Climate Change Resilience
Understanding Brain Body Mechanisms for Coping with Climate Stressors

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1. As humans, one of the most significant environmental stressors we face in our lifetime is climate change. We must bring our strongest selves to protect the planet, and in turn to protect ourselves. With Tang Prize funding, I initiated a collaboration with the California State University that allows us to study the impacts of California's deadliest wildfire (the Campfire in 2018) on mental health of 725 California residents.
   This research revealed that climate change exacerbated environmental events are severely impacting mental health, generating clinical symptoms of post-traumatic stress disorder, anxiety and depression. In this research, we also shows that childhood trauma and sleep disturbances further worsen mental health symptoms. Notably, we found that self-reported resilience had a positive effect on mental health, and mindfulness was associated with significantly lower depression and anxiety symptoms, and hence, mindfulness intervention strategies may be effective in enhancing resilience.
   This research has been recently published:

   Silveira S, Kornbluh M, Withers M, Grennan G, Ramanathan V, Mishra J. Mental health impacts of the California wildfire environmental disaster: dimensions of vulnerability and resilience. International Journal of Environmental Research and Public Health 18, 1487. https://doi.org/10.3390/ijerph18041487 2021

   Notably, as per Altmetric it is in the top 5% of all research outputs scored and is in the 98th percentile in terms of attention received for publications of similar age.

   Several news media channels have covered this research: UCSD Health | The Medical News | Neuroscience News | ScienceDaily | UN Prevention Web | Medical Xpress

2. In a second manuscript in review from this work, we examine the tiered levels of resilience-imparting factors i.e. at the level of the individual, family and community. We find that in the face of these accelerating environmental disasters, mindfulness at the individual level, emotional support at the family level and number of close friends and sense of community promote wellbeing in the face of these anthropogenic environmental disasters.

   Kornbluh M, Withers M, Ades J, Grennan G, Mishra J. Identifying Protective Socio-Ecological Factors for Youth in Times of Environmental Disaster. American Journal of Health Promotion. 2021 (*in review*)

3. In a third manuscript in preparation from this work, we examine how brain health markers are impacted by the climate change driven environmental disasters. We find significant brain function impacts in those who are primarily exposed to the disasters versus those secondarily exposed (did not directly witness but had impacted friends/family) versus non-

exposed control individuals. This evidence, for the first time to the best of our knowledge, quantifiably shows how climate change related events are impacting the brain and consequent mental health. We firmly believe that such quantified neurobiological markers can help to further build a convincing argument for our policy makers to take immediate climate action.

Grennan G, Withers M, Kornbluh M, Mishra J. Cognitive Brain Functions under exposure to Climate Change Extremes. 2021. (*in preparation*)