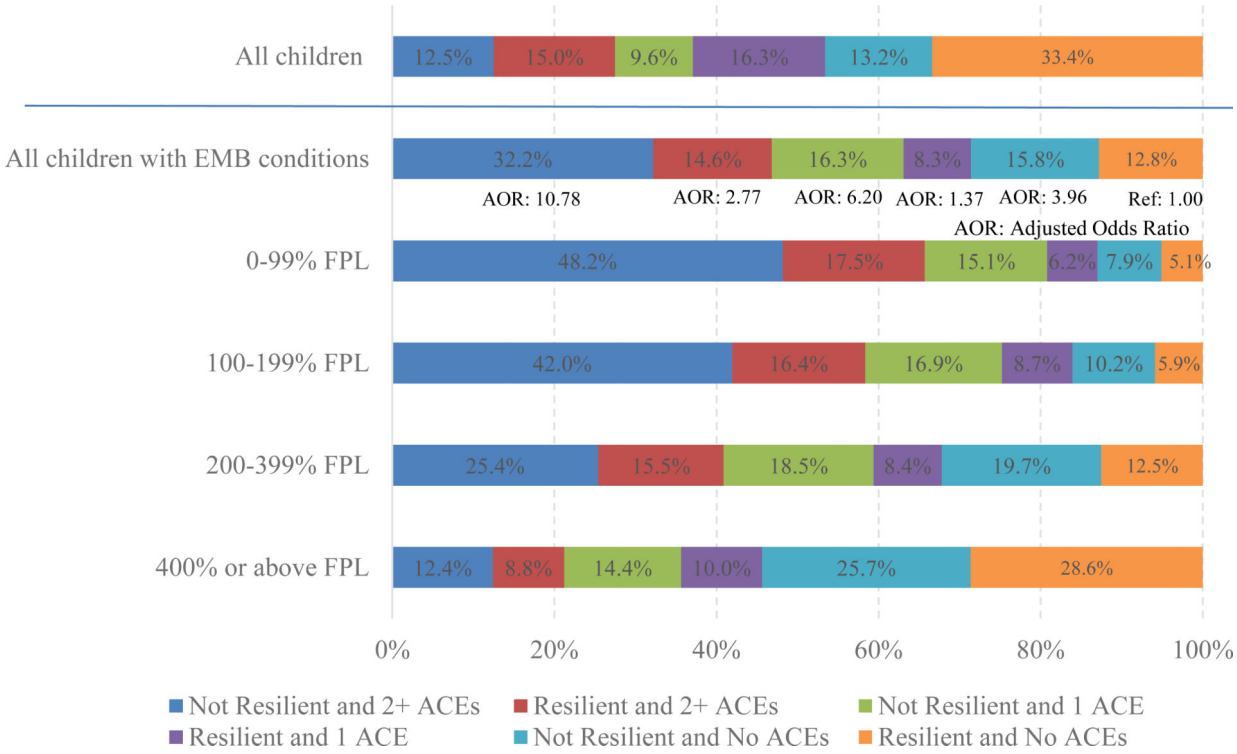
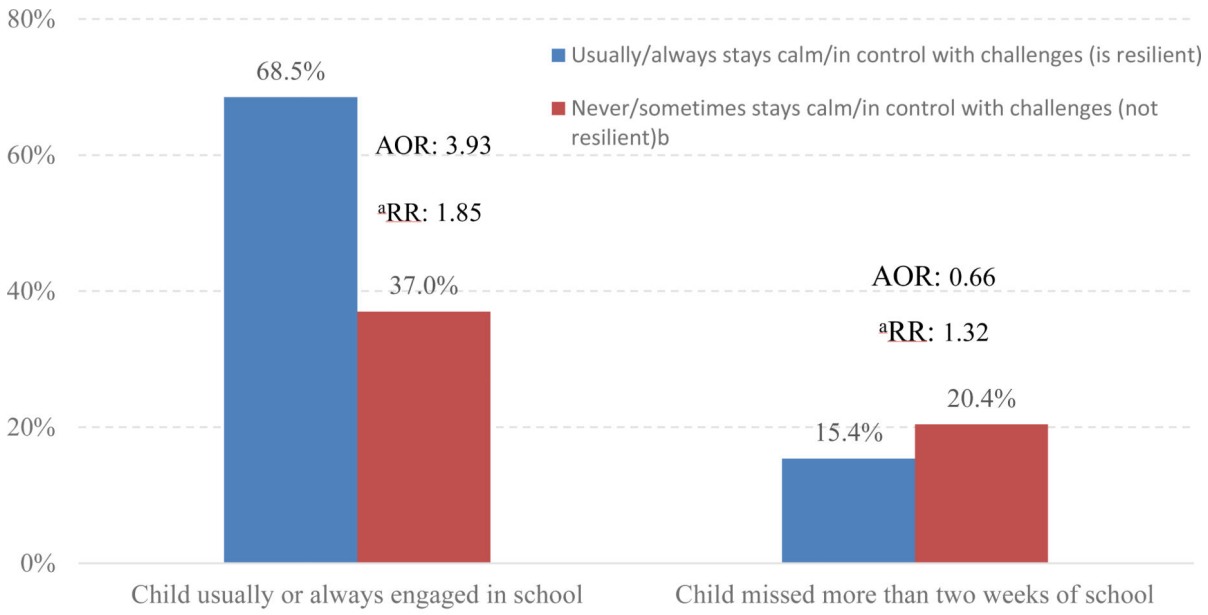


Figure 2.

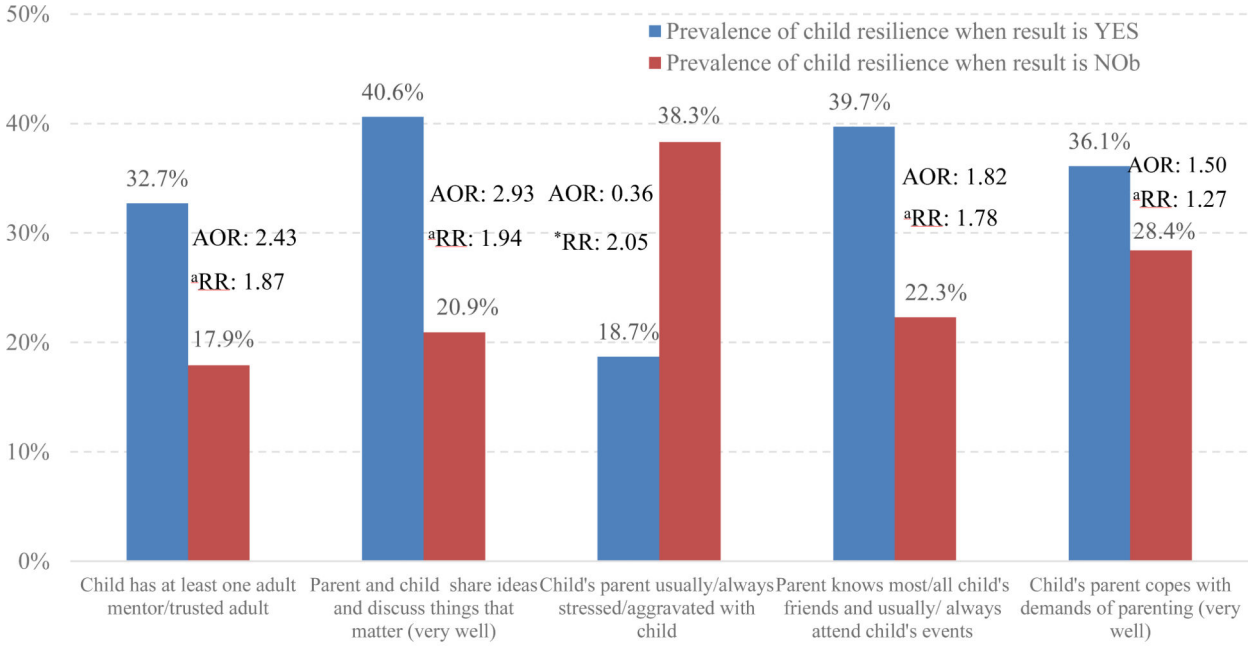
Distribution of all school age children (6–17) and children with emotional, mental, or behavioral conditions (EMBs): by resilience, adverse childhood experiences (ACEs) status and income (federal poverty level [FPL]). *Data from* 2011-2012 National Survey of Children's Health



[a]All rate ratios (RRs) are statistically significant at $p \leq 05$ and using multivariate logistic regression with adjustment for age, sex, race/ethnicity, household income, and insurance status/type [b]Reference category for multivariate logistic regression models. AOR: adjusted odds ratio.

Figure 3.

Prevalence of school success factors among US children age 6 to 17 with emotional, mental or behavioral conditions (EMB) and 2 or more adverse childhood experiences exposures (ACEs) by resilience status. *Data from* 2011-2012 National Survey of Children's Health



[a]All rate ratios (RRs) are statistically significant at $p \leq 05$ and using multivariate logistic regression with adjustment for age, sex, race/ethnicity, household income, and insurance status/type [b]Reference category for multivariate logistic regression models. AOR: adjusted odds ratio.

Figure 4.

Prevalence of resilience among US children age 2 to 17 with emotional, mental or behavioral conditions (EMB) and 2 or more adverse childhood experiences (ACEs) exposures by key protective factors. *Data from* 2011-2012 National Survey of Children's Health

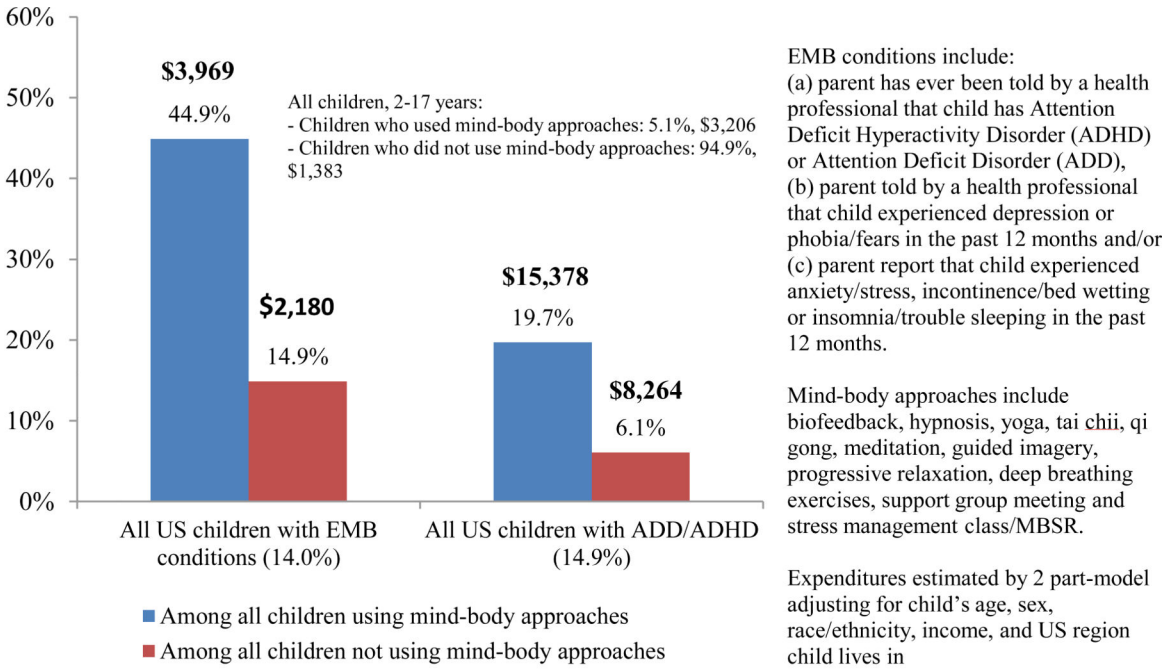


Figure 5.

