

Supplemental Materials

Index

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|---|-----------|
| Supplementary Results | Pages 2–4 |
| Figure 1: Cardiac Output Reactivity..... | Page 4 |
| Figure 2: Total Peripheral Resistance Reactivity..... | Page 5 |
| Experimental Manipulations | Page 6 |
| Diagnostic Exam | Page 7 |

Results

Cardiac Output. We hypothesized that in the diagnostic condition, lower SES students would exhibit cardiovascular patterns consistent with threat states (lower CO), whereas higher SES students would exhibit cardiovascular patterns consistent with challenge states (higher CO). In line with these predictions, we observed a significant condition \times SES interaction on CO reactivity, $F(1, 92) = 4.34$, $b = 0.14$, $CI_{95\%} = [0.08, 0.21]$, $t(92) = 4.33$, $p < .001$, $R^2 = 0.25$. In the diagnostic condition, SES was significantly related to CO reactivity, such that higher SES was associated with higher CO, $b = 0.11$, $CI_{95\%} = [0.07, 0.15]$, $t(92) = 4.96$, $p < .001$. In contrast, SES was not significantly associated with CO in the control condition, $b = -0.03$, $CI_{95\%} = [-0.08, 0.18]$, $t(92) = -1.23$, $p = .221$. Analyses of simple effects revealed significant differences by condition among lower SES students ($-1 SD$), such that lower SES students exhibited lower CO in the diagnostic condition compared to the control condition, $b = -0.68$, $CI_{95\%} = [-1.13, -0.23]$, $t(92) = -3.01$, $p = .003$. In contrast, higher SES students ($+1 SD$) exhibited significantly higher CO in the diagnostic condition than in the control condition, $b = 0.70$, $CI_{95\%} = [0.24, 1.14]$, $t(92) = 3.04$, $p = .003$. In sum, under SES-based social identity threat, lower SES students exhibited greater relative threat reactivity, while higher SES students exhibited greater relative challenge reactivity.

Total Peripheral Resistance. We hypothesized that in the diagnostic condition, lower SES students would exhibit cardiovascular patterns consistent with threat states (higher TPR), whereas higher SES students would exhibit cardiovascular patterns consistent with challenge states (lower TPR). Consistent with these predictions, we observed a significant condition \times SES interaction on TPR reactivity, $F(1, 88) = 9.83$, $b = -14.52$, $CI_{95\%} = [-20.82, -8.22]$, $t(88) = -4.58$, $p < .001$, $R^2 = 0.44$. In the diagnostic condition, SES was negatively related to TPR

