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The Effects of Samatva Yoga on Perceived Stress among University Students
in the Midwest

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The Effects of Samatva Yoga on Perceived Stress among University Students
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A THESIS

APPROVED FOR THE DEPARTMENT OF KINESIOLOGY AND HEALTH STUDIES

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Abstract

The purpose of this study was to determine the effects of Samatva yoga on perceived stress among university students in the Midwest. Criteria for participants included that participants were students at a University located in a metropolitan area and enrolled in two sections of the 2011 fall yoga courses. The comparison group included participants from the two different universities enrolled in a fall 2011 weight training courses. Weight training was chosen as the comparison group because it was the most closely related form of exercise to yoga. Demographic data were collected on participants before the questionnaires were administered. The questionnaires, Perceived Stress Scales (PSS) and Revised Life Orientation Test (LOT-R) instruments which measure stress and optimism were administered as a pre-test to university students enrolled in yoga and weight training for the fall 2011 semester. After eight weeks, the Perceived Stress Scale and LOT-R questionnaires were administered again to the yoga and weight training classes. This study had a quasi-experimental design due to lack of randomization, since students selected which courses they wanted to take. Two 2 X 2 ANOVA with repeated measures were used to analyze the perceived stress and optimism data. The level of significance or alpha was set at 0.05. Statistical significance was not reached in PSS between groups over time, $F(1, 36) = .08, p = .77$, or over time, $F(1, 36) = 2.26, p = .14$. Despite non-significance, there was a moderate effect size over time within the group in yoga students and small effect size within weight training students. Statistical significance was not found in LOT-R between groups over time, $F(1, 35) = .17, p = .67$, but was found over time, $F(1, 35) = 14.56, p = .001$. Both groups had a small effect size over time.

No research exists on Samatva yoga, the findings from this study will help enhance the body of knowledge on the effects of this growing practice.

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Chapter One: Introduction

Significance of Study

Stress has become a major concern in our society and can affect all aspects of health and ultimately the quality of life for an individual. As the average American continues to create an even faster-paced lifestyle, stress has become more prevalent in the United States. Stress has been linked to various diseases and can have a negative effect on an individual's mental and physical state that can cause overall health to decline (American Institute of Stress (AIS), 2010b). The most common lifestyle and behavioral changes recommended by health care providers to reduce stress are: exercise more, lose weight, and eat a healthier diet. Even though most Americans understand the importance of healthy behaviors, depending on the level of stress within a region, there may be a gap between what they think is important and how successful they are at achieving their goals. The top four causes of stress within the Midwest include money, work, relationships (i.e. spouse, kids, boyfriend, girlfriend), and the economy (American Psychological Association (APA), 2009a). The purpose of this study was to determine if Samatva yoga would decrease perceived stress among University students. Samatva yoga, a style of gentle hatha yoga, focuses on creating balance (samatva) of the body, mind, and spirit, placing an emphasis on safe exercise techniques, building body awareness, use of breath to support the postures and creating balance within (Prior, 2003). To date, there was no research on the effects of a Samatva style yoga intervention. This study will help enhance the body of knowledge on this growing practice.

The development of yoga, an ancient discipline, can be traced back to over 5,000 years ago. Yoga is believed to have started in the northwest part of India in the Indus Valley civilization. The earliest archeological evidence was found on stone seals, which depicted figures

of yoga poses (Sparrowe, 2008). In modern society, yoga is thought to be the product of a complex spiritual evolution. The word yoga, meaning “unity or oneness,” was derived from the Sanskrit word *yuj*, which means “to join.” The intention of yoga is to unite (or yoke) the mind, body, and spirit (Lasater, 2003). The intention of this practice was to prepare the body to be healthy and strong so that one could sit comfortably in one position for long periods of time to practice meditation (Sparrowe, 2008).

The Bhagavad Gita (also known as the Gita) was created around 500 B.C.E., and most scholars see this text as the first fully realized yoga scripture (Syman, n.d). The human body was thought to be a temple of the immortal soul. Exercises were developed in conjunction with breathing techniques and meditation with the thought that it would help rejuvenate the physical body, achieve enlightenment, and prolong life. This practice was known as hatha yoga. As yoga entered the West in the 1800s, other branches of yoga started to develop (Sparrowe, 2008). The initial intent of yoga was for meditation, and as the practice became modernized, it evolved into a more physical practice (i.e. asanas or physical poses). In 1994, Samatva (Sanskrit word meaning balance) yoga was created. This style of yoga draws from various classical hatha yoga styles, and focusing on: 1) body awareness; 2) safe exercise techniques; 3) use of breath to support the postures; and 4) creating balance physically and mentally (Prior, 2003).

In the United States, yoga is more commonly used to improve emotional well-being and increase physical strength (Yogananda, 2007a). The literature on yoga provided support for the idea that yoga interventions can be useful for a variety of populations at both the individual and group levels to enhance quality of life and decrease stress and anxiety. Since stress can be a determining factor for well-being, further research is needed to determine the reliability of these

effects. This study will help enhance the body of knowledge on the effects of this growing practice.

Statement of the Problem

Stress has been described as a subjective phenomenon that is difficult to define. Despite the “misgivings of its usefulness” (DeLongis, Folkman, & Lazarus, 1988, p. 486), stress is a casual factor for various illnesses. Levels of stress vary depending on life events, while personal levels of stress are based upon daily activities. Since stress is a part of a system of interdependent processes, it is difficult to conclude that stress, as a single variable, can be directly linked to a physical or mental illness. Most studies that have demonstrated a correlational relationship between stress and health have been cross-sectional, not longitudinal (DeLongis, Folkman, & Lazarus, 1988). There were several physical and emotional body responses to stress; including: headaches, insomnia, neck ache, back pain, muscle spasms, heart burn, nausea, chest pain, anxiety, depression, weight loss or gain without a diet, reduced work productivity, and suicidal thoughts (American Institute of Stress, 2010b).

Individual cognitions produced when one is stressed can have a negative effect on an individual’s mental and physical state, which can cause one’s overall health to decline (American Institute of Stress, 2010c). The 24/7 fast-paced lifestyle filled with the pressures of competition and technology has made the boundaries between work life and home life blurry (Families and Work Institute, 2001). Stress is overtaking lives and has manifested itself into physical and mental problems. If yoga can help enhance well-being and possibly decrease the manifestations of stress, then with the right guidance, this practice should not be limited to a yoga studio, but should be implemented in the work place, special populations, and at home. Ultimately, the goal is to decrease stress as a risk factor for disease and illness and increase quality of life.

Hypothesis

The research hypothesis of the study was that University students who took Samatva yoga would score lower on perceived stress scales than those within the comparison group after the yoga intervention.

Research Question

The purpose of this study was to see if there would be a significant difference in perceived stress scores among University students participating in a Samatva yoga class in comparison to University students participating in a weight training class.

Definitions

For the purpose of this study, the following definitions were used:

Asana – Physical pose or posture (Sparrowe, 2008, p. 10).

Dahn-hak – Brain respiration, breathing technique that makes the brain active by using the “Bio-energy” or power of life (Hayes, Lampi & Leigh, 2002, p. 4).

Dharana – Concentration (Lasater, 2003, p. 2).

Dyhana – Sanskrit word for meditation (Feuerstein, 1999, p. 3).

Niyama – Personal and religious observance of purity, devotion and study (Lasater, 2003, p. 2),

Kripalu Yoga – A challenging approach to asana practice that emphasizes meditation and breathwork, and encourages inward focus and spiritual attunement (*Yoga Journal*, 2011, para. 1).

Pranayama – Sanskrit word for breathing techniques; breath control or regulation (Lasater, 2003, p.191).

Pratyahara – Abstraction of the senses (Lasater, 2003, p. 2).

Samadhi – Oneness; absorption in the sublime and blissful awareness (Lasater, 2003, p. 2).

Samatva – Sanskrit word for balance (Prior, 2003, para. 1).

Stress – The term "stress," as it is currently used was coined by Hans Selye in 1936, which defined it as "the non-specific response of the body to any demand for change" (The American Stress Institute, 2010a, para. 1).

Yama – Self-restraint or ethical conduct (Lasater, 2003, p. 2).

Yoga – Comes from Sanskrit, the scriptural language of ancient India. It means “to yoke” or “to unite” (Lasater, 2003, p. 2).

Yoga Nidra – Style of meditation known as a systematic method of complete relaxation, holistically addressing our physiological, neurological, and subconscious needs (Levin-Gervasi, 2011, para. 2).

Yoga Sutras – Written by Patanjali and accepted as the ultimate source book of classical yoga that presents the “eight-limbed path” of practice (Lasater, 2003, p. 2).

Limitations

The purpose of the Samatva yoga class was to teach students techniques they could utilize to help them relieve their stress. The following limitations were considered when interpreting the results of the study:

1. A lack of integrity on the part of the survey respondents could impact results;
2. a lack of willingness of the survey participants to follow directions when filling out the questionnaire;
3. difficulty in defining stress;
4. previous yoga experience of participants;

5. duration of class; and
6. quasi-experimental design.

Delimitations

The following are characteristics of this study that limited the scope of research and defined the boundaries:

1. College students enrolled in yoga (KES 1161) and weight training (PHED 1161) at separate universities;
2. age range of 18 years old to 30 years old; and
3. Samatva Yoga.

Assumptions

The assumptions for this study included:

1. The researcher assumed that the participants were honest when they completed the questionnaires.
2. Perceived Stress Scale (PSS) is a valid method for assessing perceived stress.
3. Participants who enrolled in the yoga class had a desire to participate in this type of activity.

Stress has become a growing health concern. The purpose of this study was to determine if yoga would significantly impact perceived stress scores among University students in the Midwest.

Chapter Two: Literature Review

Introduction

The purpose of this study was to determine if Samatva yoga would significantly impact perceived stress scores among University students in the Midwest. Yoga is a multi-dimensional practice because it links the mind, body, and soul together. Stress is also multi-dimensional because there are many factors that can determine the level of stress an individual can have. Therefore, the literature needed to be examined to determine what role yoga has on the psychological and physical aspects of the human body. Published literature has provided information on the positive effects of yoga, mind and body activities, and meditation.

Stress

There has been no definition of stress that everyone accepts. The most common is, "physical, mental, or emotional strain or tension" (American Institute of Stress (AIS), 2010a, para.1). Another definition of stress is, "a condition or feeling experienced when a person perceives that demands exceed the personal and social resources the individual is able to mobilize" (AIS, 2010a, para. 1). In this study, the definition of stress by Hans Selye, was "the non-specific response of the body to any demand for change" (AIS, 2010a, para. 1). According to the AIS, stress has become one of America's number one health problems. Job stress has been the leading cause of stress for adults, but recently stress has become elevated for children, college students, the elderly, and teenagers. The reasons for stress among these groups include: increased threats of personal safety; peer pressures that lead to substance abuse and other unhealthy lifestyle habits; loneliness and social isolation; loss of family; and religious values and ties (AIS, n.d.d). Determinants of stress are widely varied and depend on individual conditions.

The American Psychological Association (APA) conducted a survey in 2009 to determine the nation's stress status and its impact. The survey measured perceptions and attitudes about stress within the general public. The survey also separated the types and causes of stress and how each affected lifestyles and behaviors. Results showed that 24% of Americans experienced advanced stress, while 51% reported moderate stress levels; 47% of adults reported that they lay awake at night because of stress; 43% reported that they eat too much or eat unhealthy foods because of stress; women had higher percentages of sources of stress and symptoms of stress compared to men; the Southern region of the nation had a higher percentage of stress about economy and family responsibilities when compared to the West, Midwest, and East; and 51% of employers reported a loss in productivity due to stress at work (APA, 2009b). These results indicated the seriousness of the physical and mental implications of stress.

In 2006, Milligian studied the effects of a yoga program for stress management as a complementary alternative counseling resource in a University setting. The intention of this program was to introduce the concept of yoga for stress management program (YSMP), describe the logistics of creating and implementing such a program, and to consider the therapeutic uses of yoga. University counseling centers have been presented with more severe issues than ever before and were serving a more psychologically diverse student population. It has been reported that those students who leave college early have reported difficulty with chronic health problems, sleep, anxiety, and depression. The need for a primary prevention and health promotion in this group was high considering those counseling centers' financial, personnel, and physical resources did not increase in proportion to the increase student body needs. These groups were used to help students become more aware of their own mental and physical health and provided teachable moments that allowed them to improve their ability to self-access and manage their

health so that they may prevent these illnesses. Both students and faculty/staff participated in this program. Participant motivations for attending the yoga program included: relief from stress associated with being a student, learn and experience a new exercise, social or recreational, referral by counselors, or trying to overcome the negative impact of stress on academics. The goals of the YSMP participants included relaxation, increase in energy, stress relief, improved flexibility, mental focus, health and fitness, greater body awareness, gaining peace and patience, having fun, and attempting to establish a routine. Although there were no statistics run to evaluate the effectiveness of this program, this counseling center program has become a favorite among students and faculty who want to manage stress in a natural and alternative way (Milligian, 2006). This indicates that yoga seems to be viewed as a preferable way to manage stress in college students. Several considerations need to be made when implementing a program like this which includes: an appropriate space for students to gather, certified yoga teacher to facilitate the classes, and counseling staff buy-in since the program was a non-traditional form of counseling. Exploring the benefits of yoga as a stress reduction practice among University students was needed to determine the reliability of these effects (Milligian, 2006).

History of Yoga

The development of yoga can be traced to over 5,000 years ago. In modern society, yoga is thought to be the product of a complex spiritual evolution. The Bhagavad Gita (also known as the Gita) was created around 500 B.C.E. The Gita is the sixth book of the Mahabharata, which is one of India's most epic poems. Most scholars see this text as the first fully realized yoga scripture (Syman, n.d.). In the Gita, three aspects must be brought simultaneously into our existence: Jnana (knowledge), Bhakti (devotion), and Karma (cause and effect). The intention of the Gita was to unify the Yogic traditions of Jnana Yoga, Bhakti Yoga, and Karma Yoga as a

way to sacrifice the ego through self-knowledge (Yogananda, 2007b). During the Classical period (second century C.E.) of yoga, Patañjali created the 195 sutras (words of wisdom). These sutras were based on the belief that every individual was composed of Prakrti (matter) and Purusha (spirit), and that the goal of yoga was to free the spirit from the material world. This was in severe contrast to Pre-Classical (800 to 500 B.C.E.) and Vedic Yoga (3500 years ago), which signified the unification of the water and the spirit. The yoga sutras expanded the practice of yoga into an eight-limbed path of self-transcendence (Lasater, 2003). These included: Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana, and Samadhi. For several centuries, yogis took Patañjali's concepts and focused entirely on meditation and ignored the practice of asanas, physical poses. It was only in the Post-Classical period (ninth or tenth century) that yogis began to focus their attention on the physical body. The human body was thought to be a temple of the immortal soul. Therefore, new exercises were developed in conjunction with breathing techniques and meditation with the thought that it would help rejuvenate the physical body, achieve enlightenment, and prolong life. This practice was known as hatha yoga. As yoga entered the West in the 1800s, other branches of yoga started to develop (Sparrowe, 2008).

