Race-Related Stress and Academic Disparities: New Models and Mechanisms

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Northwestern University
Outline

• Background
  – Racial Disparities in Attainment, Race-Based Stress

• Theoretical Model
  – Role of Race-based Stress and Stress Biology in Academic Outcomes

• Data from 20-Year Longitudinal Study
  – On Hx of Racial Discrimination, Stress and Attainment

• Discussion, Questions and Suggestions?
Racial Disparities in Academic Attainment

• Disparities between whites and racial/ethnic minorities are observed on a number of educational and attainment indicators including:
  – test-performance
  – high school graduation rates
  – college graduation rates
  – adult employment and income
  (Burchinal et al., 2011; Snyder & Dillow, 2012; Reardon, 2011).

• Black-White differences in test scores have declined over the past 70 years but still remain substantial, hovering around .5-.6 SD units
  (Reardon, 2011).
Black-White Gaps in Reading (from Reardon, 2011)

Trends in Income and Black-White Gaps in Reading, 1943-2001 Cohorts

Black-White Gaps in Math (from Reardon, 2011)


Note: Solid symbols represent 90/10 income achievement gaps; hollow symbols denote black-white achievement gaps. See note 6 and online appendix section 5.A5 for further details.
Race-Related Stress

• Multiple forms of race-related stress exist
  – Some exist due to confounding of minority race and lower income
    • Stress associated with individual and family poverty
    • Stress associated with impoverished and lower quality neighborhood and school environments

• Some exist independent of income
  • Specifically due to being a member of a disadvantaged racial/ethnic minority group
  • We will refer to these as “race-based” stress
Race-based Social Stress

- **Perceived discrimination** = the observation or anticipation of unfair treatment based on race/ethnicity

  - In nationally representative data comparing perceptions of discrimination by blacks and whites, 24.8% of blacks believe themselves to “often” be the target of everyday discrimination vs. only 3.4% of whites (Kessler et al., 1999)

  - Black and Latino adolescents more likely than their Asian and non-Hispanic White peers to report being the victims of discrimination (Fisher et al., 2000)
Race-based Social Stress

• **Stereotype threat** = the stress of wanting to perform well to overcome negative expectations of one’s racial/ethnic group
  – Racial/Ethnic Minority youth aware of negative stereotypes that link their racial/ethnic identities to low intellectual ability
  – Activation of negative stereotypes leads to increased stress and cognitive load (Beilock et al., 2007; Schmader et al., 2008)
Race-based Social Stress

• The past few years have seen increased media and policy attention to issues and impacts of racial discrimination, in institutions ranging from law enforcement to higher education.
• These issues and institutional responses to them have caused further stress among minority youth and adults.
Hypothesis

• Given that the racial/ethnic (and esp. black-white) achievement gap is not fully explained by:
  – Socioeconomic factors, such as family income
  – Structural factors, such as school, teacher, and neighborhood quality

• We propose that:
  – The *psychological stress* associated with being a member of a racial/ethnic minority group
  – and the behavioral and *biological responses* elicited by that stress may be one factor contributing to the black-white achievement gap

  – Developmental histories of race-based stress and stress-system dysregulation are important
    • Sensitive period effects
Adolescence as Sensitive Period for the Impact of Race-based Stress

- Experiences of race-based social stress may be particularly impactful during adolescence.

- Adolescence is a developmental period where ability to perceive discrimination and inequality becomes more salient.

- Sensitive period for long-term effects of stress, due to rapidly changing social contexts, social identities, and biological systems

Finkelstein, Kubzansky, Capitman, & Goodman, 2007; Krueger & Chang, 2008

Adam et al., 2015

Image: http://isreview.org/issue/96/black-lives-matter
Note- all graphics [unless noted] are from pixelbay-- free image high res site that doesn't require attributions

Emily Hittner, 2/27/2016
Stress-Sensitive Biological Systems

- Multiple interrelated biological stress systems exist
- I focus on two that:
  - show variations by race/ethnicity
  - show impacts on cognition/learning and health

1) Hypothalamic pituitary adrenal axis (HPA axis)
   - affected by stress, particularly social stress
   - acute stress -> acute increases in hormone cortisol
   - chronic stress -> changes in diurnal patterns of cortisol
   - Blacks, Hispanics have less pronounced cortisol rhythms across day