Use of mind—body approaches and mean of total conventional medical care expenditures for US children age 2 to 17: all children, those with emotional, mental or behavioral conditions (EMB) and those with attention deficit disorder (ADD)/attention deficit hyperactivity disorder (ADHD). *Data from* 2007 NHIS and NHIS-Child CAM Supplement and 2008 MEPS

Table 1

Demographic and health insurance characteristics among US children age 2-17 with ACEs by emotional, mental, or behavioral health status. *Data from* 2011-2012 National Survey of Children's Health

Demographic and Health Insurance Characteristics	All US children, 2-17 Years (%)	ACEs 2-17 Years (%)				Children with Emotional, Mental, or Behavioral Problems[a], 2-17 years (%)		Children With Emotional, Mental, or Behavioral Problems[a], 2-17 years (%)			Children Without Emotional, Mental, or Behavioral Problems[a], 2-17 years (%)		
		≥4 ACEs	2-3 ACEs	1 ACE	None	Yes	No	No ACEs	1 ACE	≥2 ACEs	No ACEs	1 ACE	≥2 ACEs
All children, 2-17 years	100	7.1	17.6	25.6	49.7	14.0	86.0	29.3	25.0	45.7	53.1	25.7	21.2
Age (years)													
2-5	24.4	11.8	17.1	23.5	29.1	11.2	26.5	13.1	12.5	8.9	30.6	25.3	17.9
6-11	37.3	35.4	37.5	37.4	37.3	39.6	37.0	42.5	37.3	38.9	36.8	37.5	36.2
12-17	38.3	52.8	45.4	39.0	33.6	49.2	36.5	44.5	50.1	52.1	32.6	37.3	45.9
Sex													
Male	51.2	52.4	50.3	51.6	51.3	63.7	49.2	68.3	62.0	61.7	49.8	50.0	47.1
Female	48.8	47.6	49.7	48.4	48.7	36.3	50.8	31.7	38.0	38.3	50.2	50.0	52.9
Race													
Hispanic	23.2	21.8	22.8	26.2	21.8	17.3	24.1	15.8	19.4	17.0	22.4	27.3	24.5
White, Non-Hispanic	53.0	50.3	48.1	49.3	57.1	59.2	52.0	66.5	57.1	55.5	56.2	48.1	46.3
Black, Non-Hispanic	13.8	16.4	19.5	15.7	10.3	14.8	13.6	10.4	16.4	16.8	10.3	15.5	19.3
Other, Non-Hispanic	10.1	11.5	9.6	8.8	10.7	8.8	10.3	7.4	7.1	10.7	11.0	9.0	9.9
Household Income (FPL%)													
0-99	21.9	39.1	31.8	26.5	13.6	27.5	21.0	13.8	24.8	38.1	13.6	26.8	32.5
100-199	21.6	28.5	27.1	25.9	16.5	22.9	21.4	13.1	24.7	28.3	16.8	26.1	27.2
200-399	28.5	24.0	27.6	27.5	30.1	26.6	28.8	30.1	28.5	23.4	30.1	27.4	27.7
≥400	28.0	8.4	13.5	20.0	39.8	22.9	28.8	43.0	22.0	10.2	39.5	19.7	12.7
Insurance type													
Public	36.3	63.2	51.7	41.2	24.3	48.4	34.3	27.7	44.7	63.9	24.0	40.7	51.8

Demographic and Health Insurance Characteristics	All US children, 2-17 Years (%)	ACEs 2-17 Years (%)				Children with Emotional, Mental, or Behavioral Problems[a], 2-17 years (%)		Children With Emotional, Mental, or Behavioral Problems[a], 2-17 years (%)			Children Without Emotional, Mental, or Behavioral Problems[a], 2-17 years (%)		
		≥4 ACEs	2-3 ACEs	1 ACE	None	Yes	No	No ACEs	1 ACE	≥2 ACEs	No ACEs	1 ACE	≥2 ACEs
Private	57.9	28.4	41.5	52.0	71.2	47.7	59.5	70.1	51.5	31.2	71.3	52.1	40.1
Uninsured	5.8	8.4	6.8	6.8	4.6	3.9	6.1	2.2	3.8	4.9	4.8	7.2	8.1
Insurance adequacy[b]													
Adequate	75.8	74.3	75.0	73.7	77.4	68.8	77.0	68.3	65.6	71.0	78.2	75.0	76.2
Inadequate	24.2	25.7	25.0	26.3	22.6	31.2	23.0	31.7	34.4	29.0	21.8	25.0	23.8

Abbreviations: ACEs: adverse childhood experiences; FPL: federal poverty level.

[a]Defined as children who qualify on the Children with Special Health Care Needs Screener criteria for having emotional, developmental, or behavioral conditions that have lasted or are expected to last for ≥12 months and require treatment or counseling and/or who have had a doctor indicate current presence of ≥1 of 7 emotional, mental, or behavioral conditions asked in the National Survey of Children's Health.

[b]Among currently insured children.

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Table 2

Prevalence of EMB[a] among US children ages 2-17 by ACEs exposure status and household income and age. *Data from* 2011-2012 National Survey of Children's Health.

	EMB Prevalence: All US Children Age 2-17 (%)	EMB Prevalence: Children Age 2-17 with No ACEs		EMB Prevalence: Children Age 2-17 with 1 ACE		EMB Prevalence: Children Age 2-17 with 2-3 ACEs		EMB Prevalence: Children Age 2-17 with ≥4 ACEs of 9 ACEs		Ratio of EMB Prevalence	
		%	AOR[b]	%	AOR[b]	%	AOR[b]	%	AOR[b]	No ACES vs ≥1 ACEs	No ACEs vs 1, 2-3 or ≥4 ACEs
All children 2-17	14.0	8.3	Ref	13.7	1.64	21.7	2.62	37.0	5.02	2.39	1.65- 4.46
Household income (FPL%)											
0-99	17.6	8.5	Ref	12.8	1.44	24.0	2.66	40.0	5.21	2.58	1.50-4.70
100-199	14.9	6.6	Ref	13.1	1.89	23.1	3.34	35.7	5.59	3.04	1.98-5.40
200-399	13.1	8.3	Ref	14.2	1.69	18.9	2.27	34.8	4.86	2.23	1.71-4.19
≥400	11.5	9.0	Ref	15.1	1.57	19.2	2.02	33.9	3.67	1.97	1.68-3.77
p value (chi-square test)	<.001	.05	Ref	.41	-	.03	-	.33	-	-	-
Child age (years)											
2-5	6.4	3.7	Ref	7.3	1.85	12.6	3.13	23.5	6.59	2.78	1.97-6.35
6-11	14.9	9.5	Ref	13.7	1.44	23.6	2.69	38.0	5.08	2.16	1.44-4.00
12-17	18.1	11.0	Ref	17.6	1.75	23.6	2.44	39.4	4.71	2.14	1.60-3.58
p value (chi-square test)	<.001	<.001	Ref	<.001	-	<.001	-	.001	-	-	-

Abbreviations: ACEs: adverse childhood experiences; AOR: adjusted odds ratio; EMB: emotional, mental, or behavioral health conditions; FPL: federal poverty level.

[a]Defined as children who qualify on the Children with Special Health Care Needs Screener criteria for having emotional, developmental, or behavioral conditions that have lasted or are expected to last for ≥12 months and require treatment or counseling and/or who have had a doctor indicate current presence of ≥1 of 7 emotional, mental, or behavioral conditions asked in the National Survey of Children's Health.

[b]Adjusted for age, sex, race/ethnicity, insurance status/type.

Table 3

Prevalence of EMB[a] among children (2–17 or 6–17 depending on variable) by child resilience and protective factors status: by EMB and among EMB with 2 or more adverse childhood experiences (ACEs: 70.7% EMB have ≥1 ACEs). *Data from* 2011-2012 National Survey of Children's Health.

Protective Factors	EMB Prevalence and Rate Ratios (Children with Negative vs Positive Result on Protective Factor)				Distribution of Children with Protective Factors: by EMB and ACEs Status (Age 2-17 or 6-17 Depending Upon Protective Factor Variable)			
	EMB Prevalence: All Children (%)[b]	EMB RR[c]	EMB Prevalence: Children with ≥2 ACEs (%)[b]	EMB RR[c]	Distribution of Protective Factor: Children with EMB (%)	Distribution of Protective Factor: Children without EMB (%)	Distribution of Protective Factor: Children with EMB and ≥2 ACEs (%)	Distribution of Protective Factor: All Children (%)
Child demonstrates resilience (usually or always stays calm and in control when faced with a challenge) (age 6-17)								
Yes	9.1	3.30	16.1	2.64	35.8	70.4	31.3	64.7
No	30.0		42.5		64.2	29.6	68.7	35.3
Parent and child share ideas and talk about things that matter (very well) (age 6-17)								
Yes	13.0	1.92	23.4	1.56	55.3	73.3	52.7	70.4
No	24.9		36.6		44.7	26.7	47.3	29.6
Parent has met most/all child's friends and attends most/all of child's events (age 6-17)								
Yes	13.7	1.45	23.1	1.55	48.4	59.7	41.3	57.9
No	19.8		35.9		51.6	40.3	58.7	42.1
Parent is usually or always stressed with parenting or aggravated with child (age 2-17)								
Yes	38.7	3.62	53.3	2.64	32.9	8.5	36.4	11.9
No	10.7		20.2		67.1	91.5	63.6	88.1
Parent reports coping very well w/parenting (age 2-17)								
Yes	10.2	1.92	20.6	1.52	42.6	61.6	37.7	59.0
No	19.6		31.3		57.4	38.4	62.3	41.0
Mothers mental health excellent/very good (age 2-17)								
Yes	10.9	1.82	21.3	1.42	57.3	72.9	43.7	70.8
No	19.8		30.2		42.7	27.1	56.3	29.2
Child is usually/always engaged in school (age 6-17)								
Yes	11.3	3.35	19.5	2.39	55.0	85.4	46.8	80.4

Protective Factors	EMB Prevalence and Rate Ratios (Children with Negative vs Positive Result on Protective Factor)				Distribution of Children with Protective Factors: by EMB and ACEs Status (Age 2-17 or 6-17 Depending Upon Protective Factor Variable)			
	EMB Prevalence: All Children (%)[b]	EMB RR[c]	EMB Prevalence: Children with ≥2 ACEs (%)[b]	EMB RR[c]	Distribution of Protective Factor: Children with EMB (%)	Distribution of Protective Factor: Children without EMB (%)	Distribution of Protective Factor: Children with EMB and ≥2 ACEs (%)	Distribution of Protective Factor: All Children (%)
No	37.9		46.5		45.0	14.6	53.2	19.6
Child missed 2 or more weeks of school/year (age 6-17)								
Yes	38.6	2.59	48.5	1.91	14.5	4.5	18.8	6.2
No	14.9		25.4		85.5	95.5	81.2	93.8

Abbreviations: ACEs: adverse childhood experiences; EMB: emotional, mental, or behavioral health conditions; FPL: federal poverty level; RR: rate ratio.

