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How Prayer Mediates the Body’s Physiological Response to Stressors

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Abstract

It is important that college students have good stress coping mechanisms, as they face much stress every day. A previous study of college students that found that prayer did not significantly reduce stress levels was adjusted to test how a period of short-term prayer would impact the stress levels of college students, as indicated by psychological and physiological measurements. Students from psychology courses (n=32) participated in this experiment. Participants were assigned to either listen to a stress-relief audio clip (control) or a guided prayer (experimental) for about ten minutes. Their stress levels were assessed using physiological measurements (i.e. heart rate) and self-reported feelings (i.e. anxiety) before, after, and during the experiment. It was found that both the participants in the control and experimental groups had significantly lower stress measurements following the experiment, but there was not a significant difference between the groups. The results indicate that college students can reduce their stress levels both through prayer and relaxation exercises. Future research could investigate if long-term prayer routines would have a positive impact on students’ stress levels over a semester.
Prayer and Stress: How Prayer Mediates the Body’s Physiological Response to Stressors

Young adults who are attending college face stressful situations everyday. These situations include short-term stressors such as exams and long-term stressors such as major life decisions like choosing a career or a spouse. While most have experienced the overwhelming feelings associated with stressful situations, it is difficult to pinpoint a concrete definition of stress. One article even discussed multiple definitions of stress as it relates to speech in an attempt to determine a more concrete explanation of stress’s impact on speech. One preliminary definition that the paper proposed was that, “Stress is a psycho-physiological state characterized by subjective strain, dysfunctional physiological activity and deterioration of performance” (Murray, Baber, & South, 1996). This definition captures the essential principle that stress not only affects people mentally, but it also negatively impacts the physical health of individuals.

There are multiple ways that stress manifests itself physically in the bodies of those who are affected by the stress. One study of 75 married couples found that, especially in people who did not have many social relationships, higher stress levels were significantly associated with higher amounts of health issues like the flu (DeLongis, Folkman, & Lazarus, 1988). This study demonstrates the negative impact that stress can have on the immune system, weakening the body’s natural ability to fight off diseases, and resulting in increased rates of health issues. Not only does prolonged stress weaken the immune system and make the individual more susceptible to becoming sick, but it can also have other negative effects. Prolonged stress can be characterized by headaches, upset stomach, elevated blood pressure, chest pain, and trouble sleeping. Statistics even show that 43% of adults have negative physical symptoms because of stress and that 75-90% of all doctor’s visits are because of stress-related problems (“The Effects
of Stress on Your Body”, 2012). As prolonged stress results in these adverse physical symptoms, it is inadvisable for individuals to experience stress for a prolonged period of time. Therefore, methods to relieve stress are quite important to realize and promote.

Previous studies have looked into how well meditative and religious practices relieve stress among different populations. One study looked at 18 university students who had self-reported symptoms of anxiety. Seven of these students were placed in a treatment group, where they underwent Kouk Sun Do (mind-body) exercises over a 4-week time period. It was found that the individuals in this treatment group had significantly reduced trait anxiety when compared to the control group (Kim, Yang, & Schroeppel, 2012). Further research has investigated how Christian faith and faith practices impact the stress levels of different populations. One study looked at how Christian faith attitudes and behaviors were related to the mental health of 158 cancer patients. This study found that the more patients viewed God as loving, the better their mental health (Meisenhelder, Schaffer, Younger, & Lauria, 2013). A final study looked at how reading a prayer mediated undergraduate students’ responses to acute stress. In this study, students received a baseline measure of stress (heart rate, blood pressure, and surveys), which was followed by their reading of either a control paragraph about how to ride a bike, a paragraph containing encouraging self-talk, or a paragraph containing an encouraging prayer. The participants were then asked to record answers to a mock job interview question (a stressful task) and their stress level was again measured. It was found that prayer alone did not significantly reduce stress in this context (Belding, Howard, McGuire, Schwartz, & Wilson, 2010). Evidently there is a gap in the research literature regarding the effects of prayer and religion on the body’s stress response.
In light of the above studies, and due to the importance of discovering effective stress relief techniques, the goal of this research was to use different techniques to assess the impact of prayer on the body’s physiological responses to stress. Specifically, would hearing and hopefully following along with a guided prayer decrease the individual’s stress level as indicated by their physiological measurements? In order to test this question, there were two groups, an experimental group where participants listened to a 10 minute guided prayer and a control group where participants listened to an approximately 10 minute guided stress relief session. The physical measurements were heart rate, pulse, respiration rate, and heart rate variability. The participants also received a survey to assess their general stress levels and a pre/post-test questionnaire about their physical symptoms at the current time. It was hypothesized that the participants who listened to the guided prayer would have decreased stress levels as indicated by the physiological and psychological tests when compared to the participants in the control group.

