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The Science of ACEs and Toxic Stress (Part 3): Toxic Stress Mitigation Strategies

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Objectives

- Develop your clinical response to ACEs and Toxic Stress
- Describe the science behind each of the evidence-based strategies for toxic stress regulation
- Identify examples of clinical interventions for stress-mitigation strategies
- Identify internal and external support services for stress-mitigation strategies

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Developing Your Clinical Response to ACEs and Toxic Stress

Clinical Response

Gathering information

Making a clinical assessment

Developing a treatment and follow-up plan

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Gathering Clinical Information

Current concerns

- Physical,
- Developmental,
- Behavioral, and
- Mental health

Review screening

- PEARLS and/or
- ACE Questionnaire for Adults,
- Other tools that may already be part of your clinic practice

Medical history

- Take note of conditions that may be AAHCs
- Ask about protective and risk factors including stress-mitigation strategies

Physical Exam

- Take note of any neurologic, endocrine, metabolic or immune findings that could be related to AAHCs

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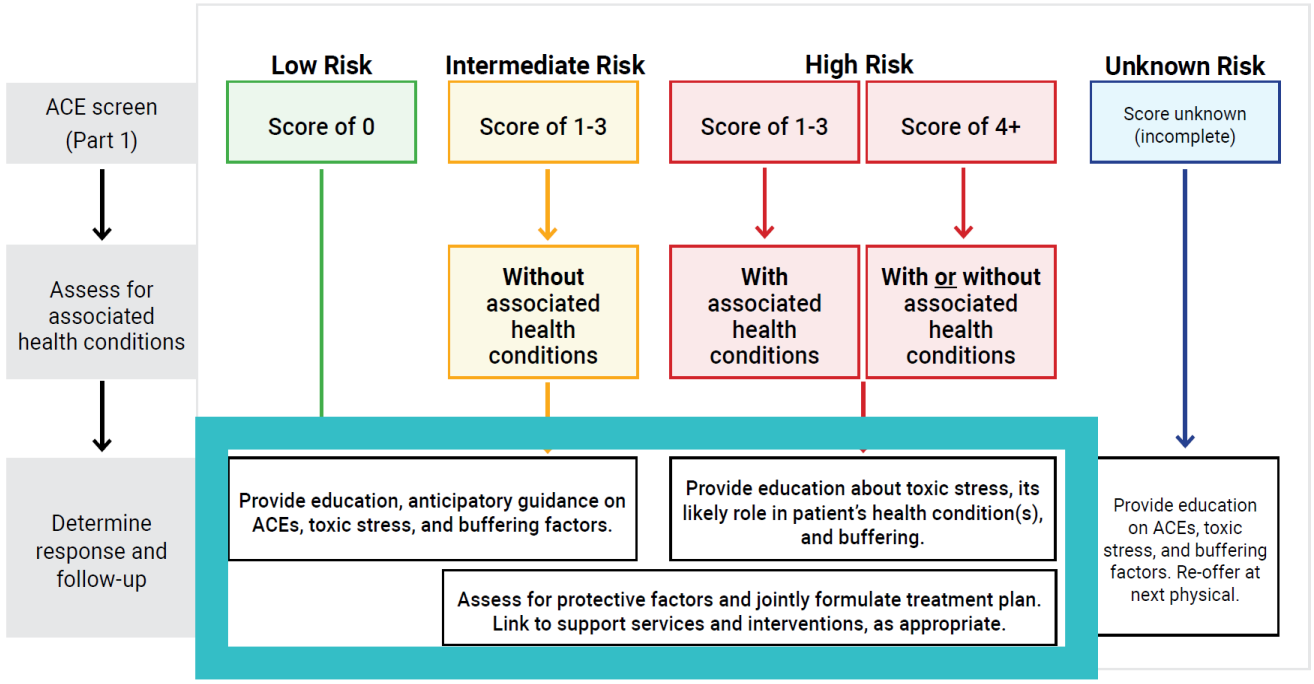
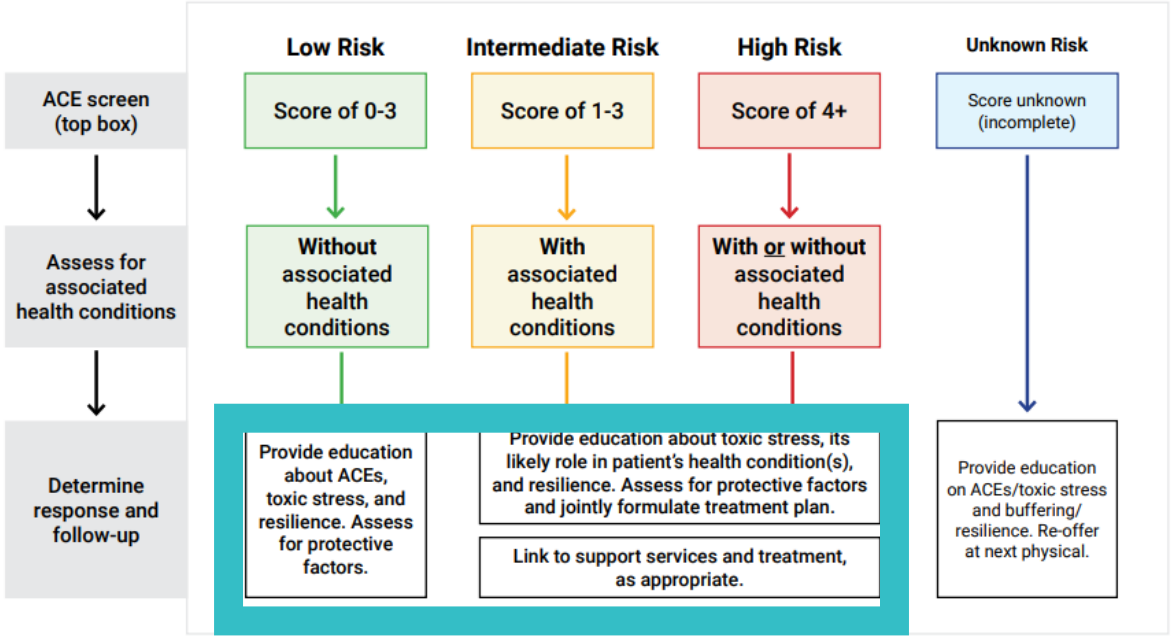
Making a Clinical Assessment: Apply Algorithm to Determine Risk of Toxic Stress and Treatment & Follow-up Plan

