

# Coronavirus Disease 2019 (COVID-19) and Toxic Stress



*Findings from Roadmap for Resilience: The California Surgeon General's Report on Adverse Childhood Experiences, Toxic Stress, and Health*

Exposure to **Adverse Childhood Experiences (ACEs)** without sufficient buffering protections and interventions can lead to development of the **toxic stress response**,<sup>1,7</sup> defined as “prolonged activation of the stress response systems that can disrupt the development of brain architecture and other organ systems, and increase the risk for stress-related disease and cognitive impairment, well into the adult years.”<sup>8</sup>

ACEs are associated, in a dose-response relationship, with substantially increased risk of many common health conditions, including heart disease, chronic lung disease, kidney disease, diabetes, and obesity.

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► ***In the presence of a COVID-19 infection, several ACE-Associated Health Conditions (AAHCs) are known to increase risk of severe illness or death.***

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In one study by the US Centers for Disease Control and Prevention, the COVID-19 mortality rate for people with underlying health conditions, including many AAHCs, was 12 times higher than for people without underlying health conditions.<sup>9</sup> Further, the immune impairment associated with toxic stress is associated with increased risk of viral infection acquisition and progression,<sup>10-14</sup> potentially increasing risk of contracting COVID-19 in the first place and having a more severe course. Stress-induced lung inflammation can impair respiratory function, similar to that seen in patients with asthma, potentially placing individuals with toxic stress at risk of worse outcomes from COVID-19.<sup>15,16</sup>



Those with a history of ACEs may also be more susceptible to the health effects of acute or chronic stress later in life. Thus, the biological condition of being "stress-sensitized" may also increase the risk of stress-related chronic disease exacerbations related to the numerous stressors (e.g., psychosocial, financial, and grief-related) associated with living through the pandemic. For example, acute stress is associated with changes in endothelial cell function, increased arterial stiffness, vessel wall damage, increased blood viscosity, and/or a hypercoagulable state, all of which increase the risk of blood clots. These changes can result in increased risk for heart attacks and/or strokes, which have been documented to rise significantly in the months following natural disasters such as earthquakes and hurricanes.<sup>17-26</sup>

## CONDITIONS SET INTO MOTION DURING COVID-19

Public anxiety about the risk and consequences of the novel coronavirus infection, compounded by economic distress due to lost wages, employment, and financial assets, and reactions of fear and grief, along with mass school closures and wide-scale physical distancing measures, represent a "perfect storm" for stress-related morbidity and mortality.

Widespread infectious disease outbreaks, natural disasters, economic downturns, and other crises have in common a number of well-documented short- and long-term health impacts, including increased cardiovascular, metabolic, immunologic, and neuropsychiatric risk. These risks accrue through a variety of mechanisms, including:

- Disruption of access to healthcare, including medications;
- Disruption of access to resources needed for health maintenance, such as nutritious foods and safe places to exercise;
- The direct effect of the inciting event, driving overactivity of the biological stress response and leading to neurologic, endocrine, immunologic, metabolic, and genetic regulatory disruptions, with
  - » Increased incidence of ACEs and other risk factors for toxic stress, and
  - » Decreased sources of buffering care.<sup>27-29</sup>



**At a population level, the impacts of crises (current and past) tend to worsen social inequities and health disparities.** These health and social impacts particularly affect those with higher baseline vulnerability, including individuals with a history of adversity, those with lower incomes and education, and those more vulnerable to job loss, housing insecurity, food insecurity, and poverty, as well as those with underlying chronic health conditions, disabilities, and older age.<sup>22,24,26,30-76</sup>

## **Health Impacts of Prior Infectious Disease Outbreaks, Natural Disasters, and Economic Downturns**

- **Increased rates of heart attack and stroke,**<sup>24,49,70</sup>
- **Blood pressure increases;**<sup>22</sup>
- **Chronic obstructive pulmonary disease and asthma exacerbations;**<sup>80-82</sup>
- **Poorer diabetes outcomes;**<sup>70,83</sup>
- **Nephritis-related death;**<sup>70</sup>
- **Immune system dysregulation,** leading to increased secondary **viral and other infectious disease susceptibility** and **poorer oral health,**<sup>22,39,50,53,54</sup>
- **New-onset or recurrent mental and behavioral health conditions,** especially in those with longer isolation, inadequate information, and/or inadequate supplies,<sup>26,30-48,55-58</sup>
- **Poorer birth outcomes,** such as preterm birth, intrauterine growth restriction, low birth weight, and other intergenerational health and social risks;<sup>62-68</sup> and
- **Risk for increased household violence.**<sup>69</sup>

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▶ ***Early indicators suggest that the COVID-19 pandemic is associated with significant increases in ACEs and toxic stress risk.***<sup>27-29,77-79</sup>

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Given the extreme stressors incurred due to the COVID-19 emergency, including the fact that ACEs, grief, loss, and other traumatic experiences are burgeoning, too many are suffering in unprecedented ways. These trends highlight the pressing need for evidence-based strategies to address these traumatic experiences and the toxic stress we know is widespread, to help our communities recover from the COVID-19 emergency.

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▶ ***These strategies must inform our COVID-19 response as we move towards reopening our society and rebuilding vital systems.***

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***The Roadmap for Resilience*** report lays out systemic approaches for how to prevent and address the toxic stress that is accumulating from the perspective of multiple sectors, including public health, justice, social services, education, healthcare, and early childhood. These strategies must inform our COVID-19 response as we move towards reopening our society and rebuilding vital systems.

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