2) Sleep
   - affected by stress – is a “vigilance” system
   - acute and chronic stress -> shorter sleep, lighter sleep
   - Blacks sleep approximately 30 minutes less per night (PSID time diary data)

-> Stress-related changes in both of these systems have implications for attention, memory and executive functioning (cognitive control processes)
RACE-BASED DISPARITIES IN STRESS AND SLEEP IN CONTEXT MODEL (RDSSC MODEL)

Developmental History and Recent Race-based Social Stress
Perceived Discrimination, Stereotype Threat

Developmental History and Recent Socioeconomic Status (SES)-based Social Stress
Daily Life Stressors (e.g. Family Conflict, Financial Stress)
Community Stresses (e.g. School and Neighborhood Stress)

Resources
Individual, School, Family and Community
Resources/Social Supports/Role Models

Perceived Stress
Stressors and Resources

- Developmental History and Recent Race-based Social Stress
  - Perceived Discrimination, Stereotype Threat
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Perceived Stress

Stress Responses

- Coping Responses
  - Devaluation & Disidentification
  - Emotion Regulation
- Negative Emotion
  - Anxiety, anger, sadness
- Basal Activity and Reactivity of Stress-Sensitive Biological Systems
  - HPA Axis Activity
  - Sleep Hours and Quality
- Educational Aspirations/Identity/Motivation
- Attention/Memory/Executive Functioning
Stressors and Resources

- Developmental History and Recent Socioeconomic Status (SES)-based Social Stress
  - Daily Life Stressors (e.g. Family Conflict, Financial Stress)
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Basal Activity and Reactivity of Stress-Sensitive Biological Systems
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Educational Aspirations/Identity/Motivation

Attention/Memory/Executive Functioning
Academic Performance and Attainment

Coping Responses
Devaluation & Disidentification
Emotion Regulation

Developmental History and Recent Race-based Social Stress
Perceived Discrimination, Stereotype Threat

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Negative Emotion
Anxiety, anger, sadness

Basal Activity and Reactivity of Stress-Sensitive Biological Systems
HPA Axis Activity
Sleep Hours and Quality

Attention/ Memory/ Executive Functioning

Educational Aspirations/ Identity/ Motivation

Outcomes

Academic Performance and Attainment
Physical and Mental Health

Educational and Workforce Disparities
Testing the Model

• Beginning to gather more evidence for elements of this model

• Today, will present data from a 20-year longitudinal study on:

A. Developmental histories of perceived discrimination
   -> Adult cortisol patterns
   -> Adult academic attainment

B. Racial/ethnic resources (R/E identity and heritage) that protect against or reduce associations between perceived racial discrimination (PRD) and these outcomes
Cortisol Diurnal (Daily) Rhythm and Reactivity

Time of Day

Waketime to Bedtime

Cortisol Diurnal Rhythm

Cortisol Stress Response
Cortisol Response to Chronic Stress

-> Flatter Diurnal Cortisol Rhythm

![Graph showing cortisol levels at different times](https://example.com/graph.png)

- **Typical diurnal rhythm**
- **Rhythm Under Chronic Stress**

**Sampling Time**

- Wake
- Wake + 40 min
- Wake + 3 hours
- Wake + 8 hours
- Wake + 12 hours
- Bedtime

**Cortisol (ug/dl)**

- 0.0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
Adolescent Stress, Negative Emotion and Flatter Diurnal Cortisol Rhythm

Cortisol (µg/dl)

- Wake
- Wake + 40 min
- Wake + 3 hours
- Wake + 8 hours
- Wake + 12 hours
- Bedtime

Sampling Time

Chronic Loneliness
Chronic Peer and Family Stress/Conflict
High Negative Life Events
Chronic Negative Emotion
Low Hours of Sleep
Recent Perceived Discrimination

Adam et al. (2015), Doane and Adam (2010), Hauner et al., (2008),
Doane et al. (2010), Doane et al. (2014), Zeiders et al. (2015), Zeiders et al., 2010
Racial/ethnic differences in cortisol across the waking day in adolescents