[a]Defined as children who qualify on the Children with Special Health Care Needs Screener criteria for having emotional, developmental, or behavioral conditions that have lasted or are expected to last for ≥12 months and require treatment or counseling and/or who have had a doctor indicate current presence of ≥1 of 7 emotional, mental, or behavioral conditions asked in the National Survey of Children's Health.

[b]All EMB prevalence rate differences for each factor are statistically significant at p≤05.

[c]RR between those with or without the positive valence of the protective factor.

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JAMA Pediatrics | Original Investigation

Positive Childhood Experiences and Adult Mental and Relational Health in a Statewide Sample

Associations Across Adverse Childhood Experiences Levels

Christina Bethell, PhD, MBA, MPH; Jennifer Jones, MSW; Narangerel Gombojav, MD, PhD; Jeff Linkenbach, EdD; Robert Sege, MD, PhD

IMPORTANCE Associations between adverse childhood experiences (ACEs) and risks for adult depression, poor mental health, and insufficient social and emotional support have been documented. Less is known about how positive childhood experiences (PCEs) co-occur with and may modulate the effect of ACEs on adult mental and relational health.

OBJECTIVE To evaluate associations between adult-reported PCEs and (1) adult depression and/or poor mental health (D/PMH) and (2) adult-reported social and emotional support (ARSES) across ACEs exposure levels.

DESIGN, SETTING, AND PARTICIPANTS Data were from the cross-sectional 2015 Wisconsin Behavioral Risk Factor Survey, a random digit-dial telephone survey of noninstitutionalized Wisconsin adults 18 years and older (n = 6188). Data were weighted to be representative of the entire population of Wisconsin adults in 2015. Data were analyzed between September 2016 and January 2019.

MAIN OUTCOMES AND MEASURES The definition of D/PMH includes adults with a depression diagnosis (ever) and/or 14 or more poor mental health days in the past month. The definition of PCEs includes 7 positive interpersonal experiences with family, friends, and in school/the community. Standard Behavioral Risk Factor Survey ACEs and ARSES variables were used.

RESULTS In the 2015 Wisconsin Behavioral Risk Factor Survey sample of adults (50.7% women; 84.9% white), the adjusted odds of D/PMH were 72% lower (OR, 0.28; 95% CI, 0.21-0.39) for adults reporting 6 to 7 vs 0 to 2 PCEs (12.6% vs 48.2%). Odds were 50% lower (OR, 0.50; 95% CI, 0.36-0.69) for those reporting 3 to 5 vs 0 to 2 PCEs (25.1% vs 48.2%). Associations were similar in magnitude for adults reporting 1, 2 to 3, or 4 to 8 ACEs. The adjusted odds that adults reported "always" on the ARSES variable were 3.53 times (95% CI, 2.60-4.80) greater for adults with 6 to 7 vs 0 to 2 PCEs. Associations for 3 to 5 PCEs were not significant. The PCE associations with D/PMH remained stable across each ACEs exposure level when controlling for ARSES.

CONCLUSIONS AND RELEVANCE Positive childhood experiences show dose-response associations with D/PMH and ARSES after accounting for exposure to ACEs. The proactive promotion of PCEs for children may reduce risk for adult D/PMH and promote adult relational health. Joint assessment of PCEs and ACEs may better target needs and interventions and enable a focus on building strengths to promote well-being. Findings support prioritizing possibilities to foster safe, stable nurturing relationships for children that consider the health outcomes of positive experiences.

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Supplemental content

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Research demonstrates that both positive and adverse experiences shape brain development and health across the life span.[1-5] Understanding human development requires a model that incorporates both risks (factors that decrease the likelihood of successful development) and opportunities (factors that increase the likelihood of successful development). On the positive side, successful child development depends on secure attachment during the first years of life.[6,7] As the child grows, exposure to spoken language[8] and having the presence of safe, stable, nurturing relationships and environments are important factors for optimal development.[9,10] On the other hand, children with adverse childhood experiences (ACEs) are at risk for observable changes in brain anatomy,[11] gene expression,[12,13] and delays in social, emotional, physical, and cognitive development lasting into adulthood.[3-5,14-17]

According to standardized measures, an estimated 61.5% of adults[18] and 48% of children[19] in the United States have been exposed to ACEs, with more than one-third of these having multiple exposures.[18,19] The wide-ranging negative associations between exposure to multiple ACEs and diminished adult and child health are well documented.[14,19-22] Most notable is the especially strong evidence linking ACEs with adult mental health problems including depression.[22-28] A robust literature also exists regarding the effect of ACEs on adult relational health (often assessed by whether adults report that they get the social and emotional support they need) and how diminished adult social and emotional support contributes to poorer adult physical and mental health.[29-56]

Beyond the extensive and growing body of research dealing with lifelong correlates of adversity, many prior studies identify resiliency factors and adaptive skills and interventions associated with improved child development and child and adult health outcomes.[2,3,16,17,25-55] For example, the Search Institute developed a list of "40 Developmental Assets" and demonstrated associations between the number of assets and both positive and negative outcomes.[52] A national population-based study[53] on child flourishing and resilience shows strong associations with levels of family resilience and parent-child connection for children with exposures to greater ACEs, poverty, and chronic conditions. Similar studies, such as those assessing the US Centers for Disease Control and Prevention (CDC)'s "safe, stable, and nurturing relationships" model, show similar findings.[55]

Despite these advances, standardized measures and the prevalence of positive childhood experiences (PCEs) at the population level for adults or children are still unknown. Yet prior studies, using data from small or nonrepresentative samples, have explored interactions between PCEs and ACEs.[25,41,56] For example, 1 study,[41] conducted by Kaiser Permanente and CDC investigators, analyzed a cohort of 4648 women. They found that adult reports of specific positive family experiences in childhood (including closeness, support, loyalty, protection, love, importance, and responsiveness to health needs) were associated with lower rates of adolescent pregnancy across all ACEs exposure levels.[41] The protective effects of reported interpersonal PCEs against mental health problems in adulthood have also been found among pregnant women[25] and young adults[56] exposed to ACEs. Despite these findings, few subsequent studies on ACEs have simultaneously evaluated PCEs.

Key Points

Question Are positive childhood experiences (PCEs) associated with adult depression and/or poor mental health (D/PMH) and adult-reported social and emotional support (ARSES) independent from adverse childhood experiences (ACEs)?

Findings In this cross-sectional study, adults reporting higher PCEs had lower odds of D/PMH and greater ARSES after accounting for ACEs. The associations of PCEs with D/PMH also remained stable when controlling for ARSES.

Meaning Positive childhood experiences demonstrate a dose-response association with adult D/PMH and ARSES after adjustment for ACEs; assessing and proactively promoting PCEs may reduce adult mental and relational health problems, even in the concurrent presence of ACEs.

Collectively, prior studies on child development point to the importance of research focusing on PCEs, especially those associated with parent-child attachment, positive parenting (eg, parental warmth, responsiveness, and support), family health, and positive relationships with friends, in school, and in the community. Knowledge of whether retrospectively reported PCEs co-occur with ACEs and how PCEs interact with ACEs to effect adult mental and relational health is needed to inform the nation's growing focus on addressing early life and social determinants of healthy development and lifelong health.

This study used data from the 2015 Wisconsin Behavioral Risk Factor Survey (WI BRFS), a representative, population-based survey,[57] to assess the prevalence of PCEs in an adult sample and evaluate hypothesized associations with adult mental and relational health across 4 ACEs exposure levels. This study builds on a 2017 *Health Outcomes of Positive Experiences* report[58] featuring bivariate findings from the 2015 WI BRFS associating individual PCEs with negative adult health outcomes. Here, we construct a PCEs cumulative score measure and use multivariable regression methods to assess the magnitude and significance of associations between this PCEs score and (1) adult depression and/or poor mental health (D/PMH) and (2) adults' reported social and emotional support (ARSES). Separate assessment of associations was conducted for each of 4 ACEs exposure levels.

Methods

Population and Data

Data were from the cross-sectional 2015 WI BRFS, a representative, telephone survey of noninstitutionalized Wisconsin adults 18 years and older who speak English or Spanish (n = 6188).[57] The WI BRFS response rate was 45.0% (weighted American Association of Public Opinion Research median, 47.2%). The cooperation rate was 64.9% (weighted American Association of Public Opinion Research median, 68.0%). The 2015 WI BRFS core and state-added items data sets were linked.

Institutional review board (IRB) approval was not required because data are based on a survey conducted by a public agency and do not include personal health information. Respondent oral consent methods and construction of race/ethnicity variables used standard CDC BRFS approved methods.

There were 18.1% to 21.1% missing cases for state-added ARSES, ACEs, and PCEs items. "Don't know/refused" responses to these questions were 0.2% to 0.9%. A 10% missing value rate for the WI BRFS state-added items is expected and is attributed to the administration of the core WI BRFS survey by another state to Wisconsin residents who have out-of-state cellular phones. In these cases, the WI BRFS state-added items were not available to be administered.[59] The remainder of missing cases were nearly all owing to respondent dropoffs prior to administering the ARSES, ACEs, and PCEs questions after administration of the core WI BRFS. Differences in D/PMH prevalence rates between respondents and missing cases were not notable. See eTable 1 in the Supplement for additional details.

Key Measures

Positive Childhood Experiences Score

The PCEs score included 7 items asking respondents to report how often or how much as a child they: (1) felt able to talk to their family about feelings; (2) felt their family stood by them during difficult times; (3) enjoyed participating in community traditions; (4) felt a sense of belonging in high school (not including those who did not attend school or were home schooled); (5) felt supported by friends; (6) had at least 2 nonparent adults who took genuine interest in them; and (7) felt safe and protected by an adult in their home. The PCEs score items were adapted from 4 subscales included in the Child and Youth Resilience Measure-28 [60]: (1) 4 items from the Psychological, Caregiving subscale (see PCEs items 1, 2, 7, and 6 listed previously); (2) 1 from the Education subscale (PCEs item 4); (3) 1 from the Culture subscale (PCEs item 3), and (4) 1 from the Peer Support subscale (PCEs item 5). Items were designed in the Child and Youth Resilience Measure-28 for cultural sensitivity, and their validity was supported by associations with improved resilience.[61] Psychometric analyses confirmed use of a PCEs cumulative score. See eTable 2 in the Supplement for details.

