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The Effects Of Yoga And Humor On Stress

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The Effects of Yoga and Humor on Stress

BY

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DEDICATION

This work is dedicated to Dr. Thomas Chiodo who is not only my husband but also my best friend.

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ABSTRACT

EFFECTS OF YOGA AND HUMOR ON STRESS

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Chair Dr. Genevieve Pinto-Zipp

Stress can be a contributing factor in the development of many health disorders, negatively affecting psychological and physical well-being. Health science programs can be a demanding and difficult period for many students, which can lead to high levels of stress. Unfortunately, stress does not diminish with the completion of an educational program, but continues throughout one's professional career. Research suggests that both yoga and humor are effective simple methods to reduce stress. However, to date, no research compares the acute effects of both yoga and humor in health science students. Therefore, the purpose of this study was to compare the effects of yoga and humor on acute stress in students enrolled in health science programs.

Twenty-two students from the School of Graduate Medical Education Doctor of Physical Therapy program (n=14) and Master's of Occupation Therapy program (n=8) were recruited. At baseline, subjects completed a demographic survey, Coping Style Scale, and Coping Humor Scale (CHS). All subjects participated in a yoga, humor, and reading intervention, once a

week on the same day and at the same time for a total of three weeks. Before and after each intervention stress was measured using the Daily Stress Inventory (DSI), heart rate, and blood pressure. A repeated one-way ANOVA indicated that yoga and humor did not significantly reduce DSI scores ($p = .362$), systolic and diastolic blood pressure ($p = .058$ and $p = .315$ respectively), or heart rate ($p = .180$) more than reading.

The results of the study indicate that yoga, humor, and the control intervention had similar effects on blood pressure and heart rate. While the hypothesis was not supported, the research still suggests 30-minutes of either yoga, humor, or reading will decrease acute stress in health science students. This finding is important since these interventions resulted in a significant reduction in stress in a relatively short amount of time. Consequently, yoga, humor or reading can be recommended to students for immediate stress reduction before examinations, practicals, presentations, and even during a highly stressful day.

Chapter I

Introduction

Stress is a growing public health concern, affecting many individuals both physically and psychologically (Sobel, 1995). Stress often puts a strain on personal and professional relationships, leading to decreased self-satisfaction and poor psychological adjustment (Kanner, Coyne, Schaefer, & Lazarus, 1981; Linn & Zeppa, 1984; Wolf & Kissling, 1984). Over the past 70 years an increasing amount of research has evaluated stress and the adverse effects it has on psychological and physical health. As early as 1925, Hans Selye observed the physiological effects stress has on a person. His initial work focused on analyzing the adverse reactions lab animals demonstrated when stimulated by noxious agents. Through his observations he theorized that when animals were exposed to stressors they exhibited a consistent pattern of responses, which he called the “general adaptation syndrome” (GAS).

GAS refers to a series of three events that occur when the body is exposed to acute and chronic levels of stress (Selye, 1956). Upon exposure

to a stressful stimulus the body initially responds with an alarm reaction. During the alarm reaction hormones are released to increase the defensive capabilities against the stressor initiating a “fight or flight” reaction. If the stressor abates, the body will return to its normal state. If the stressor persists the body will continue to “fight” the stressor by releasing additional hormones leading to the second stage of the GAS, known as the stage of resistance.

In the second stage the body continues to defend itself against the current stressor by maximizing hormone release; decreasing resistance against other stressors that may be occurring simultaneously. The body becomes more resistant to the stressor and is able to function at an optimal level, but the resistance phase can only withstand the stressor for so long. If the stressor does not abate and the person is unable to cope with the stressor, his or her coping mechanisms and defenses will become overwhelmed. The stressor will consume all of his or her energy, forcing the body into the exhaustion phase, also known as the “disease of adaptation” period.

Seyle coined the term “disease of adaptation” to refer to the third and final phase of the GAS (Seyle, 1956). This syndrome is defined by a set of adverse physiologic changes that occur when the body is overwhelmed by stress and can no longer maintain homeostasis, ultimately becoming

exhausted. Although the hormones released during the alarm phase can be protective, over time if they do not abate they can eventually promote end organ damage and accelerate pathophysiological changes of some organs. It is during the exhaustion phase that an individual's level of resistance to disease and psychological pressures are the lowest, leaving a person with the inability to cope with daily stress. More times than not this results in pronounced physical consequences, which include but are not limited to, peptic ulcer disease, heart disease, changes in the renal system, hypertension, and even arthritis (Selye, 1956).

