Introduction
Stress
• Stress can be defined as an environmental event causing activation of the autonomic nervous system (Lin et al., 2011).
• Stress can be beneficial in facilitating threat detection and escape when the stressor is acute, but can be detrimental to overall health when the stressor is chronic (Minkel et. al, 2012).
• Stress can be physiologically measured in terms of heart rate and skin conductance; it can also be induced through titrated electrical shock (Lin et al., 2011).

Stress Disturbance and Stress
• Sleep disturbance, which can be defined as overall poor sleep quality due to a wide variety of reasons, can increase chronic stress levels (Williams et al., 2013).
• The Sleep Association Monitoring Index (SAMI) is a reliable and valid measure of sleep disturbance (Semler & Harvey, 2004).

Respiration Rate and Stress
• Breathing exercises that slow respiration rates increase activation of the parasympathetic nervous system, which is responsible for stress relief (Van Diest, 2014).
• Lowering respiration rate results in a lower heart rate and can cause lower levels of reported stress (Prinsloo et al., 2013).

Hypothesis
It is hypothesized that lower Sleep Association Monitoring Index (SAMI) scores and breathing at 20 beats per minute will result in lower galvanic skin response levels and lower heart rate when experiencing stress in the form of electrical shock.

Methods
Participants
• N = 10 students from Eastern Connecticut State University
• 40% Male, 60% Female
• 10% Freshman, 40% Sophomore, 20% Junior, 30% Senior
• 90% Caucasian, 10% Hispanic/Latino(a)
• Mean Age: 19.75 (SD = 1.439)

Materials
Sleep Association Monitoring Index (SAMI)
• 5-point Likert type scale
• Higher scores indicate higher levels of sleep disturbance

Apparatus
Audio Clips
• 1 minute of 20 bpm, followed by 1 minute of 40 bpm
• Onscreen instructions: “Please breathe in and out to the beat.”
• Shock administration: 4 shocks per minute
BioPac MP150 measured:
• Galvanic skin response on the palm of the non-dominant hand
• Heart rate using electrocardiogram on the forearms

Procedure
1. Demographic measure
2. Sleep Association Monitoring Index (SAMI)
3. Washed hands with soap to the elbows
4. Shock electrode and BioPac monitors applied
5. Participant selected shock setting using titration
6. S-minute baseline
7. Audio clip and shock administration
8. Galvanic skin response and heart rate were measured

Results
• IBM SPSS 22
• Mean values:
  - SAMI score, M = 103.90 (SD = 17.31)
  - HR reactivity while breathing at 20 bpm, M = 14.77 (SD = 9.76)
  - HR reactivity while breathing at 40 bpm, M = 22.47 (SD = 8.17)
  - GSR reactivity while breathing at 20 bpm, M = .02 (SD = .03)
  - GSR reactivity while breathing at 40 bpm, M = .02 (SD = .02)

• A Spearman rho correlation coefficient was calculated for the relations between SAMI score and:
  - HR reactivity while breathing at 20 bpm: \( r(10) = .01, p > .99 \)
  - HR reactivity while breathing at 40 bpm: \( r(10) = .13, p > .73 \)
  - GSR reactivity while breathing at 20 bpm: \( r(10) = .51, p > .13 \)
  - GSR reactivity while breathing at 40 bpm: \( r(10) = .02, p > .95 \)

• All correlations are weak and not significant
• SAMI score is not related to GSR or HR at either breathing rate

• A Wilcoxon test examined galvanic skin response (GSR) reactivity between breathing at 20 bpm and breathing at 40 bpm
  - No significant difference was found in GSR (Z = -.31, p > .76)

• A Wilcoxon test examined heart rate (HR) reactivity between breathing at 20 bpm and breathing at 40 bpm
  - A significant difference was found in HR (Z = -2.60, p < .01)

• Breathing at 20 bpm resulted in lower HR

Discussion
Summary
• No relations were found between Sleep Association Monitoring Index (SAMI) scores and GSR/HR reactivity when breathing at either 20 bpm or 40 bpm
• No relations were found between breathing rate and galvanic skin response (GSR) reactivity
• A significant difference was found in heart rate (HR) between the two breathing rates (see figures below)*

Limitations
• Small sample size
• Low sample diversity
• Low power
• External/Internal validity

Future Directions
• Larger sample size
• More variety in breathing rates
• Examine more measures of stress

References