The Call for Lifestyle Medicine Interventions to Address the Impact of Adverse Childhood Experiences

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Since the landmark ACE Study, researchers have associated early-life adverse stress inflicted by extreme poverty, household dysfunction, abuse, and community violence to later manifestations of diabetes, mental illness, cancer, chronic pulmonary disease, cardiovascular disease, obesity, and premature mortality.[1-4] Adverse childhood experiences (ACEs) are highly prevalent across the United States. According to the National Child Health Organization, just under half (45%) of children in the United States have experienced at least one ACE.[5] One in 10 children nationally has experienced 3 or more ACEs, placing them in a category of "especially high risk." Furthermore, ACEs often accompany other prevalent adverse environmental and societal exposures (such as air pollution, poverty, community violence, bullying, and discrimination), which are all chronic stressors that also promote adverse health outcomes.[6] ACEs and additional environmental stressors may interact to create even greater harm.[7] Alarmingly, all these chronic stressors were likely made worse in the face of the recent COVID-19 pandemic. Left unabated, frequent or extreme activation of the body's stress response system can become toxic; in the absence of protective mechanisms, lasting adverse biological changes can occur.[8]

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CURRENT ACE INTERVENTIONS AND EVALUATION

Various ACE interventions have been created and implemented, and systematic reviews have been conducted assessing the effectiveness of these interventions (**TABLE 1**). ACE intervention treatments range from parenting education and home visitation, trauma-informed care, eye movement desensitization and reprocessing, mindfulness, and cognitive-behavioral therapy (CBT) to other types of psychological therapy. On the basis of a recent systematic review, it is readily apparent that the majority of ACE interventions seek to improve mental resilience through clinical or counseling settings.[9] A recent review of previous systematic reviews looked at interventions for ACEs. The researchers found that the most effective method of intervention for people who experienced sexual abuse during childhood is CBT. No interventions were tested for their effectiveness in treating the consequences of ACEs if the interventions were applied at the community or social level because those interventions do not look at ACEs specifically. Furthermore, a majority of the systematic reviews showed mixed results across interventions (ie, reviews of studies for a specific intervention had findings that ranged from positive to no effect).[9]

To our knowledge, there is currently no intervention addressing not only ACEs, but also additional chronic stressors, through a multifaceted lens. In their systematic review, Lorenc et al go further and point out the lack of community-

TABLE 1. **ACEs intervention approaches**

Intervention type	Intervention description and brief evaluation
Parenting education programs	**Intervention description:** Parenting education programs address inadequate parenting skills, attitudes about child rearing, and dysfunctional parenting habits. **Impact assessment:** A systematic review shows parenting education programs have a marginal impact on other risk factors such as depression and stress. Parenting education programs appear effective, although mixed results across randomized control trials (RCTs) indicate that additional RCTs are needed.[23-25] In assessing parent education programs, it did not appear that the location of the education (either at the clinic or at home) influenced the positive results.
Trauma-informed care (TIC)	**Intervention description:** TIC includes the entire healthcare team and helps physicians approach treatment of common conditions in people who have experienced trauma in a different way. It is based on 5 steps[26]: • Acknowledge and understand the ACEs the individual experienced • Provide a safe place and gain the trust of the patient • Make the healing process a joint process • See the individual as resilient and strong • Have a sensitive healing process to cultural and historical issues **Impact assessment:** Though TIC has the potential to promote healthier outcomes, given that the practice widely varies across healthcare providers, caution should be used in considering it the sufficient response to a complex problem. Despite the use of TIC in healthcare settings, there are few published studies assessing the impact of TIC on the child or on family outcomes.[28] Additionally, there is a critical need for RCTs assessing the impact of TIC.[25,29]
Eye movement desensitization and reprocessing (EMDR)	**Intervention description:** EMDR is a new, nontraditional type of psychotherapy for the treatment of ACEs. During EMDR therapy, the client attends to emotionally disturbing material in brief sequential doses while simultaneously focusing on an external stimulus. Therapist-directed eye movements are the most commonly used external stimulus but a variety of other stimuli including hand-tapping and audio stimulation are often used. It is believed that EMDR therapy facilitates the accessing of the traumatic memory network, so that information processing is enhanced, with new associations forged between the traumatic memory and more adaptive memories or information.[30] **Impact assessment:** A growing body of research indicates that despite the lack of homework attached to EMDR therapy and its use of fewer sessions, it is as effective as CBT in treating traumas, including ACEs.[31,32]

level interventions.[9] ACEs and their consequences are a tremendous burden for our society, and there is a critical need to develop interventions at the individual, family, and community level that can help prevent and mitigate the harms caused by ACEs and other stressors.

