



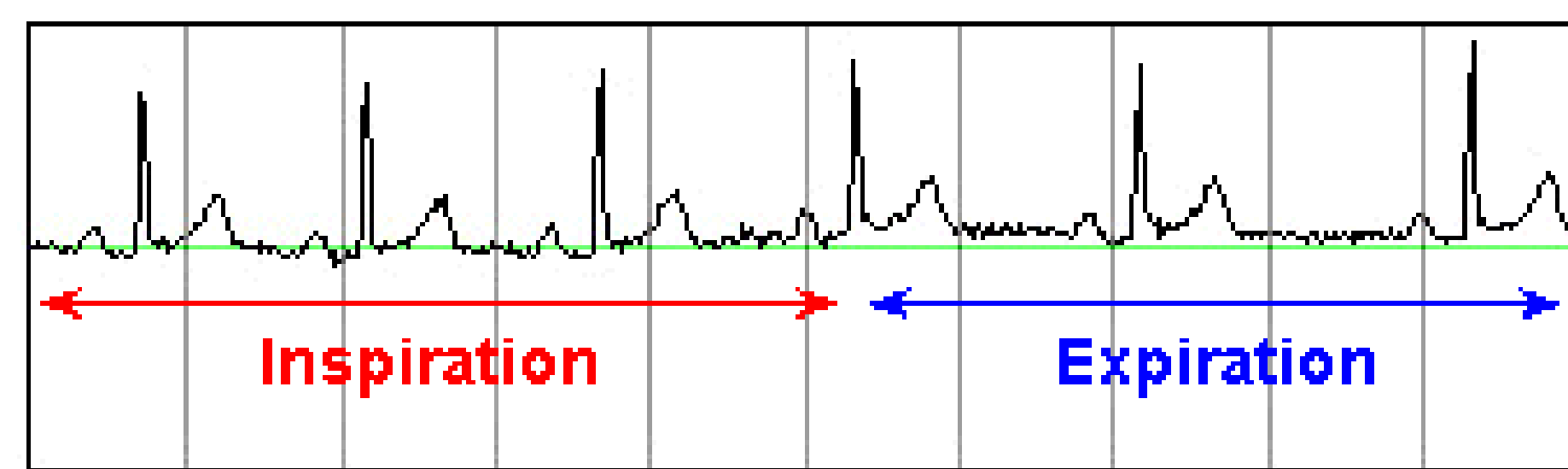
Racing Hearts, Racing Minds: The Interaction of State and Trait Anxiety on Respiratory Sinus Arrhythmia (RSA)

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Introduction

- Respiratory Sinus Arrhythmia (RSA) is a measure of cardiac vagal control that has been linked to emotion regulation and positive coping with stress.¹
- Lower RSA has been associated with anxiety disorders.²
- Lower RSA has been associated with state worry³ as well as trait levels of anxiety.⁴



Question

- What is the impact of the interaction of trait and state worry on RSA?

Hypothesis

- State and trait worry will interact, such that those with higher levels of trait worry will have greater decrease in RSA after a worry induction than those with lower levels of trait worry.

Methods

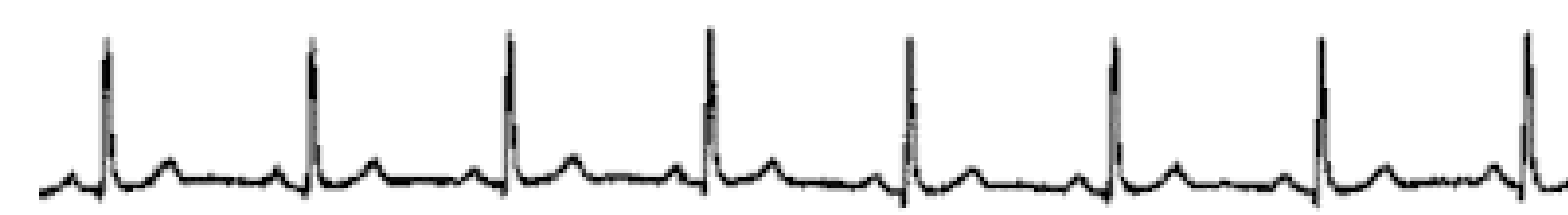
Participants. Participants were 72 University of Arizona students. Data are a subset of a larger project examining error-related brain activity.

Procedure.

- Participants were consented and prepared for EKG.
- Adapted version of Penn State Worry Questionnaire (PSWQ) was administered to collect state/trait worry.
- Participants completed six 1-minute blocks of resting while EKG was recorded
- Participants completed Worry Induction Task while EKG was recorded
- PSWQ was administered again.

EEG Recording and Processing.

- EKG was recorded in a Lead 1 setup on a Synamps system with Ag/AgCl sensors attached on collarbones.
- EKG was sampled at 500 Hz.
- EKG was processed offline using QRSTool Software
- CMetX, implemented in Matlab, was used to extract log-transformed heart-rate variability in the high frequency band (.12-.4 Hz).



