How Prayer Mediates the Body’s Physiological Response to Stressors

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Prayer and Stress:
How Prayer Mediates the Body’s Physiological Response to Stressors
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Abstract

This study was performed to explore the concept that physical, emotional, and spiritual symptoms of stress may be reduced by meditation and prayer. The participants were 32 undergraduate students from introductory psychology courses. Each individual participated in one of two conditions. The control group listened to an audio recording of relaxation and meditation guidelines, while the experimental group participated in a guided prayer for approximately the same amount of time. Both groups filled out a pre-test and post-test survey to determine their emotional stress level, as well as consent to allow a software program record their physiological functioning. The research team was interested in comparing the pre-test and post-test physical and emotional measures, and consider any significant difference between the two groups. Though the hypothesis that prayer would be more effective than meditation at reducing stress symptoms was not supported, the results of this study demonstrate that both meditation and prayer do significantly diminish stress. Future research should be conducted to continue exploring these findings.
Prayer and Stress: How Prayer Mediates the Body’s Physiological Response to Stressors

The relationship between body and mind has been a controversial topic for centuries. The concept of how a physical body can be associated with an intangible mind has stumped even the most brilliant individuals. Though this issue is surrounded with theories, questions, and thoughts, one thing is clear. The human mind is intimately connected to the physical body which houses it. This inexplicable bond has intrigued researchers for years, and many experiments have been conducted in hopes of bringing understanding to the body and mind phenomenon. One area that has specifically captured the attention of scholars recently is how the mind and body are related in terms of stress.

Stress has become one of the largest strains on society today, affecting the functioning, health, and happiness of people across the globe. Researchers have dedicated their entire lives to understanding how stressors impact everyday life. Murray, Baber, and South (1996) conducted an experiment in order to determine a working definition of the word “stress.” Stress can be defined in a strictly physical sense, where its synonyms include “strain,” “pressure,” or “emphasis,” but the idea of psychological stress requires a deeper understanding. Stressors on living organisms are anything that disrupt the homeostatic balance of a body (Murray, Baber, & South, 1996). Therefore, when a person is “stressed,” their body attempts to restore homeostasis, and therefore will undergo a “stress response.” This stress response may manifest itself physically, emotionally, or mentally, which is why stress is so detrimental for human functioning.

A prolonged exposure to stressors will therefore result in a longer physiological stress response. This is relevant for the field of psychology because there is a strong correlation between extended periods of stress and mental disorders. Slavich and Irwin (2014) suggest that
major depressive disorder, one of the most common psychiatric disorders diagnosed in the world today, often arises from early or sustained stress. These researchers explored how the immune system responds to stress by causing inflammation via cytokines (2014). Ultimately, these cytokines can result in behavioral changes that are common symptoms of depression (Slavich & Irwin, 2014). The risk of developing major depressive disorder increases significantly when an individual experiences high levels of stress, which illustrates how the mind and body strongly influence each other.

Since psychological stress is expressed through the body, treating the physical symptoms do not provide a feasible solution to the stress itself. Therefore, the mind must be the focus for researchers interested in truly reducing the negative effects of stress on people. How people mentally respond to stress has important consequences for their health. Jamieson, Nock, and Mendes (2012) performed a study to demonstrate the importance of thought in regard to stress adaptation. The researchers instructed one group of their participants to consider stress a helpful and adaptive feature of the human mind as they underwent a stress-inducing task (2012). The other group did not receive these instructions, and these participants experienced more physiological responses to the stressful situation (2012). By simply drawing attention to the stressful feelings and bringing awareness of their stress to the experimental group, the researchers managed to decrease the physical stress response of these individuals compared to the control group. Thus, the importance of thought, or the mind, is imperative to understanding how to adequately combat stress.

The power of the mind in regard to managing stress is clearly evident, but subsequent studies have been attempting to outline the most effective means of using thoughts to reduce stress responses. Prinsloo, Derman, Lamert, and Rauch (2013) articulate that acute stress can
lead to anxiety, and chronic stress may elicit cognitive impairment. They state that, “…it is increasingly important to identify effective stress management techniques…such as progressive muscle relaxation, listening to relaxing or classical music, and meditation” (Prinsloo, Derman, Lambert, & Rauch, 2013). Their experiment was conducted to test the viability of heart rate variability biofeedback as one of these stress coping mechanisms. The results were that the biofeedback group was ultimately more energized and relaxed compared to the control group. Similar to the study performed by Jamieson, Nock, and Mendes (2012), the findings suggest that drawing attention to thoughts will decrease the level of stress an individual experiences. Meditation and progressive muscle relaxation, like biofeedback mechanisms, increase an individual’s sense of awareness of their body and self. This new awareness is what calms the body and reduces the stress (2013).

Prinloo, Derman, Lambert and Rauch (2013) were not the only researchers to realize that meditation-like strategies are a successful remedy to stress. Shonin, Van Gordon, and Griffiths (2013) wrote a comprehensive article on mindful-based interventions and how these techniques can be integrated into clinical psychology practices to help reduce the amount of stress or anxiety a client is experiencing. In their article, they list at least nine different types of meditation strategies that can be utilized to treat people under stress (2013). Clearly, the idea of meditation to help individuals relax is soundly supported by the current available research.