Based upon Selye's personal observations he predicted that humans have the ability to face stress and develop stress management techniques in order to adapt to the stressors, thereby avoiding the disease of adaptation (Selye, 1956). Selye theorized responses to stress are individualized, not every person responds similarly to the same stressor. Some may thrive under a stressful situation, while others may become dysfunctional. It is those individuals who are emotionally exhausted or taxed, or do not have any methods for stress reduction that eventually succumb to psychological and physiological effects of chronic stress. Selye postulated that there is no single formula to reduce stress. Individuals need to develop stress management techniques to help build their own defense mechanisms against events or circumstances that have the potential to cause them increased

psychological stress and subsequently lead to the negative effects stress can cause.

According to Michie and Sandhu (1994) stress can equally affect all college students but students enrolled in medical programs report higher levels of psychological stress. The authors postulated students in medical programs have more intense pressures such as participating in patient care, along with working with those on the path of recovery as well as those who are dying, which in combination can result in increased levels of stress. A study done by Firth (1986) supported this theory by finding higher stress levels in medical students compared to the general population of matched controls with 15-20% of the medical students meeting criteria for a diagnosis of psychiatric illness.

Similarly to students in medical school programs, research demonstrates that students in health science programs also experience high levels of psychological stress (O'Meara, Kostas, Markland, & Preivity, 1994). Health science programs include many fields of study such as nursing, nutrition, occupational therapy, pharmacy, public health, psychology and physical therapy, yet they have similar educational objectives. Health science students are trained to understand health-related issues and how the human body works so that they are prepared to provide patient care to improve health, treat illness, and prevent and cure disease. Students in health science programs have an intensive academic curriculum and also participate

in patient care, therefore they may face similar situations as medical students. Frank and Cassady (2005) found stress levels to be higher in physical therapy students compared to a normative sample of working adults and college students. Tyrrell and Smith (1996) also found psychological stress to be higher in occupational therapy students compared to a non-university peer group.

Unfortunately, psychological stress does not stop upon completion of these educational programs but continues into many students' professional careers (Donohoe, Nawawi, Wilker, Schindler, & Jette, 1993; Hendrix, Acevedo, & Herbert, 2000; Zuger, 2004). Many of the stressors faced during the educational process and in clinical practice are unavoidable, therefore effective stress management strategies are best developed early in a student's career (Kelly, Bradlyn, Dubbert, & St. Lawrence, 1982).

Many stress management techniques have been reviewed in the literature including running, walking, bicycling, and group aerobics (Blumenthal, Williams, Needels, & Wallace, 1982; Moses, Steptoe, Mathews, Edwards, 1989; Sunsern, 2002). According to American College of Sports Medicine [ACSM] (2006) all aerobic exercises have cardiovascular and stress management properties. Walking is the most basic type of aerobic exercise followed by running. But both require access to equipment such as a treadmill or open space. Group aerobics have become an extremely popular method to help reduce stress, yet the high impact exercise inherent to most

group aerobic programs requires coordination and proper body mechanics to avoid injury. Cycling is used as a means of exercise, recreation, and even transportation. However, serious injuries can result from accidents, collisions, and falls, and chronic cycling can lead to compression of the ulnar nerve and strains of the knee capsule (ACSM, 2006). The ACSM advocates daily exercise but also suggests a person should engage in some form of relaxation technique to further reduce and manage stress. If a person is already physically active, a stress management program can be integrated into their daily exercise routine (ACSM, 1993; ACSM, 2006).

More recently, research has focused on yoga and humor as possible adjunctive stress management techniques because they are accessible to many individuals, pose little harm, improve mental health, and can be performed alone or in group setting (Fry, 1994; Martin, 2001; Smith, Hancock, Blake-Mortimer, & Eckert, 2006). Yoga and humor are two promising techniques for stress management since they have been shown individually to decrease psychological stress, improve concentration and outlook on life, relieve tension, and are found to be enjoyable. Both can positively alter stress hormones, blood pressure and heart rate (Malathi & Damodaran, 1999; Malathi, Damodaran, Shah, Patil, & Maratha, 2000; Newman & Stone, 1996; Schell, Allolio, & Schonecke, 1993; Smith et al., 2006). Unfortunately, most of the research on yoga and humor is either poorly controlled or limited to correlational studies and designs and there is limited research on the stress

management properties of these two activities in health science students. Therefore, further empirical research is needed to determine if they are viable adjunctive stress management strategies to for students.