Adverse Childhood Experiences

We used data from the standardized ACEs survey items defined by the CDC.[62,63] The ACEs measure included 11 ACEs items assessing recollections of childhood experiences of physical or emotional abuse or neglect, sexual abuse, and household dysfunctions such as substance abuse, parental incarceration, and divorce. As recommended by the CDC, items were coded using cumulative score groupings of 0, 1, 2 to 3, or 4 to 8 ACEs. Subjective reports of experiences in childhood are the intended construct for assessment of both PCEs and ACEs and not whether what is reported would be validated using objective assessments.[64]

Adult-Reported Social and Emotional Support

Adult-reported social and emotional support is assessed using a standardized single item, "How often do you get the social and emotional support you need?" Response choices were "always," "usually," "sometimes," "rarely," or "never." Based on previous research and analysis of this ARSES variable, this study separately evaluated "always" and "usually" responses and created a combined "sometimes/rarely/never" response category.[45,47,48]

Depression/Poor Mental Health

The D/PMH category was constructed using (1) the single item on depression asking whether a physician or other health professional "ever told you that you have a depressive disorder, including depression, major depression, dysthymia, or minor depression?"; and (2) a score of 14 or higher on the single item validated as an indicator of current poor mental health[59,60,65,66] that asked, "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" Adults reporting either or both of these outcomes were included in the D/PMH variable.

Other Covariates

Demographic covariates included age (18-34 years, 35-54 years, 55-64 years, and 65 years or older), race/ethnicity (nonwhite or white/non-Hispanic), and annual income (less than $25 000, $25 000-$49 999, $50 000-$74 999, and $75 000 or more). Sample size and statistical power analysis findings required combining race/ethnicity subgroups into 2 categories for purposes of statistical analysis.

Analytic Methods

Prevalence rates for all variables were computed, and bivariate associations between individual PCE items and PCEs cumulative score groups and all other variables were evaluated using χ^2 tests. Iterative and recursive analyses confirmed independent variable construction and focused on confirmation of assumptions on the linearity and comparability of associations with study outcomes when ordinal (count) or cumulative score groupings of PCEs and ACEs were used. Cumulative score groups of 0 to 2, 3 to 5, and 6 to 7 PCEs and 0, 1, 2 to 3, and 4 to 8 ACEs were also selected to ensure adequate statistical power to detect meaningful associations. Such score groups also simplify reporting of results by narrowing the number of comparative groups requiring reporting. Interaction variables crossing PCEs by ACEs and PCEs by ARSES were also analyzed for each study outcome and supported decisions to assess PCEs, ACEs, and ARSES as independent (vs interacting) variables in regression models.

As noted, multivariable logistic regression analyses evaluated 2 association pathways between PCEs items and cumulative score groups and 2 outcome variables: (1) meeting criteria for D/PMH and (2) reports of "always" on ARSES. Regression models were adjusted for age, sex, race/ethnicity, income, and ACEs. Separate models were evaluated for each ACEs exposure level (0, 1, 2-3, and 4-8) to examine stability of associations across ACEs exposure levels. We further assessed the stability of associations between D/PMH and PCEs when ARSES were or were not controlled for in regression models. This was done to further understand more nuanced asso-

ciation pathways between PCEs and ARSES and their individual or interacting association with D/MPH. Additional sensitivity analyses of PCEs associations when ACEs were or were not included in models were also conducted. The survey data were weighted to be representative of the Wisconsin population. We used SPSS Complex Samples, version 24 (IBM Corporation) for data analysis.[67] A *P* value of .05 or less was used to determine statistical significance.

Results

Population Characteristics and Prevalence of Study Outcomes by PCEs

Demographic characteristics for the 2015 WI BRFS mirrored the state population: 50.7% women and 84.9% white. About half (52.3%) reported 6 to 7 PCEs, more than half (56.7%) reported ACEs, 21.2% met D/PMH criteria, and more than half (55.1%) reported "always" to getting the social and emotional support they needed (ARSES). Nonwhite, younger, and lower-income adults reported fewer levels of PCEs (**Table 1**). Compared with those reporting 6 to 7 PCEs, adults reporting 0 to 2 PCEs had nearly 4 times higher prevalence of D/PMH (48.2% vs 12.6%) and were half as likely to report "always" to getting the social and emotional support they needed (33.0% vs 67.9%) (**Table 2**). Similar variations in prevalence were observed when each of the 7 PCEs items were separately evaluated for each study outcome (**Figure 1** and **Figure 2**). As hypothesized and shown in these Figures, stronger associations emerged for cumulative PCEs scores.

The lowest adult D/PMH prevalences were observed for respondents reporting both 6 to 7 PCEs and either no ACEs (10.5%) or "always" on the ARSES variable (8.5%). Highest D/PMH prevalences were for those reporting 0 to 2 PCEs and either 4 to 8 ACEs (59.7%) or "sometimes/ rarely/never" on the ARSES variable (61.7%). Yet, even among those reporting always getting needed social and emotional support, a subset reported 0 to 2 PCEs, and this group had 4 times greater prevalence of D/PMH compared with those reporting 6 to 7 PCEs (33.8% vs 8.5%). Likewise, 21.2% of those with 4 to 8 ACEs and 26.6% of those reporting "sometime/rarely/never" to the ARSES item nonetheless also reported 6 to 7 PCEs. (Table 1, **Table 3**, and eTable 3 in the Supplement).

Association Pathway 1: PCEs and D/PMH

After controlling for ACEs, the adjusted odds of D/PMH were 72% lower (odds ratio [OR], 0.28; 95% CI, 0.21-0.39) for adults with the highest vs lowest PCEs scores (12.6% vs 48.2%). Odds were 50% lower (OR, 0.50; 95% CI, 0.36-0.69) for those reporting intermediate PCEs scores of 3 to 5 (25.1% vs 48.2%) (Table 2). Associations were similar in magnitude for adults reporting 1, 2 to 3, or 4 to 8 ACEs (Table 3).

Association Pathway 2: PCEs and ARSES

The adjusted odds of "always" reports on the ARSES item were 3.53 times (95% CI, 2.60-4.80) greater for adults with the highest vs lowest PCEs scores. Adjusted odds of reports of "always" on the ARSES variable were not significant for adults with intermediate PCEs of 3 to 5 (adjusted OR, 1.31; 95% CI, 0.97-1.78) (Table 2). Findings were similar across all ACEs exposure level subgroups (Table 3). Because PCEs and ARSES were strongly associated as hypothesized, we further examined whether each variable demonstrated an independent association with D/PMH and whether associations of PCEs with D/PMH remained stable when ARSES was included in regression models. Results showed that PCEs associations with D/PMH remained significant and changed only modestly when ARSES was included. Associations between ARSES and D/PMH also remained stable when PCEs were or were not included. See eTable 4 in the Supplement for details.

Discussion

This study examined the prevalence of adult reports of both PCEs and ACEs in a statewide sample and found that PCEs both co-occur with and operate independently from ACEs in their associations with the adult health outcomes evaluated here. Findings also confirm the hypotheses that PCEs may exert their association with D/PMH through their association with ARSES. However, PCEs maintained an association with D/PMH independent from ARSES. Findings are both consistent with prior research showing that relational experiences in childhood are associated with adult social and relational skills and health[3,15,56,68] and also point to enduring effects of PCEs on D/PMH separate from their influence on adult ARSES.

While PCEs associations with D/PMH were substantial and similar for adults reporting ACEs, associations were not statistically significant for those reporting no ACEs. Insignificant findings may be owing to low sample sizes for respondents with no ACEs and fewer PCEs. Results still raise questions for further exploration. We hypothesize that PCEs may have a greater influence in promoting positive health, such as getting needed social and emotional support or flourishing as an adult. In turn, these positive health attributes may reduce the burden of illness even if the illness is not eliminated. This is consistent with prior research demonstrating a dual continuum of health whereby flourishing is found to be present for many adults despite concurrent mental health conditions.[69]

Limitations

First, this study is cross-sectional and cannot confirm causal effects. Second, the 2015 Wisconsin adult population is less diverse than the United States as a whole. Third, PCEs focused on the domain of positive emotional experiences in interpersonal relationships. Other types of positive experiences, (eg, safe and supportive environments, nature or spiritual experiences, participation in activities, or accomplishment) require further study, highlighting the need to develop and test additional measures of PCEs. Fourth, we were not able to directly examine bias in reporting of PCEs among adults with depression, although studies show an absence of such biases for reports of ACEs.[64,70] Finally, the WI BRFS did not assess overall well-being or flourishing.[69] As such, we were not able to assess whether PCEs affect positive adult health out-

Table 1. Study Population Characteristics and Prevalence of PCEs by D/PMH, ACEs, ARSES, and Demographic Characteristics

Population Characteristics (n = Unweighted Sample Size)	Statewide Population Prevalence Estimates		Prevalence of PCEs (n = 4926)[a]						*P* Value (Test of Independence)
			0-2 PCEs		3-5 PCEs		6-7 PCEs		
	Unweighted No.	Weighted %	Unweighted No.	Weighted %	Unweighted No.	Weighted %	Unweighted No.	Weighted %	
All respondents	6188	100	635	13.2	1606	34.5	2685	52.3	NA
D/PMH (n = 6187)									
Yes	1289	21.2	294	29.4	402	40.1	347	30.5	<.001
No	4898	78.8	341	8.7	1204	33.0	2338	58.3	
ACEs exposure levels (n = 4974)[a,b]									
0 ACEs	2275	43.3	106	4.9	567	27.3	1568	67.8	<.001
1 ACE	1142	23.0	100	8.3	406	38.6	625	53.1	
2-3 ACEs	967	19.9	174	18.5	400	42.1	390	39.5	
4-8 ACEs	590	13.7	255	39.4	232	39.4	100	21.2	
ARSES (n = 5021)[a]									
Always	2707	55.1	195	7.9	687	27.3	1743	64.8	<.001
Usually	1337	25.8	171	12.9	507	41.9	635	45.2	
Sometimes, rarely, or never	977	19.1	263	28.7	393	44.7	284	26.6	
Age (n = 6127), y									
18-34	977	28.8	98	13.0	267	37.9	350	49.2	.03
35-54	1737	33.0	201	15.6	407	31.9	748	52.5	
55-64	1426	17.6	169	12.6	389	36.0	613	51.4	
65 or older	1987	20.5	163	10.4	532	33.1	954	56.5	
Sex (n = 6188)									
Male	2720	49.3	248	11.9	763	36.3	1133	51.7	.09
Female	3468	50.7	387	14.3	843	32.8	1552	52.9	
Race/ethnicity (n = 6129)									
Nonwhite	757	15.1	107	17.0	208	44.7	233	38.3	<.001
White, non-Hispanic	5372	84.9	521	12.6	1385	33.1	2433	54.3	
Income level (n = 5461),[c] $									
<24 999	1331	22.5	219	22.0	387	38.3	437	39.6	<.001
25 000-49 999	1511	27.8	168	14.9	431	36.9	631	48.3	
50 000-74 999	1010	18.9	83	9.7	288	39.1	465	51.3	
75 000 or more	1609	30.7	105	8.2	334	25.9	888	66.0	

Abbreviations: ACEs, adverse childhood experiences; ARSES, adult-reported social and emotional support; D/PMH, depression and/or poor mental health; NA, not applicable; PCEs, positive childhood experiences; WI BRFS, Wisconsin Behavioral Risk Factor Survey.

