Abstract

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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. Recently, Tang, Holzel, and Pozner (2015) reviewed meditation studies which used the hormone cortisol to indicate the physiological reduction of stress.
- 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 (n = 19) – Holding an open pose
    - Mental Stimulation (n = 19) – Playing Word Streak App

- **Measures**: recorded utilizing Vernier© LoggerPro 3.10.1 and SP02 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 subject 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).

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).
  - 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.

References