Yoga was originally developed in India over 5,000 years ago (Smith et al., 2006). Yoga practitioners view yoga as a holistic tool for self-improvement and self-healing as well as a method to help reduce stress (De Michelis, 2004). Yoga advocates believe that yoga bridges the gap between western and alternative styles of medicine. The practice of *asanas* (or postures) in yoga have been used to combat stress along with decreasing depression and anxiety. Some researchers claim yoga will calm a restless mind creating peace within oneself. Subsequently, when an individual's mind becomes rested they become relaxed, which will ultimately reduce stress (Malathi & Damodaran, 1999). Despite definitive support of the beneficial effects of yoga, healthcare professionals are recommending yoga as an adjunctive technique to assist in coping with stress more effectively, providing both a preventive and curative treatment for many of today's ailments (Garfinkel & Schumacher, 2000).

Yoga is not the only adjunctive stress management strategy that is gaining attention in the media and healthcare field. Humor is another technique that has been shown to buffer the deleterious effects of stress. According to the Association for Applied and Therapeutic Humor, humor is defined as:

Any intervention that promotes health and wellness by stimulating a playful discovery, expression or appreciation of the absurdity or incongruity of life's situations. This intervention may enhance health or be used as a complementary treatment of illness to facilitate healing or coping, whether physical, emotional, cognitive, social or spiritual (Humormatters.com, 2007).

Just as Seyle believed negative emotion could make one sick, Norman Cousins believed positive emotion could make one well. Cousins was one of the first authors to recount his experience of using humor to help him manage a difficult, painful, and stressful time in his life (1979). Cousins was faced with a life-threatening autoimmune disease and was advised there was no cure for him; he would live a short period of time and endure tremendous pain and suffering. After an infuriating hospital course, with multiple procedures and no clear diagnosis, he decided to take action against his disease. Cousins refused to accept his fate and with the help of his physician he took enormous doses of vitamin C along with engaging in daily doses of laughter. To his surprise (as well as the surprise of his physicians and the rest of the medical community) he actually began to feel better. The horrible joint pain and unrelenting fatigue he constantly felt began to abate. His sedimentation rate, which is an objective marker of inflammation, began to decrease. He not only felt better but he was able to function at a similar if not equivalent level before the disease rendered him bedridden. He believed that 10

minutes of daily belly laughter significantly improved his pain and suffering, thereby altering the course of a disease process believed to be irreversible. It can be argued that the vitamin C had an effect on the outcome of Cousins' illness, however it was the laughter that psychologically aided him in dealing with his disease more effectively, which intrigued his physicians. Although Cousins' disease was not completely cured, laughter served as a stress management technique allowing him to better cope with the pain, fatigue, and stress his illness had caused him.

Cousins' case is anecdotal, but provides an excellent illustration of the power of laughter. It demonstrates how daily laughter can mitigate the consequences of pain, stress, and fatigue, caused by a devastating disease. Norman Cousins spent a significant amount of time explaining his experience using laughter to reduce stress. His story emphasizes that humor can buffer some of the detrimental effects of stress. Given this further research into the use of humor as an adjunctive stress management technique for students in health science programs is warranted. Cousins' story is only theoretical. He did not perform any further empirical research to support his claim and research on the beneficial effects of humor there after has been limited to mostly descriptive.

Background of the Problem

Despite all of the research that emphasizes the negative consequences of stress among health science students and subsequently practicing clinicians little is being done to develop adjunctive stress management strategies for students. All programs within the health sciences have their own unique stressors. Two groups of health science students that are of particular interest are physical therapy and occupational therapy students because both groups report common stressors during their educational process including: time constraints, examinations, comprehensive and challenging material to learn in a short period of time, balancing class work and clinical rotations, lack of time for family and friends, and dealing with patients and their families (Frank & Cassady, 2005; Frazer & Echternach, 1991; Mitchell & Kampfe, 1990; O'Meara et al., 1994; Reed & Giacobbi, 2004; Tyrrell and Smith, 1996). Occupational and physical therapy are two professions where stress affects the student and subsequently the clinician (Balogun, Titiloye, Balogun, Oyeyemi & Katz, 2002; Donohoe, et al., 1993). While past research has focused on the perceived stressors these face during school few studies have examined the effects of offering adjunctive stress management techniques to assist the student in coping with stress. More specifically, there is limited empirical research on the acute effects of yoga and humor on stress in physical therapy and occupational therapy students.

The following literature review focuses on how yoga and humor are inexpensive and simple methods to help mitigate the deleterious effects of stress on college students, health science students, medical students, and the general population. Since daily stress can not be completely eliminated, techniques to deal with it efficiently need to be developed by students. Given the negative effects stress has on a student's psychological and physical health, it is necessary to examine the efficacy of yoga and humor as adjunctive stress management techniques to recommend to physical therapy and occupational therapy students. The role of educational programs is not only to provide students with a sound education, but also create professionals who are able to provide quality patient care while managing and coping effectively with stress.