OPPORTUNITIES FOR ACE INTERVENTION ADVANCEMENT

In developing new and innovative approaches for addressing adverse outcomes associated with ACEs, it is important to consider their mechanisms of action. Researchers postulate that an inflammatory process may be responsible for the adverse biological changes associated with toxic chronic stress that result from things like ACEs. A growing body of research supports this theory. Furthermore, the inflammatory process may commence in early life, as studies have revealed that ACEs are associated with increases in systemic inflammatory markers (ie, C-reactive protein, fibrinogen, and pro-inflammatory cytokines) and biological changes that may already be evident in childhood.[10-13] Additional chronic stressors (like air pollution) also have a systemic inflammatory effect that promotes adverse health outcomes. It is generally well known that increased systemic inflammation is a risk factor for an increase in chronic diseases and a reduction in lifespan. Alterations in inflammatory markers are now identified as candidate biomarkers for not only mediating the health consequences associated with ACEs, but potentially mitigating the harm from other chronic stressors and subsequently improving healthy longevity.[8]

TABLE 1. **ACEs intervention approaches *(cont'd)***

Intervention type	Intervention description and brief evaluation
Mindfulness-based stress reduction (MBSR)	**Intervention description:** MBSR is an 8-week program that offers intensive mindfulness training to assist people with stress, anxiety, depression, and pain. Developed at the University of Massachusetts Medical Center in the 1970s by Professor Jon Kabat-Zinn, MBSR uses a combination of mindfulness meditation; body awareness; yoga; and exploration of patterns of behavior, thinking, feeling, and action.[33] **Impact assessment:** A recent literature review of mindfulness-based approaches has identified many research studies with positive outcomes.[12] Mindfulness was observed to be effective in minimizing posttraumatic stress disorder (PTSD), depression, and anxiety that are a result of trauma. MBSR was found effective for both children and adults. In adults, it leads to bettering the physical and emotional health of a person after being exposed to ACEs or trauma during childhood.[12]
Cognitive behavioral therapy (CBT)	**Intervention description:** CBT is a psychosocial intervention that aims to improve mental health. CBT focuses on challenging and changing unhelpful cognitive distortions and behaviors, improving emotional regulation, and developing personal coping strategies that target solving current problems. **Impact assessment:** Systematic reviews show the strongest findings for CBT in the treatment of ACEs. Further research is needed to determine best practices around CBT and if results can be replicated within various communities.[9,33]
Solution-focused brief therapy (SFBT)	**Intervention description:** SFBT is a collaborative treatment that focuses on helping clients construct solutions rather than focus on their past experiences. **Impact assessment:** A meta-analysis of RCTs of SFBT in medical settings for patients' health-related psychosocial (eg, depression, psychosocial adjustment to illness), behavioral (eg, physical activity, nutrition score), and functional health (eg, body mass index, individual strength) outcomes indicates an overall significant effect of SFBT on improving psychosocial outcomes.[34] Use of SFBT with children and families has also shown promise, although larger research studies with better designs and a focus on treatment of ACEs are needed.[35,36]

Positive protective lifestyle factors (ie, plant-based diet, rest, time outdoors in nature), especially those supported by lifestyle medicine, have been shown to reduce systemic inflammation.[14-16] Our research team, assessing centenarians living in a region known around the world for its extraordinary health and longevity, discovered that they had not only lived long and healthy lives, but did so despite tremendous ACEs and hardships in childhood along with additional environmental stressors.[17] The positive lifestyle factors they experienced in their childhood and across their lifespan (eg, physical activity, time in nature, routine rest, plant-based diet, connection with family and friends, faith foundation, helping others, and a positive outlook on life) likely afforded protection against adversity. Furthermore, a growing body of evidence shows that a few of these factors are able to positively influence one another and potentially enhance the ability to offset inflammation and subsequent adverse biological changes.[18] Positive and protective lifestyle factors can increase the life of the individual and prevent or delay diseases; this may promote a healthier lifespan for those burdened by ACEs.[19-22]

