



The Effects of Chronic Stress and Anxiety on Neural Decision Making

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March 3rd, 2021

This research was supported by the Jamie Cassels
Undergraduate Research Awards, University of Victoria
Supervised by Tom Ferguson and Dr. Olave Krigolson

INTRODUCTION

- Stress may cause structural and functional changes to the brain, altering executive functioning¹. Suboptimal decision-making may act as a mediator for health-related stress effects²
- Chronic stress occurs when our perception of a threat persists for a long period of time³. Anxiety is an emotion that occurs when the future is interpreted to contain dangers⁴
- Executive processes pertinent to decision making include updating working memory and feedback learning. Updating working memory is measured with the oddball task eliciting P300, and feedback learning is measured with the gambling task eliciting reward positivity⁵⁻⁶
- The purpose of this large-scale study is to assess the correlations between chronic stress, state anxiety, and trait anxiety with updating working memory and feedback learning processes

METHODS

Procedure

$n = 329$ (215 F, 114 M)

Participants responded to three personality trait standard questionnaires:

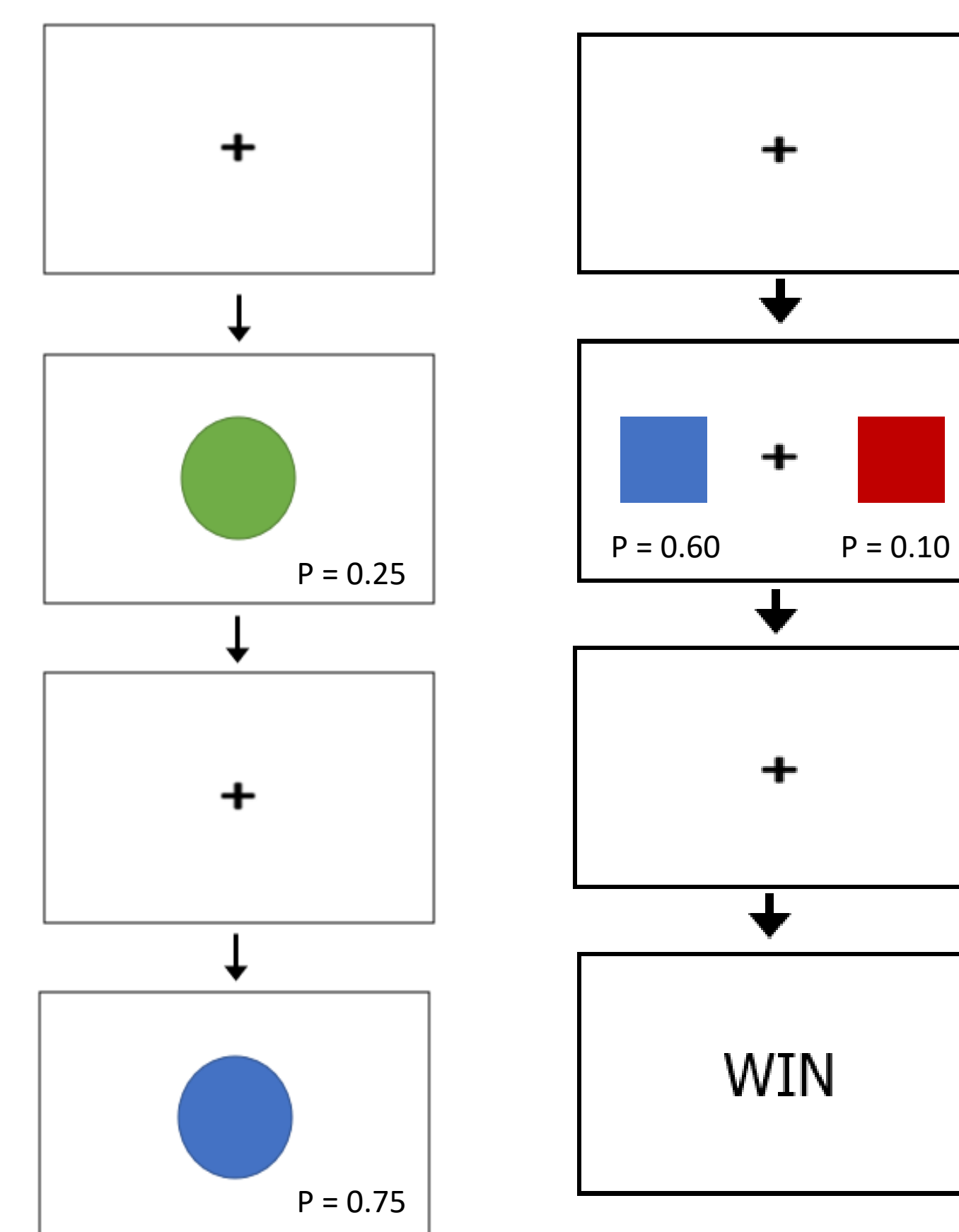
- Trier Inventory for Chronic Stress (TICs)
- State Anxiety Inventory (STAI-S)
- Trait Anxiety Inventory (STAI-T)