[a] A 10% missing value rate is expected and attributed to core WI BRFS survey administration to out-of-state cellular phone holders who never received the WI BRFS state added items.[59] The remainder were nearly all owing to respondent dropoffs prior to administering the ARSES, ACEs, and PCEs questions, which were administered after the end of the core WI BRFS. No notable differences in prevalence of D/PMH were found between respondents and cases missing ARSES, ACEs, or PCEs data. See eTable 1 in the Supplement.

[b] The ACEs cumulative scores were created placing adults into categories of 0, 1, 2 to 3, or 4 to 8 ACEs based on their responses to the 11 ACEs items. Three sexual abuse items were combined into a single item, and alcohol and substance abuse items were presented as a single ACEs item.

[c] Income missing values rate was 11.7%.

comes as hypothesized. Sample size limitations may have resulted in false-negative findings in some cases.

Conclusions

Overall, study results demonstrate that PCEs show a dose-response association with adult mental and relational health, analogous to the cumulative effects of multiple ACEs. Findings suggest that PCEs may have lifelong consequences for mental and relational health despite co-occurring adversities such as ACEs. In this way, they support application of the World Health Organization's definition of health emphasizing that health is more than the absence of disease or adversity.[71] The World Health Organization's positive construct of health is aligned with the proactive promotion of positive experiences in childhood because they are foundational to optimal childhood development and adult flourishing. Including PCEs as well as positive health outcomes measures in routinely collected

Table 2. Prevalence and Adjusted Odds Ratios of Adult D/PMH and Reports of "Always" on the ARSES Item by PCEs and Other Regression Model Variables

Population Characteristics (Raw Sample Size)	Prevalence of D/PMH			Adjusted Odds Ratio (95% CI) for Meeting D/PMH Criteria	Prevalence of "Always" on ARSES Item			Adjusted Odds Ratio (95% CI) for Reports of "Always" on ARSES Item[a]
	Unweighted No.	Weighted %	*P* Value		Unweighted No.	Weighted %	*P* Value	
All Respondents	1289	21.2	NA	NA	2707	55.1	NA	NA
Positive childhood experiences (PCEs) (n = 4926)[a,b,c]								
0-2 PCEs reported	294	48.2	<.001	1 [Reference]	195	33.0	<.001	1 [Reference]
3-5 PCEs reported	402	25.1		0.50 (0.36-0.69)	687	43.6		1.31 (0.97-1.78)
6-7 PCEs reported	347	12.6		0.28 (0.21-0.39)	1743	67.9		3.53 (2.60-4.80)
Adverse childhood experiences (ACEs) (n = 4974)[a]								
No ACEs reported	252	11.9	<.001	1 [Reference]	1394	62.4	<.001	1.22 (0.88-1.69)
1 ACE reported	215	20.2		1.62 (1.18-2.21)	596	53.9		0.93 (0.67-1.30)
2-3 ACEs reported	294	9.2		2.40 (1.77-3.24)	439	47.6		0.90 (0.64-1.27)
4-8 ACEs reported	285	42.4		3.10 (2.20-4.37)	226	44.2		1 [Reference]
Age (n = 6127), y								
18-34	215	21.0	.01	1.09 (0.78-1.53)	408	56.8	.44	1.09 (0.84-1.42)
35-54	406	22.6		1.51 (1.10-2.06)	766	54.9		0.97 (0.76-1.23)
55-64	331	24.2		1.64 (1.20-2.24)	600	52.1		0.88 (0.69-1.13)
65 or older	332	16.9		1 [Reference]	911	55.8		1 [Reference]
Sex (n = 6188)								
Male	444	16.9	<.001	0.59 (0.47-0.74)	1189	55.3	.80	0.97 (0.81-1.17)
Female	845	25.5		1 [Reference]	1518	54.8		1 [Reference]
Race/ethnicity (n = 6129)								
Nonwhite	203	23.8	<.25	0.98 (0.67-1.42)	294	53.5	.64	1.19 (0.84-1.70)
White, non-Hispanic	1078	20.9		1 [Reference]	2391	55.2		1 [Reference]
Income level (n = 5461),[d] $								
<24 999	454	33.3	<.001	2.91 (2.11-4.02)	465	47.8	<.001	0.67 (0.51-0.88)
25 000-49 999	340	22.6		1.76 (1.29-2.41)	667	53.4		0.81 (0.64-1.03)
50 000-74 999	172	18.4		1.43 (1.02-2.01)	458	54.3		0.81 (0.62-1.05)
75 000 or more	205	13.1		1 [Reference]	857	62.3		1 [Reference]

Abbreviations: ACEs, adverse childhood experiences; ARSES, adult-reported social and emotional support; D/PMH, depression and/or poor mental health; NA, not applicable; PCEs, positive childhood experiences; WI BRFS, Wisconsin Behavioral Risk Factor Survey.

[a] A 10% missing value rate is expected and attributed to core WI BRFS 5 survey administration to out-of-state cellular phone holders who never received the WI BRFS state added items.[59] The remainder were nearly all owing to respondent dropoffs prior to administering the ARSES, ACEs, and PCEs questions, which were administered after the end of the core WI BRFS. No notable differences in prevalence of D/PMH were found between respondents and cases missing ARSES, ACEs, or PCEs data. See eTable 1 in the Supplement.

[b] Without adjustment for ACEs, PCEs associations with D/PMH were 0.19 (95% CI, 0.14-0.25) and 0.40 (95% CI, 0.30-0.54) for adults reporting 6 to 7 and 3 to 5 PCEs vs 0 to 2 PCEs, respectively.

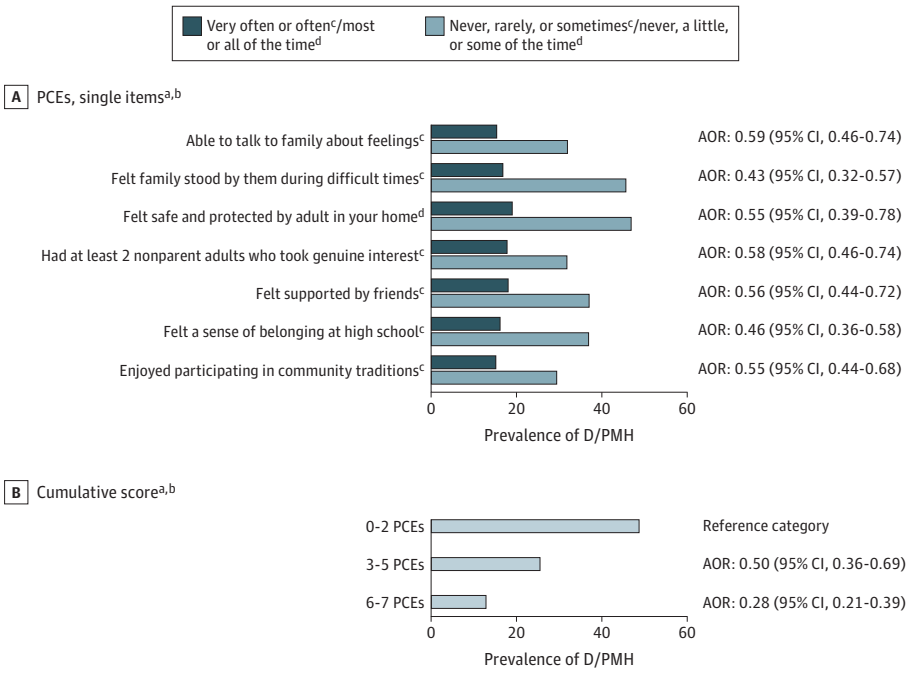
[c] Without adjustment for ACEs, PCEs associations with "always" on the ARSES variable were 3.83 (95% CI, 2.89-5.06) and 1.35 (95% CI, 1.01-1.81) for adults reporting 6 to 7 and 3 to 5 PCEs vs 0 to 2 PCEs, respectively.

[d] Income missing values rate is 11.7%. Income was not imputed for the WI BRFS by the Wisconsin Department of Health Services so federal poverty level could not be calculated.

public health surveillance systems, such as the National Survey of Children's Health and state Behavioral Risk Factor Surveillance Surveys, may advance knowledge and allow the nation to track progress in promoting flourishing despite adversity or illness among children and adults in the United States.

Even as society continues to address remediable causes of childhood adversities such as ACEs, attention should be given to the creation of those positive experiences that both reflect and generate resilience within children, families, and communities. Success will depend on full engagement of families and communities and changes in the health care, education,

Figure 1. Prevalence of Depression and/or Poor Mental Health Among Adults by Positive Childhood Experiences (PCEs) Single Items and Cumulative Scores



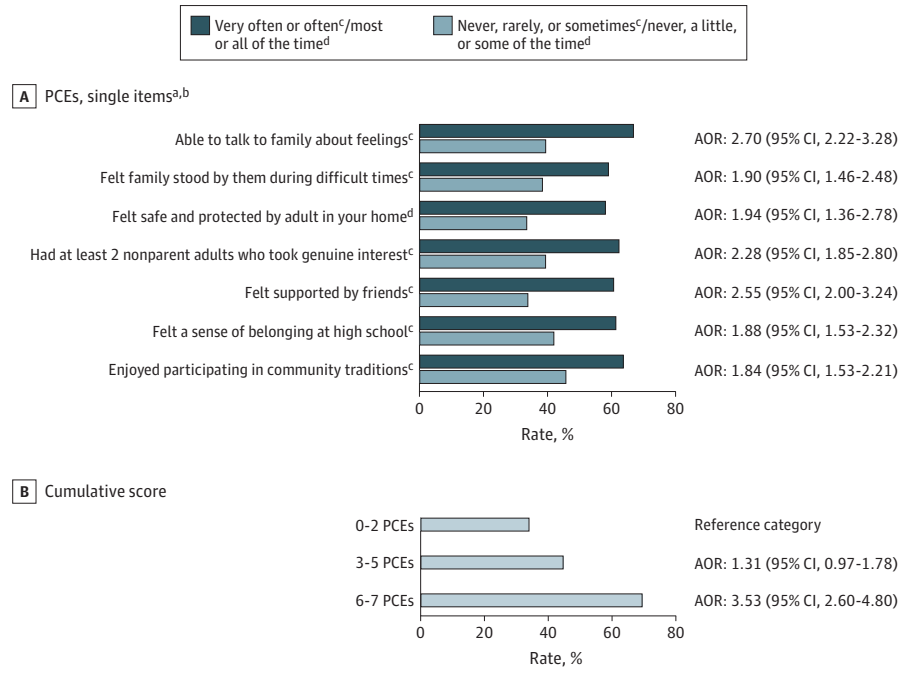
[a] Source: authors' analysis of the 2015 Wisconsin Behavioral Risk Factor Survey.