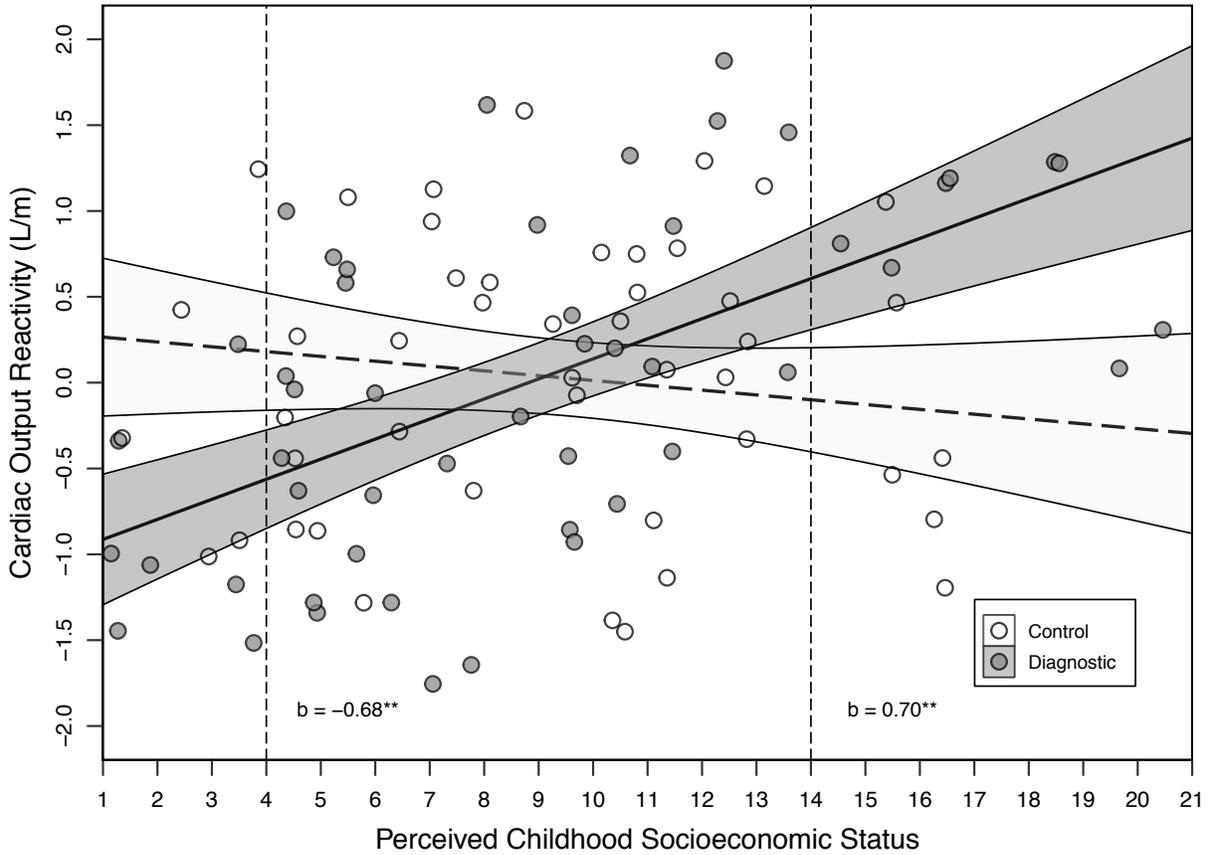
reactivity, such that higher SES predicted lower TPR reactivity, $b = -17.26$, $CI_{95\%} = [-21.60, -12.91]$, $t(88) = -17.89$, $p < .001$. In contrast, SES was not significantly related to TPR reactivity in the control condition, $b = -2.74$, $CI_{95\%} = [-7.40, 1.92]$, $t(88) = -1.17$, $p = .246$. Analyses of simple effects showed that lower SES students ($-1 SD$) in the diagnostic condition showed significantly greater increases in TPR relative to the control condition, $b = 85.97$, $CI_{95\%} = [40.66, 131.28]$, $t(88) = 3.78$, $p < .001$; whereas higher SES students ($+1 SD$) exhibited significantly lower TPR in the diagnostic condition relative to the control condition, $b = -59.27$, $CI_{95\%} = [-104.17, -14.37]$, $p = .010$. Results were consistent with predictions, showing that under SES-based threat, lower SES students exhibited cardiovascular threat responses (higher TPR), whereas higher SES students exhibited cardiovascular challenge responses (lower TPR).

Mediated Moderation. Through what process does stereotype threat moderate the relationship between socioeconomic status and performance? We hypothesized that cardiovascular reactivity would mediate the moderated condition X SES interaction. Specifically, we predicted that threat reactivity would mediate the effects of threat on performance among lower SES students, and challenge reactivity would mediate the effects of threat on performance for higher SES students. To test this hypothesis we ran a percentile method bootstrap analysis with 10,000 samples (Shrout & Bolger, 2002) using the *mediation* package in R (Tingley, Yamamoto, Hirose, Keele, & Imai, 2014). We entered the condition as the predictor (X), SES as the moderator (W), the challenge/threat reactivity index as the mediator (M), and performance on the GRE as the outcome (Y), controlling for baseline values of CO/TPR, HR reactivity, PEP reactivity, and GPA. The conditional indirect effect of condition on performance via challenge/threat reactivity at low levels of the moderator ($-1 SD$; among lower SES students) was not significant, $b = -0.40$, $CI_{95\%} = [-1.03, 2.08]$. Similarly, the conditional indirect effect of

condition on performance via challenge/threat reactivity at high levels of the moderator (+1 *SD*; among higher SES students) was also not significant, $b = -0.36$, $CI_{95\%} = [-1.87, 0.90]$.