However, an idea similar to meditation has received much less attention, and more questions remain unanswered about it. Prayer is, according to McKinney and McKinney (1999), internal communication with a divine power through the soul. Prayer is a topic that has been researched less than other components of religiosity, since it is so difficult to quantify. In McKinney and McKinney’s (1999) experiment, adolescents completed journal entries after they
prayed; describing what they prayed for, the frequency of their prayers, and if they felt that their prayers were heard or answered. Based on the journal entries, the research team classified their prayers into four categories (1999). Despite this classification, prayer proved to be an elusive element of their research, along with many other studies attempting to study prayer, and yet it remains an important piece of life for many individuals.

Though prayer is abstract and a bit obscure, the importance of studying it is clear. It is similar to meditation, and may therefore also be a stress-reliever. Observations of past occurrences seem to indicate this. Sosis and Handwerker (2011) wrote about a fitting example of how prayer served as a coping means to help relieve stress. In 2006, a group of Israeli women were living in uncertainty as the Lebanon War raged around them (2011). Sosis and Handwerker (2011) discussed how the women of Israel relied on prayerful psalm recitation to help themselves find peace in the chaos of their lives. The anthropologists found that reciting and praying through the Biblical psalms actually lowered the rates of anxiety in the women compared to those who did not participate in that practice.

Psalm recitation and prayer could both be considered aspects of spirituality. Spirituality is generally associated with feeling close to God (Aldwin, Park, Jeong, & Nath, 2013). In this experiment, the researchers compared religiosity to spirituality, looking specifically at how these two characteristics influence the health of individuals. Religiosity was found to be closely related to healthy habits and behaviors, while measures of spirituality were linked more closely with physiological features of health, such as lowered blood pressure and cardiac reactivity (Aldwin, Park, Jeong, & Nath, 2013). Considering that prayer is one of the main indictors of spirituality, and its similarity to meditation, this conclusion is logical. Prayer, like meditation, can result in physical and tangible health benefits, particularly regarding stress physiology.
The exploration of prayer and meditation led to a study performed by Bingaman (2013) to determine why thoughts and the human mind can influence physiological stress levels. Bingaman studied “mindfulness meditation” or “centering prayer” (he used them as synonyms) in hopes of understanding the relationship between body and mind through neuroscience (2013). He was particularly interested in how meditation and prayer reduce anxiety in his clientele, and he found that when his participants meditated or prayed, the activity level in their amygdala was lowered. Bingaman therefore discovered that the action of prayerful meditation was capable of physically causing a change in the brain’s functioning (2013). Lowering amygdala reactivity greatly diminished the feelings of stress for each participant, which provides more support to the theory that the mind may have authority over stress.

These studies all serve to support the claim that meditation and prayer both aid in stress reduction. The current study was therefore conducted in order to determine if prayer or relaxing meditation was more effective in physiologically and psychologically reducing a participant’s stress level. The hypothesis was that both prayer and meditation will lower stress, but prayer would be more effective in decreasing physiological symptoms of stress, as well as decreasing the emotional aspects that accompany anxiety. The experiment was designed around two different recordings: a relaxation recording that emphasized meditation techniques, and a recording that led the participants into silent prayer time. Participants were split into two groups for this procedure, and each group experienced one of the conditions. Every participant took an overall stress assessment, a pre-and post-stress test, and their physiological responses were recorded via iWorkx equipment.
Method

Participants

Participants were 32 undergraduate students (21 females, 11 males) recruited from Introduction to Psychology courses at Messiah College. They received class credit for participating. Each person experienced only one of the two conditions.

Materials

The experimental trials were held in a small lab without windows. The participants were seated in a reclining chair, and were given two different surveys. The stress inventory consisted of 25 questions in which the participants were asked to choose one of the five answer choices provided. This inventory was designed to assess the normal stress level of each individual participant. The second survey was a stress symptom test. A list of 25 common stress symptoms were provided, and the participants were asked to rank how they were currently feeling regarding each item on the list on a scale from 1 to 10 (1 being not at all, 10 being extremely). This survey was given again at the conclusion of the experiment. A blank piece of white poster board was used as a divider between the researcher and participant (48” X 36”). Two 10 minute audio recordings were used in this experiment; one for the experimental prayer group, and the other for the control relaxation group. The experimental recording was played through an audio recording player on the computer, while the relaxation clip was played from YouTube via the internet. The participants listened to the recording through noise-cancelling headphones connected to the lab computer. Physiological measures were taken throughout the experiment with iWorkx equipment and recorded with LabScribe software on a compatible computer.
**Procedure**

Students were seated in a green reclining chair facing the white wall of the Messiah College Jordan Science Center lab. They were told that the study was part of a research project on stress physiology. Each participant first filled out the stress inventory and symptom test. At this point, the researchers attached the iWorx equipment to the participants; including a breathing rate monitor, a pulse recorder, and two fingertip devices that measured galvanic skin response. After instructing the participants to sit still and keep their palms face-up, the researchers put up a large piece of white poster board between themselves and the participants to prevent distractions from skewing the data. Noise-cancelling headphones were used while the participants listened to their respective recording. Once the recordings were completed, the participants were unhooked from the iWorx setup, and filled out the stress symptom test a second time before they were dismissed.