[b] Adjusted odds ratios (AORs) shown are adjusted for age, sex, race/ethnicity, income, and adverse childhood experiences.

[c] Never, rarely, or sometimes is the reference category.

[d] Never, a little, or some of the time is the reference category.

Figure 2. Prevalence of Adult Reporting Always Receiving Needed Social Emotional Support by Positive Childhood Experiences (PCEs) Single Items and Cumulative Scores



[a] Source: authors' analysis of the 2015 Wisconsin Behavioral Risk Factor Survey.

[b] Adjusted odds ratios (AORs) shown are adjusted for age, sex, race/ethnicity, income, and adverse childhood experiences.

[c] Never, rarely, or sometimes is the reference category.

[d] Never, a little, or some of the time is the reference category.

and social services systems serving children and families. A joint inventory of ACEs and PCEs, such as the positive experiences assessed here, may improve efforts to assess needs, target interventions, and engage individuals in addressing the adversities they face by leveraging existing assets and strengths.[72] Initiatives to conduct broad ACEs screening, such as those ensuing in California's Medicaid program, may benefit from integrated assessments including PCEs.[73]

Recommendations and practice guidelines included in the *National Bright Futures Guidelines for Health Supervision of In-*

Table 3. Prevalence of D/PMH and Reports of "Always" on the ARSES Item by PCEs Scores for Each of 4 Adverse Childhood Experiences ACEs Exposure Levels (0, 1, 2-3, or 4-8)

Categories by ACEs and PCEs	Meets D/PMH Criteria[a]			Reports of "Always" to Getting Needed Social and Emotional Support (ARSES)		
	Unweighted No.	Weighted %	Adjusted Odds Ratio[b] (95% CI)	Unweighted No.	Weighted %	Adjusted Odds Ratio[b] (95% CI)
No ACEs reported						
0-2 PCEs	17	12.1	1 [Reference]	35	34.6	1 [Reference]
3-5 PCEs	86	15.8	1.15 (0.51-2.62)	266	47.3	1.58 (0.84-2.95)
6-7 PCEs	148	10.5	0.88 (0.42-1.87)	1072	70.5	4.18 (2.31-7.55)
1 ACE reported						
0-2 PCEs	35	45.7	1 [Reference]	38	30.9	1 [Reference]
3-5 PCEs	85	24.2	0.38 (0.17-0.83)	161	39.5	1.33 (0.68-2.62)
6-7 PCEs	94	13.4	0.21 (0.10-0.46)	390	67.6	4.93 (2.54-9.58)
2-3 ACEs reported						
0-2 PCEs	87	53.3	1 [Reference]	47	30.3	1 [Reference]
3-5 PCEs	131	31.4	0.47 (0.26-0.84)	167	43.9	1.65 (0.90-3.02)
6-7 PCEs	76	16.0	0.18 (0.10-0.34)	223	59.2	2.80 (1.53-5.13)
4-8 ACEs reported						
0-2 PCEs	155	59.7	1 [Reference]	75	35.1	1 [Reference]
3-5 PCEs	100	36.9	0.49 (0.28-0.84)	93	41.7	1.19 (0.69-2.03)
6-7 PCEs	29	20.7	0.23 (0.11-0.46)	56	65.6	3.37 (1.66-6.84)

Abbreviations: ACEs, adverse childhood experiences; ARSES, adult-reported social and emotional support; D/PMH, depression and/or poor mental health; PCEs, positive childhood experiences.

[a] Prevalence of D/PMH varied across levels of ACEs within each PCEs cumulative score category (0-2, 3-5, and 6-7) at $P < .01$.

[b] Adjusted odds ratios adjusted for age, sex, race/ethnicity, and income.

fants, Children, and Adolescents[74] and the CDC's *Essentials for Childhood* initiative[9] encourage policies and initiatives to help child-serving professionals and programs to adopt effective approaches to promote the type of PCEs evaluated in this study. The *Health Outcomes of Positive Experiences* framework[48] and the Prioritizing Possibilities national agenda for promoting child health and addressing ACEs[75] each seek to advance existing and emerging evidence-based approaches[44,45,47,48,50,54,76,77] that promote a positive construct of health in clinical, public health, and human services settings. This study adds to the growing evidence that childhood experiences have profound and lifelong effects. Results hold promise for national, state, and community efforts to achieve positive child and adult health and well-being by promoting the largely untapped potential to promote positive experiences and flourishing despite adversity.[53,78]

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Acquisition, analysis, or interpretation of data: Bethell, Gombojav, Sege.
Drafting of the manuscript: All authors.
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Family Resilience And Connection Promote Flourishing Among US Children, Even Amid Adversity

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ABSTRACT **The outcome of flourishing and its predictors have not been well documented among US children, especially those who face adversity. Using data for 2016 and 2017 from the National Survey of Children's Health, we determined the prevalence and predictors of flourishing among US children ages 6–17. A three-item index included indicators of flourishing: children's interest and curiosity in learning new things, persistence in completing tasks, and capacity to regulate emotions. The national prevalence of flourishing was 40.3 percent (29.9–45.0 percent across states). At each level of adverse childhood experiences, household income, and special health care needs, the prevalence of flourishing increased in a graded fashion with increasing levels of family resilience and connection. Across the sectors of health care, education, and human services, evidence-based programs and policies to increase family resilience and connection could increase flourishing in US children, even as society addresses remediable causes of childhood adversity.**

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Flourishing and its predictors and links to health outcomes are well documented in adults, including among those facing adversities.[1–6] Less is known about flourishing and its correlates among children, especially those who face circumstances such as adverse childhood experiences (ACEs), chronic illness, or poverty. Studies show that flourishing is distinct from an absence of physical or mental illness and other adversities; that flourishing can and does exist amid these circumstances; and that health outcomes vary widely among individuals exposed to similar levels of adversity.[4,6] Understanding the factors that promote flourishing amid adversity is an important public health need for children and families.

A recent systematic review[1] of human flourishing models identified six overlapping positive attributes used to define *flourishing:* meaning, engagement, positive relationships, competence (or accomplishment), positive emotion, and self-esteem (or self-worth). Among these six attributes, meaning and engagement in life were common to each flourishing model. Positive emotions were least consistently included in definitions of *flourishing*.

There is a robust literature on flourishing, its specific attributes, and how it is measured and relates to other concepts such as well-being.[1–9] In terms of the six attributes listed above, flourishing is similar to measures of subjective well-being, such as those used by the World Health Organization[10] and the Organization for Economic Cooperation and Development.[11] However, flourishing is distinct from other comprehensive measures of well-being, such as the Gallup measure,[12] which includes reflective evaluations of life satisfaction, having financial and social needs met, and experiencing physical vitality; the United Nations Children's Fund child well-being measure,[13] which includes objective measures related to material, educational, health, safety, housing, and environmental

resources and health behaviors and risks; and a recently developed population well-being measure to explain disparities in life expectancy.[14]

Attributes of flourishing identified in research on adults are reflective of goals for promoting the healthy development of children, as set forth in research[15] and national frameworks and guidelines.[16–18] This includes healthy social and emotional development and cultivating an open and engaged approach to learning. Because of children's developmental status and reliance on parent or teacher reports of children's attributes for measurement validity reasons, measuring flourishing for children typically focuses on parents' or other adults' reports of observable attributes of children.[19–22] In contrast, adult measures of flourishing typically rely on self-reports.

Flourishing constructs for children that are amenable to parent-reported measurement have been set forth.[19–22] Emphasized are indicators of whether children show interest and curiosity in learning new things, are able to regulate emotions and behaviors in challenging situations, and can focus and persist to achieve goals. Studies using attributes of child flourishing such as these document associations with reductions in risky health behaviors and mental health problems in children and youth,[23–25] as well as reductions in physical, mental, and social health problems as adults.[25,26]

Beginning with its 2011–12 administration, the National Survey of Children's Health (NSCH) included items developed to assess flourishing among children ages 6 months to 5 years and ages 6–17 years. These items were formulated by an expert panel sponsored by the Health Resources and Services Administration and facilitated by the Child and Adolescent Health Measurement Initiative in partnership with Child Trends. The issues were selected to optimize validity for parent report (tested using cognitive interviewing), align with published models of child flourishing, consider children's developmental status, and minimize survey burden. We focused on children ages 6–17 in this study, since key variables of interest are not available in the NSCH for younger children. The NSCH flourishing items for children ages 6–17 asked parents how well each of three items describes their child: "shows interest and curiosity in learning new things," "works to finish tasks he or she starts," and "stays calm and in control when faced with a challenge."

Studies using data from the 2011–12 NSCH found that fewer than 50 percent of US children ages 6–17 were flourishing.[27–30] After adjustments, modest or insignificant variations were found in flourishing by race, ethnicity, and poverty level and significant, but also modest, associations between flourishing and obesity, neighborhood and school safety, and parenting practices such as limiting television watching or sharing family meals.[28–30] The studies also revealed lower rates of flourishing for children exposed to ACEs.[30] However, children with two or more ACEs whose parent or guardian reported that their child "stays calm and in control when faced with a challenge" were substantially less likely to be identified as having an emotional, mental, or behavioral health condition.[31] Such children were also more likely to be engaged in school.[32,33] In addition, one study found that a higher proportion of children exhibited this resilience attribute of flourishing when their parent reported that they "can share about ideas and talk about things that really matter" with their child and thought they were handling the day-to-day demands of raising children "very well."[31] Studies have also shown strong evidence of a link between the attributes of child flourishing, such as resilience, with nurturing parenting and parental coping.[34–40] To date, no studies have assessed how the parenting and family factors included in the NSCH promote child flourishing across subgroups of children according to their level of adversity, such as exposure to ACEs, poverty, or the presence of special health care needs. Knowledge about this is important for efforts to promote systems of care to improve positive outcomes for children, such as the new Integrated Care for Kids Model advanced by the Centers for Medicare and Medicaid Services.[41]

Beginning with the 2016 administration of the NSCH, four new items were added to assess family resilience, and large changes were made to the sampling frame and mode of administration that prevent comparisons with prior years of the NSCH.[42] These changes require the establishment of a new baseline prevalence of flourishing among children for the US and by state. In addition, they provide an opportunity to examine population-level associations between child flourishing and attributes of family resilience and connection that research suggests foster child flourishing, for all children and those facing adversities.[34–40]

This study used 2016 and 2017 NSCH data for US children ages 6–17 to address four objectives: establish the construct validity of a three-item child flourishing index (CFI) by examining its association with school engagement, describe the national and state prevalences of flourishing, determine whether higher scores on a created six-item family resilience and connection index (FRCI) are associated with a greater prevalence of flourishing, and determine whether the strength of the association between FRCI scores and the prevalence of flourishing varies accord-

ing to children's level of adversity (ACEs, household income, and presence of special health care needs).

Addressing these objectives will advance efforts to measure and promote child flourishing and to mitigate the ongoing adversities facing US children.

Study Data And Methods

DATA AND POPULATION The National Survey of Children's Health is funded and directed by the Health Resources and Services Administration's Maternal and Child Health Bureau and is fielded by the Census Bureau.[42] The 2016 and 2017 NSCH used address-based sampling and was self-administered (on paper or online) by the parent or guardian of a randomly selected child in a sampled household. In this article, "parent" refers to parent or guardian.

