



Stress, Risk, and Reward in Financial Decision-Making: The Roles of Probability and Magnitude

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INTRODUCTION

- Considerable research suggests acute stress influences decision-making (2,3).
- Additional research is needed to explore the possibility that separable components of the stress response (the sympatho-adrenomedullary (SAM) and hypothalamic-pituitary-adrenal (HPA) axes) may influence decision-making differently.
- Participants engaged in a gambling task where they made choices between decisions of varied probability and magnitude for potential gains of money after being exposed to acute stress.

HYPOTHESES

1. For gain framed choices people will tend to be risk-averse, opting for a sure gain over a risky one.
2. Stress may alter risk-taking behavior differently when gamble is framed as probability or magnitude
3. The SAM stress condition will differ in terms of cortisol reactivity as compared to HPA stress condition.
4. Men will be more risk-seeking when exposed to acute stress as compared to women

METHOD

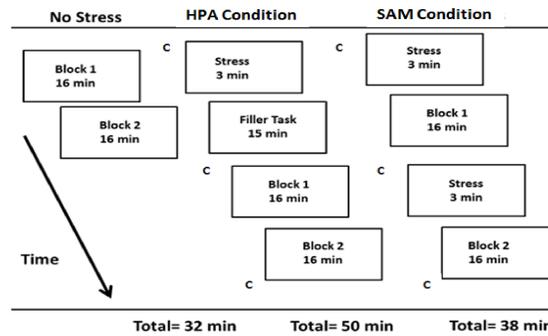
PARTICIPANTS

- 67 undergraduate college students from Rutgers University within 18 to 22 years of age (30 males, 37 females)

MEASURES

- *Stress Induction Technique:* "Cold Pressor Arm Wrap" (CPAW). Participants had cold gelpacs placed around the forearm for up to two minutes to elicit stress.
- *Physiological Measures:* Cortisol levels and Skin Conductance Levels

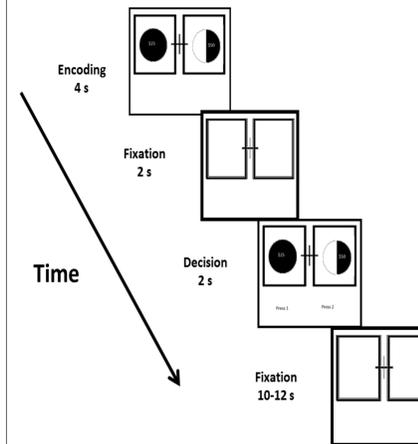
PROCEDURE



- Three between-subjects conditions: no stress, HPA stress condition, and SAM stress condition.
- Two within-subjects conditions: magnitude and probability

Decision-Making Task

- Participants chose between a 'risky' or 'conservative' decision option on each trial.
- *Magnitude Condition:* the chance of winning remained at 50% while the amount of money parametrically increased (\$20, \$40, \$50, \$60, \$80).
- *Probability Condition:* the amount of money remained at \$50 while the chance of winning parametrically increased (20%, 40%, 50%, 60%, 80%).
- The conservative option was always a 50% of winning \$25.
- Only the center decision pair in each condition was of equivalent expected value.



RESULTS

Hypothesis 1:

- Expected Value yielded a significant main effect on risk taking behavior, $F(2.62, 167.91) = 136.52, p < .05$.
- Risky behavior increased as expected value increased.

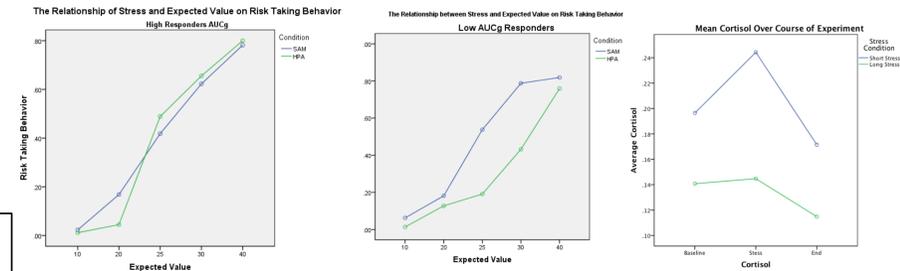
Hypothesis 2:

- A trend was observed revealing low responders to stress (in terms of AUCg) took more 'risky' choices in the SAM condition compared to the HPA condition dependent on trials where the expected value of the choices was equivalent, $F(2.62, 91.83) = 2.20, p < .15$.

RESULTS

Hypothesis 3:

- A trend towards a different levels of cortisol reactivity between SAM condition and HPA condition $F(1,37) = 2.95, p < .10$.



Hypothesis 4:

- Males made more risky decisions but females made more conservative decisions, $F(1,61) = 4.62, p < .05$. There was, however, no interaction with stress condition.

DISCUSSION

- Stress did not influence risk-taking overall, but evidence was observed in support of a stress effect on trials where the expected value of each decision was equivalent.
 - Lower cortisol levels were associated with higher risk-taking in the SAM but not HPA condition.
- Unexpectedly, application of stress twice in the SAM condition may have increased cortisol levels above the HPA condition.
- Sample size in the stress conditions is low, thus the design may be underpowered.
- Additional gambles may be needed towards the center of the decision range, as above and below the mid-point participants have a clear preference in terms of decision that could override the effects of stress.

SELECTED REFERENCES

1. Kahneman D., & Tversky, A., (1984). Choices, values, and frames. *American Psychological Association*, 39(4), 341-350
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3. Van den Bos, R., Harteveld, M., & Stoop, H., (2009). Stress and decision-making in humans: Performance is related to cortisol reactivity, albeit differently in men and women. *Psychoneuroendocrinology*, 34(10), 1449-1458.