• Flatter diurnal cortisol slopes across the day for blacks and hispanic adolescents

DeSantis et al., 2007, JAH
Average Racial/ethnic Differences in Cortisol Rhythms across a 5-year Period in Older Adults

(DeSantis et al., 2015)
Race-based Stress and Cortisol

• Racial differences in cortisol are significant covarying the effects of:
  – Income
  – Health behaviors
  – Life events stress
  – Daily hassles
  – Recent perceived discrimination

• We argue that stress specific to race/ethnicity (race-based social stress) plays a role

• And that DEVELOPMENTAL HISTORIES of race-based stress (not just recent race-based stress) are important
Maryland Adolescent Development in Context Study (MADICS)

• Prospective study of over 1400 adolescents in Prince Georges County, Maryland
  – First recruited in 7th grade: 12 years old
  – Followed for 20 years: age 32 at latest wave
  – 8 waves of data collection

• Subset invited to participate in study of perceived racial discrimination and adult stress biomarkers
  – 124 Participants, selected for high and low histories of perceived racial discrimination
    • 59 Black, 65 White
    • 50 male, 74 female

Differences Between Sub-sample and Larger Sample on Income, Parent Education, %Black, and PRD (Adolescent and Young Adult)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sub-sample</th>
<th>Full sample</th>
<th>t(df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M (SD)$</td>
<td>$M (SD)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income Wave 1</td>
<td>11.02 (3.84)</td>
<td>9.94 (4.25)</td>
<td>-2.80</td>
<td>.006</td>
</tr>
<tr>
<td>Parent Education Wave 1</td>
<td>14.56 (2.58)</td>
<td>13.77 (2.43)</td>
<td>-3.30</td>
<td>.001</td>
</tr>
<tr>
<td>Black (%)</td>
<td>44.6% (.50)</td>
<td>68.7% (.46)</td>
<td>4.91</td>
<td>.000</td>
</tr>
<tr>
<td>PRD Adolescent</td>
<td>1.36 (.51)</td>
<td>1.49 (.65)</td>
<td>2.28</td>
<td>.024</td>
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<tr>
<td>PRD Young Adult</td>
<td>1.82 (.58)</td>
<td>1.90 (.72)</td>
<td>1.23</td>
<td>.221</td>
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</table>
## Sample and Neighborhood Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>Black Sample</th>
<th>White Sample</th>
<th>Comparison</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean (or %)</td>
<td>Mean (or %)</td>
<td>Mean (or %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>SD</td>
<td>SD</td>
<td></td>
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<tr>
<td>Mean (or %) SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (percent)</td>
<td>60.71</td>
<td>64.00</td>
<td>58.06</td>
<td>-0.63</td>
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<tr>
<td></td>
<td>49.06</td>
<td>48.49</td>
<td>49.75</td>
<td>0.527</td>
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<tr>
<td>W1 Income (in 000's of $)</td>
<td>51.21</td>
<td>46.60</td>
<td>54.92</td>
<td>2.26</td>
</tr>
<tr>
<td></td>
<td>19.69</td>
<td>22.92</td>
<td>22.02</td>
<td>0.026</td>
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<tr>
<td>Parent Education (percentages)a</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Less than HS</td>
<td>21.43</td>
<td>35.14</td>
<td>10.64</td>
<td>-2.81</td>
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<tr>
<td></td>
<td>41.28</td>
<td>48.40</td>
<td>10.64</td>
<td>0.006</td>
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<tr>
<td>HS diploma</td>
<td>23.81</td>
<td>35.14</td>
<td>14.89</td>
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<td></td>
<td>42.85</td>
<td>48.40</td>
<td>35.99</td>
<td>0.031</td>
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<td>Some college</td>
<td>27.38</td>
<td>16.22</td>
<td>36.17</td>
<td>2.06</td>
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<tr>
<td></td>
<td>44.86</td>
<td>16.22</td>
<td>48.57</td>
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<td>College or more</td>
<td>27.38</td>
<td>13.51</td>
<td>38.30</td>
<td>2.60</td>
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<tr>
<td></td>
<td>44.86</td>
<td>34.66</td>
<td>49.14</td>
<td>0.011</td>
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<tr>
<td>W3 friends that are Blacka</td>
<td>3.08</td>
<td>4.08</td>
<td>2.23</td>
<td>-8.87</td>
</tr>
<tr>
<td></td>
<td>1.33</td>
<td>0.16</td>
<td>0.13</td>
<td>0.000</td>
</tr>
<tr>
<td>W3 friends that are Whitea</td>
<td>2.87</td>
<td>1.78</td>
<td>3.81</td>
<td>11.83</td>
</tr>
<tr>
<td></td>
<td>1.29</td>
<td>0.11</td>
<td>0.13</td>
<td>0.000</td>
</tr>
<tr>
<td>W3 Neighborhood school quality</td>
<td>2.97</td>
<td>3.15</td>
<td>2.80</td>
<td>-1.95</td>
</tr>
<tr>
<td>(scale 1-4)</td>
<td>0.83</td>
<td>0.70</td>
<td>0.91</td>
<td>0.054</td>
</tr>
<tr>
<td>W3 Neighborhood safety (scale 1-3)</td>
<td>2.63</td>
<td>2.53</td>
<td>2.72</td>
<td>1.84</td>
</tr>
<tr>
<td></td>
<td>0.51</td>
<td>0.55</td>
<td>0.45</td>
<td>0.069</td>
</tr>
<tr>
<td>W3 Percent Black HH in neighborhood</td>
<td>39.17</td>
<td>60.49</td>
<td>20.56</td>
<td>-8.81</td>
</tr>
<tr>
<td></td>
<td>30.36</td>
<td>26.92</td>
<td>2.53</td>
<td>0.000</td>
</tr>
<tr>
<td>W4 Percent Black students in school</td>
<td>65.78</td>
<td>76.61</td>
<td>55.83</td>
<td>-559.38</td>
</tr>
<tr>
<td></td>
<td>18.72</td>
<td>14.70</td>
<td>16.45</td>
<td>0.000</td>
</tr>
<tr>
<td>W8 Age</td>
<td>32.36</td>
<td>32.35</td>
<td>32.37</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>0.44</td>
<td>0.41</td>
<td>0.47</td>
<td>0.844</td>
</tr>
<tr>
<td>W8 Income (in 000's of $)</td>
<td>76.34</td>
<td>77.16</td>
<td>75.67</td>
<td>-0.17</td>
</tr>
<tr>
<td></td>
<td>45.63</td>
<td>45.16</td>
<td>46.36</td>
<td>0.864</td>
</tr>
</tbody>
</table>