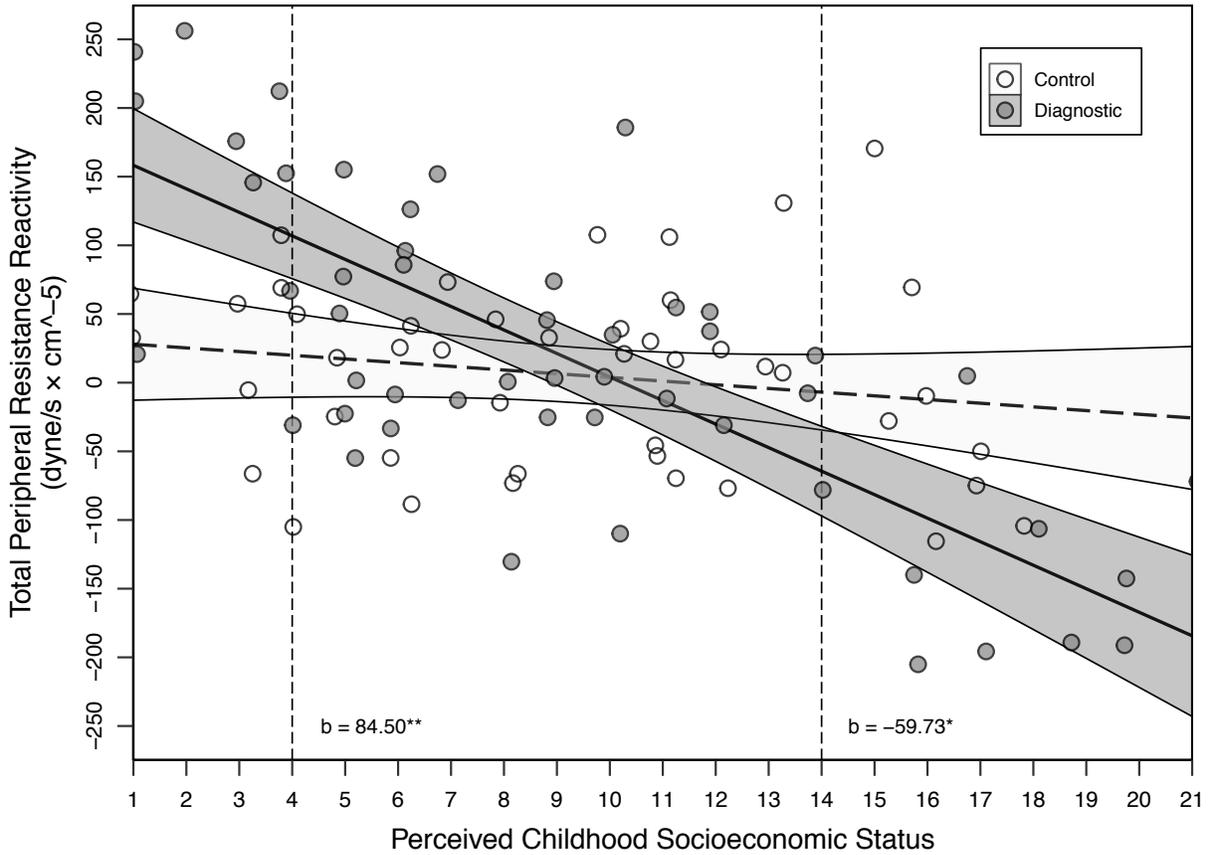
We followed this same procedure to test self-regulation (time holding handgrip at Time 2; adjusting for Time 1) as the mediator of the condition X SES interaction. Results showed that the conditional indirect effects of condition on performance via self-regulatory failure at low levels of the moderator (-1 *SD*; among lower SES students) was not significant, $b = -0.13$, $CI_{95\%} = [-1.45, 0.76]$. Similarly, the conditional indirect effects of condition on performance via self-regulatory failure at high levels of the moderator (+1 *SD*; among higher SES students) was not significant, $b = 0.01$, $CI_{95\%} = [-0.17, 0.30]$. We did not test a mediated moderation model for cognitive load, as there was no direct effect of condition X SES. These results suggest that challenge/threat reactivity or self-regulatory failure do not mediate the effects of SES-based threat on academic performance. However, caution should be noted when interpreting this finding, as our sample size may not have allowed us enough power to detect an effect. Future work should specifically examine these mechanisms using a bigger sample.

