Dissertation Abstract

A Biocultural Approach to Understanding How Psychosocial Stress Becomes Biologically Embedded in Health

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Stressful psychosocial experiences can substantially affect health and well-being, a process of biological embedding in which bodies literally incorporate the world we inhabit. This dissertation explored how disruptive social forces, such as racism and war, may leave detectable marks in measurable health metrics, such as blood pressure and newborn birthweight, through molecular mechanisms such as genetic variation and gene expression.

Genetic variation plays a role in the human response to stressful situations, such as unfair treatment. In Chapter 2, I explored how lifetime experiences of unfair treatment interacted with specific genetic markers to impact blood pressure. Utilizing participants from the Jackson Heart Study (n = 2,393), a cohort study of African Americans in the southeastern United States, I observed a significant gene by unfair treatment interaction effect on systolic blood pressure.

I then investigated the intergenerational effects of four stressful maternal exposures (chronic stress, war trauma, sexual violence, and general trauma) on the transcriptome and newborn birthweight. Utilizing samples from participants in the eastern Democratic Republic of Congo (n = 93), I found that maternal stress does not impact gene expression at the level of individual genes, but may impact global gene expression. Specifically, global placental gene expression may mediate part of the negative impact of war trauma on newborn birthweight (Chapter 3). To better understand mothers' experiences, I used an unsupervised machine learning clustering method to identify clusters of maternal stress experiences. Birthweights were significantly different in the clusters, suggesting the impact of social experiences cannot be captured by just one measure of maternal stress but by a more holistic understanding of mothers' lived experiences. I then used a supervised classification method to test how well maternal stress and global gene expression predicted newborns' birthweight quartile and percentile (Chapter 4).

My dissertation highlights the complexities associated with the human experience and demonstrates the utility of taking a biocultural approach to study the process of biological embedding. Future studies should strive to contextualize participants' lives when studying the pathogenesis of complex diseases, particularly diseases with health inequities.

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