*(1=none of them 2=a few of them 3=about half of them 4=most of them 5=all of them)*
Longitudinal data collection

Adolescence

Wave 1
- 7th grade
- 1991
- Age 12
- 1 PRD Q

Wave 3
- 8th grade
- 1993
- Age 13
- 8 PRD Q’s

Wave 4
- 11th grade
- 1996-97
- Age 16-17
- 8 PRD Q’s

Wave 5
- 1 yr after High School
- 1998, Age 19
- 3 PRD Q’s

Wave 6
- 3 yrs after High School
- 2000, Age 21
- 6 PRD Q’s

Biomarker Data, Adult Attainment and Health

Perceived Racial Discrimination (PRD) and Ethnic Identity

Demographics
(Race/ethnicity, sex, income, grades)
Perceived Racial Discrimination

• Example Questions:
  – Wave 4: How often do you feel that you get disciplined more harshly by teachers than other kids because of your race?
  – Wave 6: At work, how often have you experienced what you perceived as racist behavior or treatment?

• 3 different outcome variables:
  – Cumulative PRD (Waves 3-7)
  – Adolescent PRD (Waves 3-4)
  – Young Adult PRD (Waves 5-7)
Biomarker Data Collection
(Wave 8, age 32)

• Salivary Cortisol
  – At wakeup, 30 min after waking, bedtime
  – Every day for 7 days
  – Samples assayed for cortisol

• Used 3-level multilevel models to:
  – Model shape of diurnal cortisol rhythm for each person (L1)
  – Predict aspects of daily rhythm from day (L2) and person (L3)
    level variables including perceived discrimination
### Results – Perceived Racial Discrimination (in SD units)

