3-3-2017

The Relationship Between Salivary Measures and Perceived Stress and Anxiety in First Semester Pharmacy Students

Breanna Hughes  
*Southwestern Oklahoma State University*

Emma Leffler  
*Southwestern Oklahoma State University*

Nicholas Lockyear  
*Southwestern Oklahoma State University*

Melinda Burgess  
*Southwestern Oklahoma State University*, melinda.burgess@swosu.edu

Lisa Appeddu  
*Southwestern Oklahoma State University*, lisa.appeddu@swosu.edu

Abstract

The Anxiety and Depression Association of America defines stress as the response to a threat in a situation, whereas anxiety is the reaction to the stress. This means the acute “fight-or-flight” stress response ends once the situation is resolved, but anxiety is the resulting, long-term worry that may be

Recommended Citation

Hughes, Breanna; Leffler, Emma; Lockyear, Nicholas; Burgess, Melinda; and Appeddu, Lisa, "The Relationship Between Salivary Measures and Perceived Stress and Anxiety in First Semester Pharmacy Students" (2017). *Student Research*. 4.  
https://dc.swosu.edu/cop_ps_student/4

This Poster is brought to you for free and open access by the Pharmaceutical Science at SWOSU Digital Commons. It has been accepted for inclusion in Student Research by an authorized administrator of SWOSU Digital Commons. An ADA compliant document is available upon request. For more information, please contact phillip.fitzsimmons@swosu.edu.
manifested in such symptoms as headaches, high blood pressure, heart palpitations, and insomnia. Marshall et al. (2008) reported mental health-related... Read More
INTRODUCTION

The Anxiety and Depression Association of America defines stress as the response to a threat in a situation, whereas anxiety is the reaction to the stress. This means the acute “fight-or-flight” stress response ends once the situation is resolved, but anxiety is the resulting, long-term worry that may be manifested in such symptoms as headaches, high blood pressure, heart palpitations, and insomnia. Marshall et al. (2008) reported mental-health-related quality of life scores for third-year student pharmacists were significantly below U.S. mean scores for individuals aged 20 to 34 years old, and, as stress increased, their scores decreased. Votta and Benau (2013) found cortisol levels in pharmacy program correlated negatively with stress levels, with first-year student pharmacists being most stressed.

Preliminary evaluation of survey data from this study found first year, first semester student pharmacists perceived to have experienced significantly more stress and anxiety later in the semester as compared to the start. Therefore, it is hypothesized that physiological measures of stress will also increase over the semester, and therefore be directly related to survey measures of stress and anxiety. Lajaunie et al. (2016) found no clear preference among the comparator and three relaxation techniques in this study, other than student pharmacists ranked the comparator (Power Posing) as being easiest to conduct. In contrast, it is hypothesized that treatment differences will be found when using changes in physiological measures to more objectively assess effects on student pharmacists. Ultimately, findings will be used to encourage student pharmacists to mitigate stress and anxiety levels.

OBJECTIVES

1. To determine cortisol and testosterone levels and alpha-amylase activity in salivary samples collected from first semester, student pharmacists over the semester.
2. To evaluate correlations between salivary measures and self-reported levels of stress and anxiety.
3. To investigate differences in comparator and relaxation techniques using change in salivary components as the dependent variable.

METHODS

- **Population:** 41 Student Pharmacists (22 females and 19 males) from the first year, first semester of pharmacy school in Fall 2015.
- **Treatments:**
  - **Comparator:** Power Posing (initial n = 10) – Holding an open pose.
  - **Interventions (relaxation techniques):**
    - Body Scan Meditation (n = 10) – Guided systematic muscle relaxation.
    - Mindfulness Meditation (n = 11) – Focusing on the sound of a bell.
    - 4 x 4 Meditation (n = 10) – Breathing slowly in and out for four counts.
- **Protocol:**
  - Days 1-3 (September 12, 2015) – Survey collection.
  - Days 1-3 (September 12, 2015) – Salivary cortisol, testosterone, and alpha-amylase levels taken 5 days prior to then study.
  - Days 4-9 (September 13, 2015) – Subject is in the comparator for the first time.
  - Days 10-14 (September 19, 2015) – Subject is in comparator.
  - Days 15-22 (October 10, 2015) – Subject is in comparator.
  - Days 23-29 (October 19, 2015) – Subject is in comparator.
  - Days 30-36 (November 5, 2015) – Subject is in comparator.