Statement of the Problem

Stress is a growing public health concern, affecting many individuals both physically and psychologically (Sobel, 1995). Many individuals are able to cope with small exposures to psychological stress, and some people even become more productive when under pressure (Folkman, 1984; Rowe, 2006). However, it is problematic when stress becomes overwhelming and a person begins to suffer from the adverse consequences of stress. Adverse consequences of stress include increased anxiety and depression, multiple somatic complaints without an organic cause, and engaging in unhealthy behaviors including smoking, poor dietary habits, and poor sleep habits.

(Folkman, 1984; Friedman, Meyers, Sobel, Caudill, & Benson, 1995; Seyle, 1946).

Research suggests that students in health sciences programs have increased levels of psychological stress (Frank & Cassady, 2005; O'Meara et al., 1994; Tyrrell & Smith, 1996; Reed & Giacobbi, 2004). Although subset of all college students experience stress, such as examinations, financial difficulties, and career decisions, students in the health professions have the added responsibility of diagnosing and treating patients. The stress of making therapeutic decisions, the consequences of which can sometimes be grave, markedly increases stress in health science students (Balogun et al., 2002; Donohoe et al., 1993; O'Meara et al., 1994).

The inability of students to cope with stress successfully may lead to a cascade of negative consequences on both a personal and professional level. Stress can lead to academic decline, poor relationships with peers and family members, and overall dissatisfaction with life (Linn & Zeppa, 1984). It is postulated that stress begins during the educational process and continues throughout one's professional career (Kelly et al., 1982; Shapiro et al., 1998). It would therefore be beneficial to encourage the use of stress management techniques at the start of a student's education, thereby assisting to develop a foundation from which healthy behaviors can be created (Wolf & Kissling, 1984).

Yoga and humor are two adjunctive techniques being utilized as methods to reduce stress with limited evidence of their benefits. To date no research has compared the acute effects of both yoga and humor on stress in students in health science programs. Therefore, yoga and humor need to be further investigated to determine if they are viable adjunctive stress management techniques to offer to health science students.

Purpose Statement

The purpose of this study was to determine the acute effects of yoga and humor on physical and psychological stress in students enrolled in the Seton Hall University Doctorate of Physical Therapy (DPT) program and Masters of Occupational Therapy (OT). Since it is difficult to eliminate stress entirely in these programs, yoga and humor need to be further investigated to determine if they are viable adjunctive stress management strategies to offer to students to help manage stress during their educational process and subsequently throughout their careers.

Hypothesis

H1: Following the yoga and humor sessions, subjects will demonstrate a greater reduction in stress on the Daily Stress Inventory and a greater decrease in blood pressure and heart rate then after the 30 minutes of a reading session.

Definitions

Coping: cognitive and behavioral efforts to master, reduce, or tolerate the demands created by a stressful environment

Humor: the capacity to perceive, appreciate, or express what is funny, amusing, incongruous, or ludicrous

Laughter: the response to a humorous situation

Stress: any physical or psychological stimulus which, when impinging upon an individual, produces strain or disequilibrium

Yoga: to yoke or join together, integrating the mind and body and focuses on balance, posture, deep breathing, stretching, and relaxation.

Chapter II

Review of the Literature

Programs in health science are viewed as a high stress environment for many students (Frank & Cassady, 2005; O'Meara et al., 1994; Reed & Giacobbi, 2004; Tyrrell & Smith, 1996). Reasons for elevated stress levels can range from examinations, fast-paced lectures, long hours in the hospital, confronting life and death issues, or even simply moving from a structured classroom environment to a sometimes unstructured clinical environment. A stress-free education environment is almost impossible and even undesirable; studies show that a small amount of stress may actually help a student excel (Linn & Zeppa, 1984). When a student is consumed by stress and unable to cope, he or she may suffer devastating physiological and psychological consequences. Some students do not even recognize they are under stress and believe they are coping with the pressures of academia. The problem arises when students engage in coping strategies that are ineffective and even harmful to their own health (Huebner, Royer, & Moore, 1981). Therefore, steps need to be taken early in the students' educational

experience to help them identify their current level of stress and effectively manage it.

According to Kelly, Bradlyn, Dubbert, and St. Lawrence (1982) educational institutions need to provide information to students about adjunctive methods of stress management to prepare students for the stressors they will encounter in school and later in professional practice. Behavioral management techniques need to begin when stress is first encountered, often before their professional careers, in order to prevent what Hans Seyle refers to as the disease of adaptation (Seyle, 1946).