Apply Age-Appropriate ACEs and Toxic Stress Risk Assessment Algorithm

Pediatrics



Adults



Additional information on the clinical response and the full algorithm are available at: ACEsAware.org/clinical-assessment

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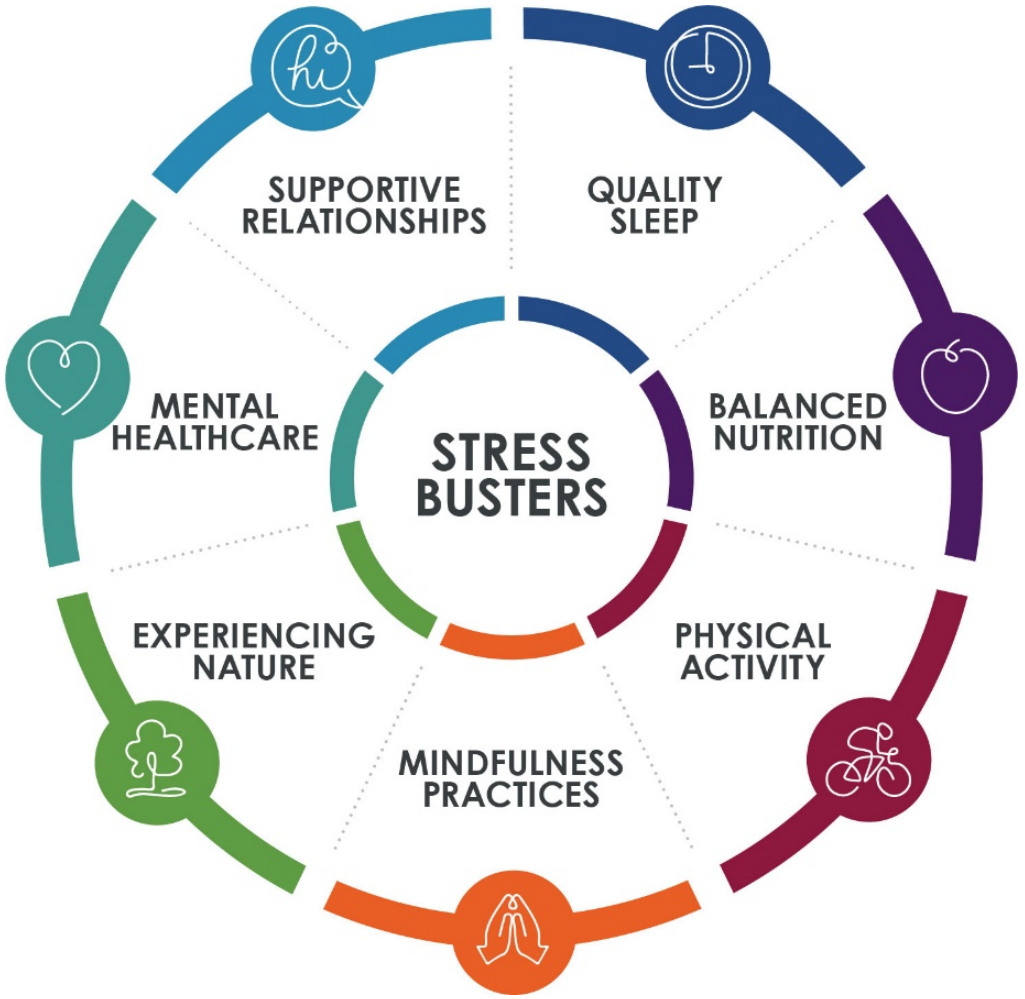