Hatha yoga is a system of exercises practiced as part of the yoga discipline to promote control of the body and mind. Hatha yoga is translated as the yoga that brings union. In the United States, there are many different styles of yoga: Iyengar (concerned with bodily alignment), Ashtanga (fast-paced, more intense style), Kundalini (concerned with inner energy and awareness), Bikram (hot yoga-temperature of the room is typically 105 degrees Fahrenheit), and Samatva (concerned with bringing about balance in the body and mind). These styles vary in their key fundamentals and intentions, and some are tied closer to tradition than others (Lasater,

2003). The initial intent of yoga was for meditation, and as the practice became modernized, it has expanded to more of a physical practice.

Samatva (Sanskrit word meaning balance) yoga was founded in 1994 by Karen Prior. Samatva yoga classes focus on body awareness, safe exercise techniques, use of breath to support the postures, and creating balance physically and mentally. This style draws from various classical hatha yoga styles (Prior, 2003), which are represented by the lineage of yoga teachers with their respective practice in Figure 1.

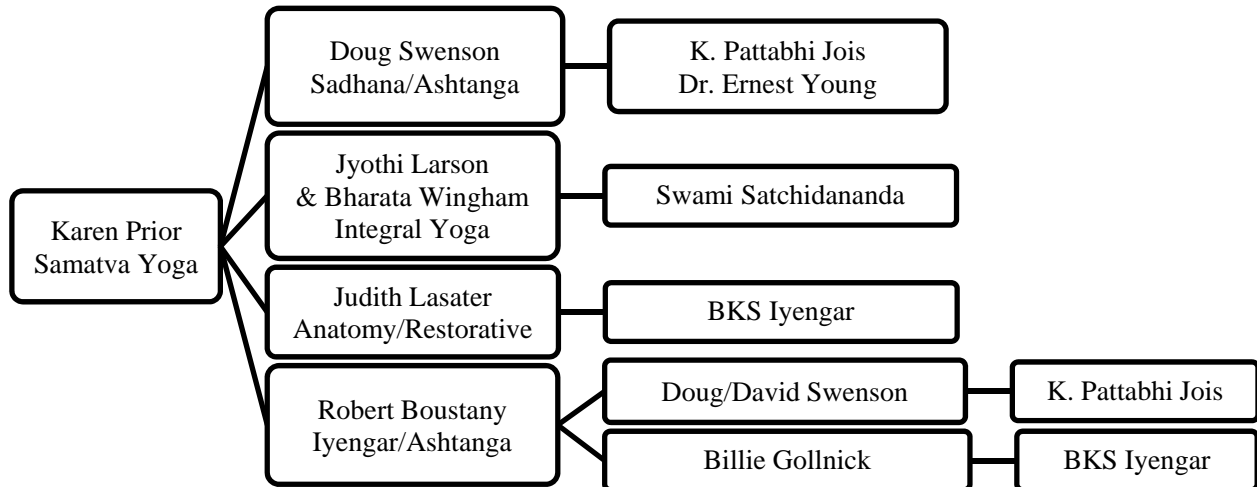


Figure 1. Diagram representing Samatva yoga lineage of teachers and practices (Prior, 2003).

The goal of Samatva yoga is to create pain-free movement and increase range of motion within the joints through asanas (poses), while simultaneously focusing on specific breathing and relaxation techniques to increase parasympathetic nervous system activity and decrease sympathetic nervous system activity (Prior, 2003). During the sympathetic nervous system response (fight or flight mode) heart rate increases, breathing becomes faster or heavier, and stress hormones (cortisol and adrenaline) begin to rise, but during the parasympathetic nervous

system response (rest and digest), heart rate decreases, breathing slows down, digestion is stimulated, and levels of endorphins increase (Fan et. al., 2009).

Benefits of Yoga

Published literature has provided information on the positive effects of yoga, mind and body activities, and meditation. Since stress is any strain or tension as related to the physical, mental, or emotional body (American Institute of Stress, 2010a), determinants of stress can be widely varied and depend on individual conditions.

In a randomized study concerning the effects of transcendental meditation on quality of life in older breast cancer patients, emotional well being ($p = .046$), social well-being ($p = .003$) subscales, and mental health ($p = .017$) were significantly different and demonstrated positive effects within that specialized population (Cella et. al, 2009). A study over mindfulness meditation (a state of present awareness; relaxed state of mind, in which one was conscious of their experience, including breathing, thoughts and feelings, sensations, and surroundings, all with an attitude of non-resistance, peace and acceptance) created alterations in brain and immune system function, suggesting that this type of meditation may positively change brain function, therefore, future research needs to be conducted (Bonus et. al, 2003). A study conducted by Chaoul-Reich, Cohen, Warneke, Fouladi, & Rodriguez, published in the *American Cancer Society*, detailing the effects of a Tibetan yoga intervention on sleep quality in patients with lymphoma, showed a significant increase in sleep quality ($p < .02$), faster sleep latency ($p < .01$), longer sleep duration ($p < .03$), and less use of sleep medications ($p < .02$). These studies typically spanned over a four-week or more time period and used several pre-intervention and post-intervention surveys. Not all studies used a control group (Chaoul-Reich, Cohen, Fouladi, Rodriquez, & Warneke, 2004).

In a study conducted by Charlson, Lee, & Mancuso (2004) to determine how mind-body training can change one's health related quality of life, 194 participants 18 and older from eight different community centers were studied over a three-month time period. Each participant was trained in dahn-hak, otherwise known as brain respiration (breathing technique that makes the brain active by using the "Bio-energy" or power of life), hatha yoga (breathing techniques, postures, and stretching) and qigong (energy cultivation). Subjects had taken no more than ten yoga classes prior to the study. Each participant was randomly assigned to one of the previous activities for at least two to three times a week. A Medical Outcomes Study SF-36 general health questionnaire ($SD \pm 20$) was required to measure eight domains: mental, role emotional, physical functional, role physical, vitality, social, body pain, and general health. After three months, another SF-36 questionnaire was sent out to follow-up on all subjects. Results showed that all eight domains improved ($p < .0001$) in all groups. There were fewer depression symptoms (down more than 8%), greater self-efficacy (up 6%), and less trait anxiety (down 10%), suggesting that complementary therapies provide clinically, moderate improvements in health-related quality of life. However, it was not understood what mechanisms in mind-body training were responsible for these improvements. Some studies have shown that yoga can positively impact the endocrine and biochemical parameters related to chronic stress (Charlson, Lee, & Mancuso, 2004). Potential limitations for this study included the presence of ceiling effects on the mental health questionnaire, no comparison to a control group, and the length of the study. However, since there has been limited research on this topic, practitioners of complementary therapies or alternative medicine can use this study to gain more scientific insight.

In 2010, Mekonnen & Mossie conducted a study to determine the effects yoga has on patterns of clinical peak expiratory flow rates and use of drugs in asthmatic patients. A clinical

trial was conducted over a four-week span and consisted of 24 volunteer asthmatic patients (clinically diagnosed). These 24 participants were randomly grouped into a yoga group or a control group. The male to female ratio was 1:1 in each group; mean age was 30 years for yoga and 31 for control group, and most of them were farmers. An Indian yoga expert was the facilitator for the yoga practice of posture and breathing techniques, which consisted of a daily 50-minute practice. Peak expiratory flow rate (PEFR) was taken using the mini Wright peak flow meter, and vital signs were measures in both groups. There was a statistically significant difference in decreased number of day attacks per week and night attacks per month ($p = 0.013$) and PEFR ($p < 0.0001$) as compared to the control group. There was also a statistical difference in pulse rate, respiratory rate, and wheezing ($p < 0.001$). The yoga group also decreased the use of drugs (Mekonnen & Mossie, 2010). Although there was statistical significance, limitations to this study included: small number of participants and short intervention time period. Therefore, a large-scale study on the effect of yoga on asthma was recommended.

In a study conducted by Myers, Sternlieb, Woolery, & Zeltzer (2004) to determine if Iyengar yoga had the ability to alter mood in young adults who are mildly depressed, a randomized selection of young adults were pre-screened for mild levels of depression. There were a total of 28 participants (ages 18-29 years of age) who were placed into a yoga course or on a wait-list control group, and none of whom had a background in yoga. The yoga group participated in two one-hour classes for five consecutive weeks. Independent t-tests were run to compare yoga and the control group. Results indicated that the depression scores at baseline differed from the depression scores after the last class yoga class, $t(9) = 5.31$, $p < .00$, in comparison to the control group, $t(9) = .78$, $p = .45$. Repeated measure ANOVA 's using GLM were used to compare depression at baseline between the two groups. Results showed a

significant decrease in symptoms of trait anxiety, $F(1,21) = 28.61$, $p < .001$, and depression, $F(2,20) = 9.04$, $p < .01$, which started to happen midway through the study. Levels of fatigue and negative mood were also decreased. Independent t-tests were also used to determine the differences between the groups and morning cortisol levels. At baseline and midcourse, no differences were found. Interestingly, by the end of the study, evidence showed a relationship between higher morning cortisol levels and yoga when compared to the control group, $t(17) = 1.83$, $p = .08$. Limitations to the study included small sample size, short period of study and limited ability to determine effects of yoga from the possible effects of expectation and attention when using a wait-list group compared to a placebo effect. More scientific research needs to be done on the effects of yoga.

According to Jadhav and Havalappanavaar (2009), yoga included cultivation of correct attitudes and reconditioning of the neuromuscular system. It is also said that yoga helps the whole body to enable it to withstand greater stress and strain. In a recent study to determine the effects of yoga on anxiety and subjective well-being among 50 first year Naturopathy and Yogic Sciences, researchers found significant differences in both state and trait anxiety ($p < 0.001$) and subjective well-being ($p < 0.001$). This indicated that yoga practices could be useful in decreasing anxiety and increase well-being among practitioners (Jadhav & Havalappanavar, 2009).

Guilt is an emotion of “remorse caused by feeling responsible for some offense” (Kumar, 2010, p. 130). The 24/7 fast-paced lifestyle filled with the pressures of competition and technology has made the boundaries between work life and home life blurry (Families and Work Institute, 2001). The ability for an individual to say no to opportunities is seldom, and if already overloaded with multiple tasks, it can easily make an individual’s life more stressful. Stress is

overtaking lives and has manifested itself into both physical and mental problems, yoga nidra is a meditation practice that will - through consciousness and breath awareness - help allow the mind to be relaxed and the mental tension released. In a study to determine the psychological changes as related to yoga nidra, researchers examined 80 college students (40 males, 40 females) of 20-30 years of age to identify levels of guilt through an Eight State Questionnaire. The intervention lasted six months; questionnaires were administered at pre-and post-intervention. Results indicated that for both men and women, yoga nidra had a statistically significant impact on levels of guilt ($p = 0.01$). The brain is what links the mind, body and emotions. The awareness of body that yoga nidra is intended to create and intensify physical relaxation and clear nerve pathways in the brain. This brings alpha dominance in the brain, which allows for mental relaxation, allowing yoga nidra to help decrease guilt levels in both male and female college students (Kumar, 2010).

In 2003, Ballinger et al., conducted a study to determine the effects of a mind/body intervention on psychological distress and perceived stress among college students. There were 128 randomly assigned students to an experimental group ($n = 63$) and control group ($n = 65$). The intervention lasted six weeks and consisted of six 90-minute sessions emphasizing cognitive behavioral skills and relaxation response. Methods used to collect data pre-and post-intervention included a Symptom Checklist-90-Revised, Spielberger State-Trait Anxiety Inventory, and a Perceived Stress Scale (PSS). Only 90 students completed the post-intervention surveys. There was a statistical difference among students who participated in the experimental group providing a reduction in psychological distress, state anxiety, and perceived stress. The findings indicate that mind/body techniques may be used by college students to prevent or minimize symptoms of stress and anxiety (Ballinger et al., 2003). Limitations to this study included: only 70 percent of the initial sample completed post-intervention surveys at the end of the study. It would be

interesting to see how long the reduction in symptoms lasted. Future research needs to be done to determine if other styles of mind/body training will produce similar effects among college students.

In 2006, a randomized study by Granath, Ingvarsson, Theiele, & Lundberg, was conducted over the effects of cognitive behavioral therapy and yoga on stress management. Participants included twenty-six women and seven men from a large Swedish company who were randomly assigned to one of two conditions: Kundalini yoga or cognitive behavior therapy, in either an all-female or mixed group (making a total of four groups). Ten sessions were held with each group over a period of four months. Physiological (blood pressure, heart rate, urinary catecholamine, and salivary cortisol) and psychological (self-related stress and stress behavior, anger, exhaustion, and quality of life) measurements were taken pre- and post- intervention. Mean scores of both groups on outcome measures pre- and post-intervention were analyzed by a 2-way ANOVA with repeated measures. Perceived stress (PSS) decreased significantly between both groups (cognitive behavior therapy $p < 0.001$; yoga $p < 0.01$). Stress behavior scale significantly decreased as well (cognitive behavior therapy $p < 0.001$; yoga $p < 0.05$). Exhaustion decreased in both groups of cognitive behavior therapy $p < 0.01$; yoga $p < 0.01$). Anger ratings decreased significantly for cognitive behavior therapy, but not for yoga (cognitive behavior therapy $p = 0.0002$; yoga $p = 0.07$). Quality of life inventory was not statistically significant for both groups (cognitive behavior therapy $p = 0.09$; yoga $p = 0.23$). Results indicate that both cognitive behavior therapy and yoga are promising stress management techniques (Granath, Ingvarsson, Theiele, & Lundberg, 2006).