Theories on the Causes of Stress

Rosch (1989) described the problem with studying stress as,

“...stress has become the modern metaphor, the buzz word of the 1980’s. Despite its ubiquitous popularity, however, the word stress remains very difficult to define, at least to a scientist’s satisfaction.... Much of the confusion stems from the fact that stress means or represents something different for each one of us (p. 103-105).”

Psychological stress is encountered almost every day and is a normal component of life. Historically, the phrase “psychological stress” was equated with a life-threatening situation, but it is now clear that daily hassles also contribute to increased stress levels (p. 105). Most individuals develop

coping mechanisms to help deal with “ordinary stress” and consequently are able to function. A problem occurs when psychological stress exceeds a person’s coping mechanism or when an individual is unable to adapt to an excessively stressful situation (Folkman, 1984). This type of maladaptation to stress puts a strain on both a person’s professional and personal life resulting in both physical and psychological consequences (Linn & Zeppa, 1984).

Many researchers have examined the relationship between an individual’s stress level and daily hassles. Kanner, Coyne, Schaefer, and Lazarus (1981) define daily hassles as the irritating, frustrating, distressing demands that occur in everyday life. Arguments, traffic jams, disappointments, and even inclement weather are considered daily hassles. Some hassles may be situationally determined and rare. Others may be predictable and constant, which leads to an accumulation of stress that can overwhelm a person’s coping mechanism. Day to day events have proximal significance for health outcomes, meaning that the cumulative daily impact of hassles results in significant increases in stress. Most people are unable to lead a hassle-free life; therefore hassles may impact some people profoundly especially if they are already under high levels of stress.

According to DeLongis, Folkman, and Lazarus (1998) stress itself is not a simple variable. It is a process that involves appraisal and subsequently coping with the situation. The authors believe that how a person handles the

stressful situation will determine their psychological and somatic response to the stressor. In order to support their notion, the authors studied the relationship between daily stress and somatic complaints. Seventy-five married couples were interviewed monthly for six months. Four days after each interview the couples completed the Daily Hassles and Uplift Scale along with the Daily Health Record. The Daily Health Record contains questions on how commonly reported symptoms such as headaches, backaches, nasal congestion, coughing, sore throat, and digestive complaints affect their daily mood. The authors found when subjects had an increase in stress scores on the Daily Hassles and Uplifts Scale they also had a significant increase in somatic symptoms and mood disturbances on the Daily Health Record. Further, subjects experienced poorer moods on stressful days compared to nonstressful days. Interestingly, one third of the individuals reported an increase in positive mood as stress rose, indicating that some people may thrive when confronted with manageable amounts of stress.

Stress and the Healthcare Community

Stress is defined as a physical or psychological stimulus which when impinging upon an individual can produce a disruption in a person's homeostatic processes (Burchfield, 1979). The stressor is the specific stimulus in the transaction that causes the psychological and/or physical

alterations in the individual. Therefore, perceived psychological stress is any event, situation, or stimulus that produces a stress response.

Several studies assessed general sources of stress in students in health science programs. Reed and Giacobbi (2004) sought to determine common stressors and coping strategies of six athletic training students. Students were interviewed utilizing open ended interviews three times over a nine month period. After combining the information from the three interviews the following general dimensions of stress emerged: (1) athletic training duties, (2) responsibilities as a student, (3) time management, and (4) future concerns about their professions and employment. The students admitted to being unaccustomed to the responsibilities inherent to professional programs which include balancing assignments and academic demands along with working long hours at high school and college athletic events. This combination led to increased levels of stress. When performing their athletic training duties the students felt stressed when assuming the role of a supervisor, teaching injury care and prevention to the athletes, and completing the vast amount of clinical documentation that was required. The students found it a challenge to socialize, eat, and even sleep properly.

Some of the students in the study were proactive and developed coping mechanisms in order to effectively manage the increased stress they faced as a result of their educational program (Reed & Giacobbi, 2004). A

few of the students chose humor as a coping strategy, stating they would joke around or tease each other to reduce stress. When discussing a stressful situation with friends they would “laugh to make it better,” thereby allowing them to view the situation in a different manner (p. 198). The authors recommend athletic training students recognize potential sources of stress early in their career and develop coping mechanisms to meet the challenges and stressors inherent to their educational process and future careers. The authors advocated the following stress management techniques: social support from friends, family, and other colleagues, journaling, and relaxation techniques.