Figure 1. *Cardiac Output Reactivity*



Note. $*p < .05$, $**p < .001$. Analysis adjusted for mean-centered GPA, HR reactivity, PEP reactivity, and baseline values of CO; solid points and open points represent individual jittered observations for the diagnostic and control conditions, respectively; bands represent 95% confidence intervals; vertical dashed lines represent 1 *SD* above and below the mean.

Figure 2. Total Peripheral Resistance Reactivity



Note. $*p < .05$, $**p < .001$. Analysis adjusted for mean-centered GPA, HR reactivity, PEP reactivity, and baseline values of TPR; solid points and open points represent individual jittered observations for the diagnostic and control conditions, respectively; bands represent 95% confidence intervals; vertical dashed lines represent 1 *SD* above and below the mean.

Experimental Manipulation

Experimental Condition:

Video 1: Hello, my name is Dr. _____. I'm a professor here at _____ in the Psychology Department. Thank you so much for being in this study. Today you will be completing a flexibility task and taking a standardized test. The standardized test you are about to take is an evaluative test that is diagnostic of intellectual ability—that is, the test has been validated as a strong indicator of a person's intellectual ability.

Video 2: As I mentioned previously, the standardized test you are about to take is a diagnostic test used to indicate your intellectual ability. Please spend the next 15 minutes completing this test.

Control Condition:

Video 1: Hello, my name is Dr. _____. I'm a professor here at _____ in the Psychology Department. Thank you so much for being in this study. Today you will be completing a flexibility task and a problem-solving task. The problem-solving task you are about to take has been shown to be culturally fair, therefore we expect every student to perform equally well, regardless of demographic characteristics.

Video 2: As I mentioned previously, the problem-solving task that you are about to take has been shown to be culturally fair, therefore we expect every student, regardless of demographic characteristics, to perform equally well. Please spend the next 15 minutes completing the problem-solving task.

DIAGNOSTIC EXAM

What is your parents' combine household income (before you turned 18 years of age)? Circle one.

- 1 = Less than \$10,000
- 2 = \$10,001 – \$20,000
- 3 = \$20,001 – \$30,000
- 4 = \$30,001 – \$40,000
- 5 = \$40,001 – \$50,000
- 6 = \$50,001 – \$60,000
- 7 = \$60,001 – \$70,000
- 8 = \$70,001 – \$80,000
- 9 = \$80,001 – \$90,000
- 10 = \$90,001 – \$100,000
- 11 = \$100,001 – \$110,000
- 12 = \$110,001 – \$120,000
- 13 = \$120,001 – \$130,000
- 14 = \$130,001 – \$140,000
- 15 = \$140,001 – \$150,000
- 16 = \$150,001 – \$160,000
- 17 = \$160,001 – \$170,000
- 18 = \$170,001 – \$180,000
- 19 = \$180,001 – \$190,000
- 20 = \$190,001 – \$200,000
- 21 = More than \$200,001

Directions: Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five lettered words or sets of words. Choose the word or set of words for each blank that best fits the meaning of the sentence.

