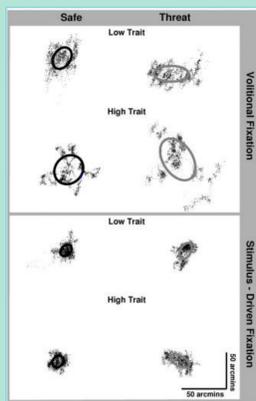


# Quiet eyes: Stress, worry and anxiety fail to influence fixational stability, accuracy, or movement frequency

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## Fixation Stability and Anxiety

- Healthy individuals demonstrate varying degrees of oculomotor control during instances of threat and anxiety.<sup>1</sup> For example trait anxiety may be linked to poorer gaze stability, especially in combination with a stressor.<sup>2</sup>
- Laretzaki et al. (2011) found threat (produced from a shock paradigm) interacted with trait anxiety to yield reduced fixation stability



From Laretzaki et al. (2011). The differences in fixation stability in individuals with low or high trait anxiety.

## The Present Investigation

- Understanding how stress and anxiety affect control of gaze and other oculomotor functions is important for a variety of professions. Consider professional athletes or soldiers who are required to maintain a steady eye, while stress or anxiety is typical to the job.



- We examined the influence of a novel anticipatory stress paradigm on fixation stability and how frequently eyes moved from a stimulus.
- We also wanted to examine the role of state/trait anxiety and worry on fixation stability in order to examine the interactions typically experienced in other studies.
- We expected that participation in an anticipatory stress scenario would destabilize eye movements and fixation, given that stress is known to disrupt processing in brain regions associated with oculomotor control.<sup>3,4</sup>

## METHOD

### Design

- 2 x 2 mixed design. Stress condition was between-subjects (either anticipatory stress or control). Stimulus driven fixation or volitional fixation was manipulated within-subjects. N= 44

### Measurement Tools

- Penn State worry questionnaire (PSWQ)
- State/Trait Anxiety Index (STAI)
- Blood pressure/ Heart rate

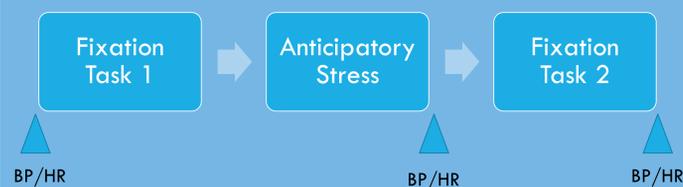
### Fixation Task

- One practice block of 6 trials, 1 stimulus driven experimental block of 10 trials, 1 volitional experimental block of 10 trials.
- For stimulus driven trials, the fixation cross remained static on the screen in one of nine locations. For volitional trials, the stimulus appeared for 3 seconds and disappeared while participants maintained fixation in the original location for 15 seconds.
- During a trial, participants viewed a stimulus (fixation cross) for 15 seconds.
- Right eye movements were recorded using an Eyelink 1000 at 500Hz.

### Anticipatory Stress Paradigm (5 min)

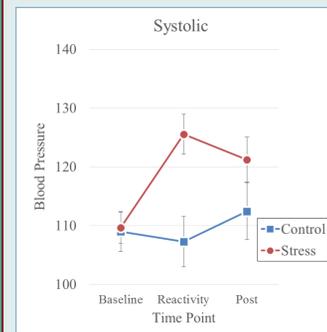
- Modified version of Trier Social Stress Test<sup>5</sup>
- Participants told they would have to deliver a speech to researchers. They were presented with a video that simulated a live feed to an auditorium where they were to present. Participants did not actually present.
- Control group read an emotionally neutral story about weather patterns.

