Can Hormetic Stress Increase Stress Resilience, Well Being, and Slow Biological Aging?

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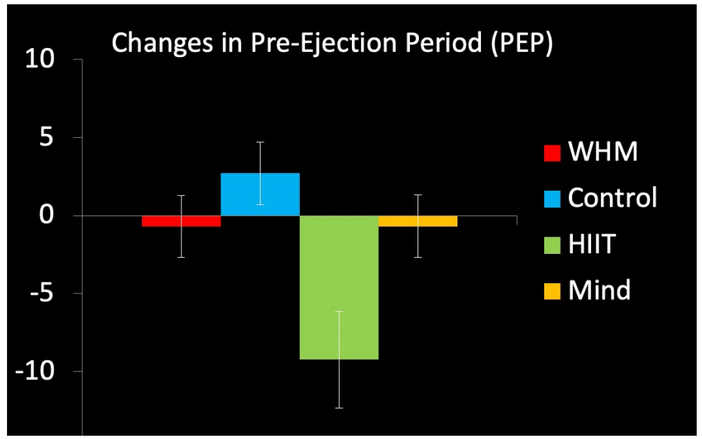
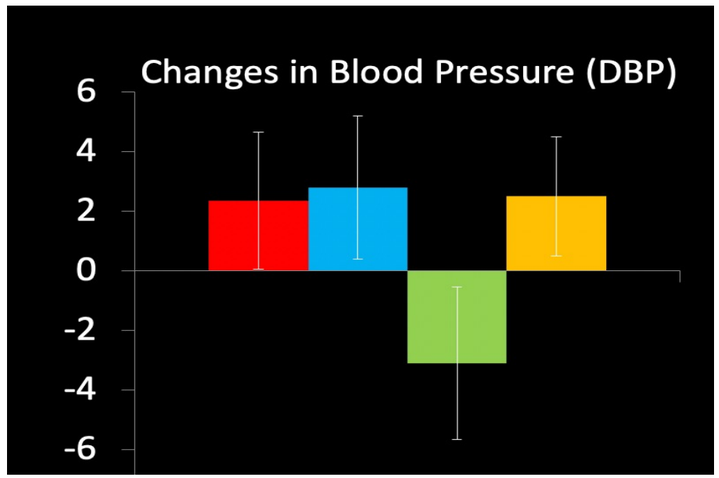
Background: In model organisms, **hormetic stressors**, acute intermittment stressors of moderate intensity, produce stress resilience (enhanced stress responses), the ability for quick recovery, and rejuvenation of cells and tissues. This process is at the heart of cellular aging mechanisms (Epel & Lithgow, 2014; Epel, 2020).

Overview & Innovation: Typically, humans pursue stress reduction and avoid acute stress. Few studies have examined the effects of hormetic stress on human physiological stress reactivity, well being, and biological aging.

Design: We compared two hormetic stress interventions (Wim Hof Method of breathing/cold showers or WHM; and high intensity interval training or HIIT), and compared them to low arousal practices—mindfulness (Mind) and Control condition (breathing 8 breaths per minute). 140 women were randomized to a condition. We assessed blood, impedence cardiography, and acute stress response to a lab stressor, at baseline, and after 3 weeks of daily practice.





PROJECT UPDATE & PRELIMINARY RESULTS: We have completed data collection for our initial trial. We have analyzed acute stress reactivity and well being.

Stress Reactivity: So far, we found that hormetic stress (HIIT but not WHM) improved reactivity profiles, significantly, compared to other groups ($p < .01$). HIIT increased sympathetic activity (PEP), led to strong vagal withdrawal (RSA) and recovery, and lower blood pressure reactivity. Together this profile is characteristic of the resilient stress response of youth, predicts slower brain aging (Jefferson, 2010), and is linked to positive psychological responses to acute stress (Mendes, 2014).

Emotional well being: Hormetic stress (WHM but not HIIT) led to improvements in depressive symptoms and positive emotions, compared to other conditions.

We are continuing to explore how the different interventions may work through different mechanisms to impact stress resilience and well being.

NEXT STEPS: We plan to measure indices of biological aging in this study, as well as how these findings may replicate in a sample of women with clinical depression.

POTENTIAL IMPACT: If hormetic stress can reliably improve our stress response regulation, enhance psychological well being, and slow biological aging, this provides a set of new easily accessible daily rituals that may enhance healthy longevity.

References:
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