In a study by Khalsa, Shorter, Cope, Wyshak, & Sklar (2009) evaluating the effects of yoga on anxiety and mood disturbance among young professional musicians, participants either

completed a two month program of yoga and meditation (experimental group) or yoga lifestyle intervention (control group). In an additional control group, participants were recruited to a no-practice control group. All three groups each had 15 participants. Both yoga groups participated in Kripalu yoga (yoga that focuses on the asana practice, while emphasizing meditation and breathwork, and encourages inward focus and spiritual attunement) or mediation classes each week. The yoga lifestyle group also participated in weekly group discussion and practice sessions. Measurements evaluated music performance anxiety, mood, performance-related musculoskeletal disorders (PRMDs), perceived stress, and sleep quality. All participants completed the above questionnaires pre- and post-intervention. A between-groups ANOVA was run to compare performance anxiety questionnaire (PAQ) among all three groups. Results were not statistically significant. However, independent t-tests showed that both yoga groups had statistically significant reductions from baseline to end-program on PAQ ($p = .05$). Comparisons of the profile of mood states (POMS) subscales at end-program for the three groups using between-subjects ANOVA showed that the yoga groups reported less anger/hostility than the control group ($p = .023$). The yoga groups also reported less tension and anxiety, but it did not reach statistical significance ($p = .059$). Correlation coefficients were run on the different scores for the PAQ and the three POMS subscales. Scores on the tension/anxiety subscale were positively correlated with PAQ practice ($r = .62, p < .001$). There was no statistical difference in PRMD. Interestingly, there were no statistical differences in perceived stress (PSS) or perceived sleep quality (PSQI) between individual or combined yoga and control groups (Khalsa, Shorter, Cope, Wyshak, & Sklar, 2009). The fact that participants had to relocate to another campus as part of their fellowships likely influenced perceived stress and sleep outcome measures, since PSS and PSQI are circumstance-dependent scales. However, since stress is closely related to

anxiety, further studies need to be done to determine these possibilities. The yoga program did show a tendency to reduce cognitive and somatic symptoms of musical performance anxiety. These benefits were possibly attributable to the practice of yoga and meditation techniques themselves rather than to psychosocial factors. Results suggested that yoga and meditation could reduce performance anxiety and mood disturbance.

Lower back pain has been reported to be one of the number one reasons why Americans visit the doctor (Orthogate, 2006). Undoubtedly, if there is extreme back pain, an individual may experience higher levels of stress, as completing daily basic activities would be difficult. To determine the effects hatha yoga had on lower back pain, Galantino et al. (2004) conducted a study consisting of 22 participants ($M= 4$; $F= 17$) between the ages of 30 and 65 with chronic low back pain (CLBP). Participants were randomly assigned to either a modified intermediate yoga based intervention or to a control group with no treatment. Those who participated in the control group did receive yoga training after the observation period. The yoga class was specifically designed for the CLBP population. Classes were held twice a week for six weeks- each class lasting an hour. The primary functional measures taken included the forward reach (FR) and sit and reach (SR). Questionnaires included the Oswestry Disability Index (ODI) and Beck Depression Inventory (BDI). A chi-square was run to analyze the differences between the groups. There was no statistical significant difference between groups, except for the BDI (Chi-square = 7.07, $p = 0.008$). This pilot study did not have the power to reach statistical significance, but results showed trends in the functional measurement scores showed improved balance and flexibility and decreased disability and depression for the yoga group (Galantino et al., 2004). To provide evidence that a yoga-based intervention may benefit individuals with

CLBP, a larger study would be necessary while possibly having multiple styles of hatha yoga integrated into the intervention.

In a similar study, researchers examined the effects of a short-term intensive yoga program on pain, function disability, and spinal flexibility in chronic low back pain in comparison to physical exercise (control group). Participants with chronic low back pain (CLBP) were randomly selected ($n = 80$) to receive yoga or physical exercise if they met the criteria. The yoga intervention was a one-week intensive program comprised of asanas (physical pose) designed for back pain, and pranayamas (breathing techniques), meditation, and sessions on philosophical concepts of yoga. The exercise group (control group) practiced under a trained physiatrist (rehabilitation physician) and also had sessions on lifestyle changes. Both groups received the intervention for the same time and were matched hour-to-hour for the type of practices. The Oswestry Disability Index (ODI) and spinal flexibility using a goniometer was used to assess pain-related outcomes at pre-and post-intervention. ANOVA with repeated measures was used to analysis the data. Results indicated a significant reduction in ODI among the yoga group compared to the control group ($p = 0.01$). Spinal flexibility improved significantly for both groups, but the yoga group had greater improvement (Tekur, Singphow, Nagendra, & Raghuram, 2008). Just seven days of an intensive yoga-based program may reduce pain-related disability and improved spinal flexibility in participants with CLBP better than a physical exercise program.

The United States spends more than \$250 billion a year on heart disease (Centers for Disease Control and Prevention (CDC), 2009). Coronary artery disease is the leading killer of men and women in western civilization. In the United States alone, more than half a million people die from it every year. Three times that number suffers known heart attacks, and

approximately three million more have “silent” heart attacks (having minimal symptoms without being aware of them until the damage is done). One of every two American men and one of every three American women will have some form of the disease in a course of a lifetime (Esselsytn, 2007). Recently, a study was conducted to determine the effects of yoga on cardiovascular and mental status in normal subjects. Cardiovascular status was assessed by recording heart rate and blood pressure, while mental status was assessed through the General Health Questionnaire (GHQ). A total of 50 healthy subjects (28 males and 22 females) who regularly participated in yoga were included in the study. The intervention lasted for six months. Results indicated a significant reduction in resting heart rate ($p < 0.001$), systolic blood pressure ($p < 0.001$), and diastolic blood pressure ($p < 0.001$). Mental status was also significantly different ($p < 0.001$), showing the rise in positive attitudes among participants (Herur, Kolagi & Chinagudi, 2010). While yoga may be a practice used among ageing individuals to reduce the mortality and morbidity of heart disease, it would be interesting to determine if these same effects occur in those at high risk for heart disease.

In a similar study, researchers studied the effects of yoga and supervised integrated exercise on heart rate variability and blood pressure in hypertensive patients. The study consisted of 47 participants whom were diagnosed as hypertensive. The participants were divided into three experimental groups (16 in yoga, 16 in exercise, and 15 in the yoga plus exercise group). These groups participated in their activity for nine months. Heart rate variability (HRV) during deep breathing and blood pressure (BP) were assessed at 0, 3, 6, and 9 months in all three groups. Results indicated a statistically significant improvement in HRV in the exercise group ($p < 0.001$), while there was no significant difference found in HRV among the yoga group. In the yoga plus exercise group, there was a significant change in HRV ($p < 0.001$). In the exercise

groups, systolic blood pressure (SBP) and diastolic blood pressure (DBP) were found to be corrected to normalcy, but the yoga group did not produce the same effects. Yoga by itself was not found to cause any significant changes, but when combined with exercise was found to be very effective at improving HRV and BP (Niranjan, Bhagyalakshmi, Adhikari, & Bhat, 2009). Since there is limited research on the effects of yoga and heart disease, more research is necessary to determine the reliability and effects of this practice.

In another study to determine the effects yoga has on the cardiovascular system, researchers investigated the cardio respiratory and metabolic changes that occurred during yoga sessions by examining the effects of exercises and mediation practices. Nine yoga instructors (five females and four males) participated in this study. These subjects were volunteers who had at least three years in hatha yoga training. Participants were subjected to analysis of the gases expired during three different periods of 30 minutes: rest, respiratory exercises and meditative practice. The meditation practice also included pranayamas (breathing techniques). There was a statistical difference in oxygen uptake (VO_2) and the carbon dioxide output (VCO_2) during meditation and pranayama practices ($p \leq 0.05$) when compared to rest. Heart rate was reduced during meditation six beats per minute on average when compared with rest or even pranayama. The measures of blood pressure taken for all activities were not statistically significant; this may be due to participants' health status. Only a small proportion of lipids were metabolized during meditation compared to rest (Danucalov, Simoes, Kozasa, & Leite, 2008). Results from this study suggest that pranayama can increase metabolic rate, while meditation decreases it when compared to the rest state.

Migraines are chronic headaches that may cause severe pain for hours, sometimes even days. Medication can help reduce frequency and severity of migraines, but there is still no cure

(Mayo Clinic, 2010). There is no doubt that having a migraine can cause stress levels to raise and vice versa. Several studies have examined the effectiveness of alternative medicine in the treatment of migraines, but there has not been any documentation of the role yoga therapy may play in migraine management until just recently when researchers examined the effectiveness of yoga therapy in the treatment of migraines when compared to self-care. Seventy-two participants were randomly selected and assigned to a yoga therapy or self-care group for three months. Outcomes measured included: headache frequency through a headache diary, severity of migraine (0-10 numerical scale), and McGill pain questionnaire to assess pain. Secondary outcomes were anxiety and depression, measured by the hospital anxiety depression scale, and medication score. All results had statistical significance ($p < 0.001$): intensity, frequency, pain rating, total pain, anxiety and depression, and symptomatic medication use (John, Sharma, & Kankane, 2007). This study provides yoga as a possible treatment for those who suffer with migraines. Future studies on this type of intervention are needed to determine the reliability of the effects.

Working in an area that requires good visual perception may also cause stress for an individual. As an individual's visual perception may change, strain on the eye may occur and overall stress levels may rise. This may be due to frustration of not being able to see or not having the ability to enhance eye-site due to unforeseen circumstances. However, recent findings on the effect of yoga on visual perception and strain provide promising treatments. In 2007, a study was conducted to identify what role yoga may play in visual perception, as significant changes were reported in the visual perception of advance practitioners of Buddhists mindfulness meditation. Thirty-six healthy volunteers (age 17-22) were randomly placed into a yoga or control group and were followed up after 10 days. During the 10-day intervention, the yoga

group received intense training in yoga comprising of asanas (physical pose), pranayama (breathing techniques), and meditation (dhyana) for six hours a day. The yoga groups showed a significant increase in critical flicker fusion (CFF- frequency at which an intermittent light stimulus appears to be completely steady to the observer) by 13.3%, while the control showed no change. In a later study, 36 males volunteered to participate in the same study. Participants were assigned to yoga or control group. However, this study was conducted over a 30-day period. With the same intensive training as the first group, the CFF increased significantly after 20 days by 11.2% and by 15.05% after 30 days. The same study was conducted on 118 professional computer users over a two-month period. Results showed a reduction in subjective reports of symptoms of dry eye and objective evidence of visual fatigue (Telles, Dash, Manjunath, Deginal, & Naveen, 2007). A yoga practice may enhance or improve visual perception. However, future studies are needed to understand the underlying mechanisms that caused these changes.

Comparison of Yoga, Exercise, & Weight Training

Exercise has been considered an acceptable method for maintaining and improving physical and emotional health. As yoga has attained more popularity in the United States, a growing body of evidence has supported the benefits of yoga for both physical and mental health. A comparison of the effects of yoga and exercise on a variety of health outcomes and conditions is necessary to identify if the physical exercises themselves result in the change of health outcomes or if the breathing techniques and meditation are what have an effect on these health outcomes. To date, no research has been conducted over the comparison of yoga and weight training.

In a review of comparison studies, 81 studies were evaluated using PubMed. These studies were classified as uncontrolled ($n = 30$), wait list controlled ($n = 16$), or comparison ($n = 35$). However, the most common comparison intervention involved exercise ($n = 10$). The studies showed that the yoga interventions were either equal or superior to exercise in almost every outcome measured except those involving physical fitness. It was concluded that in both healthy and diseased populations, yoga might be as effective as or better than exercise at improving a variety of health-related outcomes (Ross & Thomas, 2009).

The benefits of yoga and exercise on mood and anxiety have been established. However, understanding whether or not changes in mood, anxiety and gamma-aminobutyric acid (GABA) levels are specific to yoga or related to physical activity has not been addressed until recently, when a study to determine the effects of yoga versus walking on these three domains was conducted. Healthy subjects were randomly assigned into a yoga ($n = 19$) or walking ($n = 15$) group. Both groups met three times a week for 60 minutes, spanning over 12 weeks. Mood and anxiety scales were taken at weeks 0, 4, 8, 12, and before each magnetic resonance spectroscopy scan. A total of three scans were taken. While both groups had statistical significance, the yoga participants reported greater decreases in anxiety than the walking group. There were also positive correlations between changes in mood and decreased anxiety and GABA levels. The yoga group had positive correlations between changes in mood scales and changes in GABA levels, which indicates yoga as a beneficial practice for reducing anxiety (Streeter et al., 2010). Future research is needed to determine the reliability of these effects.

In an attempt to determine the relationship between psychological perceptions of walking, water aerobics and yoga among college students, researchers evaluated 37 undergraduates enrolled in two sections of general stress management classes at a regional

university in the southeastern United States. Each exercise consisted of a five minute warm-up, 40 minute exercise, and a five minute cool-down. Each participant completed all trials on separate days of the laboratory component of their academic course. Stress levels were measured using the state anxiety inventory (SAI), rating of perceived exertion (RPE) and pain was measured using Borg's CR-10 scale, and arousal was measured using the Felt Arousal Scale. A 3 X 2 ANOVA with repeated measures was run to compare RPE, pain, arousal, and mood at the end of each trial. Results for all analyses were statistically significant ($p \leq .05$). All three exercises in this study reduced anxiety, although water aerobics anxiety levels were higher at baseline, reduced anxiety was the lowest. Exertion was similar for all exercise types, which suggests that all of the trials were of the same intensity. Pain was higher in yoga, which may be attributed to low flexibility levels, which makes the postures more challenging. Yoga was the most effective in reducing arousal levels, which created a state of calmness or relaxation (Wei, Kilpatrick, Naquin, & Cole, 2006). Limitations of this study included the lack of generalization due to students being enrolled in the two sections. However, the sample of students did represent a variety of individuals from different ages, race, and physical activity level.

There is a paucity of research comparing yoga to weight training. The type of exercise used in comparison to yoga typically included some type of aerobic exercise (i.e. walking, running, dancing, or stationary bike). In order for an exercise to build cardiorespiratory fitness, the exercise must be performed at an intensity of at least 55% of your maximum heart rate. Although, recent research is finding that some styles of yoga are increasing VO₂max, there still has been no statistical significance (Bauman, 2002). The intent of Samatva yoga has been to lower the heart rate through various breathing techniques (Prior, 2003), therefore Samatva yoga would not be considered to be a cardiovascular exercise. The asanas (physical postures) of yoga

are intended to increase muscular strength and flexibility; therefore since yoga does not involve any cardiovascular training, weight or strength training would be the closest style of exercise to use as a comparison to yoga. However, no research has been conducted comparing weight training as the style of exercise, to yoga. Due to the trend in exercise decreasing stress levels, it was expected that there would be some type of decrease in stress levels for those who take a weight training class. However, yoga was expected to have a greater impact on stress levels. Future studies comparing yoga to other types of exercises that are more closely related to the same physical intentions are needed to examine the distinctions between exercise and yoga.

Summary

There are many benefits to yoga, meditation, and mind/body training. Although results vary, the majority of interventions found statistical significance with a minimum of a six-week intervention for all activities. Due to the lack of research on Samatva yoga, it is necessary to start assessing this style of training at a basic level. Therefore, stress will need to be measured and depending upon results, future research may be conducted to identify what factors contribute to reducing stress when participating in Samatva yoga.