This study focused on children ages 6–17. Combined, the 2016–17 NSCH data included 71,811 completed questionnaires, of which 51,156 were completed for children ages 6–17. Data were weighted to be representative of the nation and each state's population and adjusted for the complex sampling design. All analyses were conducted using SPSS, version 24. (See online appendix A1 for additional information on the NSCH data used in this study.)[43]

KEY MEASURES Below is a summary of the key measures used in this study. (See appendixes A2, A3, and B for additional information on the measures, including psychometric properties of key measures.)[43]

▶ **CHILD FLOURISHING INDEX:** We used three items in the NSCH, described above, to create a child flourishing index for children ages 6–17. The CFI assigns one point for each parent response of "definitely true" (versus "somewhat or not true") to each item, with the score ranging from 0 to 3. Children with a score of 3 were classified as flourishing.

▶ **FAMILY RESILIENCE AND CONNECTION INDEX:** A four-item family resilience index (FRI) asked parents, "When your family faces problems, how often are you likely to": "talk together about what to do," "work together to solve our problems," "know we have strengths to draw on," and "stay hopeful even in difficult times." Additionally, two items in the survey asked parents how well they "can share ideas or talk about things that really matter" with their child (parent-child connection) and how well they think they are "handling the day-to-day demands of raising children" (parent coping). We created a six-item FRCI for this study. First, one point was assigned for each time a parent respondent answered "all of the time" to one of the four FRI items. Second, one point was assigned for each time a parent responded "very well" to the two additional items listed above.

▶ **SCHOOL ENGAGEMENT:** Children were classified as meeting criteria for school engagement if their parents reported "definitely true" for both of the following items: their child "cares about doing well in school" and "does all required homework."

▶ **SOCIODEMOGRAPHIC FACTORS, SPECIAL HEALTH CARE NEEDS, AND ADVERSE CHILDHOOD EXPERIENCES:** Child age, sex, race and ethnicity, and household income (as a percentage of the federal poverty level) were measured using standard NSCH categories.[44] Children's special health care needs status was assessed, and ACEs measures were created using validated methods documented elsewhere.[45,46] Children with special health care needs are classified as "more complex" when they meet more than the first of the five criteria in the Children with Special Health Care Needs Screener.[46]

ANALYTIC METHODS

▶ **CHILD FLOURISHING INDEX CONSTRUCT VALIDITY:** Multivariable logistic regression models were used to assess the construct validity of the CFI. These models used school engagement as the outcome (dependent) variable, the CFI items or scores as the predictor variables, and ACEs, special health care needs status, and sociodemographic variables as covariates. A separate regression model was developed for each CFI item, using its response levels as predictors. For the CFI score, the categories of 0 or 1, 2, and 3 were used as predictors.

▶ **STATE PREVALENCES OF CHILD FLOURISHING:** Nested *t*-tests were used to assess the statistical significance of the difference between each state's prevalence of child flourishing (using CFI criteria) and the national prevalence.

▶ **ASSOCIATIONS BETWEEN INDEXES ACROSS CHILD ADVERSITY CATEGORIES:** Chi-square tests were used to assess the significance of differences in the prevalence of child flourishing across levels of exposure to ACEs (0, 1, 2 or 3, and 4 or more), household income (four levels, expressed as a percentage of the federal poverty level), special health care needs status ("more complex needs," "less complex needs," and "no special health care needs"), and other sociodemographic characteristics. Multivariable logistic regression analysis was employed to calculate adjusted odds of flourishing by levels of the FRCI score (0 or 1, 2 or 3, and 4–6), after other variables (including ACEs) were controlled for. Finally, the strength of the association between FRCI scores and the prevalence of flourishing was separately evaluated for subgroups of children who faced different levels of adversity as

measured by ACEs, household income, and the presence of special health care needs.

LIMITATIONS Our study had several limitations. First, this study was cross-sectional and could not establish causal relationships between flourishing and family resilience and connection.

Second, the flourishing measure used in this study was not meant to be definitive and may have overestimated flourishing, since reporting bias among parents tends to be positive and only three items are used in the NSCH to operationalize the measurement of flourishing. If additional items and dimensions were assessed, a lower prevalence of flourishing likely would result, because some children would fail to meet the additional criteria. Additional research is needed—especially to determine measures of flourishing among children with disabilities, for whom the three items in the CFI might not be as meaningfully applied.

Third, the CFI and FRCI have not yet been evaluated for clinical applications, nor are child self-report versions available.

Fourth, the ACEs measure included in the NSCH did not explicitly ask about child sexual abuse or neglect. Research suggests that the experiences that are assessed are likely to co-occur with these unassessed ACEs. Thus, we do not expect children with such experiences to be missed by the NSCH ACEs cumulative risk measure,[46] though some may be.

EXHIBIT 1

Percent of US children ages 6–17 who were engaged in school and adjusted odds ratios, by child flourishing index (CFI) score and score items, 2016–17

	Percent	Adjusted odds ratio	95% CI
CFI score			
3	89.4	14.19	12.42, 16.21
2	73.6	4.97	4.39, 5.61
0 or 1	33.2	Ref	
CFI score items			
Shows interest and curiosity in learning new things			
Definitely true	75.0	5.98	5.24, 6.83
Somewhat true or not true	28.7	Ref	
Works to finish tasks he or she starts			
Definitely true	84.9	9.02	8.12, 10.03
Somewhat true or not true	34.9	Ref	
Stays calm and in control when faced with a challenge			
Definitely true	82.8	3.98	3.58, 4.43
Somewhat true or not true	51.4	Ref	

SOURCE Authors' analysis of data for 2016 and 2017 from the National Survey of Children's Health.
NOTES All percentages are weighted to represent the US population of children ages 6–17. The percentage of children who engaged in school differed significantly ($p < 0.001$ using chi-square tests) across each level of the CFI score and within each level of the CFI score item. Adjusted odds ratios controlled for age, sex, race/ethnicity, household income, special health care needs status, and adverse childhood experiences (ACEs) status.

Study Results

VALIDITY OF THE CHILD FLOURISHING INDEX We found a significant graded relationship between greater flourishing as shown on the CFI score and the prevalence of school engagement. There was a 56.2-percentage-point difference in school engagement between children meeting zero or one versus meeting all three CFI criteria (33.2 percent versus 89.4 percent) (exhibit 1). Compared to children meeting zero or one CFI criteria, the adjusted odds of school engagement were 14.19 times greater for children meeting all three criteria and 4.97 times greater for children meeting two criteria. A significant graded relationship was also found between parent endorsement of each CFI item (from "not true" to "somewhat true" to "definitely true") and the prevalence of school engagement, but there was a stronger graded relationship between school engagement and levels of the CFI score. (See appendix D for detailed regression findings.)[43]

NATIONAL AND STATE PREVALENCES OF CHILD FLOURISHING The prevalence of flourishing among US children ages 6–17 was 40.3 percent (exhibit 2). This ranged from 29.9 percent to 45.0 percent across states. (See appendix exhibits C1 and C2 for findings for each state.)[43]

VARIATIONS IN PREVALENCE OF FLOURISHING BY CHILD CHARACTERISTICS The prevalence of flourishing varied by about 5 percentage points across age and sex categories, with a higher prevalence observed in older children and females (exhibit 2). Prevalence varied by about 12 percentage points across income categories, with the highest prevalence among children living in households with incomes 400 percent of or higher than the federal poverty level (46.9 percent). Prevalence of flourishing varied about 7 percentage points across racial and ethnic groups. After other factors were adjusted for, race and ethnicity were not significantly associated with flourishing. Prevalence varied most (by 33.2 percentage points) across subgroups of children with special health care needs and second-most (by 27.3 percentage points) by children's level of exposure to ACEs.

ASSOCIATION OF FAMILY RESILIENCE AND CONNECTION WITH FLOURISHING The FRCI and each of its components showed a graded association with child flourishing. Compared to children with a FRCI score of 0 or 1, those with scores of 2 or 3 and 4–6 had 2.11 times and 3.71 times greater odds of flourishing, respectively, after covariates were adjusted for (exhibit 3). Specifically, a 30.0-percentage-point difference in

EXHIBIT 2

Percent of US children ages 6–17 who were flourishing and adjusted odds ratios, by child and family characteristics, 2016–17

		Flourishing ("Definitely true" response to all 3 CFI items)			"Definitely true" response for each CFI item:[a]		
	Percent with characteristic	Percent	Adjusted odds ratio[b]	95% CI	Interested and curious in learning new things	Works to finish tasks started	Stays calm and in control when faced with a challenge
All children	100.0%	40.3	—[c]	—[c]	83.1%	64.4%	50.3%
Child's age (years)[d]							
6–11	50.0	38.7	Ref		88.6	64.5	46.4
12–14	24.8	40.4	1.26	1.12, 1.41	79.1	63.1	51.6
15–17	25.1	43.6	1.51	1.35, 1.68	76.0	65.6	56.8
Child's sex****							
Male	51.1	37.4	0.81	0.74, 0.89	80.5	59.8	48.0
Female	48.9	43.4	Ref		85.8	69.3	52.8
Child's race/ethnicity[e]							
Non-Hispanic white	50.9	40.6	Ref		85.1	65.2	49.3
Non-Hispanic black	13.8	35.6	0.93	0.80, 1.08	78.0	57.9	49.5
Non-Hispanic other	10.0	42.8	1.13	0.99, 1.28	83.6	65.1	52.6
Hispanic	25.3	41.5	1.05	0.92, 1.21	81.6	66.2	51.8
Household income (percent of FPL)****							
0–99%	21.1	35.2	0.71	0.61, 0.82	77.9	58.9	46.5
100–199%	22.1	37.2	0.73	0.64, 0.84	80.1	60.7	47.7
200–399%	26.5	39.6	0.77	0.70, 0.85	84.3	64.0	49.7
400% or more	30.3	46.9	Ref		87.7	71.5	55.4
Child has special health care needs****							
Yes (more complex needs)	15.8	12.8	Ref		65.4	35.1	19.1
Yes (less complex needs)	6.9	40.7	4.04	3.36, 4.85	84.9	63.0	51.8
No	77.3	46.0	4.64	4.03, 5.34	86.5	70.6	56.6
Number of adverse childhood experiences****							
4 or more	7.3	20.6	Ref		71.6	44.5	30.0
2 or 3	17.5	30.6	1.32	1.04, 1.68	76.5	54.4	41.8
1	25.3	37.8	1.62	1.28, 2.06	82.0	60.3	49.0
0	49.9	47.9	2.10	1.67, 2.65	87.9	73.1	56.6
FRCI score[f] ****							
0 or 1	25.5	21.5	Ref		68.6	45.9	31.3
2 or 3	26.5	38.1	2.11	1.86, 2.39	85.1	64.8	48.9
4–6	48.0	51.5	3.71	3.31, 4.15	89.7	74.1	61.0
Family resilience index score[g] ****							
0 or 1	45.1	30.4	Ref		76.7	55.6	40.4
2 or 3	21.0	40.7	1.55	1.36, 1.75	86.5	66.3	51.9
4	33.9	53.1	2.55	2.30, 2.83	89.6	75.0	62.1
Parent-child connection[h] ****							
Not very well or not at all	4.4	5.3	Ref		36.7	21.8	12.8
Somewhat well	27.1	23.4	3.90	2.56, 5.92	70.6	48.6	34.0
Very well	68.5	49.9	12.55	8.32, 18.93	91.1	73.6	59.1
Parent coping[i] ****							
Not very well or not at all	1.4	16.4	Ref		61.3	32.9	21.7
Somewhat well	32.7	24.5	1.32	0.72, 2.43	74.7	50.3	34.6
Very well	65.9	48.7	3.56	1.94, 6.53	87.9	72.3	58.7
Engaged in school****							
No	32.9	13.1	Ref		63.2	29.5	26.4
Yes	67.1	54.2	6.64	5.88, 7.50	92.8	81.5	61.9