Method

Participants

Participants were recruited from psychology courses at Messiah College (11 males, 21 females, n=32). The participants volunteered to participate in the study by signing up for a time slot, and were randomly assigned to treatment groups. For the most part, odd numbered participants were assigned to the control group and even numbered participants were assigned to the experimental group. There were 16 participants in the control group, and 16 participants in the experimental group.

Materials

Each participant was given a survey that asked to what extent they were currently experiencing certain physical symptoms that are associated with stress, and used a rating scale
from 1 (this symptom is not bothering you at all) to 10 (this symptom is extremely troubling; very severe). They also received a questionnaire with 25 questions to assess their average stress level. Participants sat in a comfortable leather chair with a footrest, and listened to one of two recordings through noise-canceling headphones. One recording was from YouTube (http://www.youtube.com/watch?v=WiKATI1yGj0) and a researcher recorded the other. Each recording was about ten minutes in length. The participants were each hooked up to the iWorx software, which was run through a researcher’s computer. The software determined their heart rate, pulse, respiration rate, and galvanic skin response.

**Procedure**

The participants arrived at the researchers’ lab at their designated times, and were asked to sit in a comfortable armchair. All participants first read some details about the study, in which they were told that they would be participating in an experiment that would help the researchers in understanding more about the body’s physiological responses to stress. Next, the participants answered questions about their current physical symptoms on one survey and questions meant to assess their average stress level on a questionnaire. Each participant was then hooked up to the iWorx software machine and given noise-canceling headphones. Participants were assigned to the control or experimental condition based on their participant number, with even numbered participants in the experimental and odd numbered in the control condition. The participants in the control group then listened to a relaxation video from YouTube that was about 9 minutes long. Participants in the experimental group listened to a pre-recorded guided prayer that was about 11 minutes long. After the recording was complete, participants filled out the same survey about their current physical symptoms. The data was statistically analyzed to investigate if there existed a significant differences in the means of the dependent variables, both before and after
the test and between the control and experimental groups.

**Results**

Several ANOVA tests were performed on the data. Of the physiological tests, it was found that heart rate ($F=9.787, p=0.01$) was significantly lower after both the guided prayer and meditative stress audio clip, but was not significantly different between the groups (see Figure 1). Of psychological interpretations of stress, it was found that anxiety ($F=10.385, p=0.01$)(see Figure 2) and perceived muscle tension ($F=8.442, p=0.01$)(see Figure 3) were both significantly lower following each audio clip, but again did not differ significantly between the groups. Lastly, of religious thoughts, participants felt significantly less weighed down by sin ($F=6.914, p=0.05$)(see Figure 4) and significantly closer to God ($F=5.279, p=0.05$)(see Figure 5) following the audio clips. Again, there was no significant difference between the experimental and control groups.

