Childhood & Later Life Stressors & Increased Inflammatory Gene Expression in Old Age

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However...

- It is often difficult to disentangle the influences of adversity in childhood vs. adulthood.
- We don’t know whether these differences persist into old age.
Examine the associations between stressors experienced in childhood and adulthood, and the quantitative expression level of three cardinal pro-inflammatory genes:
• COX2, also known as prostaglandin-endoperoxide synthase 2, *PTGS2*
• *ILIB*
• *IL8*

We hypothesize that:
• Childhood exposure to adversity will be associated with more pronounced increase in inflammatory gene expression than later life exposures.
• Early life adversity will sensitize inflammatory gene expression to the effects of stress encountered later in life.
DATA

HRS Pilot Sample, 2010

• Randomly selected sample of N=122 participants who had participated in the interview in 2006 or 2008

• Blood samples collected into PAXgene RNA tubes.

• Six mRNA species were assayed by quantitative RT-PCR, including ILIB, IL8, PTGS2 and a housekeeping / normalization marker—ACTB.

• A composite RNA score was calculated as the mean between ILIB, IL8, PTGS2 after subtracting ACTB from each.

• Five adversity variables.
  1. Childhood SES
  2. Childhood Trauma
  3. Childhood Health
  4. Adulthood SES
  5. Adulthood Trauma
### Sample Characteristics (N=114)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (sd)</td>
<td>73.22 (9.55)</td>
</tr>
<tr>
<td>Sex (Female=1), (%)</td>
<td>55.26%</td>
</tr>
<tr>
<td>Race (White=1), (%)</td>
<td>92.16%</td>
</tr>
<tr>
<td>Former Smoker, (%)</td>
<td>54.39%</td>
</tr>
<tr>
<td>Current Smoker, (%)</td>
<td>10.53%</td>
</tr>
<tr>
<td>Obesity, (%)</td>
<td>29.82%</td>
</tr>
<tr>
<td>Drinks per Day, mean (sd)</td>
<td>2.12 (4.51)</td>
</tr>
<tr>
<td>Childhood Trauma, mean (sd)</td>
<td>0.19 (0.44)</td>
</tr>
<tr>
<td>Childhood SES, mean (sd)</td>
<td>1.57 (1.35)</td>
</tr>
<tr>
<td>Childhood Health Conditions, mean (sd)</td>
<td>0.29 (0.62)</td>
</tr>
<tr>
<td>Adulthood Traumas (count), mean (sd)</td>
<td>1.21 (1.08)</td>
</tr>
<tr>
<td>Low Adult SES, (%)</td>
<td>7.02%</td>
</tr>
<tr>
<td>Centered RNA Composite Score, mean (sd)</td>
<td>0 (1.97)</td>
</tr>
</tbody>
</table>
## RESULTS

### Pearson Correlations Between Childhood and Adulthood Adversity

<table>
<thead>
<tr>
<th></th>
<th>Adulthood Traumas</th>
<th>Low Adult SES</th>
<th>Childhood Trauma</th>
<th>Childhood SES</th>
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<tbody>
<tr>
<td>Adulthood Traumas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Adult SES</td>
<td>-0.054</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Childhood Trauma</td>
<td></td>
<td>0.036</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childhood SES</td>
<td>0.183</td>
<td>0.369</td>
<td>0.141</td>
<td></td>
</tr>
<tr>
<td>Childhood Health Conditions</td>
<td>0.040</td>
<td>-0.073</td>
<td>0.183</td>
<td>0.076</td>
</tr>
</tbody>
</table>
RESULTS

P = .025

P = .037
RESULTS

\[ P(\text{interaction}) = 0.034 \]
CONCLUSIONS

Childhood exposure to traumatic events is associated with elevated expression of pro-inflammatory genes in late adulthood.

Childhood trauma may exacerbate the association between gene expression and low SES in adulthood.
  • Early life adversity may increase later life reactivity to stress.
ACKNOWLEDGMENTS

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Steve Cole
David Weir
Self-reported items used to measure adversity

**Childhood SES (Possible Range 0-5)**
- Before age 16, would you say your family during that time was pretty well off financially, about average, or poor? (poor=1)
- Before age 16, was there a time when you or your family received help from relatives because of financial difficulties?
- While you were growing up, before age 16, did financial difficulties ever cause you or your family to move to a different place?
- Mother had less than 9 years of education

**Father had less than 9 years of education**

**Childhood Traumas (Possible Range 0-2)**
- Before you were 16 years old, did either of your parents drink or use drugs so often that it caused problems in the family?
- Before you were 16 years old, were you ever physically abused by either of your parents?

**Childhood Health (Possible Range 0-6)**
- Before you were 16 years old, did you have asthma?
- Before you were 16 years old, did you have diabetes?
- Before you were 16 years old, did you have heart problems?
- Before you were 16 years old, did you have ear problems?
- Before you were 16 years old, did you have severe headaches/migraines?
- Before you were 16 years old, did you have epilepsy/seizures?
- Before you were 16 years old, did you have respiratory problems?
- Before you were 16 years old, did you have hypertension?

**Adulthood Traumas (Possible Range 0-7)**
- Has a child of yours ever died?
- Have you ever been in a major fire, flood, earthquake, or other natural disaster?
- Have you ever fired a weapon in combat or been fired upon in combat?
- Has your spouse, partner, or child ever been addicted to drugs or alcohol?
- Were you the victim of a serious physical attack or assault in your life?
- Did you ever have a life-threatening illness or accident?
- Did your spouse or a child of yours ever have a life-threatening illness or accident?

**Adulthood Low SES (0, 1)**
- Participant had less than 9 years of education