## Procedure

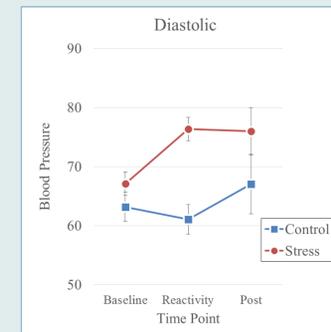


## RESULTS

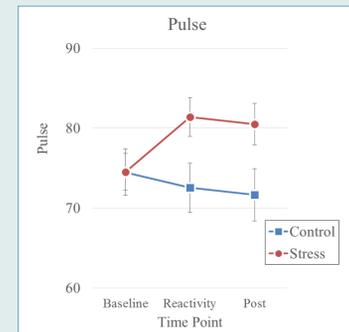
### Physiological Changes between Stress Groups



There was an interaction between time point and condition for systolic blood pressure.  $F(2,41) = 6.49, p < .01, \eta_p^2 = .24$

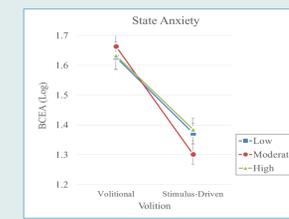
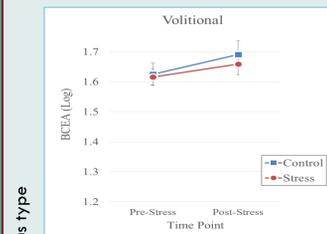


There was an interaction between time point and condition for diastolic blood pressure.  $F(2,41) = 7.91, p < .01, \eta_p^2 = .28$

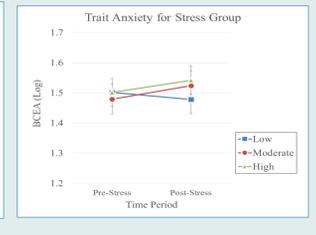
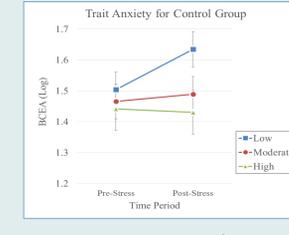
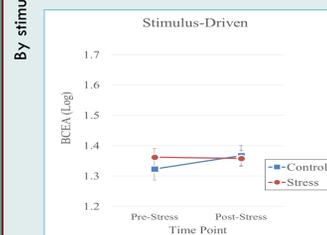


There was an interaction between time point and condition for heart rate.  $F(2,41) = 6.95, p < .01, \eta_p^2 = .25$

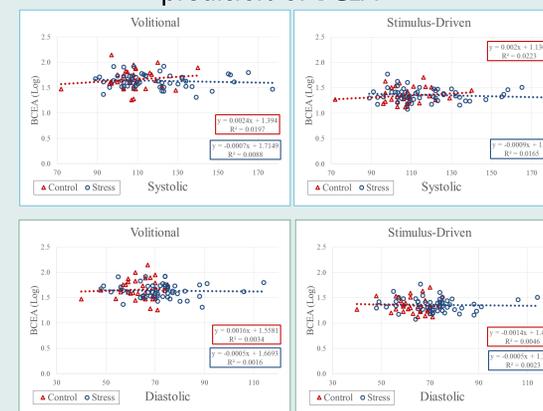
### Comparisons of fixation stability



### State/Trait Anxiety

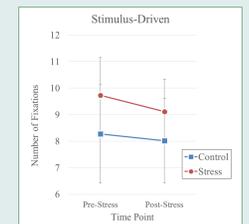
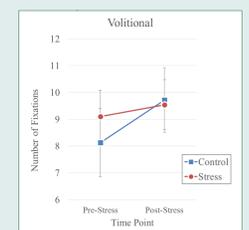


### Regressions with blood pressure as predictors of BCEA



BCEA: Bivariate Contour Ellipse Area is the measure of fixation stability. It refers to the area of an ellipse that contains the majority of fixations around the interest area.

### Number of



No Sig. between stress conditions comparing number of fixations

## CONCLUSIONS

- The stress manipulation was successful in inducing physiological changes in stress responses.
- We found no evidence that anxiety, worry or anticipatory stress affected fixational stability or movement frequency. We did not replicate findings of Laretzaki et al.
- Threat, anxiety, and stress appear to have differential effects on oculomotor control.<sup>1</sup> It could be the case that the particular type of stress (i.e. anticipatory psychosocial) elicited in this study was not influential on oculomotor control and fixation stability.
- Some speculate that the type of stimulus (i.e. threatening stimuli) moderates how stress influences fixation stability. Most of the literature examining stress and fixation typically use visually complex, emotional stimuli. Here we used an affectively neutral fixation cross. It could also be that fixated stimuli emotionally congruent with stress, or stimuli that produce the stress and anxiety are more likely to affect oculomotor control.