**Results**

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

The hypothesis presented at the onset of this study, that prayer would more effectively decrease physiological and emotional aspects of stress than meditation, was not supported by this experiment. However, the results do suggest that prayer and relaxation do significantly decrease stress symptoms, but they just do not differ significantly from each other. These findings are concurrent with the literature available in the field. There have been numerous studies with results that indicate how meditative relaxation reduces the body’s stress response. An example of this would be the experiment performed by Prinsloo, Derman, Lamert, and Rauch (2013), which supported the idea that various relaxation techniques are somatically beneficial. Conversely, other studies have found that religiosity also directly improves health in regard to stress. This is evident by the experiment carried out by Aldwin, Park, Jeong, & Nath (2013) which demonstrated how psalm recitation and prayerful behavior improved physiological symptoms of the participants.

The current experiment was conducted in an attempt to merge these two concepts together by comparing meditation to prayer, and then subsequently looking for a significant difference between the two groups. Though no difference was observed, this study did support the past evidence for each of these ideas individually. According to the ANOVA tests, both meditation and prayer reduced stress symptoms physiologically, emotionally, and even spiritually. The iWorx software allowed the researchers to see that the heart rate of the participants significantly decreased from the onset of the audio clip to the conclusion. Both the experimental and control group experienced this change in heart rate. The researchers did not find any significant decreases regarding the pulse, breathing rate, or galvanic skin response of the participants.
The pre- and post-test survey produced some insight on the emotional well-being of the participants. Both the control group and the experimental group scored significantly lower on the anxiety item of the survey after listening to their respective recordings, suggesting that meditation and prayer can reduce feelings of anxiousness. Additionally, both groups also rated their feelings of muscle tension significantly lower at the conclusion of the audio clip than at the beginning. The same conclusion can therefore be drawn from these findings: that prayer and meditation may reduce the stressful feeling of muscle tension.

Not only were physical and emotional symptoms alleviated, but some spiritual stress responses were diminished as well. Both groups reported a decrease in feeling weighed down by sin after the experiment was performed. Similarly, the participants also expressed through their surveys that they felt less far from God (closer to Him) by the conclusion of the audio recording. Each of these measures, though not different between groups, suggest that either prayer or relaxation techniques will improve spiritual symptoms of stress.

Despite all of these findings, many of the other items on this self-assessment survey such as anger, depression, fatigue, pessimism, or feelings of worthlessness did not elicit a significant change as a result of the recordings. Perhaps this could be attributed to a few potential problems with the study. The most obvious issue with this experiment is the small sample size, which was limited by time constraints. An N of 32 is very low for an experiment of this nature. This experiment was also a form of a convenience sample experiment, because the researchers only took participants from a selection of introductory psychology courses at a Christian college. The results, therefore, may not be very generalizable to the public since the sample was not representative of the entire population.
Having two different researchers conduct the trials may have introduced an additional variable as well. Despite all efforts to keep the procedure as standard as possible, two different people running the trials could have altered the results slightly. Another problem with this experiment was its duration. 10 minutes is a relatively short amount of time to cause any significant changes in stress symptoms, physical or mental. Bodily stress responses take time to develop, but likewise, take time to lessen as well.

To conclude, one suggestion for future research would be to create a longer-term plan. Perhaps the study could be carried out over the course of an entire semester, or a year. More significant changes may result from this adjustment, and also a difference between the experimental and control group may also occur. There are many different types of prayer, as well as types of relaxation or meditation. Altering the logistics of the experiment may also yield some different results. This could be achieved through trial and error processing through some of the various manners of praying and of meditating and trying different combinations for the experimental procedure. Though the survey was complementary to the pre- and post-test questionnaire, the researchers could have utilized this tool more during their analysis as well. Effectively considering how stressed the individual participants typically are or if they have an anxious personality may have given some insight on the results. Essentially, this topic is not yet exhausted. More research will only enhance our understanding of stress physiology and the elusive relationship between the mind and the body.
Figures

**Heart Rate Means Pre/Post-Test**

- **Time**
  - 1
  - 2

- **Heart Rate (bpm)**
  - 60
  - 65
  - 70
  - 75

- **Control**
- **Experimental**

**Anxiety**

- **Time**
  - 1
  - 2

- **Control**
- **Experimental**

**Muscle Tension**

- **Time**
  - 1
  - 2

- **Control**
- **Experimental**

**Weighed Down By Sin**

- **Time**
  - 1
  - 2

- **Control**
- **Experimental**

**Far From God**

- **Time**
  - 1
  - 2

- **Control**
- **Experimental**

Figure 1
Figure 2
Figure 3
Figure 4
Figure 5
References


