Resilience in Health Disparities

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Poverty and Health

(CDC/Natl Center Health Statistics, 2015)
Poverty in Children

PERCENTAGE OF CHILDREN WHO LIVED IN POVERTY: 2011

The number of poor children continued to climb even as the national unemployment rate was gradually declining.

23%
OR
16.4 MILLION CHILDREN

SOURCE U.S. Census Bureau, 2011 American Community Survey.

(US Census Bureau, 2011)
Poverty and Child Health

(CDC/Natl Center Health Statistics, 2015)
What are the biological mechanisms that explain this relationship?
Inflammation

Cytokines

Stimulus

Cytokine producing cell

Target cell

Effect

Signal

Receptor

Cytokines
Pro-Inflammatory Phenotype

- Excessive inflammatory responses to microbial challenges
- Insensitivity to inhibitory hormonal signals

(Miller, Chen, & Parker, Psych Bull, 2011)
In vitro Testing

Endotoxin (LPS) stimulates Monocytes & Macrophages, leading to the release of Inflammatory Mediators. These mediators, including Cytokines (TNF-α, IL-6, and IL-1β), in turn stimulate Gram Negative Bacteria.
In vitro Testing in Asthma

PMA/INO

Th1
IFN-γ

Th2
IL-4, IL-5, IL-13
Glucocorticoid Sensitivity

- Adrenal Glands → Cortisol Release
- Blocking Inflammation
- Immune Cells
SES & Inflammatory Phenotypes

- Healthy adult sample
- Either low in early life SES (Low EL SES) or high in early life SES (High EL SES)
- Peripheral blood mononuclear cell production of IL-6 following stimulation with flagellin
SES & Microbial Responses

Stimulation by Flagellin

![Graph showing IL-6 levels (pg/ml) for Low EL SES and High EL SES](image)

F=3.97, p<.05

(Miller, Chen, et al., PNAS, 2009)
SES & Asthma Immune Processes

- Children ages 9-17 physician-diagnosed with asthma
- Family SES interview with parent
- Asthma immune processes
  Th-2 cytokines following PMA/INO stimulation
  Glucocorticoid sensitivity: Th-2 cytokine responses to PMA/INO + cortisol
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<tr>
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<th>Th-2 cytokine responses</th>
<th>PMA/INO</th>
<th>PMA/INO + Cortisol</th>
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<td>Age</td>
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<td>Gender</td>
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<td>Ethnicity</td>
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<td>Beta agonist use</td>
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<td>Inhaled corticosteroid use</td>
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<td>Family SES</td>
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(Chen,…Miller., Psychosom Med, 2016)
Biological Mechanisms

Low SES associated with:

- More aggressive inflammatory responses
- Less sensitivity to cortisol’s anti-inflammatory signals

both in healthy individuals and in those with a chronic illness
Health-Related Resilience
What psychosocial factors protect low SES youth from poor health outcomes?
Buffering Factors

- Individual level: Shift-and-persist
- Family level: Nurturant parenting
Shift-and-Persist

Shifting
- Accepting a situation
- Adjusting the self

Persisting
- Finding meaning
- Maintaining optimism
- New ways to get to goals

(Chen & Miller, Persp Psych Sci, 2012)
Shift-and-Persist

Combination important for physical health resilience in low SES

- Reduces physiological responses acutely
- Slows down longer-term pathogenic processes

(Chen & Miller, Persp Psych Sci, 2012)
SAP & Healthy Adolescents

- Healthy teenagers ages 14-18
- Family SES interview with parent
- Shift-and-persist questionnaire
  - Shift (e.g., “I think about the positives that can come from stressful situations”)
  - Persist (e.g., “I believe there is a larger reason for my life”)
- Pro-Inflammatory Phenotype
  - Glucocorticoid sensitivity (LPS + cortisol)
  - Low-grade inflammation
Better Sensitivity to Cortisol with Shift and Persist in Low SES Youth

Interaction: \( \beta = .21, p < .05 \)