Developing a Treatment and Follow-Up Plan

- Patient Education
- Clinical Interventions
- Support Services
- Follow-Up

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Supportive Relationships

Impacts of Supportive Relationships and Social Engagement

Neurologic and HPA Axis

- Larger hippocampus
- Improves cortisol reactivity

ANS and Cardiovascular Reactivity

- Lower blood pressure
- Lower catecholamines

Oxytocin

- Oxytocin receptors on the amygdala
- Allows oxytocin to inhibit ANS and HPA response

Immune Function

- Decreased inflammation
- Protects against the common cold
- Decreased asthma symptoms

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(Uchino 2006; Blaisdell, Imhof et al. 2019; Slopen, McLaughlin et al. 2014; Meyer 2020; Ditzen 2007; Heinrichs 2009; Suglia J of Epi and Comm Health 2010; Lim J of Fam Psych 2008; Manczak Health Psch 2017; Wang J of Neuroimm 2015; Li Frontiers in Imm 2017; Cohen 2004, 2015)

Interventions that Improve Social Relationships can Improve Stress Hormones and Health

Slopen, 2014	Marie-Mitchell, 2018	Purewal Boparai, 2018
• Interventions designed to improve social relationships, environments or psychosocial functioning in children associated with improved cortisol activity.	• Multicomponent interventions including parenting education, mental health support, and social service referrals were associated with improvements in parent–child relationship and behavioral and mental health problems.	• Three key intervention elements – a focus on strong parenting skills, earlier intervention placement, and greater intervention engagement – improved or even normalized stress hormone profiles and decreased the impact of toxic stress on brain development and epigenetic regulation.

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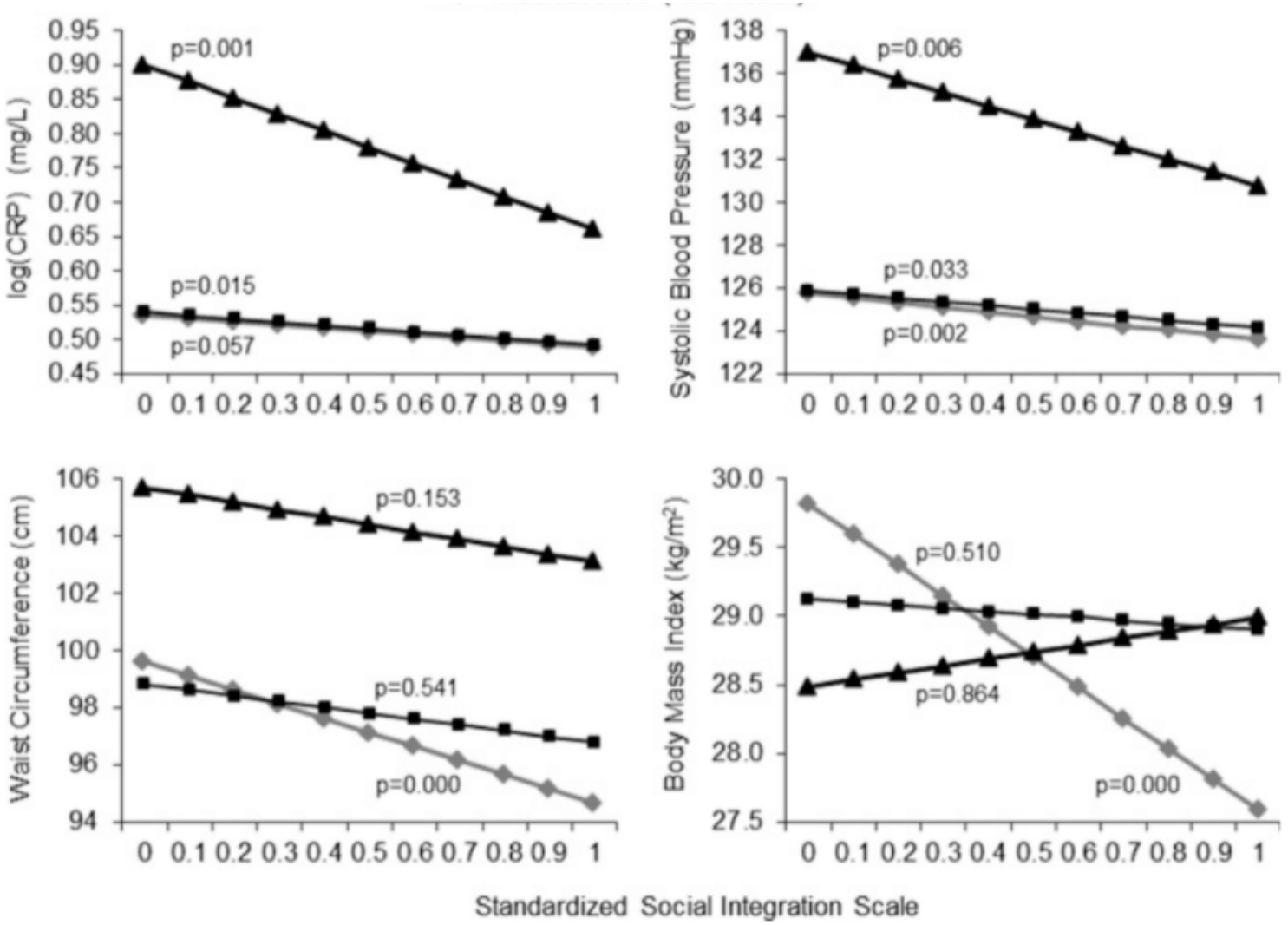
Social Integration

