Stress is the response of the brain to any demand (NIMH, ND). It can be routine, brought on by a sudden negative change, or caused by a traumatic event. Not all stress is bad, but stress can be harmful depending on its intensity and duration. Acute psychological stress response is triggered in the amygdala, an area of the brain involved in emotional processing. The amygdala sends a message to the hypothalamus. The hypothalamus communicates to the rest of the body through the autonomic nervous system to prepare us to fight or flee. More specifically, the adrenal medulla produces a hormonal cascade that results in the secretion of catecholamines, especially norepinephrine and epinephrine. The hypothalamus also initiates a chronic stress response, which results in the secretion of cortisol by the adrenal cortex. Excessive cortisol levels can lead to brain tissue atrophy in order to prioritize the elevated metabolic demands placed on the heart and skeletal muscles in response to stress (Herbert et al., 2006). The hippocampus, which is involved in the storage of our memories, is particularly susceptible.

College students encounter stress throughout the course of any semester. In recent years, the American College Health Association has reported that college students report stress and anxiety as the two most common factors affecting their academic performance (ACHA, 2014, 2016).

This small study was conducted to test whether simple stress measures in college students were related to academic performance. To evaluate this association, both objective and subjective measures of stress were recorded. Grades in one course just before the midterm of the semester served as a measure of cognitive function. Multivariate regression was used to statistically evaluate the relationship between measures of stress and course grades just prior to midterm examinations.

### Participants
- 51 undergraduate PA student volunteers enrolled in the same class participated
- 84.4% women and 15.6% men

### Measures
- **Spielberger State Anxiety Inventory (STAI):** A short version of the Spielberger State Anxiety Inventory (Spielberger, Gorsch, Lushene, Vagg, & Jacobs, 1983) consisting of 6 items chosen for reliability and validity for measuring state anxiety. Participants rated their state anxiety on a 4-point Likert-type scale.
- **Heart Rate** was measured over the radial artery for 30 seconds
- **Blood Pressure** was measured using a sphygmomanometer
- **Academic Performance** was defined as identified course grades in the sixth week of the spring 2018 semester. These were de-identified and added to the data file by a faculty advisor on the project

### Procedure
- All data was collected during the sixth week of the semester (one week before midterm and analyzed using stepwise multiple regression

### RESULTS
- Summary statistics for all measures are listed Table 1.
- Bivariate Pearson’s correlations among the variables are depicted in Table 2.
- A scatterplot showing the relationship between heartrate and week 6 course grades are depicted in Figure 1 ($r = .665$, $p = .647$).
- A normal anxiety score on the Spielberger State-Trait Anxiety Inventory (STAI Y-6) is 34-36. Anxiety in this population of students appears to be higher ($M = 52.8$, $t(51) = 11.008$, $p < .001$).
- The prediction model that resulted contained no predictor of week 6 grades, $r^2 = .068$, $F(4,46) = .843$, $p = .505$.

#### Table 1

<table>
<thead>
<tr>
<th>Measures</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Anxiety</td>
<td>52.8</td>
<td>53.3</td>
<td>11.7</td>
<td>30.0</td>
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<td>47.0</td>
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<tr>
<td>Heart Rate</td>
<td>75.6</td>
<td>75.0</td>
<td>12.7</td>
<td>43.0</td>
<td>104.0</td>
<td>61.0</td>
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<tr>
<td>Systolic Pressure (mm/Hg)</td>
<td>118.4</td>
<td>118.0</td>
<td>13.9</td>
<td>70.0</td>
<td>138.0</td>
<td>68.0</td>
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<tr>
<td>Diastolic Pressure (mm/Hg)</td>
<td>72.8</td>
<td>72.0</td>
<td>14.7</td>
<td>60.0</td>
<td>124.0</td>
<td>64.0</td>
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<tr>
<td>Week 6 Course Grade</td>
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<td>.867</td>
<td>.059</td>
<td>.710</td>
<td>1.00</td>
<td>.290</td>
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</tbody>
</table>

#### Table 2

<table>
<thead>
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<th>Measures</th>
<th>Systolic Pressure</th>
<th>Diastolic Pressure</th>
<th>Anxiety</th>
<th>Grades</th>
</tr>
</thead>
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<td>-.145</td>
<td>.002</td>
<td>.065</td>
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<tr>
<td>Systolic Pressure (mm/Hg)</td>
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<tr>
<td>Diastolic Pressure (mm/Hg)</td>
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<td>.206</td>
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<tr>
<td>State Anxiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### REFERENCES

**Undergraduate Honors Statistics Experience: Multiple Linear Regression Using SPSS Software to Predict Grades from Measures of State Anxiety**

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