Participants completed:

- Oddball task where they responded to colored circles that differed in frequency to elicit P300
- Gambling Task where they chose a square and got feedback to elicit Reward positivity

Personality scores were binned to represent the tails of the distribution

Cognitive Assessment Tasks



**Oddball
task**

**Gambling
task**

RESULTS

State anxiety and P300

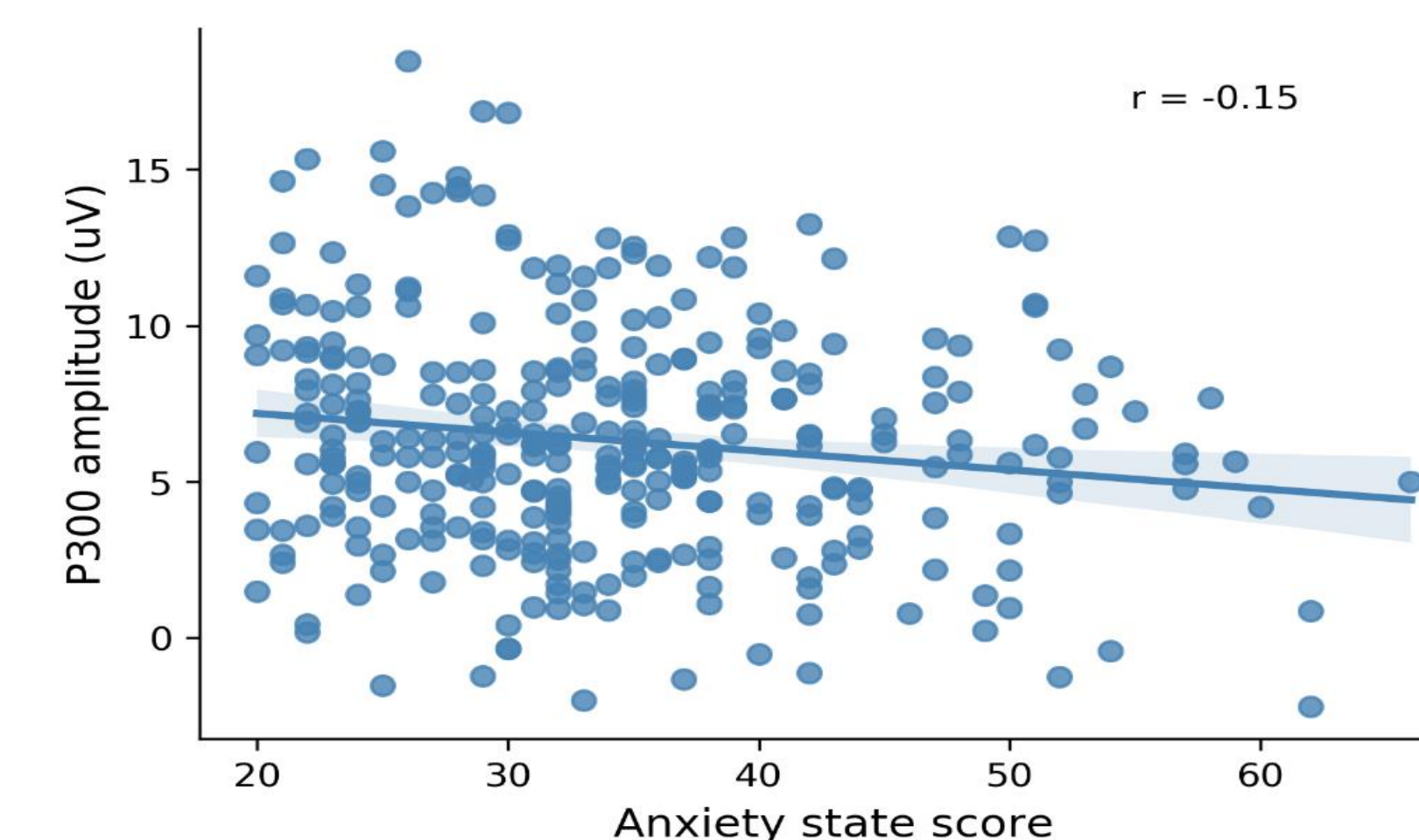


Figure 1. Negative correlation between STAI-S scores and P300 amplitudes

Trait anxiety and P300