SOURCE Authors' analysis of data for 2016 and 2017 from the National Survey of Children's Health. **NOTES** All percentages are weighted to represent the US population ages 6–17. Statistical significance refers to chi-square tests comparing the percentage of children who are flourishing or have "definitely true" responses to child flourishing index (CFI) items across levels of each characteristic. CI is confidence interval. FPL is federal poverty level. FRCI is family resilience and connection index. [a]CFI items are given in full in exhibit 1. [b]Adjusted odds ratios controlled for age, sex, race/ethnicity, income, adverse childhood experiences (ACEs), and special health care needs status. [c]Not applicable. [d]Differences in percentages by age category are all significant ($p < 0.001$) except for "works to finish tasks started" ($p > 0.10$). [e]Differences in percentages by race/ethnicity category are all significant ($p < 0.001$) except for flourishing, which is significant ($p < 0.05$), and "stays calm and in control when faced with a challenge" which is not significant ($p > 0.10$). [f]Six-item score (0–6) with one point for each "all of the time" response to the four family resilience index items, and one point for each "very well" response to the parent-child connection and parent coping items. [g]Four-item score (0–4) with one point for each "all of the time" response. [h]Based on response to a single item: "How well can you and this child share ideas or talk about things that really matter?" [i]Based on response to a single item: "How well do you think you are handling the daily demands of raising children?" ****$p < 0.001$

EXHIBIT 3

Percent of US children ages 6–17 who were flourishing and adjusted odds of flourishing, by family resilience and connection index (FRCI) score and score components, 2016–17

	Percent	Adjusted odds ratio[a]	95% CI
FRCI score			
0 or 1	21.5	Ref	
2 or 3	38.1	2.11	1.87, 2.39
4–6	51.5	3.71	3.31, 4.15
FRCI components 1-4:			
Family resilience index score			
0 or 1	30.4	Ref	
2 or 3	40.7	1.55	1.36, 1.75
4	53.1	2.55	2.30, 2.83
FRCI component 5:			
Parent-child connection			
Not very well or not at all	5.3	Ref	
Somewhat well	23.4	3.90	2.56, 5.92
Very well	49.9	12.55	8.32, 18.93
FRCI component 6:			
Parent coping			
Not very well or not at all	16.4	Ref	
Somewhat well	24.5	1.32	0.72, 2.43
Very well	48.7	3.56	1.94, 6.53

SOURCE Authors' analysis of data from the combined 2016 and 2017 National Survey of Children's Health. **NOTES** Parent-child connection and parent coping items are explained in the notes to exhibit 2. *Flourishing* is defined as having a "definitely true" response to all 3 items in the child flourishing index (index score = 3). All percentages are weighted to represent the US population ages 6–17. Statistical significance refers to chi-square tests comparing the percentage of children who were flourishing across the levels of FRCI score or components. CI is confidence interval. [a]Adjusted odds ratios controlled for age, sex, race/ethnicity, income, adverse childhood experiences (ACEs), and special health care needs status.

flourishing was found between children in the highest FRCI category and those in the lowest (51.5 percent versus 21.5 percent). A 16.6-percentage-point difference was observed between children with an FRCI score of 2 or 3 and those with a score of 0 or 1 (38.1 percent versus 21.5 percent).

Across FRCI components, the association with child flourishing was strongest for the parent-child connection component. The adjusted odds of flourishing were 12.55 times greater for children whose parents reported "very well" (versus "not very well or not at all) to the item "how well can you and this child share ideas or talk about things that really matter." The adjusted odds were 3.90 times greater for children whose parents reported "somewhat well." (See appendix F for regression details.)[43]

Despite the significant association between ACEs and flourishing (exhibit 2), there were only small changes in the adjusted odds of child flourishing associated with FRCI scores before or after adjusting for ACEs, which indicates that the FRCI is associated with flourishing independent of ACEs. (See appendix exhibit C3 for regression details.)[43]

ASSOCIATION OF FAMILY RESILIENCE AND CONNECTION WITH FLOURISHING ACROSS LEVELS OF ADVERSITY For groups of children within each level of exposure to ACEs, household income, or special health care needs, there was a similar graded association between flourishing and FRCI scores, with a greater prevalence of flourishing at higher levels of family resilience and connection. Overall, the adjusted odds of flourishing were three to four times greater for children with an FRCI score of 4–6 (compared to a score of 0 or 1) within groups of children at all four levels of exposure to ACEs and at all four levels of household income (exhibit 4). Adjusted odds of flourishing for those with a score of 2 or 3 versus that of 0 or 1 were smaller but also significant.

More specifically, the adjusted odds of flourishing for children with a score of 4–6 versus a score of 0 or 1 within the categories of ACEs ranged from 3.15 to 3.88. For children's household income level, this range was 3.67–3.86.

Among children with "more complex" special health care needs, the adjusted odds of flourishing for those with an FRCI score of 4–6 were 3.69 times greater than for those with a score of 0 or 1. The same comparisons within two other groups of children—those with "less complex" needs and those without any special health care needs—produced similar results. (See appendix E for regression details.)[43]

Discussion

Approximately 40 percent of school-age children in the US meet criteria for flourishing, as operationalized by an index derived from three items designed to assess flourishing in the National Survey of Children's Health. With only four in ten US children meeting flourishing criteria, populationwide approaches to promoting attributes of flourishing are suggested, even as targeted efforts address the needs of children exposed to adversity. The promising news is that the prevalence of flourishing was associated in a graded fashion with greater levels of family resilience and connection, and the strength of this association was similar across groups of children defined by varying levels of adversity—as measured by exposure to ACEs, household income as a percentage of the federal poverty level, and the presence of special health care needs.

The especially strong association between flourishing and the parent-child connection component of the family resilience and connection index score is consistent with the science showing the primacy of safe, stable, and nurturing relationships to optimal child development. Such relationships are advanced through the

EXHIBIT 4

Percent of US children ages 6–17 who were flourishing and adjusted odds of flourishing, by family resilience and connection index (FRCI) score, stratified by number of adverse childhood experiences (ACEs), household income, and special health care needs status, 2016–17

	Percent flourishing, by FRCI score[a]			Adjusted odds of flourishing, by FRCI score (ref: 0 or 1)			
				2 or 3		4–6	
	0 or 1	2 or 3	4–6	Adjusted odds ratio[b]	95% CI	Adjusted odds ratio[b]	95% CI
All children	21.5	38.1	51.5	2.11	1.87, 2.39	3.71	3.31, 4.15
Number of ACEs							
0	26.8	44.3	57.6	2.06	1.74, 2.44	3.74	3.20, 4.38
1	20.1	36.6	48.4	2.24	1.75, 2.87	3.88	3.08, 4.88
2 or 3	16.8	30.6	40.8	2.15	1.61, 2.88	3.73	2.88, 4.82
4–9	11.9	21.6	30.5	1.91	1.12, 3.26	3.15	1.94, 5.12
Household income (% of FPL)							
0–99%	16.0	37.1	43.7	2.96	1.98, 4.44	3.86	2.70, 5.52
100–199%	18.2	31.3	49.8	1.85	1.35, 2.55	3.84	2.84, 5.19
200–399%	21.3	35.5	51.5	1.92	1.57, 2.35	3.72	3.08, 4.51
400% or more	27.4	45.4	58.9	2.06	1.76, 3.42	3.67	3.17, 4.26
Child has special health care needs							
Yes (more complex needs)	5.7	14.7	18.9	2.84	2.08, 3.88	3.69	2.75, 4.95
Yes (less complex needs)	17.6	43.2	52.4	3.86	2.69, 5.53	5.70	4.05, 8.03
No	27.4	41.9	56.4	1.95	1.70, 2.24	3.58	3.15, 4.07

SOURCE Authors' analysis of data from the combined 2016 and 2017 National Survey of Children's Health. **NOTES** All percentages are weighted to represent the US population of children ages 6–17. *Flourishing* is defined as having a "definitely true" response to all 3 items in the child flourishing index (index score = 3). All percentages are weighted to represent the US population ages 6–17. CI is confidence interval. FPL is federal poverty level. [a]Within each level of ACEs, household income, and special health care needs status, the percentage of children who were flourishing differed significantly ($p < 0.001$) both within and across the three FRCI scores. [b]Adjusted odds ratios controlled for age, sex, race/ethnicity, household income, ACEs, and special health care needs; the exception is that when one of these variables is the dependent variable (for example, ACEs, household income, special health care needs), that variable was not included in the model as an independent variable.

Centers for Disease Control and Prevention's Essentials for Childhood framework[18] and the national Bright Futures Guidelines.[16]

Across the US, efforts are emerging to identify the concrete approaches and resources required to improve resilience and connection within families.[47–50] Many of these strategies, such as those advanced in the Institute of Medicine report on family-focused interventions,[47] focus on families as the key social unit for increasing child flourishing and mitigating the negative effects of adversities. These strategies also emphasize the broader social factors that influence family resilience and connection by including family supports related to housing, jobs, transportation, neighborhood safety, social support, and access to resources.

Across the sectors of health care, education, and human services, evidence-based programs and policies to increase family resilience and connection could increase flourishing in US children, even as society addresses remediable causes of childhood adversity. Efforts such as the emerging national Integrated Care for Kids Model[41] seek to promote well-being and value in children's health care and assessing and tracking child flourishing and family resilience and connection may support these goals. Similarly, assessing child flourishing and family resilience and connection in the context of emerging initiatives to screen for and address ACEs, as in California's Medicaid program,[51] may help target and assess the outcomes of efforts to prevent and mitigate the negative effects of ACEs.

People trying to successfully engage families and children in this process must make them partners and give them a voice.[48,52] Success will also require efforts to increase flourishing among people who provide health care, social, or educational services so that they have sustained meaning and engagement in their work with families.[53,54]

Promoting the specific aspects of flourishing assessed here could increase the level of meaning and engagement that children have in their relationships and activities in their homes, schools, and neighborhoods. Success relies on people who wish to create safe, stable, and nurturing relationships with children and families as the basis for intergenerational flourishing in the face of aging, disease, and other unavoidable challenges across the life span. ■

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