Chapter Three: Methodology

Subjects

The purpose of this study was to determine the effects of Samatva yoga on perceived stress among university students in the Midwest. Criteria for participants included that participants were students at a University located in the metropolitan area and enrolled in the 2011 fall yoga courses, which included two yoga sections. The yoga classes were offered on Tuesdays and Thursdays from 11:00 a.m. to 11:50 a.m. and 12:00 p.m. to 12:50 p.m. The comparison group included participants from the two universities enrolled in a weight training course which was held on Tuesday and Thursday from 11:00 a.m. to 11:50 a.m. and on Monday and Wednesday from 8:00 a.m. to 8:50 a.m. Weight training was chosen as the comparison group because it was the most closely related form of exercise to yoga. In order for an exercise to build cardiorespiratory fitness, the exercise must be performed at an intensity of at least 55% of your maximum heart rate. Although, recent research is finding that some styles of yoga are increasing VO₂max, there still has been no statistical significance (Bauman, 2002). The intent of Samatva yoga has been to lower the heart rate through various breathing techniques (Prior, 2003); therefore, Samatva yoga would not be considered to be a cardiovascular exercise. The asanas (physical postures) of yoga are intended to increase muscular strength and flexibility; therefore, since yoga does not involve any cardiovascular training, weight or strength training would be the closest style of exercise to use as a comparison to yoga. Based upon descriptive statistics from the Wei, Kilpatrick, Naquin, & Cole (2006) study and Cohen's *d* ($ES = .42$), there needed to be 34 to 52 participants in this study to find a difference, power was .80 and the alpha was set to .05.

Instruments

Demographic data was collected on participants before the questionnaires were administered. The questionnaires, Perceived Stress Scales (PSS) and Revised Life Orientation Test (LOT-R) were the instruments used to measure stress and optimism pre-and post-test among university students enrolled in yoga and weight training for the fall, 2011 semester. The PSS and LOT-R were both 10-question surveys that took about 10 to 15 minutes for participants to complete. The PSS was considered to be the criterion or gold standard for measuring perceived stress. Cohen, Kamarck, & Mermelstein (1983) conducted a study that took evidence from three groups (two of college students and one of participants in a community smoking cessation program) to identify the validity and reliability of the Perceived Stress Scale (PSS) in measuring the degree to which situations in one's life were appraised as stressful. In sample one, 332 freshman college students living in dormitories at the University of Oregon, completed five scales: life events, social anxiety, depressive symptomatology, physical symptomatology, and perceived stress. In the second sample, 114 college students in an introductory class on personality psychology were given the same five questionnaires. Within the third sample, 64 participants completed a life-event scale, physical-symptom check list (CHIPS), and a perceived stress scale (PSS). Mean scores for the complete samples for college students were 23 and 24 and 25 for the smoking-cessation (third sample). Age was determined to be unrelated to PSS in all three samples. Coefficient alpha reliability for PSS was .84, .85, and .86 in each of the three samples. Perceived stress scale was determined to have adequate internal and test-retest reliability and validity and was correlated with a range of self-report and behavioral criteria. Perceived stress scale (PSS) was more closely related to a life-event impact score and seemed to be a better predictor of health and health-related outcomes than either of the life-event scales.

Even though PSS was highly correlated with depressive symptomatology, it was found to measure a different and independently predictive construct. The PSS has been shown to have substantial reliability and validity, providing a way to measure the outcome of experienced levels of stress and examine the role of appraised stress levels for disease and behavioral disorders (Cohen, Kamarck, & Mermelstein, 1983). The majority of research conducted to examine the effects of yoga on stress used the PSS, so it seems that PSS is the gold standard or criterion for measuring perceived stress.

In 2006, Roberti, Harrington & Storch conducted a study over the validity of the PSS-10, a modified version of the original 14 item PSS, among college students. Participants included 281 undergraduates from three public Universities. Perceived helplessness and perceived self-efficacy were the other structured measurements used in this study. Internal consistency of the items was strong, ranging from .84 to .86. Test-retest reliability was .85 and concurrent validity ranged from .17 to .35. Results indicated that the PSS-10 is a valid and reliable instrument for assessing perceived stress among college students (Roberti, Harrington, & Storch, 2006).

The revised life orientation test (LOT-R) was created to measure optimism and is based off the original life orientation test (LOT). The original LOT did not focus explicitly on expectations for the future as theory indicated; therefore, revisions were made which resulted in the LOT-R. It has been used in research to assess the behavioral, affective, and health consequences of this personality variable. The LOT-R assessed the generalized expectations for positive versus negative outcomes. Respondents were asked to indicate to what degree of agreement they had with various statements using a five-point response scale ranging from strongly agree to strongly disagree. Internal consistency correlations ranged from .43 to .63,

while test-retest correlations ranged from .68 to .79. The LOT-R is considered to be both valid and reliable (Scheier, Carver & Bridges, 1994).

Procedure

Upon Institutional Review Board (IRB) approval from both Oklahoma City University and the University of Central Oklahoma, supplies were obtained for the yoga course (i.e. yoga blankets, straps, blocks, eye pillows, and mats). The yoga props were important tools used to adjust the level of intensity of the yoga poses. Props provided comfort and added support or resistance while enhancing and deepening the efficiency of the poses (Lasater, 2003). If these props were not available, then some participants would not be able to go into the pose or any modified version of the pose due to muscle tightness, stiffness of the body, or because of limited range of motion in the joints.

After supplies were obtained, university faculty members, distributed information to participants regarding the study. This was done to ensure that the study was completely voluntary for participants since the researcher was the instructor for the yoga courses. A script was created for the person who administered the surveys to the yoga participants so that both groups received the same instructions and information regarding the study. There were not any direct incentives for participants other than the benefits they received from taking the yoga or weight training course.

Participants signed an informed consent before the surveys were administered. A code system was created by each participant taking the surveys to make sure there was no identifiable information on the questionnaires so that their answers remained anonymous. This code was the first, middle, and last initial of one of their parent's names and their complete birth date in numbers. Perceived Stress Scale (PSS) and LOT-R questionnaires were given to the yoga class at

the beginning of the study and administered after eight weeks. Questionnaires were also administered to the weight-training class (comparison group) by the researcher at the beginning and end of the eight-week period.

Each yoga class consisted of centering, warm-up, asanas (physical poses), finishing postures, and relaxation/closing. The class met twice a week for eight weeks. Each session lasted 50 minutes. Each weight training class met twice a week (50 minute sessions) for eight weeks and was designed to provide the student with an understanding of the anatomy and kinesiology, underlying the exercises presented in class necessary to achieve fitness and weight training goals. Course objectives for the weigh training course included: 1) demonstrate an understanding of proper lifting technique and weight room etiquette; 2) demonstrate a commitment to regular exercise and an interest in improvement through regular participation; 3) improve strength and muscular endurance through regular participation; and 4) identify basic muscle groups and exercises that involve those muscles.

Design & Analysis

The null hypothesis stated that there would be no statistical difference in perceived stress and optimism of university students who participated in yoga when compared to students in a weight training class. In this study, the independent variables were yoga and time, while the dependent variables were perceived stress and optimism. Due to lack of randomization, since students choose which courses they wanted to take, this study had a quasi-experimental design. Two 2 X 2 ANOVA with repeated measures were used to analyze the perceived stress and optimism questionnaires data. The level of significance or alpha was set at 0.05. Since statistical significance was not reached, after statistical analysis was run, effect size was calculated for both groups for PSS and LOT-R.

Chapter Four: Results

Introduction

The purpose of this study was to determine the effect of Samatva yoga on perceived stress among university students in the Midwest. A secondary purpose was to determine the effect of Samatva yoga on optimism. There were two groups of University students: one group consisted of yoga students and the other weight training students.

Hypothesis

The research hypothesis of the study was that University students who took Samatva yoga would score lower on the perceived stress scale and higher on the optimism scale than those in the comparison. Two 2 X 2 ANOVAs with repeated measures were used to analyze the perceived stress and optimism data. The level of significance or alpha was set at 0.05.

Descriptive Statistics

Demographic data were collected on participants before the questionnaires were administered. Data collection occurred twice during an 8-week period. The questionnaires, Perceived Stress Scales (PSS) and Revised Life Orientation Test (LOT-R), were the instruments used to measure stress and optimism pre-and post-test among university students. The study began with a total of 25 yoga participants and 24 weight training participants. A total of 38 participants completed post-test PSS surveys (19 yoga, 19 weight training). This was due to the lack attendance on the date of post-test administration and may also be due to students dropping the course after taking pre-test questionnaires.

The mean PSS score for yoga participants at pre-test was 18.37 ± 5.67 and 15.84 ± 3.86 for the weight training participants. While at post-test, the yoga students PSS mean score was

16.42 ± 5.57 and 14.53 ± 5.97 for weight training students. All model assumptions were met (Table 1; Figures 1 and 2).

A total of 37 participants completed post-test LOT-R surveys (19 yoga students and 18 weight training students). The mean LOT-R score for yoga participants at pre-test was 14.32 ± 4.47 and 16.17 ± 3.07 for weight training participants. While at post-test the yoga students LOT-R mean score was 15.84 ± 4.15 and 17.39 ± 3.43 for weight training students (Table 1, Figure 3 and 4). Since outliers existed for the yoga group at pre-intervention in LOT-R and within the weight training group at post-intervention in PSS, data was checked for errors. Since this was not an error and a valid score, the outliers were left in the data set. All model assumptions were met (Figures 2 and 4).

Descriptive statistics over gender were run for pre-and post-test for both PSS and LOT-R. The mean for males at pre-test for PSS among the yoga group was 17.33 while females had a mean of 18.85. At post-test, males had a mean of 15.00, females 17.08. Perceived stress within males in the weight training group had a mean of 16.00 at pre-test, females 15.50. At post-test, males had a mean of 14.00, females 13.25 (Table 2).

Independent t-tests were run to determine if there were any differences between groups at baseline. There were no differences between groups for PSS, $t = -1.631$, $p = .110$. However, there was a trend toward a difference between groups for LOT-R, $t = 1.945$, $p = .058$. Even though there was a trend toward a difference between groups for LOT-R, no differences did exist between groups for both PSS and LOT-R.

Results of Statistical Tests

All participants were assessed using the Perceived Stress Scale (PSS) and the Life Orientation Test Revised (LOT-R) questionnaires. Statistical significance was not reached in

PSS between groups over time, $F(1, 36) = .08, p = .77$, or over time, $F(1, 36) = 2.26, p = .14$.

Despite non-significance, there was a moderate effect size over time within the group ($ES = .50$) in yoga students and small effect size ($ES = .33$) within weight training students (Figure 5).

Statistical significance was not found in LOT-R between groups over time, $F(1, 35) = .17, p = .67$, but was found over time, $F(1, 35) = 14.56, p = .001$. Both groups had a small effect size over time, yoga $ES = .49$ and weight training $ES = .39$ (Figure 6).

Difference Scores

Due to the trend toward group difference at baseline, difference scores were calculated. To calculate difference scores for PSS, post-test data was subtracted from pre-test data, while the LOT-R pre-test data was subtracted from post-test data (Table 1). An independent t-test was then used to examine the difference between groups for these difference scores. Results showed no difference for PSS, $t = -.291, p = .773$ or LOT-R, $t = -.422, p = .675$.

Even though there was no difference between groups, demographics were cross tabulated among the groups from pre-test data. The data indicated that the majority of participants in the weight training group were seniors in college (40.9%), while the majority of participants in yoga were sophomores in college (36%). There was also more diversity among ethnicity within the yoga group in comparison to the weight training group (Figure 7). It is also important to know that the yoga group had more females ($n = 13$) than males ($n = 6$), while the weight training group had more males ($n = 12$) than females ($n = 4$). See Table 2; Figure 8.

Activity Levels & Physical Exercise Hours

Correlations were used to compare baseline activity level and physical exercise hours, and pre-test scores and difference scores. At pre-test there was a moderate negative relationship between PSS and activity level, $r = -.397$, and physical exercise hours, $r = -.350$, and a weak

positive relationship between LOT-R and activity level, $r = .203$. Even though statistical significance was not reached between optimism and physical exercise hours, there was a moderate positive relationship trend, $r = .301$, $p = .059$. Difference scores showed no relationship with activity level or physical exercise hours in either PSS or LOT-R (Table 3; Figures 9 and 10). There was a larger range of variability in difference scores in PSS between the yoga ($SD = 8.81$) and weight training group ($SD = 4.87$).

Participants who had higher stress and lower optimism changed more than other participants, while participants who exercised more had lower stress levels with no trend in changing more or less than other participants.

Chapter Five: Discussion, Conclusions, and Recommendations

Summary of Findings

The purpose of this study was to see if there would be a significant difference in perceived stress scores among University students participating in a Samatva yoga class in comparison to University students participating in a weight training class. During the study participants ($N = 38$) were administered two questionnaires that assessed perceived stress and optimism: Perceived Stress Scale (PSS) and Life Orientation Test Revised (LOT-R). The findings and conclusions were based on data that was gathered from August, 2011, to October, 2011.

The following research hypothesis was tested at the .05 level of significance: University students who took Samatva yoga would score lower on perceived stress scales than those within the comparison group after the yoga intervention. Statistical significance was not reached in PSS over time ($p = .141$) or between groups ($p = .773$). There was a moderate effect size ($ES = .50$) in yoga students and a small effect size ($ES = .33$) within weight training students. Statistical significance was reached in LOT-R over time ($p = .001$) but not between groups ($p = .675$). Both groups has a small effect size (yoga $ES = .49$, weight training $ES = .39$). These data do not support the research hypothesis (Figure 5 and 6).

Discussion and Conclusions

This study was designed to test the differences between yoga and weight training on perceived stress and optimism. While the studies about yoga in the literature review seem to defend the belief that yoga is a stronger way to reduce stress, this study yielded no statistical significance to support this idea. However, the yoga group reduced stress at a higher rate than the weight training group as indicated by the univariate effect sizes for each group. Therefore, even though

statistical significance was not reached between groups, the intervention still had a stronger effect than weight training on perceived stress of college students.

The yoga group had more stress and lower optimism at baseline than the weight training group (Table 1; Figures 5 and 6). This may be due to university differences, such as the majority of students in the weight training group were from a public university while all the yoga participants were from a private university. Various differences exist when comparing a public and a private university, such as ACT scores, tuition, and other costs. Within the public university, the average enrollment was 15,953 (College State, 2011b) while the private university was much smaller in size with an enrollment of only 3,712 students (College State, 2011a). The public university accepts about 96% of its applicants on average and 42% of the students receive some sort of financial aid for college. Of those applicants 8.1% were African American, 5% Native American, 2.9% Asian, 2.8% Hispanic, and 71.4% Caucasian (College State, 2011b). While the private university accepts about 79% of its applicants on average, and 99% of the students receive some sort of financial aid for college. Of those applicants 5.7% were African American, 4.2% Native American, 5.2% Asian, 2.5% Hispanic, and 60.7% Caucasian (College State, 2011a). According to Southern Methodist University (SMU), foreign students tend to be more stressed due to language barriers and not having family and friends to express emotions or thoughts about school (Sudderuddin, Low, & Gek, 2009). Figure 7 shows the ethnicity among yoga and weight training participants.