- Lower C-reactive protein (CRP)
- Lower systolic blood pressure (SBP)
- Lower Waist Circumference
- Lower body-mass index (BMI) in adolescence
- Higher BMI in late adulthood



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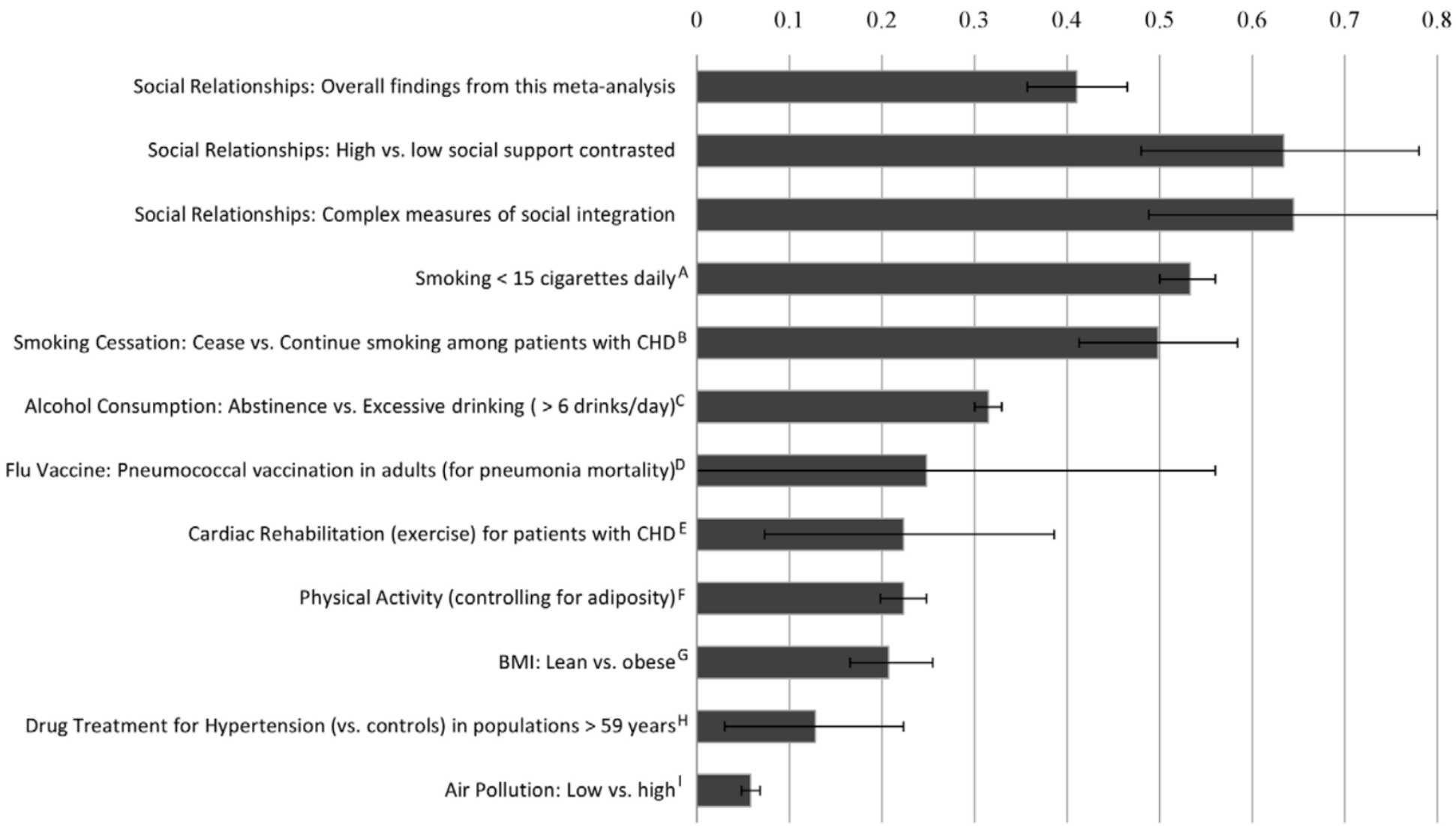
Yang Claire, et al. "Social relationships and physiological determinants of longevity across the human life span." *Proceedings of the National Academy of Sciences* 113.3 (2016): 578-583.