Tasks

Worry Induction Task. We adapted a worry induction task used by Lyonfields, Borkovec, & Thayer (1995) in which participants were asked what they worry about the most.

Participants were then asked to worry about this topic for five minutes and told to “stop worrying.”

Results

Figure 1: Conditional Effect of State Worry by Level of Trait Worry on RSA

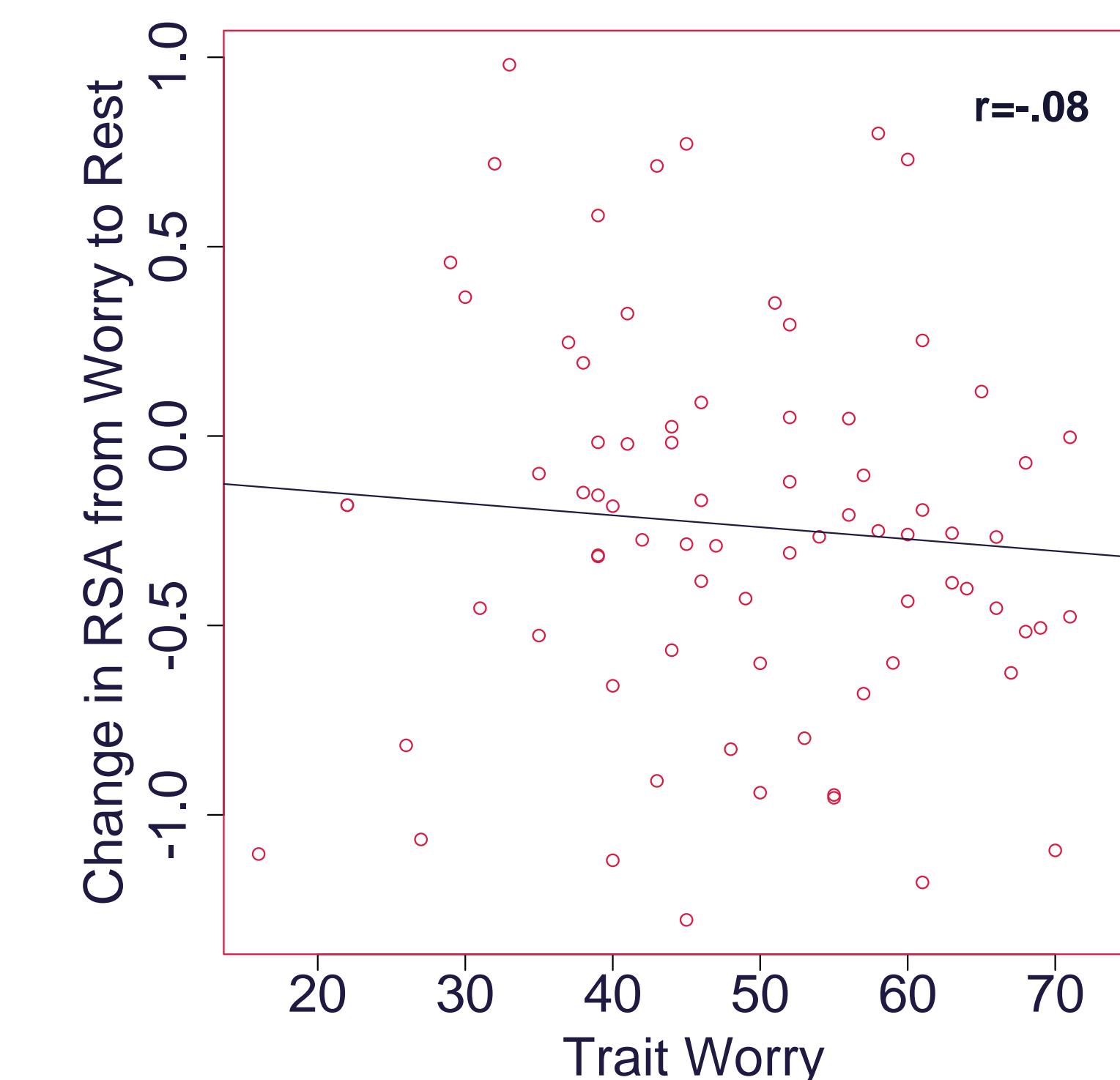


Figure 1. There was no significant relationship between change in RSA from worry to resting and trait worry, $p > .47$. This analysis did not account for individual differences in response to the worry induction, the focus of the next analysis (Figure 2).

