Introduction

Personally, I find the field of psychology to be highly intriguing. Specifically, I am fascinated by the influences of the human mind and mental state on stress perception, where perceived stress is defined as a conscious state of emotional or mental strain. This interest, in part, stems from my position as a student and my aspiration to pursue a future career as a professor, strengthening my curiosity towards the student experience, with a particular interest in improved stress-coping. Short term stress may negatively influence performance and cognitive functioning. A study by Allan, J. L. *et al* found stress in nurses to lead to cognitive failure and decreased efficiency in work performance[1]. If short-term stress is not controlled, chronic stress may develop and lead to even greater implications, such as its potential to increase breast cancer likelihood. A study by Cui, B. *et al*, showed greater tumour growth in mouse models, in the presence of prolonged stressors[2].

Long-term stress may be prevented through meditation. Relaxation Response Meditation (RRM) and Mindfulness Meditation (MM) are particularly associated with stress reduction. A study by Sevinc, G. *et al*, found MM to evoke psychological responses, as related to stress, such as increased self-compassion, in comparison to the physiological effects of RRM, such as a decrease in the fight or flight state of stress[3]. Due to the greater psychological influences of MM, it is worthwhile to consider whether the physiological implications of RRM create stronger effects on perceived stress levels when combined with MM.

This project seeks to achieve the goal of determining the most effective meditation practice, as related to the reduction of stress perception. A literature review by Sedlmeier, P. *et al*, explains how several past meditation studies have lacked precise theoretical background and measurement[4]. Thus, this project aims to create an impact in meditation research by contributing more dependable methodology, specifically as related to overcoming high levels of stress perception through the most successful meditation program. This project also aims to use technology in order to improve stress coping, through the use of online meditation modules.

Research Question

This study considers the question: Does a combined meditation approach of MM and RRM display synergistic, or combined, effects on the decreased perception of stress, as compared to the individual use of MM practices?

Methodology

The independent variable is the meditation approach to which participants will be assigned. The dependent variable is the level of perceived stress, preceding and following the meditation practices. Control variables include the duration and number of meditation or alternative sessions assigned. During the first summer, training will be completed in conducting literature review, experimental design, completing an ethics proposal, the preregistration of a hypotheses and analysis plan, as well as in establishing survey programming and piloting the experiment.

In outlining the methodology, the small scope of the research project must be considered. Due to timely ethics approval and experimental setup, two summers seem more appropriate for the project. The three major milestones of the first summer include completing an ethics board proposal, the preregistration of the hypotheses and analysis plan, and the experimental setup for the following summer. To establish a stronger theoretical background for the project, the first two weeks will be reserved for a literature review of relevant current and previous research. The goal of the review will be to identify the gap in meditation research, while also gaining a deeper understanding of the following concepts: the nature of stress including its healthy and unhealthy implications, the emotion regulation associated with stress management, and the minimal components required to operationalize efficient MM and RRM training respectively. A greater understanding of these concepts will ensure the appropriate planning of the experimental procedures for measuring perceived stress as well as delivering meditation trainings.

To provide a more specific timeline for the first summer of the project, the first week will consist of filtering the studies relevant to the literature review, while also gaining a general understanding of the major literature review concepts outlined above. The second week will be

focused more on reviewing the details pertaining to the measurement of perceived stress and the delivery of MM and RRM training. The third week of the project will be encompassed by completing the ethics proposal and establishing the experimental design, which will include selecting a population of study, recruiting a representative sample, ensuring the completion of participant consent forms, establishing the nature of the target meditation, and forming necessary questionnaires on perceived stress. The fourth week will be dedicated towards the completion of the hypotheses and analysis plan, as well as their preregistration. The fifth week will be comprised of the introduction to survey programming, which will involve setting up a prototype of the meditation modules, as well as piloting the experiment. The sixth week will involve the final polishing and approval of the experimental goals, as well as creating a detailed schedule for the following summer. The seventh and eighth weeks will provide any additional time which may be needed to complete the project.

The second summer will be reserved for conducting the experiment. The experiment will include 60 participants: a 20-person control group, 20-person MM group, and a 20-person combined MM and RRM group, randomly assigned. During the first four weeks of the study, participants will use online modules, in order to consistently report on their perceived stress levels and engage in the meditation or alternative practice assigned to their study group. Data will be collected on participants' perceived stress levels over time, both before and after each assigned meditation or alternative practice. The fifth and sixth weeks of the project will involve a process of data analysis and reporting on the experimental results. The seventh and eighth weeks will provide any additional time which may be needed to complete the project. No travel is required, and no external organizations or offices will be involved in this research project.

Research Advisor Role

My research advisor will be available to support the research project and its goals, as well as provide advice needed throughout the process. He will provide any lab equipment or space needed for the project, including materials, such as the meditation modules, and methodology already in place in his lab, which can be modified to fit the goals of this project. He will also serve as a guide for any concerns regarding the safety of the research team and participants. Furthermore, he will be present

for any expertise needed regarding the experimental setup described in the methodology, including assisting with ethics board approval. His role will also involve guidance through any statistical knowledge required for data analysis.

Outcomes

The goal of this research is to determine whether a combination of MM and RRM will lead to differences in perceived stress levels. Through comparing the perceived stress levels of participants in both groups, the best meditation practice for perceived stress reduction will be identified. The first summer's key achievement is to develop a more comprehensive understanding of the proposed research topic, while also designing an experiment which can be used in order to practically apply this research. The second summer, as well as the entire program's, key achievement is the identification of the resulting lower perceived stress levels through combined MM and RRM practices.

Citations

1. Allan, J. L. *et al* (2013). Stress in Telephone Helpline Nurses is Associated with Failures of Concentration, Attention and Memory, and with More Conservative Referral Decisions. *British Journal of Psychology*, **105(2)**, 200–213.
2. Cui, B. *et al* (2019). Stress-induced Epinephrine Enhances Lactate Dehydrogenase A and Promotes Breast Cancer Stem-like Cells. *Journal of Clinical Investigation*, **129(3)**, 1030-1046.
3. Sevinc, G. *et al* (2018). Common and Dissociable Neural Activity After Mindfulness-Based Stress Reduction and Relaxation Response Programs. *Psychosomatic Medicine*, **80(5)**, 439–451.
4. Sedlmeier, P. *et al* (2012). The Psychological Effects of Meditation: A Meta-Analysis. *Psychological Bulletin*, **138(6)**, 1139–1171.