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Holt-Lunstad J, Smith TB, Layton JB (2010) Social Relationships and Mortality Risk: A Meta-analytic Review. PLoS Med 7(7): e1000316.

Supportive Relationships in Clinical Practice

- Patient Education & Anticipatory Guidance:
  - We live longer!
  - Hugs are protective!

Clinical Interventions & Support Services

- Talk Read Sing and Reach Out and Read
- Encourage "time in" – with your children, friends and relatives!
- Connect with community programs, faith programs
- Support groups

Clinical Interventions & Support Services

- Home visiting programs, Parenting programs
- Mental health, Family Therapy, and targeted dyadic interventions:
  - Attachment and Biobehavioral Catch-up (ABC), Child-Parent Psychotherapy (CPP), and Parent-Child Interaction Therapy (PCIT)

Quality Sleep

Science of Sleep and ACEs

- Sleep disturbances are among the most common and nonspecific outcomes of childhood adversity.
- Increased, decreased or disordered sleep
- Nightmares
- Disruptive nocturnal behaviors (moaning, thrashing, tossing and turning)
- Poor sleep associated with poor health outcomes
    - **Adults:** Heart disease, hypertension, obesity, diabetes, cancer, decreased cognitive performance, depression, anxiety, inflammatory diseases, infection risk, all cause mortality.
    - **Children:** Impaired neurocognitive development, social-emotional skills, physical health, family functioning.

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Sadeh 1996; Kajeepeta 2015; Brock 2019; Nurius 2015; Chatburn 2014; Greenfield 2011; Luyster 2012; Besedovsky 2019; Itani 2017; McEwen 2015; Mindell 2018; Irwin 2015; Besedovsky 2012

Impacts of Quality Sleep

Neurologic

- Memory consolidation
- Allows for normal circadian rhythms of cortisol

ANS and Cardiovascular Reactivity

- Decreases SNS output

Endocrine/Metabolic

- Increases growth hormone, prolactin, melatonin
- (Poor sleep increases insulin, blood glucose, appetite and caloric intake)

Immune Function

- Decreased inflammation
- Improved response to vaccination
- Decreased risk of infection

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Quality Sleep in Clinical Practice

- Anticipatory guidance:
  - Sleep disturbances are common.
  - Healthy sleep can improve neurological, endocrine, metabolic and immune regulation
  - Sleep hygiene

- Additional support: night light, weighted blanket, relaxation techniques, journaling, or conversations with a trusted adult/friend to address specific worries.
- Meditation, yoga, exercise during the day

- Medications
- Sleep Study and referral to sleep speciality
- Referral to mental health for cognitive-behavioral therapies.

Balanced Nutrition

Science of Nutrition and ACEs

- ACEs have been linked to increased risk of obesity, insulin resistance, and diabetes, as well as eating disorders such as anorexia nervosa and bulimia.

- Bidirectional relationship between nutrition and stress: malnutrition/ undernutrition can activate the physiologic stress response, and, conversely, stress can affect food behavior, digestive processes, and metabolism.

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Descheness 2018; Isohookana 2016; Guillaume 2016; Campbell 2018; Kimber 2017; Molendijk 2017; Pginatelli 2017; Coffino 2020; Lindsay 2019; Romeo 2008; Lindsay 2017; Kiecolt-Glaser 2010; Lyte 2018; Sapolsky 2004

Impacts of Nutrition

Neurologic

- Nutrients such as magnesium, zinc, and Omega-3 fatty acids support brain function, cell membrane transport and neurotransmitter production

Cardiovascular Reactivity/ Endocrine/Metabolic

- Excessive sugar consumption increases risk for heart disease, HTN, dyslipidemia, insulin resistance and hepatic dysfunction
- Omega-3 fatty acids lower NE, ACTH and plasma cortisol in response to endotoxin challenge

Immune Function

- Pesticides, fast food, overly processed foods are pro-inflammatory
- Vegetables, whole grains, omega-3 decrease inflammation

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Descheness 2018; Isohookana 2016; Guillaume 2016; Campbell 2018; Kimber 2017; Molendijk 2017; Pginatelli 2017; Coffino 2020; Lindsay 2019; Romeo 2008; Lindsay 2017; Kiecolt-Glaser 2010; Lyte 2018; Sapolsky 2004; Lustig 2012 *Nature*

Nutrition in Clinical Practice

- Anticipatory guidance:
  - Stress can INCREASE or DECREASE appetite
  - Stress can increase cravings for high-fat and high-sugar foods
  - Western diet associated with increased inflammation
  - Anti-inflammatory diet: fruit, vegetables, fish, whole grains

- Consider Omega-3 Fatty Acid supplementation
- Trauma-informed weight loss programs
- Tie into other domains - eat with family and friends, physical activity, mindful eating
- Nutritionist or Dietician support

- Referral to needed specialist (anorexia clinics, obesity clinics, Cardiology, Endocrinology, GI, etc.)