<table>
<thead>
<tr>
<th></th>
<th>Black (N=59)</th>
<th>White (N=65)</th>
<th>Difference</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent Discrimination</td>
<td>.215</td>
<td>-.174</td>
<td>.39 SDs</td>
<td>-2.08</td>
<td>.040</td>
</tr>
<tr>
<td>Young Adult Discrimination</td>
<td>.553</td>
<td>-.446</td>
<td>1.0 SDs</td>
<td>-6.04</td>
<td>.000</td>
</tr>
<tr>
<td>Cumulative Discrimination</td>
<td>.468</td>
<td>-.377</td>
<td>.85 SDs</td>
<td>-4.88</td>
<td>.000</td>
</tr>
</tbody>
</table>
Results

• Find significant racial-ethnic differences in diurnal cortisol rhythms
  – lower waking levels and flatter slopes for blacks

• 37% of racial differences in waking cortisol, and 38% of racial differences in diurnal cortisol slope accounted for by PRD

-> How do adolescent and adult exposure to PRD compare in predicting adult cortisol?
Results. Adolescent Perceived Racial Discrimination and Adult Cortisol (Age 32)
Results. Adolescent Perceived Racial Discrimination and Adult Cortisol (Age 32)

- Flatter diurnal cortisol slope in both blacks and whites with high PRD.
- Low waking and average cortisol in blacks with high adolescent PRD.
Results. Adult Perceived Racial Discrimination and Adult Cortisol (Age 32)

Higher CAR in low PRD whites
Why do we care about low, flat cortisol?

Are LOW AUC cortisol, and a flatter diurnal cortisol slope problematic?
Simple Correlations between Adult Cortisol Levels and Adult Academic Attainment/Health outcomes within the MADICS sample

<table>
<thead>
<tr>
<th></th>
<th>AUC cortisol</th>
<th>Cortisol Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>.325*</td>
<td>-.415**</td>
</tr>
<tr>
<td>College Grad</td>
<td>.355*</td>
<td>-.031</td>
</tr>
<tr>
<td>General Health</td>
<td>.135</td>
<td>-.304*</td>
</tr>
<tr>
<td>Depression</td>
<td>-.054</td>
<td>-.335*</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-.290*</td>
<td>-.433**</td>
</tr>
</tbody>
</table>

$+ = p < .10$; $* = p < .05$; $** = p < .01$

Plus, meta-analysis of 77 studies supports negative associations with a wide variety of health outcomes (Adam, Gilbert, Quinn, Tavernier and McQuillan, *in preparation*).
for blacks only
Emily Hittner, 2/29/2016

Need to pull label from other dataset- what does gen health equal? "rate overall physical health"?
Emily Hittner, 2/29/2016
Protective factors against low cortisol?

What factors protect or reduce the negative effects of PRD on cortisol?
Protective factors against low cortisol?

Strong Racial/Ethnic Identity, Particularly in Early Adulthood (Weaker effects for Adolescence)

What factors protect or reduce the negative effects of PRD on cortisol?
Scales

**Family Tradition Scale** (4 items, $\alpha = .673-.748$)
- E.g. How often do you talk in the family about your racial background

**Ethnic Heritage Scale** (4-items, $\alpha = .725-.808$)
- E.g. People of my race/ethnicity have a culturally rich heritage

**Racial Importance Scale** (3 items, $\alpha = .632-.745$)
- E.g. How proud are you of your racial background?
Adolescent PRD, YA Ethnic Heritage

E.g., “People of my race/ethnicity have a culturally rich heritage.”

<table>
<thead>
<tr>
<th></th>
<th>$\beta$ (Model 3)</th>
<th>$\beta$ (Model 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRD Adolescent</td>
<td>-.459**</td>
<td>-.401*</td>
</tr>
<tr>
<td>Ethnic Heritage_Adolescent</td>
<td>.508**</td>
<td>.497**</td>
</tr>
<tr>
<td>PRD X Ethnic Heritage</td>
<td>-</td>
<td>-.082 (ns)</td>
</tr>
</tbody>
</table>

![Graph showing Mean AUC for Low and High PRD and Ethnic Heritage categories]
Adolescent PRD, YA Racial Importance

E.g., “How proud are you of your racial/ethnic background?”