On the average 4.0 scale, the average high school GPA for students that are entering the public university was 3.17, and average ACT score was 21 (College State, 2011b). In the private university, the average GPA was 3.58 and ACT score was 24 (College State, a). Only about 5% of the student body in the public university lived outside of the state while 45% of the student

body from the private university did (College State, 2011b). The estimated average cost of the public university was \$3,850 per semester for tuition and fees and \$4,006 for room and board – 38% lived on campus (College State, 2011b). The estimated cost of the private university per semester was \$17,900 for tuition and \$7,700 for room and board (College State, 2011a). Since the private university has 84% of their student body living on campus (College State, 2011a), the average student who attended a private university paid much more than the average public university student. Therefore, those who attend a private university may have had higher stress levels because of higher debt, expectations to do better for scholarship retention, and a harder grade scale. Since post-test questionnaires were distributed during mid-terms, this may have also caused yoga participants to be even more stressed because of the higher expectations of scholarship, financial aid, and GPA.

In the literature review, the yoga interventions were at least 60 minutes, if not longer (Orthogate, 2006; Myers, Sternlieb, Woolery & Zeltzu, 2004; Ballinger et al., 2003). Due to the University setting, each class was only 50 minutes. This made it difficult to get in the warm-up, asanas (physical practice), and relaxation (savasana). If there was limited time for relaxation, it would most definitely impact results (Prior, 2003). It was also important to note that during the middle of the intervention, the yoga group was moved from an isolated quiet classroom to a basketball gym where there were other activities occurring. Due to the importance of breathing and relaxation, this may have caused the rates of stress to reduce at a slower rate. The fact that participants had to relocate likely influenced perceived stress and optimism, since PSS and LOT-R are circumstance-dependent scales.

One of the limitations of the study was the quasi-experimental design. The majority of those participating in weight training were men, and the majority participating in yoga were

women. According to Haji (2008), females have a tendency to report higher levels of worrying, anticipating and trying, and seeking spiritual support, while males have a tendency to report higher levels of physical recreation and denial (Haji, 2008). Therefore, if women worry and anticipate more than men, and the surveys were given during mid-terms, there was reason to believe that these gender differences in participants may have contributed to the reason why the yoga intervention did not yield a statistical difference between groups (Table 2; Figure 8).

The literature supports that exercise in general helps to reduce stress (Ross & Thomas, 2009). Since weight training is closely related to the same physical exercise in yoga, it was expected that both groups would reduce their stress levels, but that the yoga group would decrease much more (Wei, Kilpatrick, Naquin, & Cole, 2006). The students who participated in this study chose to take the yoga or weight training class. Since the students were already the type of student who chose to participate in a yoga or weight training activity, this may have been the reason the stress levels were so close. Figures 9 and 10 show that both groups already exercised almost the same amount per week.

Due to the trend in stress reduction, if the study had been conducted over a longer period of time, it is possible that statistical significance could have been reached based upon the rate at which yoga student's stress was reduced. A larger sample size would have increased the odds for significance. In the studies from the literature review in which interventions were conducted among college students, sample sizes range from 80 total participants and higher (Ballinger et al., 2003; Kumar, 2010).

Since there was no research comparing weight training to yoga, this study can be a building block for studies in the future.

Recommendations for Future Studies

Although this study did not yield statistically significant results for Perceived Stress Scale (PSS), yoga and stress should remain a topic of investigation since the body of knowledge is relatively new and limited. It is also important because stress is an indicator of well-being and can contribute to other health-related outcomes. Future studies need to examine what methods enhance stress reduction and help create a higher quality of life within individuals.

Recommendations for future studies include:

1. a similar study needs to be conducted using a larger sample size so that the findings can be more applicable to various demographics;
2. a study that lasts longer than 8-weeks to enhance the ability for change;
3. a study that examines other qualities that may contribute to stress, such as sleep, dieting habits, etc;
4. a study that has a quiet space for the activity to be able to quiet the mind from distractions;
5. a study that incorporates strength or weight training as a comparison group to identify whether it is the exercise or the breathing and relaxation that reduces stress; and
6. a study with a true experimental design: a true control group or a control group and a weight training comparison group.

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Table 1

Descriptive Statistics for Perceived Stress Scale (PSS) and Life Orientation Tests Revised (LOT-R) at pre-and post-test among Yoga and Weight Training participants.

Perceived Stress Scale							
	N	Mean	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
Pre-yoga	25	18.37	5.67	-0.52	0.06	6	28
Post-yoga	19	16.42	5.57	0.02	0.12	5	28
Difference yoga	19	1.94	8.10	0.16	0.05	-14	18
Pre-weight training	24	15.84	3.86	-0.15	-0.39	5	24
Post-weight training	19	14.53	5.97	0.56	0.65	4	29
Difference weight training	19	1.31	4.87	0.15	0.51	-9	10
Life Orientation Scale - Revised							
Pre-yoga	25	14.32	4.47	-0.20	0.46	5	22
Post-yoga	19	15.84	4.15	-0.24	-0.18	8	23
Difference yoga	19	1.52	2.19	0.57	0.12	-2	6
Pre-weight training	23	16.17	3.07	0.65	0.86	12	24
Post-weight training	18	17.39	3.43	-0.07	-0.10	11	24
Difference weight training	18	1.22	2.18	0.36	-0.84	-2	5

Note: The word difference represents descriptive statistics for difference scores. To calculate difference scores for PSS, post-test data was subtracted from pre-test data, while the LOT-R pre-test data was subtracted from post-test data

Table 2

Descriptive separated by gender pre-and post-intervention for both Perceives Stress Scale (PSS) and Life Orientation Test Revised (LOT-R).

		Males		Females	
		N	M ± SD	N	M ± SD
PSS	Pre-yoga	6	17.33 ± 9.35	13	18.85 ± 3.33
	Post-yoga	6	15.00 ± 5.29	13	17.08 ± 5.78
	Pre-weight training	12	16.00 ± 3.59	4	15.50 ± 4.65
	Post-weight training	12	14.00 ± 6.75	4	13.25 ± 5.12
LOT-R	Pre-yoga	6	13.17 ± 5.81	13	14.85 ± 3.87
	Post-yoga	6	15.50 ± 5.01	13	16.00 ± 3.91
	Pre-weight training	12	16.08 ± 2.42	4	16.50 ± 5.06
	Post-weight training	12	17.67 ± 3.05	4	17.50 ± 5.32

Table 3

Correlations between activity levels and exercise levels at pre-test for Perceived Stress Scale (PSS), Life Orientation Test Revised (LOT-R), difference score PSS, and difference score LOT-R.

Measure	Pre-test PSS	Difference score PSS	Pre-test LOT-R	Difference score LOT-R
Physical Activity Level	$r = -.397$ $p = .006$	$r = .097$ $p = .575$	$r = .203$ $p = .176$	$r = .185$ $p = .288$
Physical Exercise Hours	$r = -.350$ $p = .025$	$r = -.208$ $p = .2562$	$r = .301$ $p = .059$	$r = -.016$ $p = .935$

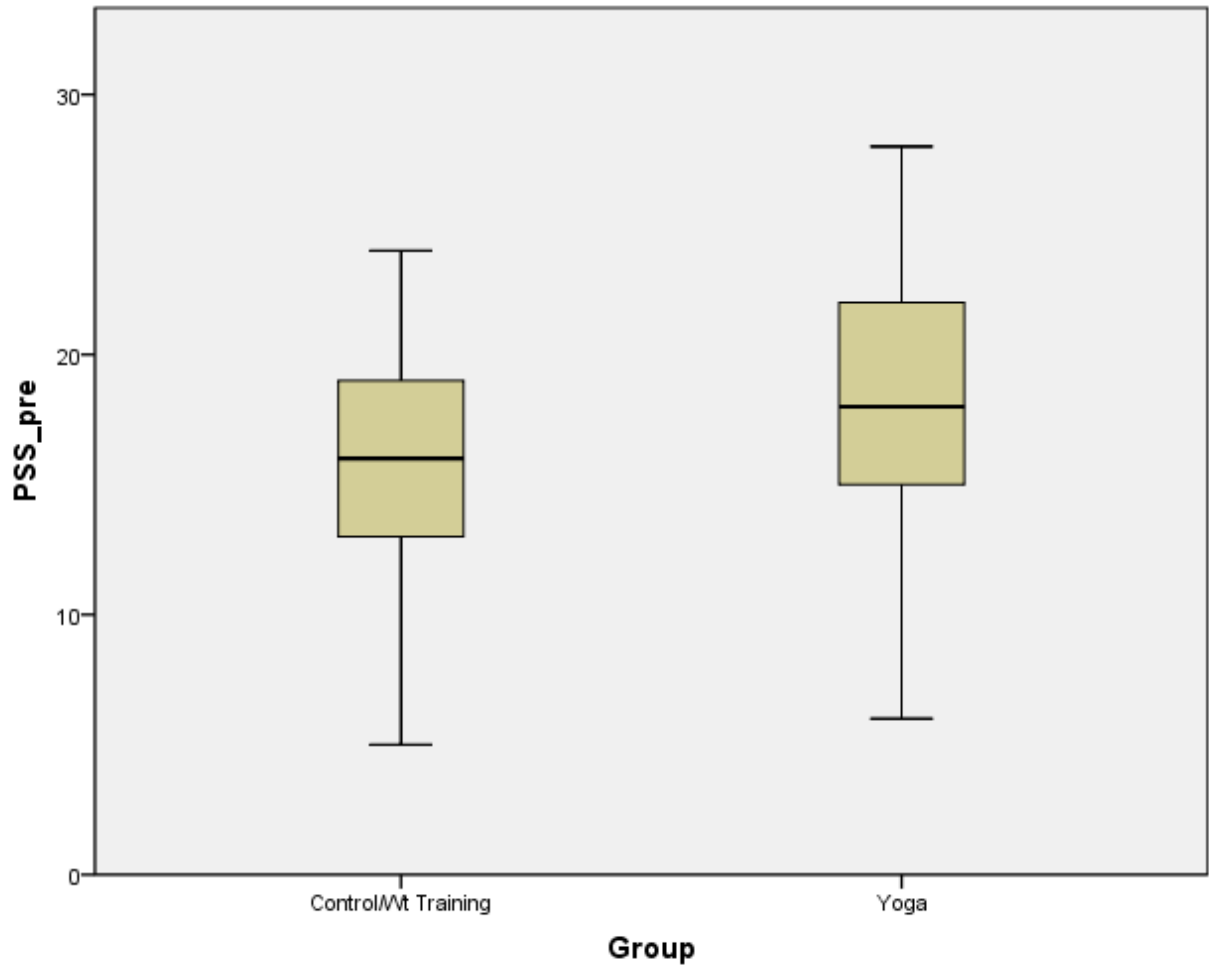


Figure 1. Box plot representing perceived stress scale (PSS) scores at pre-intervention among weight training and yoga participants.

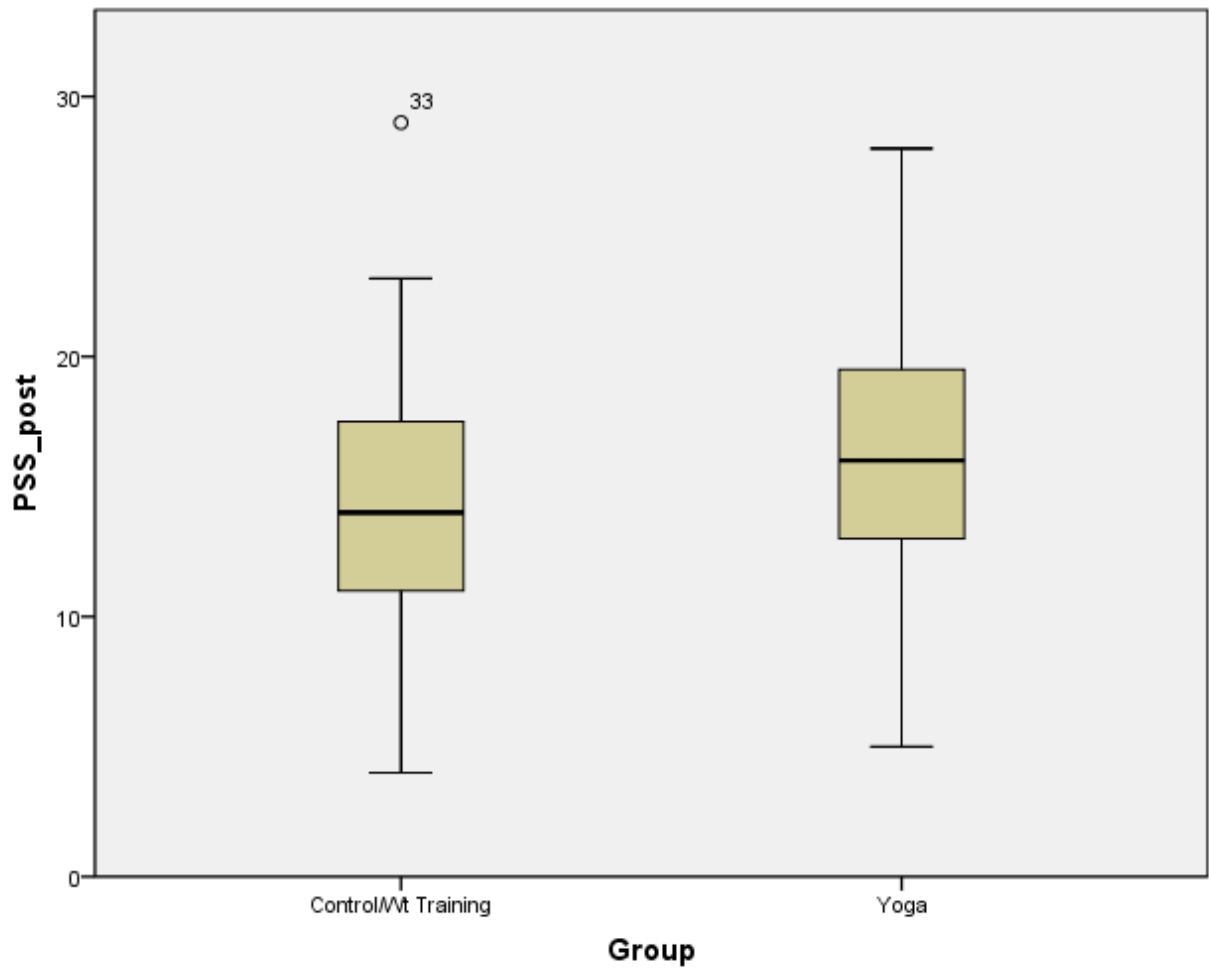


Figure 2. Box plot representing perceived stress scale (PSS) scores among weight training and yoga participants at post-intervention.