Physical Activity

Impacts of Physical Activity

Neuro, Endocrine, Metabolic

- Increased hippocampal neurogenesis, blood flow and volume
- Improved memory, attention, cognition, psychosocial functioning
- Increased BDNF< dopamine, endogenous opioids, cortisol and catecholamines
- Decreases insulin

Immune Function

- Improved immune function and competency
- General anti-inflammatory effect over time

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Di Liegro 2019; Coelho 2013; De Assis 2018; Bathina 2105; Verbickas 2018; Firth 2018; Li 2017; Erickson 2011; Woon 2008; Northey 2018; Hansen 2012; Van Bruggen 2011; Kandola 2016; Rimmele 2009; Dhabar 2018; Flesner 2005; Pedersen 2000; Gleeson 2011; Campbell 2018;

Other Ways Physical Activity Supports Health and Well-Being

- Increasing resilience factors
  - Skill development,
  - Self-regulation,
  - Problem-solving abilities,
  - Sense of agency
  - Supports healthy relationships
  - Improves sleep
- Metabolize stress energy

Irwin 2015; Ho 2015; Masten 2018; Easterlin 2019; Bhushan 2020

Physical Activity

- Anticipatory guidance:
  - Physical activity - improved memory, attention, cognition, mental health, immune function
  - May help promote the positive stress response, metabolize increased energy associated with anxiety or stress, and increase resilience factors

- Brief physical activity breaks to release excess energy
- Moderate-intensity aerobic activity, for longer durations, three times or more a week
- Activities that combine physical activity with self-regulation skills and breathing techniques, such as martial arts and yoga, may also be beneficial

- Low mood and stress have been identified as barriers to exercising; professional support may help patients overcome these barriers.

Mindfulness Practices

Science of Mindfulness and ACEs

Mindfulness has been defined as nonjudgmental, moment-to-moment awareness that involves attention, intention, and a kind attitude.

- Mindfulness has been shown to be helpful for people with
  - ACEs and trauma
  - PTSD
  - Anxiety and depression
  - Executive functioning disorders
  - Pain management concerns
  - Attention-deficit/hyperactivity disorder (ADHD)
  - Sleep problems
  - Parental stress

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Gallegos 2017; Kabat-Zin 2011; Shapiro 2006; Ortiz 2017; Marchand 2012; Piet 2011; Sharma 2014; Sibinga 2016; Fox 2012; Vollestad 2012; Sze 2010; Veehof 2016; Wang 2016; Goldsmith 2014

Impacts of Mindfulness

Neurologic

- Involves PFC, anterior cingulate cortex, insula, amygdala and hippocampus
- Improves default mode network processing and self-referential thinking

ANS and Cardiovascular Reactivity

- Decreased sympathetic activation
- Improved parasympathetic activity
- Decreased cardiovascular disease

Immune Function

- Improved immune function

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King 2016; Marchand 2012; Marchand 2014; Cahn 2017; Burg 2012; Ortiz 2017; Bethel 2016; Chiesa 2009; Roemer 2015; Castillo-Richmond 2000; Zamarra 1996; Levine 2017; Black 2016

Mindfulness Interventions – Clinical Practice

- Anticipatory guidance:
  - Nonjudgmental, moment-to-moment awareness that involves attention, intention, and a kind attitude
  - Can support trauma healing and regulation of stress
  - Improved cardiovascular and immune health

- Online and downloadable apps
  - UCLA, Oprah and Deepak, Sesame Street in Communities
- Other mind-body practices: including tai chi, yoga, acupuncture, breathing techniques, and massage therapy

- Mindfulness-based stress reduction (MBSR)

Experiencing Nature

Science of Experiencing Nature and ACEs

- Interacting with nature is associated with decreased diabetes, depression, heart rate and blood pressure, heart disease, mortality.
- Plants and flowers in the hospital rooms associated with lower blood pressure, lower ratings of pain, anxiety, and fatigue, and higher room satisfaction.
- Room with a view looking out on a natural scene had shorter hospital stays and required less pain medication.
- Adding green spaces in low-resourced communities has been associated with reduced crime and violence, improved perception of safety, increased social connections, and reduced depressive symptoms.