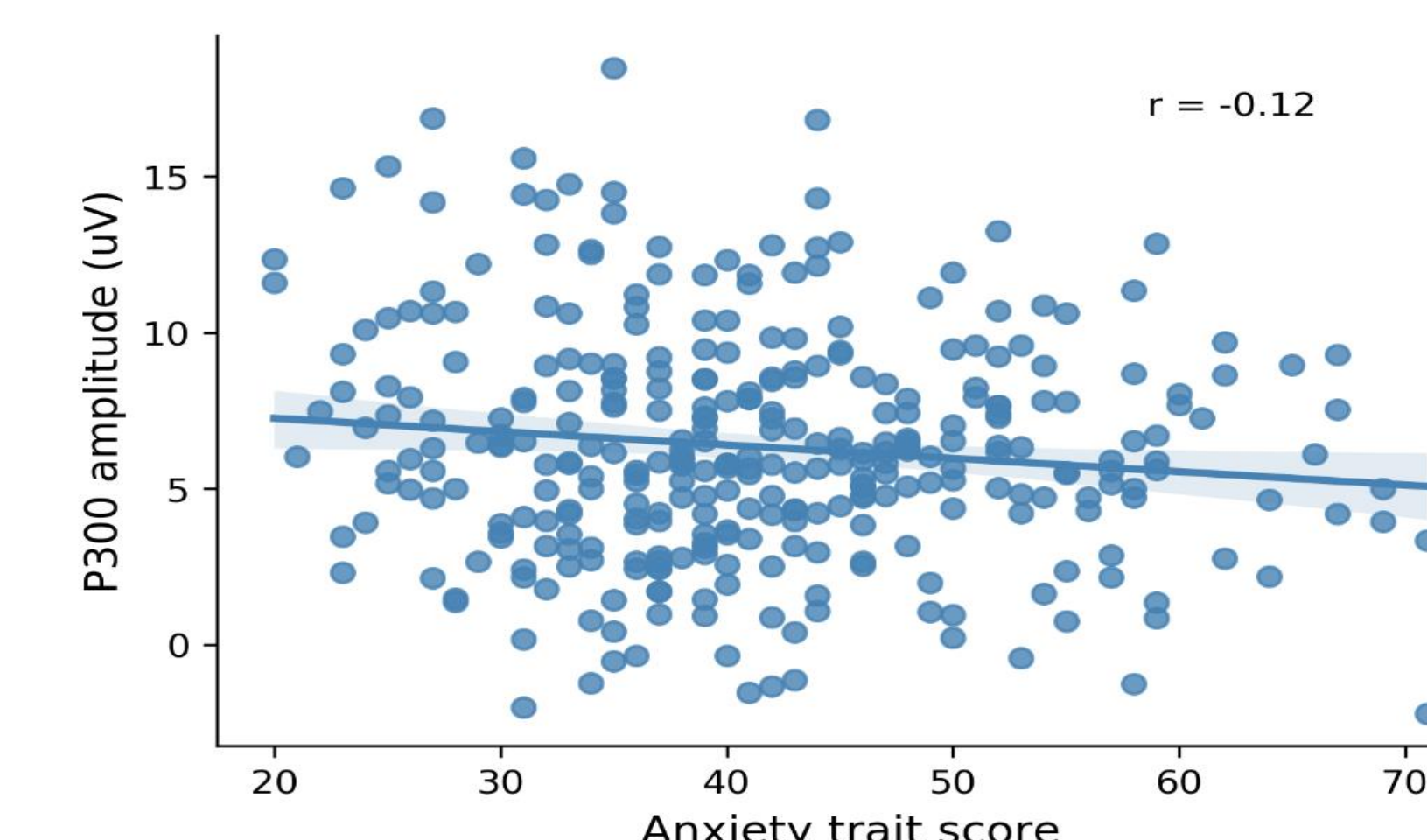


Figure 3. Negative correlation between STAI-T scores and P300 amplitudes

P300 component

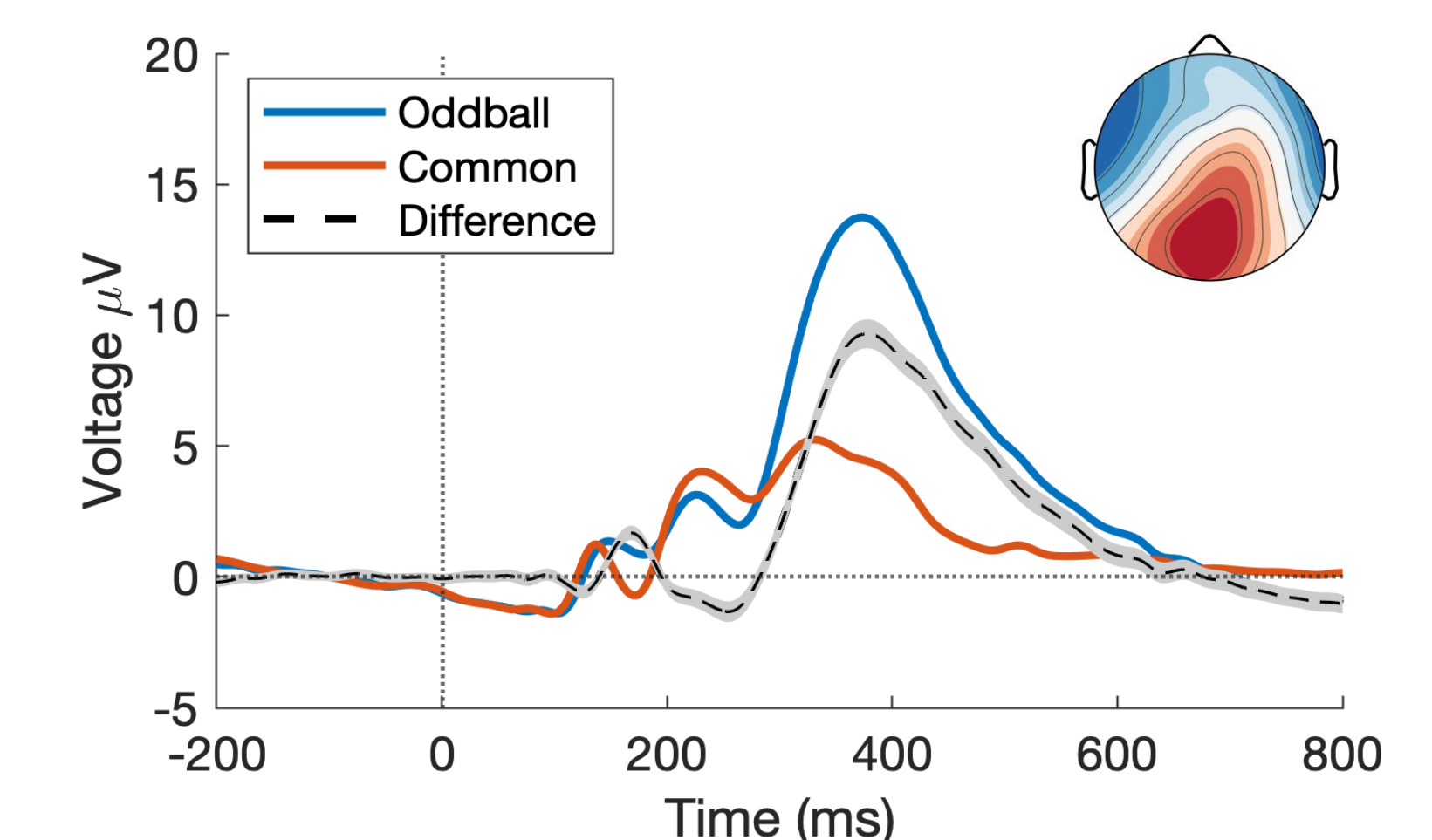


Figure 5. P300 ERP components for the oddball task comparing common and rare (oddball) stimuli.