Figure 2: Conditional Effect of State Worry by Level of Trait Worry on RSA

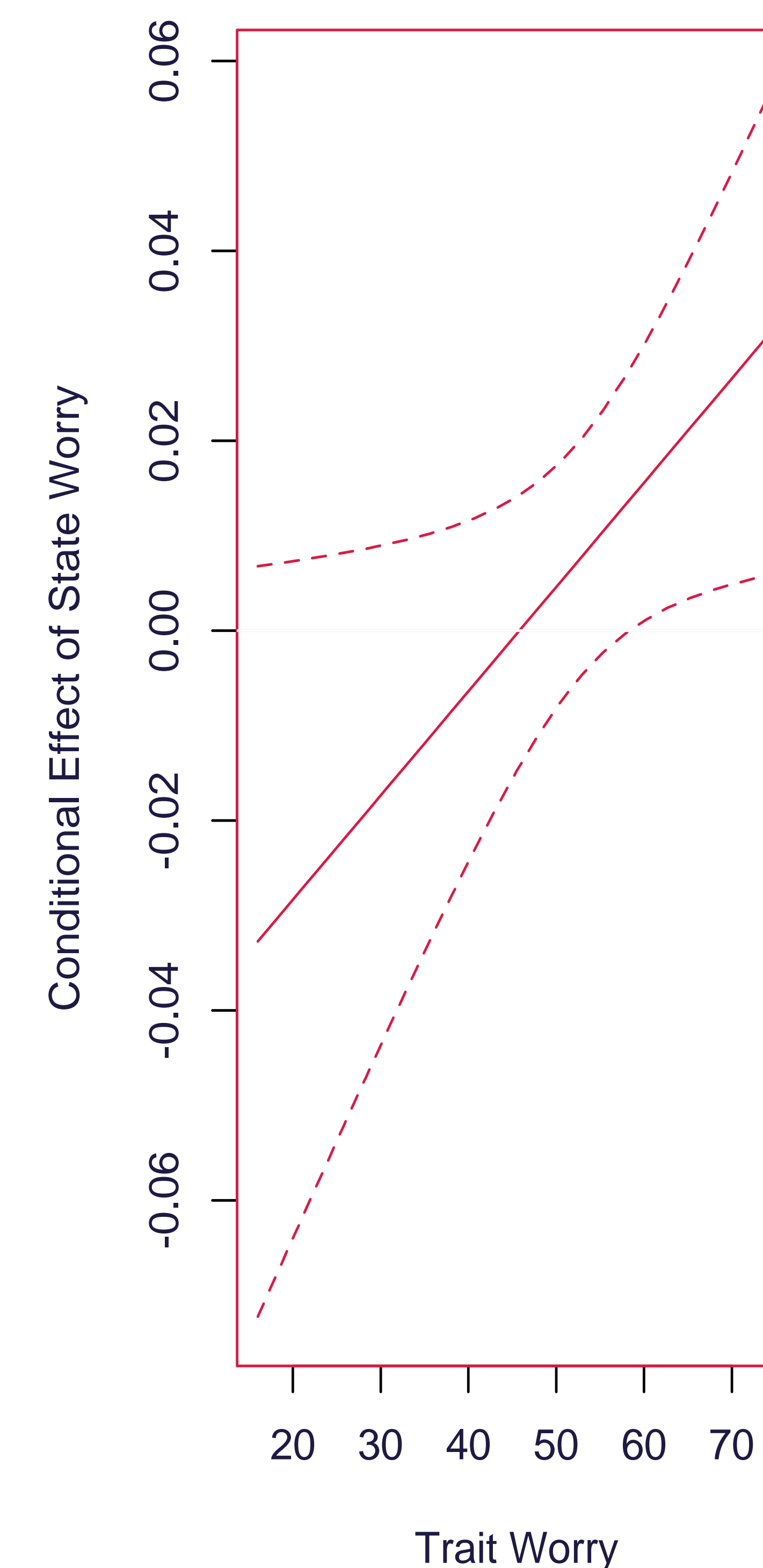


Figure 2. A regression model was used to examine the effect of trait PSWQ, state PSWQ, and their interaction on RSA at rest and worry. The graph indicates the effect of state level on RSA at each level of trait worry. As there was no overall relationship between change in RSA and trait worry, level of trait worry serves as a moderator of the relationship between state worry and RSA. Condition was a covariate and state worry was the difference from post to pre worry. There was no main effect of condition or trait worry. There was a significant interaction of state and trait worry, $b = 0.002$, $t(72) = 3.005$, $p < 0.003$. The interaction reveals that those with the greatest state worry had the lowest RSA if they were low in trait worry, but had the highest RSA if they were high in trait worry. Confidence bounds are shown.

Discussion

- For those individuals low in trait worry, higher state worry is associated with lower RSA. Among individuals high in trait worry, however, higher state worry is associated with higher RSA.
- Results suggest the possibility that individuals who experience high chronic worry may have dysregulated correspondence between autonomic physiology and subjective experience.
- This work supports the Cognitive Avoidance Theory of Worry, which suggests that worry functions as a mechanism for cognitive avoidance in high worriers [6].

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