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South 2018; Kondo 2017; Kondo 2018; Wang 2019; Park 2009; Ulrich 1984; Branas 2018; Razani 2018; Razani 2020; Summers 2018; Kuo 2015

Impacts of Experiencing Nature

Neurologic

- Improved cognitive function, attention, psychological well-being, meaningfulness and energy

ANS and Cardiovascular Reactivity

- Decreased SNS activity, increased PNS activity
- Decreased blood pressure

Endocrine

- Decreased perceived stress and cortisol levels
- Decreased blood glucose

Immune Function

- Reduced inflammatory cytokines

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Razani 2018; Kuo 2015; Kim 2010; Summer 2018; Berman 2012; Cervinka 2012; Aspinal 2015; Razani 2020; Hu 2008; Mock 2016; Gross 2017

Experiencing Nature – Clinical Practice

- Anticipatory guidance:
  - Parks, local green spaces, playgrounds, and even indoor plants.
  - Decreases diabetes, depression, heart rate, blood pressure, and mortality
  - Calms the stress response system and increases healthy behaviors such as physical activity, mindfulness, and relational health

- Park Prescriptions! Visit Parkrx.org, and the Center for Nature and Health
- Encourage green space.
- Providers can recognize that there may be cultural, community, and policy barriers to equal access to nature. Access to nature is a social justice health issue.

- Referral to ecotherapy or adventure-based treatment programs.

Mental Health

Science of Mental Health and ACEs

- Mental and behavioral healthcare can help patients build skills and capacities for resilience, directly address trauma-related symptoms, and scaffold with medications as necessary, all in the context of safe, supportive, and trusting relationships.

- Multidisciplinary care should include bidirectional flow of information.

- Psychological interventions may improve both the mental and the physical health consequences of toxic stress.

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Fallot 2009; NASEM 2019;

Impacts of Mental Health Interventions

- CBT improves patient awareness of negative thoughts, behaviors, and feelings about their disease, increase compliance with medical recommendations, and support healthy self-care behaviors.
- Cognitive therapy may enhance prefrontal cortex function and inhibit amygdala activation.
- CBT may decrease children's medical symptoms including asthma and anxiety
- Patients with heart disease who received traditional care plus CBT had a 41% lower rate of recurrent cardiovascular disease event and 45% fewer heart attacks than patients who received traditional care alone.
- CPP has also been shown to protect against the telomere shortening associated with trauma, suggesting the intervention slowed, stopped, and, for some children, reversed the cellular "wear and tear" of early adversity.

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Pan 2020; Davidson 2012; Santarnecci 2019; Ghosh 2011; Slopen 2014; Boparai 2018; Lieberman 2011; Lieberman 2006; Lieberman 2005; Ghosh Ippen 2011; Bush in review

Mental and Behavioral Health – Clinical Practice

- Anticipatory guidance:
  - Mental health providers can help patients build skills and capacities for resilience, directly address trauma-related symptoms, provide a safe, supportive, and trusting clinical relationship
  - Behavioral and mental health programs may improve physical health and neuro-endocrine-immune-metabolic dysregulation

- Address barriers to mental health services (access, engagement, stigma)
- Consider: multidisciplinary teams, integrated behavioral and mental healthcare, care coordination, and medical home models
- Linguistic and cultural congruence between provider and patient is critical

- Referral to Developmental and Behavioral Pediatrics, Mental Health, Neurofeedback
- Medications

Evidence-Based Mental Health Therapies

Therapy	Ages	General Description
Child-Parent Psychotherapy	Birth to 6 years	Dyadic intervention for young children and their caregivers that supports family strengths and relationships.[586,587,994]
Parent-Child Interaction Therapy	2 – 12 years	Dyadic parent training treatment that emphasizes improving the quality of the parent-child relationship and interactions.[995-997]
Cue-centered therapy	8 – 18 years	Protocol of 15 sessions through which children and caregivers learn about traumatic stress, how to cope rather than avoid, and the value of verbalizing their life experiences.[998,999]
Trauma-focused cognitive behavioral therapy (TF-CBT)	Verbal children and adults	A structured, short-term treatment model for children and adults who have experienced trauma.[1000-1002]
Eye movement desensitization reprocessing (EMDR)	Verbal children and adults	Focuses on helping clients resolve unprocessed traumatic memories.[1003-1005]
Family systems therapy	Verbal children and adults	Supports resolving family conflict or issues.[1006,1007]
Cognitive processing therapy	Adolescents and adults	A type of CBT, generally 12 sessions, that helps modify maladaptive thinking related to their trauma.[1008]
Prolonged exposure therapy	Adolescents and adults	A CBT approach that helps clients gradually approach their memories, feelings, and situations of trauma.[1009]

Evidence-based trauma therapies.

