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Measuring Physiological Variables in Student Pharmacists after Conducting Relaxation and Non-Relaxation Techniques

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Background

❖ The positive effects of conducting relaxation techniques on reducing stress, increasing focus, and improving mindfulness is well-documented via self-reported responses to survey questions[1,2,3].

❖ Recently, Tang, Holzel, and Pozner (2015) reviewed meditation studies which used the hormone cortisol to indicate the physiological reduction of stress[4].

❖ This study investigates the acute impact of relaxation techniques on student physiological measures to gain another, more objective view of their effects.

Objectives

❖ **Primary outcomes**: To compare physiological measures (body temperature, muscle tension, respiration rate, and heart rate) between intervention (relaxation) and control (non-relaxation) techniques.

❖ **Secondary outcomes**: To compare the effect of each treatment on these measures.

Methods

❖ **Population**: 86 Student Pharmacists were recruited via convenience sampling from P1, P2, and P3 years from the SWOSU College of Pharmacy.

❖ **Subjects were randomly assigned to and taught one of the following techniques:**
  ▪ Three relaxation interventions (n = 48)
    • **Body Scan Meditation(n = 16)** – Systematically relaxing muscles
    • **Mindfulness Meditation (n = 16)** – Focusing on the sound of a bell
    • **4 x 4 Meditation (n = 16)** – Counting breaths
  ▪ Two non-relaxation controls (n = 38):
    • **Power Posing[5] (n = 19)** – Holding an open pose
    • **Mental Stimulation (n = 19)** – Playing Word Streak App

❖ **Measures recorded utilizing Vernier© LoggerPro 3.10.1 and SPO2 Review v1.5 software while conducting techniques**:
  ▪ **Respiration Rate** – Secured respiration belt around diaphragm, and then inflated belt to increase pressure ~ 5 mmHg.
  ▪ **Body Temperature** – Taped probe onto forehead.
  ▪ **Muscle Tension** – Stuck electromyography (EMG) electrodes on dominant arm (ground), cheekbone, and jawbone.
  ▪ **Heart Rate** – Put monitor on index finger of opposite arm.

❖ **Preliminary Analysis:**
  ▪ The recording of each measure was manually evaluated as follows:
    • Selected a representative time period (i.e., between 60 seconds after recording started and 60 seconds before student had obviously taken off equipment)
    • Recorded resulting descriptive statistics (i.e., mean, median, standard deviation, and minimum and maximum values)
    • Evaluated overall trend by recording linear fit (i.e., slope) of the data
  ▪ Preliminary analysis of physiological measures included t tests and simple ANOVA to compare mean data responses (IBM SPSS Advanced Statistics, version 21).
  ▪ We expect relaxation techniques to lower body temperature, respiration rate, and muscle tension more than controls.

Results

❖ **Primary outcomes**: Maximum muscle tension in the face was found to be lower ($P < 0.05$) in subjects while conducting relaxation versus non-relaxation techniques in comparing the mean maximum EMG values (see **Figure 1** below).

❖ **Secondary outcomes**:
  ▪ **Respiration Rate** – Average respiration rate of at least one technique was different ($P < 0.05$) in evaluating mean and median respiration rates. Post-hoc results suggest Word streak increased respiration rate, whereas 4x4 meditation reduced it (see **Figure 2** for median respiration rate results).
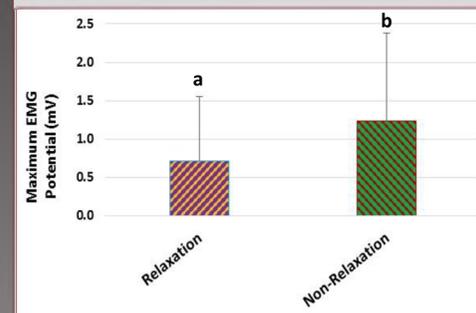

Figure 1. Maximum facial muscle tension during relaxation and non-relaxation techniques (n = 37 and 29, respectively). [ab]Techniques with different superscripts are different ($P < 0.05$).
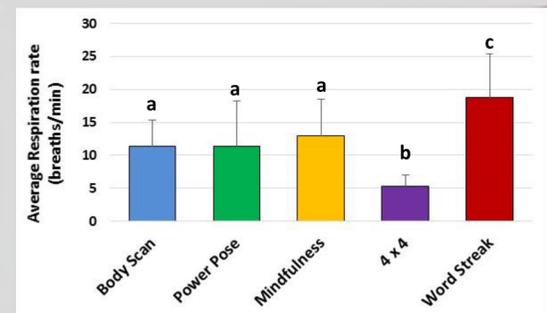
Figure 2. Median respiration rates among the five techniques (n = 14, 17, 14, 16, 17, respectively). [abc]Techniques with different superscripts are different ($P < 0.05$).

  ▪ **Body Temperature and Muscle Tension** – No differences ($P > 0.05$) in physiological measures among techniques were detected.
  ▪ **Heart Rate:** Time did not permit analysis of this variable.

Challenges & Future Directions

❖ The following are challenges in conducting physiological measures on human subjects:
  ▪ A few subjects continued to chew gum after salivary collections.
  ▪ Default setting of Vernier software to ECG accidentally preventing recording of EMG.
  ▪ Medical tape did not always stick, causing the body temperature probe or EMG electrodes to detach during recording.
  ▪ Medical tape did not stick to beards, requiring EMG measures to be taken from different facial positions.
  ▪ Respiration belt did not fit all students – either being too small or too large.
  ▪ Minimum and maximum values for respiration rate were not measured yet.
  ▪ Overall, it took a lot of time and labor to individually collect measures on 86 students, as well as to manually evaluate each recorded measure for each student.

❖ Aside from heart rate and remaining respiratory measures, pre- and post-technique salivary samples need to be analyzed for cortisol, testosterone, and alpha-amylase.

❖ Correlations will be evaluated between physiological and survey measures in studying the impact of relaxation and non-relaxation techniques on student well-being.

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