Similarly to the athletic training students, physical therapy students find their educational training to be stressful. O’Meara, Kostas, Markland, and Preivity (1994) designed a correlational study to determine sources of perceived stress and the relationship between health and illness in 305 physical therapy students. The most common stressors reported on the Academic Stress Scale (ASS) were studying for examinations, final grades, forgotten assignments, incomplete assignments, and fast-paced learning. The students stated they would study wrong material and at times were unprepared to answer questions when called upon during class. As stress increased so did the number of reported incidences of illness, infections, gastrointestinal complaints, neurological and emotional disorders and other health problems as reported on the Health Index Scale. The authors

concluded that it is important for educators to emphasize stress management to students during their educational process and recommended integrating stress management techniques into the curriculums of physical therapy programs.

Frazer and Echternach (1991) findings supported prior work on common stressors in physical therapy education. Based on the results of the Academic Stress Scale and Holmes and Rahe's Student Stress Scale, 113 first and second year physical therapy students reported were taking notes, studying, learning new skills, fast-paced lectures, examinations, and excessive homework as common stressors. Some of the lifestyle changes students found most stressful included changes in sleeping habits, increased workload at school, change in social and eating habits, and the number of family get-togethers they were unable to attend. The students with the highest stress levels were prone to more health risks according to the results of the Student Stress Scale and had the tendency to be moderately or severely obsessive-compulsive based on the Freedom from Compulsion Scale. The authors suggest physical therapy programs are academically intensive and as a result of the inherent pressures in many of these programs there is an increased probability students will become psychologically stressed. The authors admit that few students withdraw from programs because of the inability to adapt to the stress academia has caused them, but are aware this could potentially happen. More importantly they believe the inability to cope with high levels of

stress during school will have a negative impact on personality, performance, and lead to burnout when students become clinicians. Although most physical therapy curricula cannot be altered if students are unable to manage the fast-paced and intensive learning environment, institutions can consider encouraging adjunctive methods of stress management to help mitigate the deleterious effects of stress.

Moving from a discussion of the research on stressors in didactic training, research on clinical clerkships suggests stress may become more intense at the patient-care level. Mitchell and Kampfe (1990) explored whether moving from a didactic environment to a clinical atmosphere causes an increase in stress in occupational therapy students. Twenty-four occupational therapy students completed the Transition from Being an Academic Student to Being a Full-Time Student and revised Ways of Coping Checklist at the start of their rotations and again nine weeks later. When completing the Ways of Coping Checklist, the authors specified the stressful event as moving from an academic to a clinical environment in order to keep the stressor constant across students. The results indicated that 53% of the students reported the transition to field experience as stressful. Almost 41% found the change disruptive to their lives. Five types of coping strategies were used, but in this sample many students employed problem-focused strategies. This is generally considered an adaptive approach to dealing with a stressful situation. Nevertheless, since over half of the students felt clinical

rotations cause them increased stress, open dialogue regarding the potential stressors that are involved in clinical clerkships should be discussed.

Linn and Zeppa (1984) also compared perceived stress of students before and after a clinical clerkship to determine the relationship of unfavorable and favorable stressors on personality and performance. A group of 169 medical students from the University of Miami School of Medicine filled out the Stress in Medical School Scale (SIMS) before and after a 12 week surgical clerkship. At the end of the clinical clerkship stress levels increased significantly. Over 80% of the class cited the following stressors as unfavorable: too much to do, lack of time for family/friends, lack of time for personal interests, lack of time to study, uninteresting curriculum, peer pressure, knowing what is important to study, taking written examinations, and financial difficulties. The stressors that were considered favorable by 60% of the class were interacting with patients, dealing with patients' families, and presenting patients during rounds. The most salient finding in the study was the association between increased unfavorable perceived stress and poor performance on post rotational examinations, and once again time constraints were at the top of the list. Time constraints are not only experienced in school but are also experienced by many health professionals throughout their careers. By having more control over the stress in their lives, students will not only feel better, but they will perform better.

To recommend stress management techniques, it is essential to uncover sources of perceived stress at the didactic and clinical level, as well as to identify the types of behaviors that predispose students to have greater difficulty with handling stressful situations. Admission requirements for health science programs are competitive, and a competitive environment can persist once the student is enrolled into the program. Students who are already high achievers may have additional stress when trying to continually keep up with the demands of their curriculum, colleagues, and clinical rotations.

Vitaliano, Maiuro, Russ, and Mitchell (1989) developed a study to determine if there is a relationship between Type A personality traits, coping strategies, and psychological stress in medical students. Three hundred twelve freshman students filled out the Reeder Daily Stress Scale, Framingham Type A Behavior Pattern Scale, and Ways of Coping Checklist in September during orientation and then again in May. The results of the Daily Stress Scale showed an increase in stress between the two intervals. If the student had a high level of stress in September, they were more likely to have subsequent high levels of stress in May. Increased stress in May was positively related to Type A personality and anger suppression, but negatively related to problem-focused coping. This is important because the characteristics associated with Type A personalities, such as preoccupation with time, competitive nature, and achievement needs, can be fueled by the similar to the characteristics of health science programs: too little time, peer

competition, too much material to be learned. The data suggests it is important to screen and identify students early in the program, especially students with Type A personality traits, to determine levels of stress so that adjunctive stress management techniques can be offered in a timely fashion. By doing so, holistic methods of stress management can be introduced early in a student's educational process, and hopefully be continued throughout their professional careers.