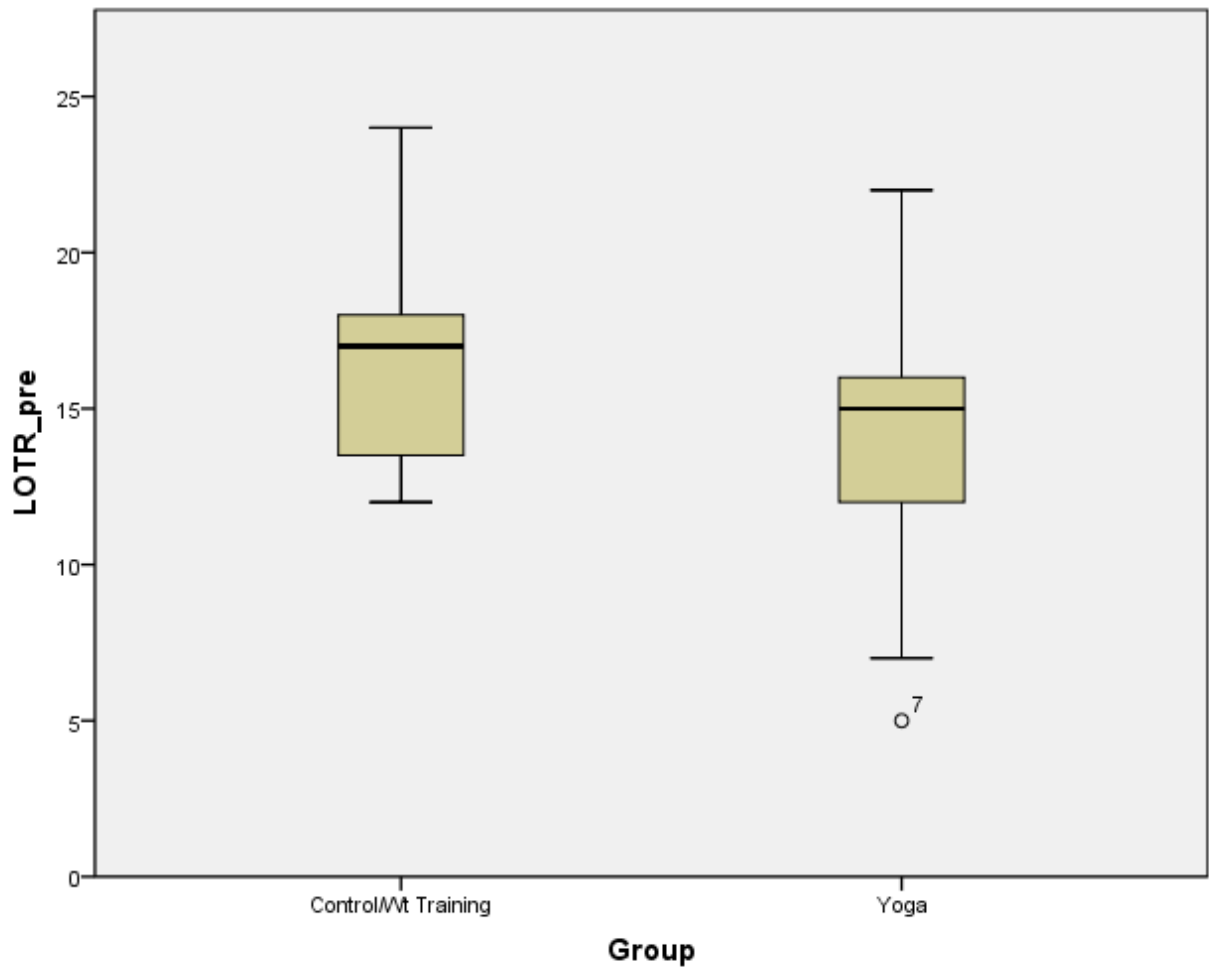


Figure 3. Box plot representing Life Orientation Test Revised (LOT-R) scores among weight training and yoga participants at pre-intervention.

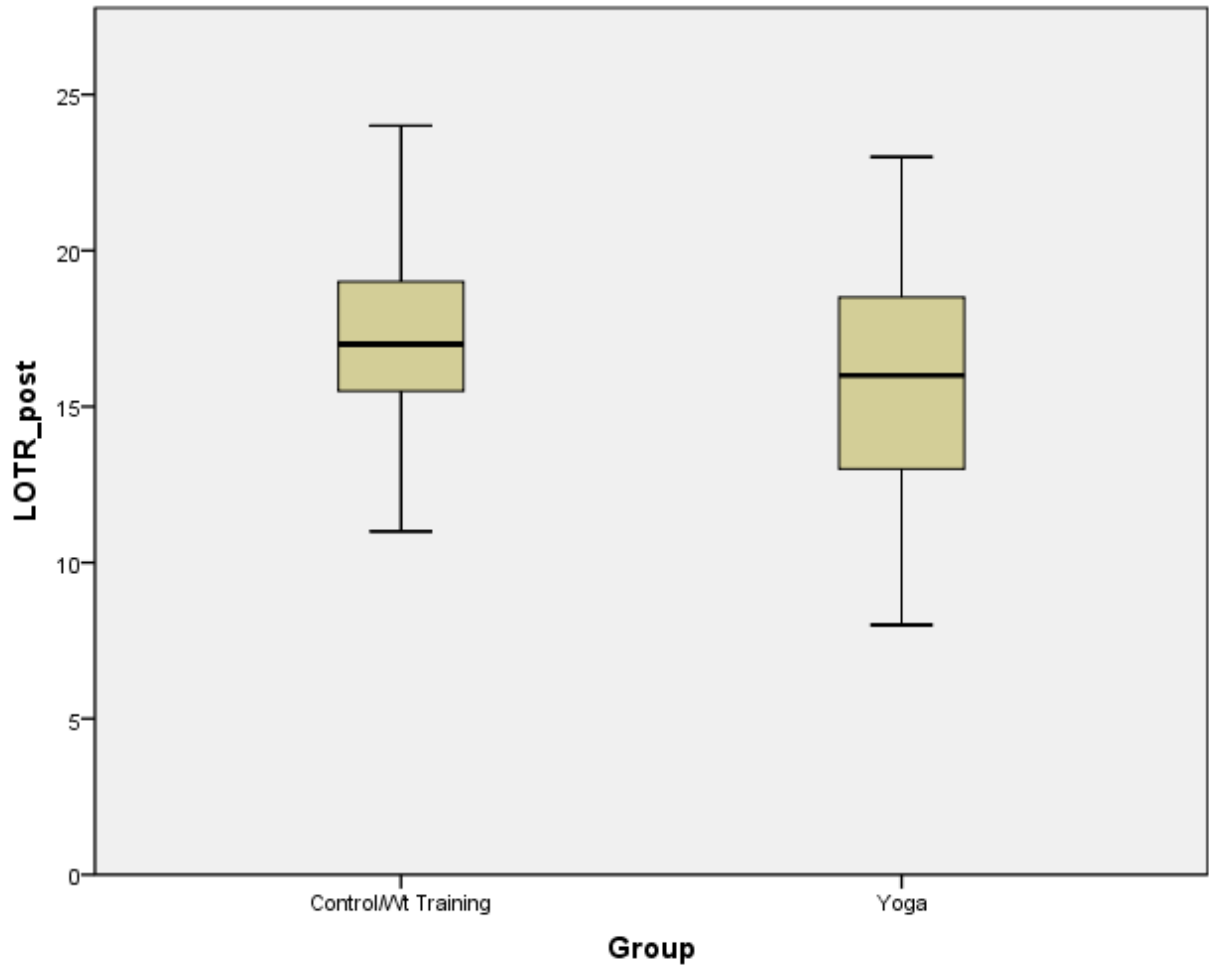


Figure 4. Box plot representing Life Orientation Test Revised (LOT-R) scores among weight training and yoga participants at post-intervention.

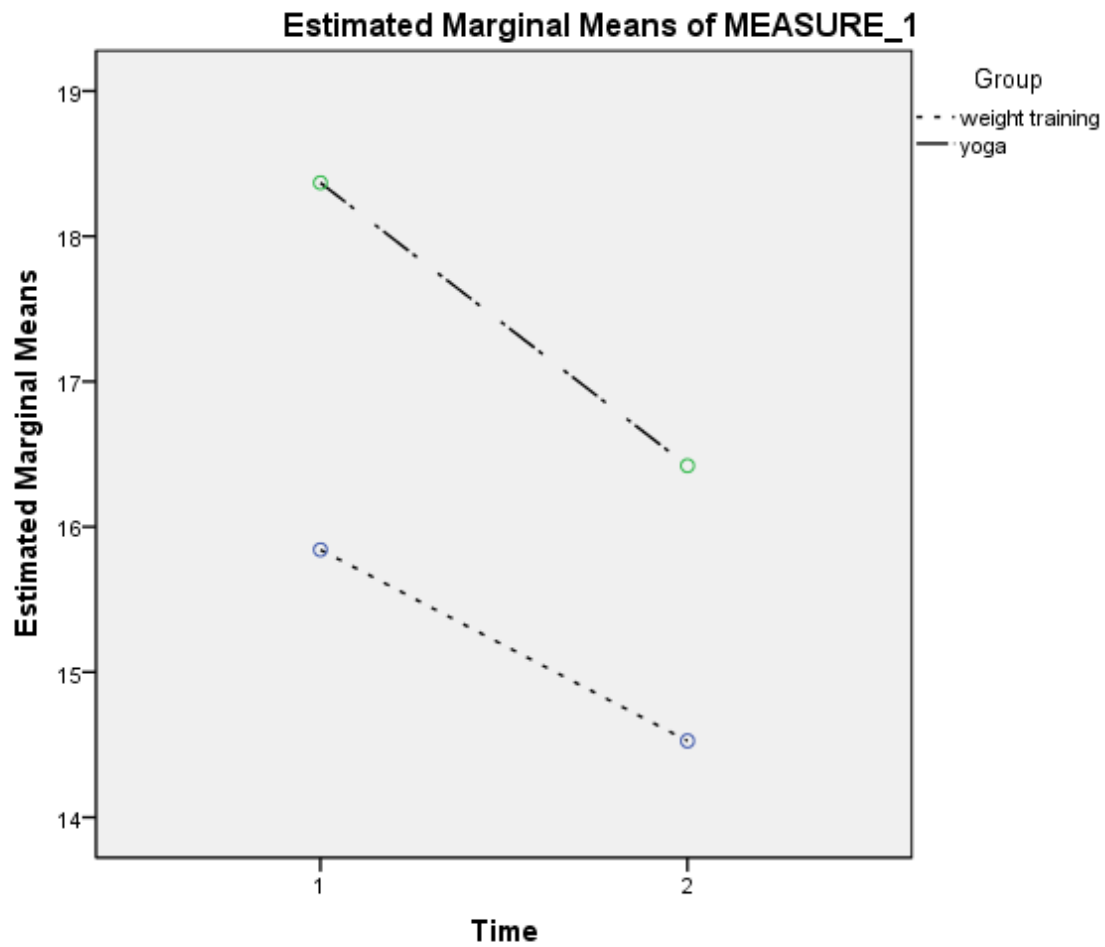


Figure 5. Perceived Stress (PSS) scores from pre- to post-intervention among yoga (top line) and weight training (bottom line) participants.

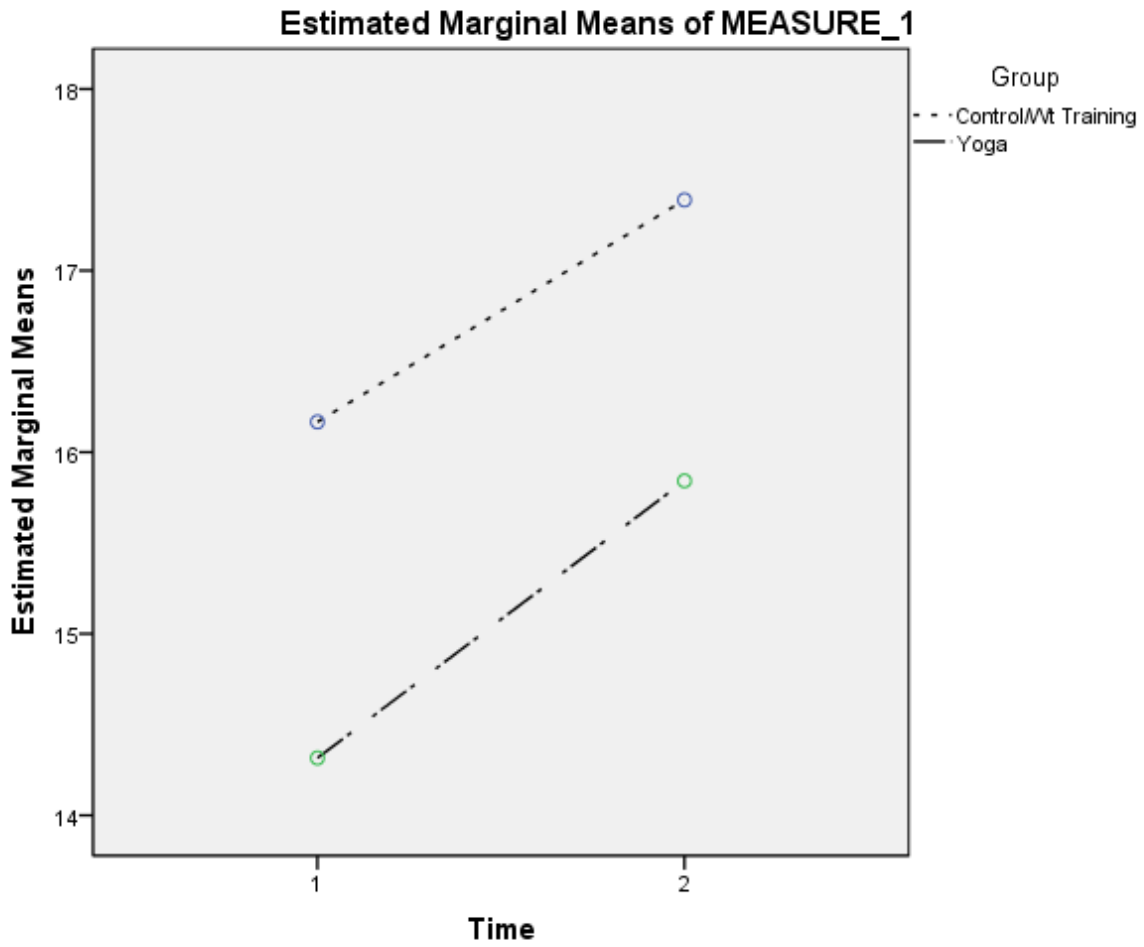


Figure 6. Life Orientation Test Revised (LOT-R) scores from pre- to post-intervention among weight training (top line) participants and yoga (bottom line).