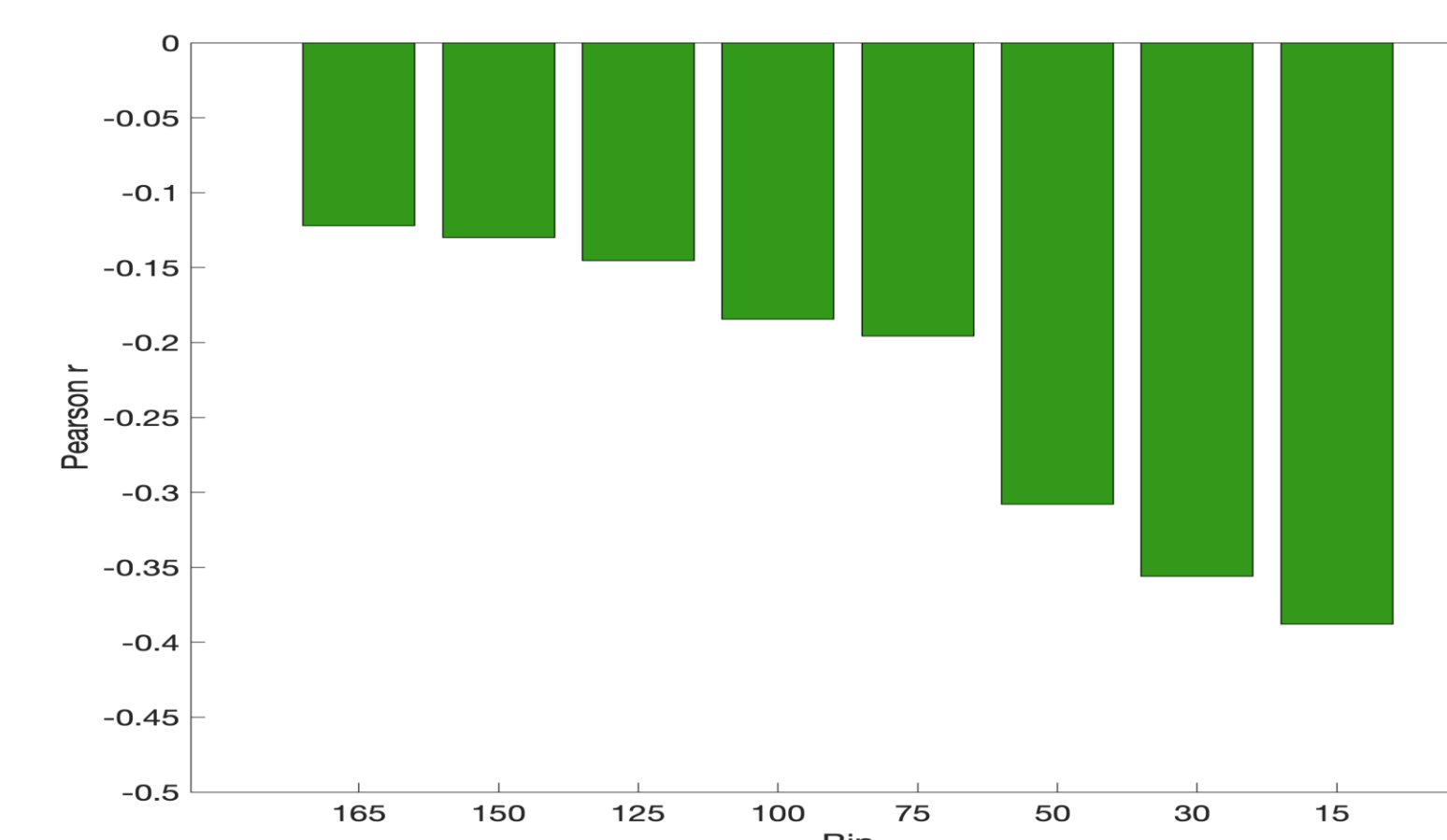


Figure 2. Stronger negative correlations of the P300 amplitudes with decreasing STAI-S score bin sizes