Ultimately, a combined approach addressing whole patient care (mind, body, and spirit) may prove the most effective in the battle against ACEs. Given that ACEs rarely occur in isolation and often negatively and synergistically interact with other chronic stressors, it is important to address ACEs in light of this context. Interventions that interact synergistically and also address additional environmental stressors are critically needed, and positive lifestyle factors fit the bill. **TABLE 2** provides a list of opportunities for interventions building on positive lifestyle factors. Especially needed are interventions that can offset systemic inflammation. Combined intervention approaches may prove the most effective. Not only may promoting lifestyle factors mitigate the damage from ACEs among patients and their families, but they may also prove helpful in improving the health of healthcare workers during and recovering from the COVID-19 pandemic. Trauma is widespread with the potential to be exceptionally debilitating and devastating; thus, it is vital that we start implementing positive lifestyle interventions to minimize the effect of ACEs and trauma on as many people as possible. ●

TABLE 2. **Potential protective lifestyle intervention opportunities**

Patient and family care	• **Encourage greater screening for positive lifestyle factors.** Encourage greater emphasis on screening for healthy lifestyle factors (rather than just a few questions on an appointment survey) for both parents and children, along with screening for ACEs. A standard Whole Health Lifestyle Questionnaire should be developed for screening in the clinical setting and could include questions from all of the categories identified through the resilient centenarian research[17] such as: physical activity, time in nature, routine rest, plant-based diet, developing and strengthening family and friend relationships, faith foundation, ability to help others, and positive outlook on life. We recommend using pre-appointment wait time to collect more in-depth information on these whole health (resiliency factor) questions.
	• **Develop and promote appealing media and conversations.** Increase awareness (through conversations with families, concise and appealing brochures, providing coloring books, etc.) of the importance of protective lifestyle factors in general, but especially among those who have ACE exposures.
	• **Use key health partners.** Partner with health coaches to provide onsite educational services with a "learn it, live it, evaluate, and adapt it" approach for encouraging families to put protective lifestyle activities into practice.
	• **Combine interventions.** Combining lifestyle interventions with ongoing ACE treatments may prove successful. One such example is the Nurse-Family Partnership (NFP).[37] The NFP is a prevention strategy to help reduce child abuse and neglect, reduce the likelihood of mothers giving birth to additional children while in their late teens and early 20s, reduce prenatal smoking among mothers who smoke, and improve cognitive and/or academic outcomes for children born to mothers with low psychological resources. Providing additional healthy lifestyle promotion (ie, plant-based diet, positive mindset, spiritual connection, time in nature, rest) to this program may prove even more successful.
Medical professional development	• **Provide continuing medical education opportunities.** Provide continuing medical education opportunities on lifestyle factors to educate and encourage health professional training.
	• **Screen healthcare employees.** Encourage and provide opportunities for medical professionals to anonymously screen for their own lifestyle resiliency factors, especially in the face of the pandemic and physician burnout.
	• **Create healthcare facility interventions for employees.** Create intervention opportunities (ie, within hospital settings and beyond) to help medical staff learn about lifestyle factors and put them into practice. This is especially needed in the wake of the COVID-19 pandemic.
Community engagement	• **Promote key partnerships.** Healthcare institutions can partner with local community-based organizations, school districts, and other agencies to develop whole health (mental, physical, spiritual, social, and emotional) programs targeting ACEs through lifestyle promotion. Programs can be at the community or individual level (targeting both adults and children).
	• **Lobby for funding.** Medical professionals can lobby for funding to support community-level programs that target ACEs. This aspect is especially needed in the wake of the COVID-19 pandemic.
Scientists and research institutions	• **Encourage lifestyle research.** More research that assesses the impact of lifestyle medicine on ACEs is critically needed. To date, little research has been conducted assessing the impact of protective lifestyle factors on mitigating the adverse effects of ACEs, especially around mitigating the associated inflammatory response. Partnering with schools of public health engaged in lifestyle research can prove fruitful in developing and assessing innovative lifestyle intervention for ACEs. Future research could also explore the impact of positive lifestyle trainings/exposures on subsequent generations of offspring.
	• **Develop more research on the impact of interventions for ACEs on inflammation.** More research is needed to assess the impact of current treatments for ACEs on mitigating the ACE-associated adverse inflammatory response.
	• **Assess combined interventions.** Research is needed to assess the impact of combined interventions for ACEs, especially of positive lifestyle-factor approaches along with other treatment modalities.

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