**Discussion**

The results of this study were assessed as they related to the hypothesis. The hypothesis was not supported. In other words, participants who listened to a guided prayer did not have significantly less stress levels as assessed by their physiological measurements when compared to participants in the control group. These particular results were consistent with what was found in the study by Belding, et al. (2010). They found that when the participants were in the experimental group and read an encouraging prayer, they did not have significantly decreased stress levels when compared to two control conditions. The results were inconsistent with those obtained by Belding, et al. because it was found that the participants in the prayer condition did have significantly lower stress levels than before they listened to the silent prayer. The catch is that these lower stress levels were not significantly different from the lower stress levels found
after the participants listened to the meditative recording in the control condition. The discrepancy in these findings could be the result of inherent differences in the research methodology. One major difference between the studies was how they measured stress. The current research measured stress using both perceived stress as indicated on surveys given to the participants and more objective physiological measures of stress. The research by Belding et al., however, seemed to only use subjective measures of stress before and after the stressful task. Additionally, the current research did not contain a specific stressor task, while the research by Belding et al. purposefully stressed the participants with a job interview task. These differences in the presence of a stressful task and the method used to measure stress levels could account for the discrepancy in the findings of these two studies.

There are some problems with this study that could be remedied in future research to ensure more accurate results, and possibly achieve significance in the findings. A first problem is the small number of participants. As the results were trending toward significance, a higher number of participants could have pushed the results over into the significant range. An additional problem was that the entire experiment was being conducted in a short time frame, and so participants were unable to be placed in long-term experimental and control groups. This is another flaw because long-term prayer routines are more realistic, and more plausibly will elicit long-term stress reductions. To best test the hypotheses, it would be better to put participants in extended regular prayer and Bible study programs that last over a period of months or years, and assess their stress levels using various types of measurements (both subjective and objective) throughout this time. These types of experiments would demonstrate how a Christian lifestyle influences the overall stress levels of college students.

The results of this study in general should not be generalized too widely to other
populations, as the external validity of this research is not high. The low external validity is due
to the lack of random selection in obtaining participants. In other words, the results that were
obtained by a sample of students from psychology courses cannot necessarily be generalized to
an entire college campus in general. In order to obtain more generalizable results, future
researchers could conduct a similar study on college students; yet randomly select the students
from all classes at the college of interest.

There are options for future research that examines how religious practices impact the
stress levels of college students. One possible future research idea would be to assign
participants to three groups, one group that is asked to not pray regularly, one group that prays
regularly for six months, and one group that prays regularly for one year. The researcher could
test the stress levels of the participants in each group at various points throughout the time. An
additional future research option would be to randomly assign participants to similar prayer
conditions, but measure how well they performed in school (their grades, how often they got
sick, the average amount of sleep they got, etc.) during that semester as the dependent measures.
This research design would be more realistic, and possibly more applicable to the college setting
and college students in general. There are countless other future research ideas that would
investigate how religious practices, like prayer, impact stress levels, which could benefit the
general public with the information that this research would obtain.
References


Figure 1. Differences in the mean heart rates (bpm) before and after participants listened to the recordings are presented. The mean heart rate at Time 2 was significantly lower than the mean heart rate at Time 1 for both the control and experimental groups. The mean heart rate at Time 2 was not significantly different between the groups.
Figure 2. Differences in the perceived anxiety level before and after participants listened to the recordings are presented. The mean anxiety level at Time 2 was significantly lower than the mean anxiety level at Time 1 for both the control and experimental groups. The mean anxiety level at Time 2 was not significantly different between the groups.
Figure 3. Differences in the perceived muscle tension before and after participants listened to the recordings are presented. The mean muscle tension at Time 2 was significantly lower than the mean muscle tension at Time 1 for both the control and experimental groups. The mean muscle tension at Time 2 was not significantly different between the groups.
Figure 4. Differences in the mean feeling of being weighed down by sin before and after participants listened to the recordings are presented. The mean feeling at Time 2 was significantly lower than the mean feeling at Time 1 for both the control and experimental groups. The mean feeling at Time 2 was not significantly different between the groups.
Figure 5. Differences in the mean feeling of being far from God before and after participants listened to the recordings are presented. The mean feeling at Time 2 was significantly lower than the mean feeling at Time 1 for both the control and experimental groups. The mean heart feeling at Time 2 was not significantly different between the groups.