(Chen, McLean, & Miller, Psychosom Med, 2015)
Lower Inflammation with Shift and Persist in Low SES Youth

Interaction: $\beta = .18, p < .05$

(Chen, McLean, & Miller, Psychosom Med, 2015)
SAP & Children with Asthma

- Children ages 9-18 physician diagnosed with asthma
- Family SES interview with parent
- Shift-and-persist questionnaire
- Asthma immune processes
  Th-2 cytokine responses to PMA/INO
- Asthma clinical outcomes
  Rescue inhaler use (over 6 month period)
  School absences (over 6 month period)
Lower Inflammation with Shift and Persist in Low SES Youth

Asthma inflammation composite (standardized scores)

Shift-and-Persist

Interaction: $\beta = .19$, $p < .05$

(Chen, ... Miller, J Allergy & Clin Immunol, 2011)
Lower Inflammation with Shift and Persist in Low SES Youth

Low SES                    High SES

(Asthma inflammation composite)

(Chen,…Miller, J Allergy & Clin Immunol, 2011)
Less Asthma Impairment with Shift and Persist in Low SES Youth

Interaction: \( \beta = .32, p < .01 \)

(Chen, ... Miller, J Allergy & Clin Immunol, 2011)
Less Asthma Impairment with Shift and Persist in Low SES Youth

Low SES

High SES

(Asthma impairment (residualized scores)

(Chen,…Miller, J Allergy & Clin Immunol, 2011)
Shift-and-persist buffers lower SES children from detrimental inflammation and asthma outcomes
Nurturant Parenting

- Associated with better psychological adjustment, social competence, and fewer behavioral problems (Yates, 2003; Klein & Forehand, 2000)

- Animal research shows that high maternal licking/grooming buffers rats from elevated physiological responses to stressors as adults (Liu, 1997; Frances, 1999)
Nurturant Parenting

(Evans et al., Dev Psych, 2007)
Parenting Intervention

- Low SES African American mothers + 11 year old child
- Random assignment to SAAF or control group
  SAAF: Strong African American Families parenting intervention
  Control: 3 flyers on child development
- Outcomes
  Pro-inflammatory cytokines at age 19
Reduced Inflammation in Youth Who Received Intervention

F=41.46, p<.001

F=51.04, p<.001

(Miller,…Chen, PNAS, 2014)
Nurturant parenting buffers low SES African American youth from heightened inflammation.
Resilience: % of High School Grads Who Go On to College

(Natl Center for Education Stats, 2012)
What are the physical health consequences of resilience?
To succeed in the face of adversity, youth need high levels of self-regulation (Brody et al., 2012; Masten, 2007)

Sustained efforts at self-regulation may take a physiological toll over time (Evans, 2013)
Costs of High Self-Control?

- Sample of African American adolescents
- Family poverty measures
- Teacher ratings of child self-control ages 11-13
- Outcomes at age 19
  - Externalizing behaviors
  - Allostatic load
Skin-Deep Resilience

Interaction: $\beta = -0.09$, $p < 0.05$

Interaction: $\beta = 0.12$, $p < 0.01$

(Brody et al., Psych Sci, 2013)
SDR with a Clinical Outcome

- Add Health: 14,167 adolescents ages 12-20 (White, Black, Hispanic)
- Family disadvantage
- College attendance (yes/no)
- Depressive symptoms at age 24-32
- Metabolic syndrome at age 24-32
Interaction ORs:
Whites=1.09, n.s.
Blacks=1.53, p<.01
Hispanics=2.01, p<.01

(Gaydosh et al., PNAS in press)
Skin-Deep Resilience

Low SES youth of color who exhibit high levels of striving have good mental health outcomes but are at risk for poor physical health.
Summary

- Inflammatory mechanisms help explain SES-health associations
- Shift-and-persist and parental nurturance can buffer low SES youth from poor health outcomes
- Low SES youth of color who strive hard to succeed are at risk for skin-deep resilience