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Bhushan D, Office of the California Surgeon General, 2020

Useful ACEs Aware Tools

Self-Care Tool

ACEs Aware Self-Care Tool for Adults

When a person has experienced significant Adverse Childhood Experiences (ACEs), their body may make more or less stress hormones than is healthy. This can lead to physical and/or mental health problems, such as diabetes, heart disease, anxiety, smoking, or unhealthy use of alcohol or other drugs. Safe, stable, and nurturing relationships can protect our brains and bodies from the harmful effects of stress and adversity. The following tips can help you manage your stress response. Healthy nutrition, regular exercise, restful sleep, practicing mindfulness, building social connections, and getting mental health support can help decrease stress hormones and improve health. Here are some goals you can set to support your health. [*Check the goals that you are choosing for yourself!*]

- ❑ **Healthy relationships.** I've set a goal of...
  - ❑ Spending more high-quality time together with loved ones, such as:
    - ❑ Having regular meals together
    - ❑ Having regular "no electronics" time for us to talk and connect with each other
  - ❑ Making time to see friends and create a healthy support system for myself
  - ❑ Connecting regularly with members of my community to build social connections
  - ❑ Asking for help if I feel physically or emotionally unsafe in my relationships
    - ❑ The National Domestic Violence hotline is **800-799-SAFE (7233)**
    - ❑ The National Sexual Assault hotline is **800-656-HOPE (4673)**
    - ❑ To reach a crisis text line, **text HOME** to **741-741**
  - ❑ Create your own goal: _____
- ❑ **Exercise.** I've set a goal of...
  - ❑ Limiting screen time to less than __ hours per day
  - ❑ Walking at least 30 minutes every day
  - ❑ Finding a type of exercise that I enjoy and doing it regularly
  - ❑ Create your own goal: _____
- ❑ **Nutrition.** I've set a goal of...
  - ❑ Eating a healthy breakfast daily (with protein, whole gains, and/or fruit)
  - ❑ Drinking water instead of juice or soda
  - ❑ Limiting my alcohol consumption

Clinical Response: Patient Education and Anticipatory Guidance

- **Tips for Providers**
  - ACEs Aware Provider Toolkit
    - Communicating About ACEs
    - Providing Anticipatory Guidance
    - Motivational Interviewing Techniques
  - ACEs Aware Trauma-Informed Network of Care Roadmap
  - Coming soon – additional materials on clinical response and tiered approaches.
- **Patient handouts**
  - General handout(s) about ACEs and Toxic Stress
  - Handout about each of the 7 stress-mitigation strategies

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Case Example

Case Example: High ACE Score and Obesity

- An adolescent or young adult presents with an ACE score of 4 and obesity.
- Gathering information
    - Current concern: Trouble sleeping. Doesn't feel rested. Having trouble falling asleep. Stays asleep but told he snores.
    - Nutrition – Often has a muffin, doughnut or bagel for breakfast, not eating a lot of fruits and vegetables, usually has a deli meat sandwich for lunch, dinner is often delivery, drinks soda. Has tried numerous diets but says they never work.
    - Physical Activity – With COVID and physical distancing he really hasn't exercised in over a year. He used to really enjoy walking with friends and playing sports.

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Case Example: High ACE Score and Obesity

- Gathering information
  - Physical exam: Notable for BMI 31, Acanthosis nigricans, large tonsils
  - ACE score 4
  - PHQ 2 (Depression Screen) – normal
  - GAD-7 (Anxiety Screen) - normal

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Clinical Assessment

- X-year-old male who presents with trouble falling asleep and snoring, acanthosis nigricans, large tonsils and obesity. Concern for insulin resistance and obstructive sleep apnea. High risk of toxic stress (ACE score of 4, + 1 or more ACE-Associated Health Conditions)

- Strengths: He enjoys walking with friends and playing sports.

- Poor nutrition and limited exercise at this time.

Patient Education

- "I see from this form that you have had some of these difficult experiences. Research tells us that difficult or traumatic experiences during childhood can put us at risk for poor health through a process called toxic stress. For example, for you *I think that because of your past adverse childhood experiences, the stress hormones in your body are telling you to get prepared for future threats – to eat high fat, high sugar foods and store up that energy in case you need it in the future.*

- The good news is that we can do something about this.

- *I would like to make sure you feel safe now, (pause) and to work with you on ways to ways to calm down those stress hormones."*

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Clinical Intervention

- **Sleep:** Referral to sleep specialist for sleep study – rule out OSA. Discuss sleep hygiene AND relaxation tools. Patient has always liked writing and wants to try journaling before bed.
- **Acanthosis nigricans and obesity**: labs to screen for diabetes, lipid panel, and CMP
- **Physical Activity**: Patient likes the idea of getting back into walking his dog every day and inviting his friend a few times a week.
- **Nutrition:** Discussed the benefits of an anti-inflammatory diet. Patient identified increasing fruits and vegetables as his goal. Also recommended omega 3 fatty acid supplementation.
- Note to follow-up on these and other toxic stress reduction strategies at future visits.

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Questions

Thank you!

Rachel.gilgoff@aurrerahealth.com

DECEMBER 09, 2020

Roadmap for Resilience

The California Surgeon General's Report on Adverse Childhood Experiences, Toxic Stress, and Health

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