1. Physicists rejected the innovative experimental technique because, although it _____ some problems, it also produced new _____.

- A. clarified .. data
- B. eased .. interpretations
- C. resolved .. complications
- D. cause .. hypotheses
- E. revealed .. inconsistencies

2. During a period of protracted illness, the sick can become infirm, _____ both the strength to work and many of the specific skills they once possessed.

- A. regaining
- B. denying
- C. pursuing
- D. insuring

E. losing

3. The _____ of mass literacy coincided with the first industrial revolution; in turn, the new expansion in literacy, as well as cheaper printing, helped to nurture the _____ of popular literature.

- A. building .. mistrust
- B. reappearance .. display
- C. receipt .. source
- D. selection .. influence
- E. emergence .. rise

4. Although ancient tools were _____ preserved, enough have survived to allow us to demonstrate an occasionally interrupted but generally _____ progressed through prehistory.

- A. partially .. noticeable
- B. superficially .. necessary
- C. unwittingly .. documented
- D. rarely .. continual
- E. needlessly .. incessant

5. In parts of the Arctic, the land grades into the landfast ice so _____ that you can walk off the coast and not know you are over the hidden sea.

- A. permanently
- B. imperceptibly
- C. irregularly
- D. precariously
- E. slightly

6. Intellectual _____ and flight from boredom have caused him to rush pell-mell into situations that less _____ spirits might hesitate to approach.

- A. restlessness .. adventurous
- B. agitation .. passive
- C. resilience .. quiescent
- D. tranquility .. versatile
- E. curiosity .. lethargic

7. Old beliefs die hard: even when jobs became _____, the long-standing fear that unemployment could return at a moment's notice _____.

- A. vacant .. perished
- B. easier .. changed
- C. plentiful .. persisted
- D. protected .. subsided
- E. available .. receded

Directions: In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

8. STUDY: LEARN: :

- A. pervade : encompass
- B. search : find
- C. gather : win
- D. agree : keep
- E. accumulate : raise

9. TABLECLOTH: TABLE

- A. tent : ground
- B. shirt : hanger
- C. window : sill
- D. sheet : mattress
- E. cloud : earth

10. CANVA: PAINTER: :

- A. leather : shoe
- B. brush : palette
- C. chisel : wood
- D. marble : sculptor
- E. hammer : carpenter

11. MANSION: RESIDENCE: :

- A. limousine : automobile
- B. chisel : palette
- C. tuxedo : wardrobe
- D. diamond : rhinestone
- E. yacht : harbor

12. REFEREE: FIELD: :
EMBARRASSMENT: :

- A. scientist : results
- B. mediator : deadlock
- C. gladiator : contest
- D. teacher : classroom
- E. judge : courtroom

13. BLUSH :

- A. scream : anger
- B. smile : pleasure
- C. laugh : outrage
- D. love : sentimentality
- E. whine : indecision

Directions: Each question below consists of a word printed in capital letters, followed by five lettered words or phrases. Choose the lettered word or phrase that is most nearly opposite in meaning to the word in capital letters.

14. BOISTEROUS:

- A. grateful
- B. angry
- C. clever
- D. frightened
- E. quiet

15. EMIT:

- A. absorb
- B. demand
- C. mistake
- D. prevent
- E. require

16. METAMORPHOSE:

17. PERSEVERE:

- A. move ahead
- B. remain unaltered
- C. descend slowly
- D. examine in haste
- E. prepare in advance

- A. put into
- B. send out
- C. take away
- D. give up
- E. bring forward

18. WATERPROOF:

- A. soggy
- B. natural
- C. unglazed
- D. viscous
- E. permeable

19. AMALGAMATE:

- A. separate
- B. fixate
- C. terminate
- D. calibrate
- E. correlate

20. RETAIN:

- A. allocate
- B. distract
- C. relegate
- D. discard
- E. misplace