Not only are Type A personality traits linked to increased stress, but so are perfectionist personality characteristics. Henning, Ey, and Shaw (1998) investigated the role of perfectionism and stress in 477 dentistry, nursing, medicine, and pharmacy students from the Medical University of South Carolina. Over 27% of the students reported experiencing psychological distress based on the Brief Symptom Inventory (BSI) and 21% reported equal or greater distress than the average student seeking mental health counseling. A positive correlation was found between the scores of the BSI and the scores on the Multidimensional Perfectionism Scale (MPS), indicating that students who consider themselves perfectionists were at significantly higher risk for psychological stress. Further, students who were constantly worried about what others thought of them had more psychological symptoms and higher stress levels. This was true for all four academic programs in the study. The authors believe medical programs favor students who set high personal standards. Once accepted into these programs many students self

impose unrealistic expectations, resulting in significant psychological distress. The authors state students try to become perfectionists in order to become successful not only as students but also as clinicians and many of these behaviors persist beyond training. Moreover, perfectionism is linked to higher rates of depression, anxiety, obsessive-compulsive symptoms, and even suicide. The study reinforces the need to identify and address personality traits such as perfectionism since students with these traits may be at risk for maladjustment during their training.

Health science programs have common stressors during the didactic and clinical training, many of which have a negative impact on the student's psychological and physical health (Frazer & Echternach, 1991). Also, many of the behaviors and personality traits inherent to the students in health science programs are correlated to increased levels of stress (Henning et al., 1998). Unfortunately stress does not end with the completion of school; it may persist well into a student's career as a healthcare professional (Balogun et al., 2002; Donhoe, et al., 1993; Kelly et al., 1982).

Common sources of stress cited by healthcare professionals are managed care, malpractice issues, limited time to spend with patients, and increased paperwork (Balogun et al., 2002; Donohoe et al., 1993; Kassierer, 1998; Zuger, 2004). Managed care programs limit many practitioners' clinical decisions by requiring referrals to specialists, limiting the number of visits to

therapists, and requiring pre-authorization for certain diagnostic tests and prescriptions. Malpractice insurance premiums are rising for all practicing clinicians, along with the constant fear of litigations if mistakes are made. Since insurance companies are paying less for visits, clinicians need to see more patients per hours. This can lead to clinician frustration, dissatisfaction, and ultimately burnout.

Balogun, Titiloye, Balogun, Oyeyemi, and Katz (2002) surveyed 169 physical therapists and 138 occupational therapists to determine the prevalence of burnout among these two groups. Using the Maslach Burnout Inventory (MBI) 58% of the sample experienced high emotional exhaustion (EE), 40% reported moderate EE, while 97% reported low personal accomplishment (PA). Overall the therapists experienced greater EE along with higher feelings of depersonalization (DP) and lower levels of PA than the general population. Common stressors mentioned were patient caseloads, time for patient care, time for documentation, and support from supervisors. In summary, the therapists were more emotionally exhausted and had less enthusiasm and satisfaction with their work. This can lead to negative attitudes towards work which can negatively impact patient care.

Donohoe, Nawawi, Wiiker, Schindler and Jette (1993) also examined factors associated with burnout. They surveyed 129 physical therapists in a rehabilitation setting to determine common perceived stressors. The themes

on the Maslach Burnout Scale (MBI) leading to increase stress where lack of communication with others (“I have no one I can trust to tell my work-related problems to”), a feeling of diminished personal achievement (“I set unrealistically high goals for my patients”), and time constraints (“there are more treatments and resultant documentation to complete than there is time for in a day”) (p. 753). The authors suggest recognizing common causes of stress in the workplace so preventive measures may be developed to avoid burnout.

The loss of autonomy, managed healthcare bureaucracy, and increased malpractice trends can lead to increased stress (Kassierer, 1998; Zuger, 2004). Eliminating these stressors entirely would be impossible, therefore strategies to manage stress successfully need to be developed. One solution is to begin to teach stress management strategies at the start of a student’s education in order to decrease and possibly prevent future stress.