<table>
<thead>
<tr>
<th></th>
<th>$\beta$ (Model 3)</th>
<th>$\beta$ (Model 4)</th>
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<tbody>
<tr>
<td>PRD Adolescent</td>
<td>-.432**</td>
<td>-.397+</td>
</tr>
<tr>
<td>Racial Importance_{Adolescent}</td>
<td>.510**</td>
<td>.496**</td>
</tr>
<tr>
<td>PRD X Racial Importance</td>
<td>-</td>
<td>-.043 (ns)</td>
</tr>
</tbody>
</table>

![Graph showing Mean AUC for Low and High PRD across Low and High Racial Importance](image_url)
• N = 307, both blacks and whites
• Preliminary; don’t snap or tweet
## Simple Correlations between PRD and Adult Academic Attainment

<table>
<thead>
<tr>
<th></th>
<th>Adolescent PRD</th>
<th>Young Adult PRD</th>
<th>Average PRD</th>
</tr>
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<tbody>
<tr>
<td>Education Level</td>
<td>-.472**</td>
<td>-.019</td>
<td>-.270+</td>
</tr>
<tr>
<td>HS Grad</td>
<td>-.279+</td>
<td>-.031</td>
<td>-.177</td>
</tr>
<tr>
<td>College Grad</td>
<td>-.451**</td>
<td>-.037</td>
<td>-.265+</td>
</tr>
<tr>
<td>Income ~age 30</td>
<td>-.394**</td>
<td>-.363*</td>
<td>-.447**</td>
</tr>
</tbody>
</table>

+ = $p < .10$; * = $p < .05$; ** = $p < .01$
College Graduation Rates by Race and Adolescent Perceived Discrimination

• Overall college graduation: 65%

  Blacks: 63%  \[ \chi^2 = 0.06, p = 0.80 \text{ (n.s.)} \]
  Whites: 65%  

Below Median Adolescent PRD: 75%
Above Median Adolescent PRD: 55%  \[ \chi^2 = 4.35, p = 0.03 \]
Adolescent PRD, Adolescent Family Traditions

College Grad \textsubscript{YoungAdult} = Black + Gender + Income\textsubscript{1} + Parent Education + GPA\textsubscript{1} + PRD\textsubscript{Adolescent} + Family Traditions\textsubscript{Adolescent} + e

E.g., “How often do you talk in your family about your racial background?”

<table>
<thead>
<tr>
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<th>Exp(B)</th>
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+1 SD higher adolescent PRD: ~ \textbf{44\% lower odds} of college graduation
+1 SD higher adolescent family traditions \textbf{1.5X higher odds} of college graduation
Emma - check this interpretation
Royette Tavernier, 4/19/2016
## Adolescent PRD, Adolescent Ethnic Heritage

College Grad \(_{\text{YoungAdult}}\) = Black + Gender + Income\(_1\) + Parent Education + GPA\(_1\) + PRD\(_{\text{Adolescent}}\) + Ethnic Heritage\(_{\text{Adolescent}}\) + e

E.g., “People of my race/ethnicity have a culturally rich heritage.”

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+1 SD higher adolescent PRD: ~ 42% lower odds of college graduation
+1 SD higher adolescent ethnic heritage: 1.3X greater odds of college graduation
Emma - check this interpretation
Royette Tavernier, 4/19/2016
Adolescent PRD, Young Adult Family Traditions

College Grad_{Young Adult} = Black + Gender + Income_{1} + Parent Education + GPA_{1} + PRD_{Adolescent} + Family Traditions_{Young Adult} + \epsilon

E.g., “How often do you talk in the family about your racial background?”

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+1 SD higher adolescent PRD: ~41% lower odds of college graduation
+1 SD higher young adult family traditions: 1.5X greater odds of college graduation
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</tbody>
</table>
Adolescent PRD, Young Adult Ethnic Heritage

College Grad \(_{\text{YoungAdult}} = \text{Black} + \text{Gender} + \text{Income}_1 + \text{Parent Education} + \text{GPA}_1 + \text{PRD}_\text{Adolescent} + \text{Ethnic Heritage}_\text{YoungAdult} + e\)

E.g., “People of my race/ethnicity have a culturally rich heritage.”