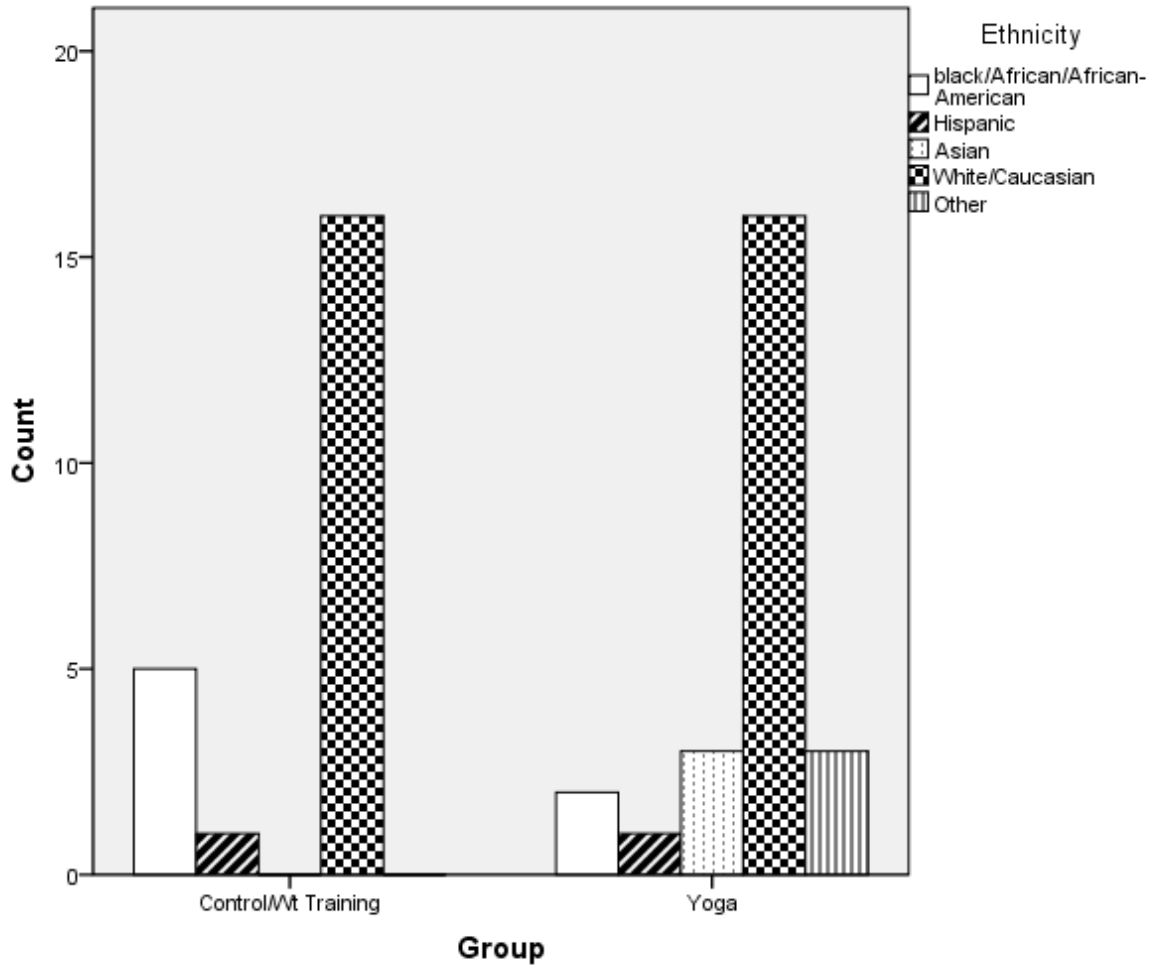


Figure 7. Histogram representing the ethnicity of yoga and weight training participants.

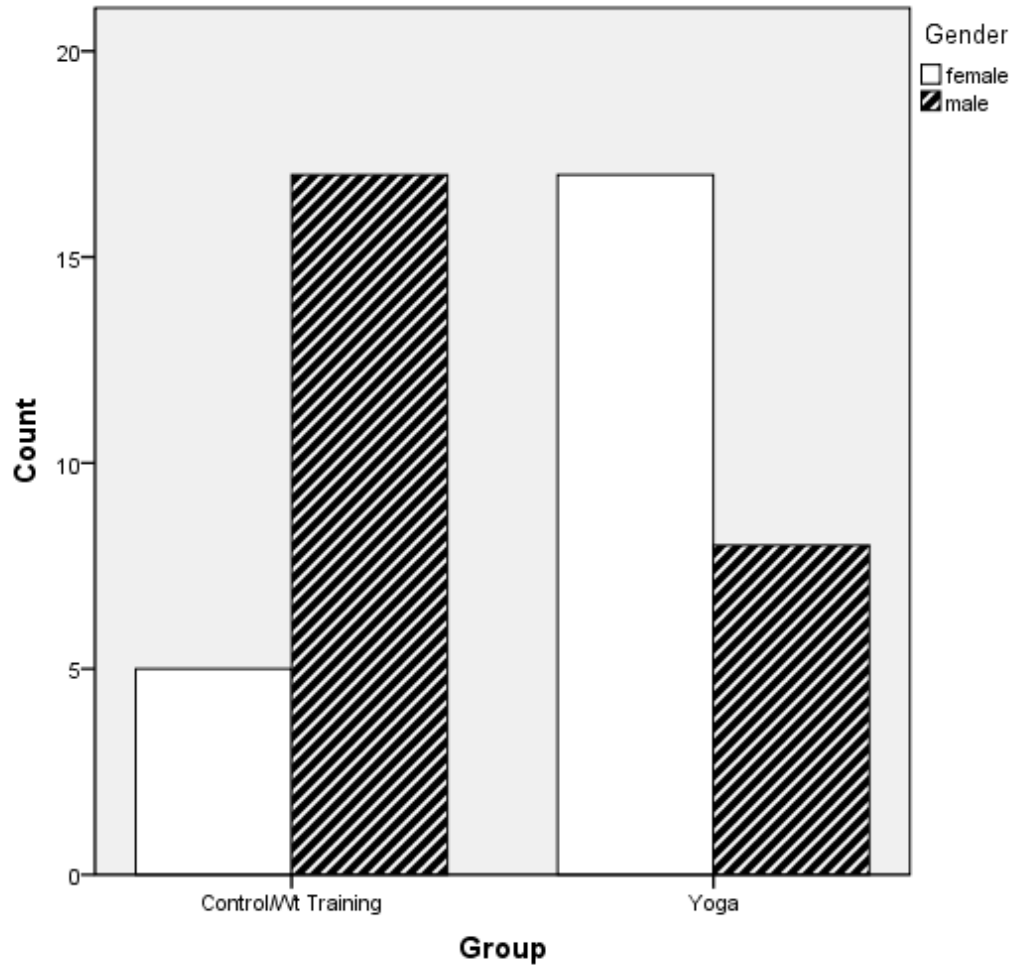


Figure 8. Histogram representing the number of male and female participants of yoga and weight training.

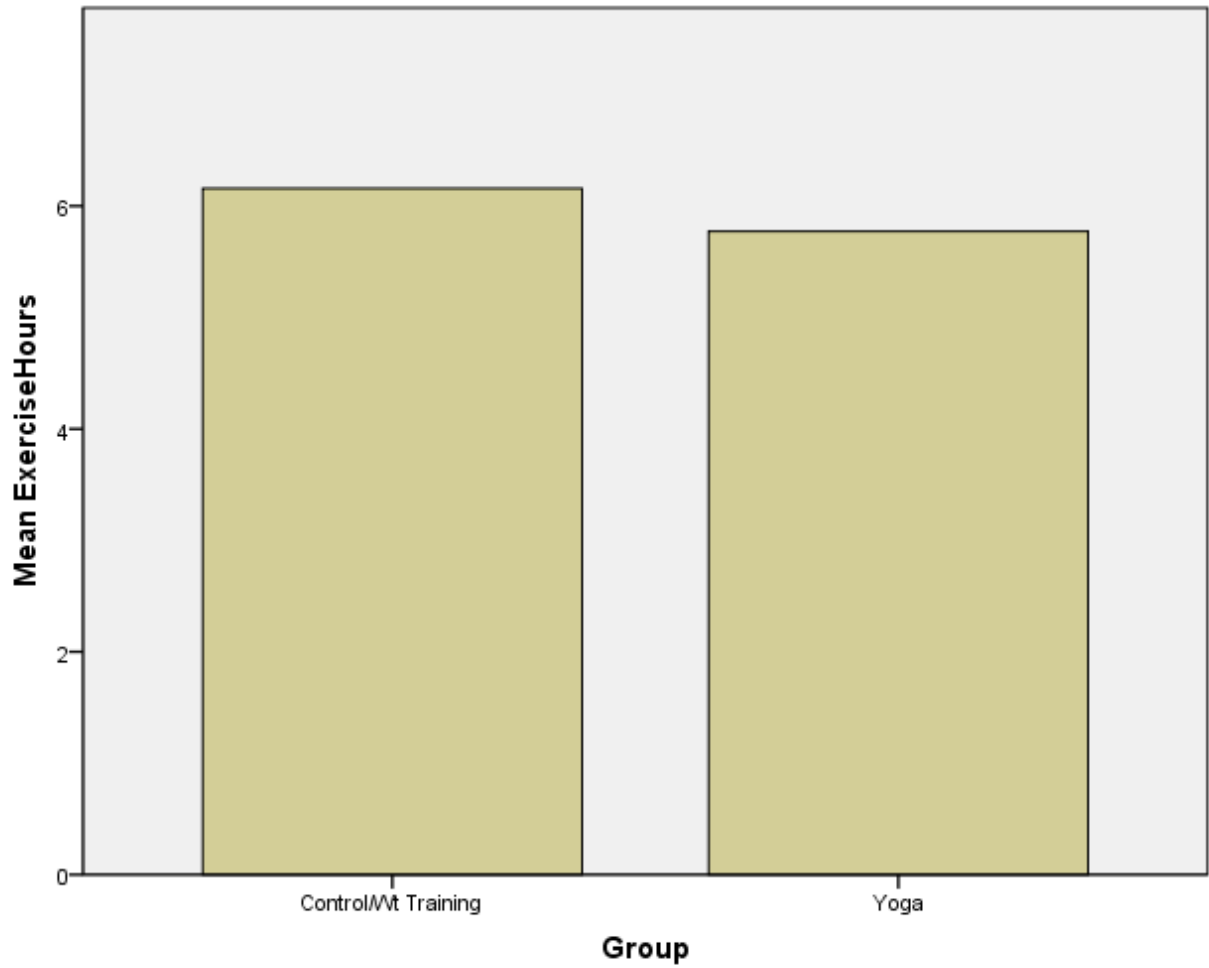


Figure 9. Histogram representing the number of exercise hours performed per week by the participants of yoga and weight training at pre-test.

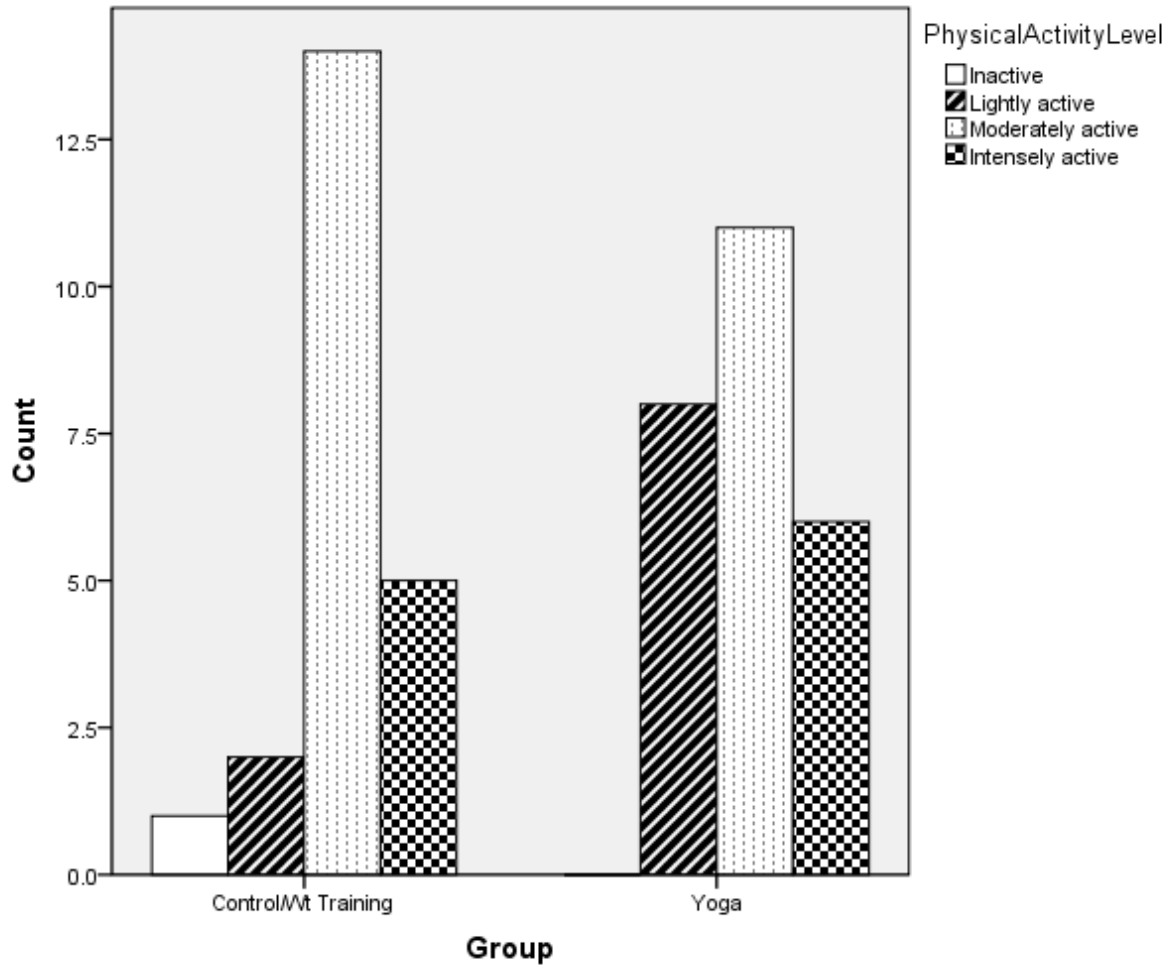


Figure 10. Histogram representing the physical activity level of weight training and yoga participants.

Appendix A

Informed Consent Form
University of Central Oklahoma
Effects of Samatva Yoga on College Students

Principal Investigator: Avy Doran, Phone: 405-315-3313

Purpose & Procedure: The purpose of this research is to determine the effects Samatva yoga has on College students at Oklahoma City University. As a college student taking yoga, you have been identified as a potential candidate for this study. If you agree to participate, you will be asked to complete a demographic survey and two questionnaires during your scheduled class time. Completion of the questionnaires should take no more than 10 to 15 minutes.