RESULTS

**Objective 1:**

**Figure 1.** The means and 95% confidence intervals of physiological measures in salivary samples as determined over time in first year, first semester student pharmacists for (A) Cortisol (Time effect, $P = 0.088$), (B) Testosterone (Time effect, $P = 0.024$), and (C) Alpha-Glyceraldehyde (Time effect, $P = 0.121$). Days relate to the date when treatments were assigned to student pharmacists, with baseline measures taken 5 days prior to then see Protocol in Methods for specific dates.

**Objective 2:**

**Table 1.** Spearman correlation coefficients for physiological measures in salivary samples as related to ratings for stress and anxiety since starting Pharmacy School in first year, first semester student pharmacists (Note: Higher ratings indicate higher self-reported stress or anxiety).

<table>
<thead>
<tr>
<th>Stress since starting Pharmacy School (Day -5)</th>
<th>Cortisol</th>
<th>Testosterone</th>
<th>Alpha-amylase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety since starting Pharmacy School (Day -5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress since starting Pharmacy School (Day 79)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety since starting Pharmacy School (Day 79)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Objective 3:**

**Figure 2.** The means and SE of overall percentage change in the physiological measure of salivary testosterone calculated from Day -5 to 79 in first year, first semester student pharmacists (Treatment effect, $P = 0.078$).

CONCLUSIONS

- Results suggest student pharmacists had physiologically (cortisol) and self-reported higher stress levels by the end of their first semester.
- The negative relationship between testosterone levels with stress and anxiety ratings may have resulted from first semester, first year student pharmacists experiencing decreased feelings of power.
- A percentage increase in testosterone over the course of the semester suggests positive impacts of Power Posing and 4 x 4 meditation on feelings of power.
- However, student pharmacists rated 4 x 4 meditation to be the least useful, less relaxing, hardest to conduct, and least liked treatment in a 4 x 4 acute study.
- Overall, this study educated first year, first semester student pharmacists about techniques to lower stress and anxiety levels.

LIMITATIONS & FUTURE DIRECTIONS

- A high variation was observed in salivary measures. This also has been observed in other studies we have conducted.
- There was a lack of control over how often and when student pharmacists conducted treatments or other relaxation techniques.
- Future analysis will include:
  - Identifying outlier data points and other factors which may have significantly impacted variation in salivary measures.
  - Conducting statistical analysis using scores obtained from more objective survey instruments, which included the Kentucky Inventory of Mindfulness Skills scale, the Four Scale Anxiety Questionnaire, and the Perceived Stress Scale.
  - Conducting follow-up questionnaires to determine long-term application of these or other relaxation techniques.

REFERENCES


CONCLUSIONS

**Correlation is significant at the 0.05 level (2-tailed).**

**References**

**Bar Graph:**

- **A.** Power Posing (n = 10) – Holding an open pose.
- **B.** 4 x 4 Meditation (n = 10) – Breathing slowly in and out for four counts.
- **C.** Mindfulness Meditation (n = 11) – Focusing on the sound of a bell.

**RESULTS**

- **Objective 1:**
  - Figure 1. The means and 95% confidence intervals of physiological measures in salivary samples as determined over time in first year, first semester student pharmacists for (A) Cortisol (Time effect, $P = 0.088$), (B) Testosterone (Time effect, $P = 0.024$), and (C) Alpha-Glyceraldehyde (Time effect, $P = 0.121$). Days relate to the date when treatments were assigned to student pharmacists, with baseline measures taken 5 days prior to then see Protocol in Methods for specific dates.

- **Objective 2:**
  - Table 1. Spearman correlation coefficients for physiological measures in salivary samples as related to ratings for stress and anxiety since starting Pharmacy School in first year, first semester student pharmacists (Note: Higher ratings indicate higher self-reported stress or anxiety).

- **Objective 3:**
  - Figure 2. The means and SE of overall percentage change in the physiological measure of salivary testosterone calculated from Day -5 to 79 in first year, first semester student pharmacists (Treatment effect, $P = 0.078$).