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+1 SD higher adolescent PRD: ~ 40% lower odds of college graduation
+1 SD higher young adult ethnic heritage: 1.5X greater odds of college graduation
Emma - check this interpretation
Royette Tavernier, 4/19/2016
Summary

- High adolescent PRD strongly predicts dysregulated adult cortisol rhythms and reduced rates of college graduation.

- Having rich family and community traditions related to race/ethnicity during adolescence and especially young adulthood is associated with better-regulated stress biology and higher college graduation rates.
Discussion

• With further evidence, supports idea that policy and intervention efforts should help to reduce exposure to discrimination, particularly in adolescence.

• But promotion of positive racial identities and support of rich cultural traditions will also help, in protecting stress biology, and for academic attainment.
Questions?

ek-adam@northwestern.edu
@emmakadam
Extra Slides
## Summary of Protective Factors

<table>
<thead>
<tr>
<th></th>
<th>Low Adult Cortisol</th>
<th>College Graduation</th>
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<tbody>
<tr>
<td><strong>Adolescent</strong></td>
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<tr>
<td>Family Traditions</td>
<td>![Image of cortisol molecule]</td>
<td>![Image of graduate]</td>
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<tr>
<td>Racial Importance</td>
<td>![Image of cortisol molecule]</td>
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<tr>
<td>Ethnic Heritage</td>
<td>![Image of cortisol molecule]</td>
<td>![Image of graduate]</td>
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</tbody>
</table>
3-Level Multilevel Model

- Moment Level: \( \text{Cortisol} = \pi_0 + \pi_1 \text{Time Since Waking} + \pi_2 \text{Time Since Waking}^2 + \pi_3 \text{CAR} + e_i \)

- Day Level: \( \pi_0 \text{ to } \pi_3 = b_{i0} + b_{ij} \text{Day Level Controls} + r_{ij} \)

- Person Level: \( b_{i0} \text{ to } b_{ij} = g_{ij0} + g_{ij1} \text{Race/ethnicity} + g_{ijk} \text{SES} + g_{ijk} \text{PRD} + g_{ijk} \text{Person Level Controls} + u_{ijk} \)

- Person Level with Moderators: \( b_{i0} \text{ to } b_{ij} = g_{ij0} + g_{ijk} \text{R/E} + g_{ijk} \text{Person Level Controls} + g_{ijk} \text{PRD} + g_{ijk} \text{Ethnic Identity} + g_{ijk} (\text{Ethnic Identity} \times \text{PRD}) + u_{ijk} \)

- \( \pi_0 \) = waking cortisol level
- \( \pi_1 \) = steepness of linear diurnal cortisol decline
- \( \pi_3 \) = size of the CAR, post-awakening cortisol surge
PRD Items: Waves 3 & 4

How often do you feel...

• That teachers call on you less because of your race?
• That teachers grade you harder than they grade other kids because of your race?
• That you get disciplined more harshly by teachers than other kids because of your race?
• That teachers think you’re less smart because of your race?
• That teachers/counselors discourage you from taking certain class because of your race?
• Like you are not picked for certain teams or other school activities because of your race?
• That you get in fights with some kids because of your race?
• That kids do not want to hang out with you because of your race?

Cronbach’s Alpha of 0.861 across all W3-4 measures
PRD Items: Waves 5 & 6

Wave 5 & 6

• I feel harassed at my job because of my race.
• I feel harassed at my school because of my race.
• Instructors treat me badly because of my race.

Wave 6 Only

• At work, how often have you experienced what you perceived as racist behavior or treatment?
• At work, how often have you heard your ethnic group referred to in a derogatory way?
• In your classes, how often have you heard your ethnic group referred to in a derogatory way?

Respondents only answered school- or work-based questions, not both
PRD Items: Wave 7

Wave 7

- I feel harassed at my job because of my race. [Same as Wave 5-6 question.]
- Discrimination because of your race/ethnicity has kept you from advancing in your career.
- Discrimination because of your race/ethnicity has kept you from getting the education you wanted.
- How much do you think you are discriminated against because of your race/ethnicity?

Cronbach’s Alpha

- 0.778 across all waves
- 0.719 across adulthood waves only