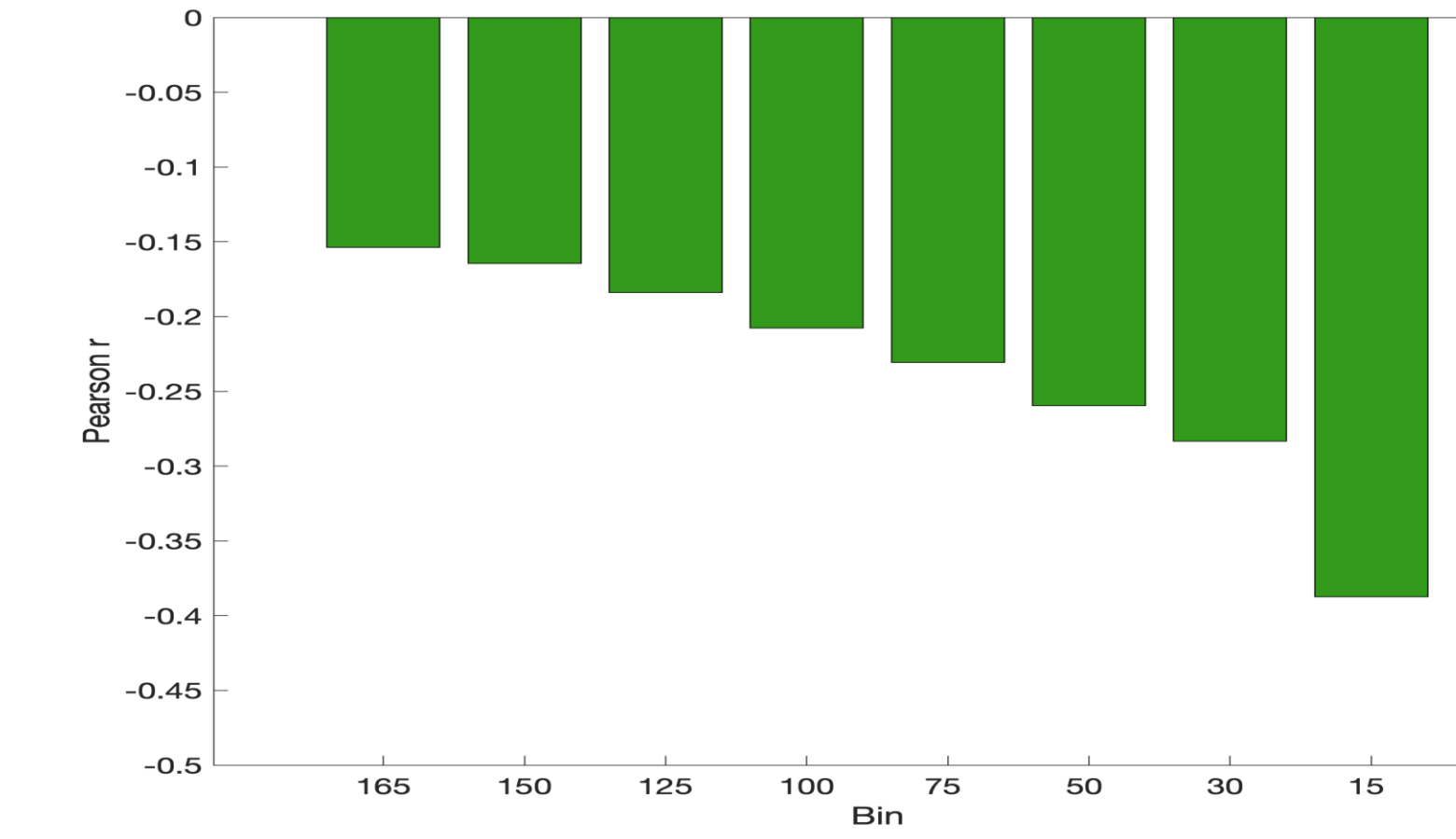


Figure 4. Stronger negative correlations of the P300 amplitudes with decreasing STAI-T score bin sizes

Reward positivity

The three personality traits were not significantly correlated with reward positivity amplitudes. Chronic stress was also not significantly correlated with P300 amplitudes.

CONCLUSIONS

- State anxiety and trait anxiety are negatively correlated with P300 amplitudes, supporting our hypotheses
- Anxiety impacts working memory processes and this effect is amplified by decreasing the bin sizes of the anxiety scores
- Future research should investigate the neural correlates of decision making in participants who demonstrate greater levels of chronic stress and anxiety

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