Pre-testing: Once you sign the consent form, you will be asked to complete the demographic survey and two questionnaires. The demographic information and information n the questionnaires are used to collect only group scores, not your individual score. The study will last approximately 8 weeks- of the yoga class.

Post-testing: At the end of 8 weeks, you will be asked to complete two questionnaires.

Expected Length of Study: 8 weeks

Risks & Benefits: There are no additional risks or discomforts to participating in this study. You will not encounter stress, psychological, social, physical, or legal risks, and greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. Your questionnaire responses will remain anonymous, and your instructor will not be informed of your choice to accept or deny participation. There will be no direct compensation or benefit to you for your involvement, but as an indirect benefit, the information obtained through this study may assist the faculty in implementing programs for stress relief among college students.

Confidentiality and Privacy: All data will be reported in group averages and no one will be personally identified. Your signed consent form will be maintained separately from your anonymous questionnaire to prevent any possibility of linking your responses to your name. Individual questionnaires will be stored in a locked filing cabinet in Dr. Rudebock's office and will only be accessible to the investigators' who will be analyzing the data.

Assurance of Voluntary Participation: Your participation in this study is strictly voluntary. You have the right to refuse participation and choose not to answer all questions without penalty. Your choice to participate, decline, or withdraw will not be discussed with anyone and will not have any effect on your grade in this course.

Contact Information: For more information about this study or results after completion, please contact the principal investigator, Avy Doran at 405-315-3313 or avy.doran@gmail.com, University of Central Oklahoma graduate Wellness Management, Health Studies student, or co-investigator Dr. Diane Rudebock, Associate Professor, University of Central Oklahoma, Department of Kinesiology and Health Studies at 405-974-5216 or crudebock@uco.edu. You may also contact Dr. Jill Devenport at the University of Central Oklahoma Institutional Review Board office at 405-974-5479 or IRB@uco.edu for questions regarding research participation.

Please provide your name, signature, and date below if you are willing to participate. Return the completed form to the person who administered this form. Please keep the second copy of the consent form for your records

AFFIRMATION BY RESEARCH SUBJECT

I hereby voluntarily agree to participate in the research study listed on the back of this page and further understand the explanations and descriptions of this research study. *I also understand that there is no penalty for refusal to participate and that I am free to withdraw my consent and participation in this study at any time without penalty.* I acknowledge that I am at least 18 years of age. I have read and fully understand this Informed Consent Form. I sign it freely and voluntarily. I acknowledge that a copy of this Informed Consent Form has been given to me to keep.

Research Subject's Name (Please Print) _____

Signature _____

Date _____

Appendix B

June 20, 2011

IRB Application #: 11081

Proposal Title: The Effects of Samatva Yoga on Perceived Stress among University Students in the Midwest

Type of Review: Initial-Expedited

Investigators:

Ms. Avy Doran
Dr. Diane Rudebock
Department of Kinesiology & Health Studies
College of Education & Professional Studies
Campus Box 189
University of Central Oklahoma
Edmond, OK 73034

Dear Ms. Doran and Dr. Rudebock:

Re: Application for IRB Review of Research Involving Human Subjects

We have received your revised materials for your application. The UCO IRB has determined that the above named application is APPROVED BY EXPEDITED REVIEW. The Board has provided expedited review under 45 CFR 46.110, for research involving no more than minimal risk and research category 7.

Date of Approval: 06/20/2011

Date of Approval Expiration: 06/20/2012

If applicable, informed consent (and HIPAA authorization) must be obtained from subjects or their legally authorized representatives and documented prior to research involvement. A stamped, approved copy of the informed consent form will be sent to you via campus mail. The IRB-approved consent form and process must be used. While this project is approved for the period noted above, any modification to the procedures and/or consent form must be approved prior to incorporation into the study. A written request is needed to initiate the amendment process. You will be contacted in writing prior to the approval expiration to determine if a continuing review is needed, which must be obtained before the anniversary date. Notification of the completion of the project must be sent to the IRB office in writing and all records must be retained and available for audit for at least 3 years after the research has ended.

It is the responsibility of the investigators to promptly report to the IRB any serious or unexpected adverse events or unanticipated problems that may be a risk to the subjects.

On behalf of the UCO IRB, I wish you the best of luck with your research project. If our office can be of any further assistance, please do not hesitate to contact us.

Sincerely,

Richard Sneed, Ph.D.
Acting Chair, Institutional Review Board
Campus Box 159
University of Central Oklahoma
Edmond, OK 73034
405-974-5497
irb@uco.edu<<mailto:irb@uco.edu>>

August 11, 2011

Avy Doran
University of Central Oklahoma
Department of Kinesiology and Health Studies
Campus Box 189
Edmond, OK 73034

Dear Ms. Doran:

Your research proposal, *D0811 Effect of Samatva yoga on College Students* [with Dr. Marvel Stefanie Latham (OCU) and Dr. Diane Rudebock (UCO)] meets our criteria for expedited review and has been approved in accordance with the Code of Federal Regulations governing human subjects research (Title 45, Part 6, *Protection of Human Subjects*) and Oklahoma City University Institutional Review Board policies and procedure.

This approval expires August 11, 2012. On or before that date please submit either a Periodic Progress Report (PPR) if the project will continue, or final PPR if the project has ended. Please note that if it becomes necessary to modify the protocol or consent form you have described in your proposal, an amending request must be submitted to the IRB chairperson for review and approval before implementing any such changes.

Sincerely yours,

Terry R. Conley, Ph.D.
IRB Chairperson
Oklahoma City University

C: Stefanie Latham

Appendix C

Demographics Survey

Instructions: Please do not write your name questionnaire. Your answers will remain anonymous and will be compiled other survey participants to form a composite picture.

- 1) What is your birth date? __ __ / __ __ / __ __ __ __
 Sample 0 5 1 8 1 9 8 5

Please mark an "X" on the circle that best describes your answer to the following questions below:

2) Gender?

- Female
 Male

3) How would you describe your race/ethnicity?

- Black/African/African-American
 Hispanic
 Asian/Pacific Islander
 White/Caucasian
 Other (please describe: _____)

4) Current year in school:

- Freshman
 Sophomore
 Junior
 Senior
 Other (please describe: _____)

5) Current school status:

- Full-time student (at least 12 credit hours)
 Part-time student (less than 12 credit hours)

6) What is your physical activity level?

- Inactive
 Lightly active (walking slowly, vacuuming, gardening)
 Moderately active (walking briskly, weight lifting, recreational swimming)
 Intensely active (jogging/running, swimming laps, moving/pushing furniture)

7) How often do you exercise?

Average: _____ hr(s)/week

8) Do you have a chronic disease?

- Yes
- No, I do not have a chronic disease.

9) If you answered yes, please check the appropriate box.

- Diabetes mellitus
- Hypertension
- High cholesterol
- Heart disease
- Other (please describe: _____)

Appendix D
Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way. Name

_____ Date

_____ Age _____

0 = Never	1 = Almost Never	2 = Sometimes	3 = Fairly Often	4 = Very Often	
1. In the last month, how often have you been upset because of something that happened unexpectedly?.....	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going your way?.....	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?.....	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?..	0	1	2	3	4
9. In the last month, how often have you been angered because of things that were outside of your control?.....	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

Please feel free to use the *Perceived Stress Scale* for your research.

Mind Garden, Inc.

References

info@mindgarden.com www.mindgarden.com

Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health*. Newbury Park, CA: Sage, 1988.

Revised Life Orientation Test (LOT – R)**Instructions:**

Please answer the following questions about yourself by indicating the extent of your agreement using the following scale:

- (0) = strongly disagree
- (1) = disagree
- (2) = neutral
- (3) = agree
- (4) = strongly agree

Be as honest as you can throughout, and try not to let your responses to one question influence your response to other questions. There are no right or wrong answers.

- _____ 1. In uncertain times, I usually expect the best.
- _____ 2. It's easy for me to relax.
- _____ 3. If something can go wrong for me, it will.
- _____ 4. I'm always optimistic about my future.
- _____ 5. I enjoy my friends a lot.
- _____ 6. It's important for me to keep busy.
- _____ 7. I hardly ever expect things to go my way.
- _____ 8. I don't get upset too easily.
- _____ 9. I rarely count on good things happening to me.
- _____ 10. Overall, I expect more good things to happen to me than bad.

Appendix E

Oral Script: Pre - Intervention

(Read to intervention group (yoga) before beginning study)

My name is Dr. Stefanie Latham, Chair and Associate Professor of Kinesiology and Exercise Studies. As a student enrolled in a yoga class, I would like to invite you to participate in a research study that is being conducted with your yoga class on campus during the fall semester. The effects of yoga and weight training in university students are being studied.

Before we begin, I want to explain to you what we will be doing so that you know what to expect.

First, we will go over the informed consent form, and if you are willing to participate, then you will need to sign and date the back of the form. For those who are participating, you will be asked to complete a demographic survey and two questionnaires, which will take about 10 minutes to complete. You will be asked to create an identification number to maintain confidentiality. The purpose of the identification number is for the researcher to keep track of all the data sheets that are collected (e.g. if data sheets accidentally get out of order, the researcher will be able to place the correct data sheet with its corresponding set). The study will last approximately 8 weeks during your fall yoga class. At the end of 8 weeks of yoga, during class time, you will be asked to complete two questionnaires.

There are no additional risks or discomforts that you will encounter psychologically, socially, physically, or legally, any greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. Your questionnaire responses will remain anonymous and your instructor will not be informed of your choice to accept or deny participation.

There will be no direct compensation or benefit to you for your involvement other than the benefit you may receive from taking the yoga class, but the information obtained through this study may assist Universities in implementing programs for stress relief for college students. If you would like to participate in this study, please read and sign the informed consent form and keep one copy for yourself. By signing the informed consent form, you agree to voluntarily take part in the study. However, you have the right to terminate the study at any time without penalty if you feel you are unable to go on.

Now, please create an identification number. This number should be one of your parents first, middle, and last initial along with the numbers representing the month, day, and year of your birth (example: 05/18/1985). The identification number is to be placed in the top right corner of the demographic survey and the two questionnaires. In addition, please put your name and identification number on the 3x5 index card given to you at the same time as the questionnaires. After completing the survey and questionnaires please return them to the person who administered them. Please return the 3x5 card also. This will be kept separately from the survey and questionnaire responses and will only be used at the end of the study in case you need to be reminded of the unique ID that you created. Once you submit the information, please sit quietly until all are finished, and then you will return to your yoga class which will begin.

What questions do you have?

Oral Script: Pre - Intervention

(Read to comparison group, weight training, before beginning study)

My name is Avy Doran, University of Central Oklahoma graduate Wellness Management, Health Studies student. As a student enrolled in a weight training class, I would like to invite you to participate in a research study that is being conducted with your weight training class on campus during the fall semester. The effects of yoga and weight training in university students are being studied.

Before we begin, I want to explain to you what we will be doing so that you know what to expect.

First, we will go over the informed consent form, and if you are willing to participate, then you will need to sign and date the back of the form. For those who are participating, you will be asked to complete a demographic survey and two questionnaires, which will take about 10 minutes to complete. You will be asked to create an identification number to maintain confidentiality. The purpose of the identification number is for the researcher to keep track of all the data sheets that are collected (e.g. if data sheets accidentally get out of order, the researcher will be able to place the correct data sheet with its corresponding set). The study will last approximately 8 weeks during your fall weight training class. At the end of 8 weeks of weight training, during class time, you will be asked to complete two questionnaires.

There are no additional risks or discomforts that you will encounter psychologically, socially, physically, or legally, any greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. Your questionnaire responses will remain anonymous and your instructor will not be informed of your choice to accept or deny participation.

There will be no direct compensation or benefit to you for your involvement other than the benefit you may receive from taking the yoga class, but the information obtained through this study may assist Universities in implementing programs for stress relief for college students. If you would like to participate in this study, please read and sign the informed consent form and keep one copy for yourself. By signing the informed consent form, you agree to voluntarily take part in the study. However, you have the right to terminate the study at any time without penalty if you feel you are unable to go on.

Now, please create an identification number. This number should be one of your parents first, middle, and last initial along with the numbers representing the month, day, and year of your birth (example: 05/18/1985). The identification number is to be placed in the top right corner of the demographic survey and the two questionnaires. In addition, please put your name and identification number on the 3x5 index card given to you at the same time as the questionnaires. After completing the survey and questionnaires please return them to the person who administered them. Please return the 3x5 card also. This will be kept separately from the survey and questionnaire responses and will only be used at the end of the study in case you need to be reminded of the unique ID that you created. Once you submit the information, please sit quietly until all are finished, and then you will return to your weight training class which will begin. What questions do you have?

Oral Script: Post - Intervention

(Read to intervention group, yoga, after completion of the study)

Thank you for your participation in the research study which is evaluating the effects of Samatva yoga on students enrolled in an 8-week yoga class at Oklahoma City University this fall.

Today, you will be asked to fill out two questionnaires, which will take about 10 minutes to complete. Please include your identification number at the top right hand corner of the forms that you created (parent first, middle, and last initial and the numbers representing your birth date). As you may recall, the purpose of the identification number is for the researcher to keep track of all the data sheets that are collected (e.g. if data sheets accidentally get out of order, the researcher will be able to place the correct data sheet with its corresponding set). After you complete the questionnaires, please return them to the person who administered them. Please sit quietly until all have completed their questionnaires.

What questions do you have?

Your participation in the research study is complete, but you will need to continue to go to class. If you wish to receive a summary of your results of this study or have any questions after you leave today, you may contact Avy Doran at adoran@uco.edu or 405-315-3313, after December 30, 2011. If you have any other questions after you leave today, you can contact Avy Doran. Thank you very much for your time and willingness to participate in this study.

Oral Script: Post - Intervention

(Read to comparison group, weight training, after completion of the study)

Thank you for your participation in the research study which is evaluating the effects of Samatva yoga on students enrolled in an 8-week yoga class at Oklahoma City University this fall.

Today, you will be asked to fill out two questionnaires, which will take about 10 minutes to complete. Please include your identification number at the top right hand corner of the forms that you created (parent first, middle, and last initial and the numbers representing your birth date). As you may recall, the purpose of the identification number is for the researcher to keep track of all the data sheets that are collected (e.g. if data sheets accidentally get out of order, the researcher will be able to place the correct data sheet with its corresponding set). After you complete the questionnaires, please return them to the person who administered them. Please sit quietly until all have completed their questionnaires.

What questions do you have?

Your participation in the research study is complete, but you will need to continue to go to class. If you wish to receive a summary of your results of this study or have any questions after you leave today, you may contact Avy Doran at adoran@uco.edu or 405-315-3313, after December 30, 2011. If you have any other questions after you leave today, you can contact Avy Doran. Thank you very much for your time and willingness to participate in this study.