It’s not only important to understand the significance stress has on the student and healthcare provider, but the effects of stress on the endocrine and neurohumoral systems. When a cognitive or emotional event requires a significant homeostatic adaptation, a “flight or fight” response occurs. This response stimulates the release of the catecholamine, adrenaline, which is associated with anticipation, unpredictability, and fear, or what might be broadly considered as unpleasant “psychological stress” (Greenwood, 1990).

Public speaking, mental arithmetic, and performing in front of an audience causes stress in many individuals and as a result an increased sympathetic response occurs. Chronic release of these hormones can lead to various physical ailments and complaints in individuals.

High levels of stress can lead to an increase in release of cortisol and decreased secretion of (S-IgA), which has an adverse effect on a person's health. Volkman and Weeks (2006) studied the effect of academic examinations on perceived stress, upper respiratory tract infections symptoms, S-IgA levels, and cortisol levels. In their study, each subject completed the Inventory of College Student's Recent Life Experiences (CSRLE) and submitted saliva samples during the summer, a low stress time, and during final examination week, a high stress time. During high stress conditions the subjects reported 35% more upper respiratory symptoms, which correlated with higher cortisol levels and lower S-IgA levels. The results support the theory that stress, in the form of examinations and daily hassles, has a negative influence on physical and psychological health in students and can cause impairment in his or her daily functioning.

McClelland, Floor, Davidson, and Saron (1980) also theorized that individuals with high stress levels have increased sympathetic activity. The sympathetic nervous system is responsible for the regulation of hormones responsible for a "fight" or "flight" reaction. When the sympathetic nervous

system is stimulated there will be an increase in catecholamine excretion which can in turn cause an immunosuppressive effect through the release of corticosteroids and epinephrine. This reaction will subsequently impair the immune function and lead to a greater incidence of illness and infection. A sample of 27 male college students completed the Life Events Schedule and Illness Inventory along with submitting urine samples to analyze epinephrine (E) and saliva samples to analyze S-IgA levels. All subjects returned the next day and participated in a number of mildly stressful perceptual and learning tasks for two and a half hours and then resubmitted the urine and saliva samples. The results suggested that subjects with higher levels of stress had significantly more illnesses 6 to 10 months prior to the study as reported on the Life Events Schedule. Also, subjects with higher levels of stress showed signs of higher sympathetic nervous system activity when placed in a mildly stressful situation during the experiment. Furthermore, higher epinephrine levels were associated with significantly lower levels of S-IgA. The study supports the hypothesis that students with high levels of stress have a greater arousal in their sympathetic nervous system which can lead to more upper respiratory infections, allergies, and even gastrointestinal complaints. The authors of the study suggest that if a student is already under stress, even mildly stressful tasks will increase their excretion of epinephrine leading to chronic sympathetic overactivity, making individuals more susceptible to illness and disease.

Although elevated hormone levels are initially protective to an individual, sustained release of hormones will eventually overwhelm physiological homeostasis leading to conditions such as peptic ulcer disease, hypertension, and even heart disease (Seyle, 1946). All of these conditions require medical treatment which can become costly. Psychological stress and its physiological consequences have important implications for society, both economically and socially. Individuals with stress related complaints visit their healthcare providers more often, contributing to the escalating costs of medical care (Frosthalm et al., 2005). An estimated 60% to 90% of doctor visits are stress-related, and the economic cost of stress is approximated 10% of the United States' gross national product (Perkins, 1994; Tucker, Sinclair, & Thomas, 2005).

Quite often individuals visit their physician's office with multiple complaints, ranging from chest pain, abdominal pain, insomnia, and headache, only to find out that psychological stress is the cause of their problems (Kroenke & Mangelsdorff, 1989; Sobel, 1995). Clinicians will respond by ordering a battery of diagnostic tests and prescribing multiple medications, only to have their patients return in a week with no relief of their symptoms (Friedman et al., 1995). This leads to more diagnostic tests and therapeutic services adding to the already escalating costs of health care.

Many clinicians advocate taking the time to talk to patients in order to determine the underlying cause of a patient's symptoms before turning to

diagnostic tests and prescription medications as the answer to a patient's complaints. If the origin of the symptoms is stress related, then clinicians should begin to counsel their patients on different stress management techniques. This in turn may offset the costs of increased medical expenditures while improving the quality of a person's life.

Stress management begins by identifying an individual's current coping strategies and then determining what techniques will be most beneficial. Coping strategies can be effective or ineffective, depending on the person and situation (Folkman, 1984). Identifying coping skills and developing stress management plans should begin before a student enters his or her professional career. Therefore, academic institutions need to determine a student's current level of stress, identify how he or she is coping with stress, and begin to advocate adjunctive stress management techniques to help the student manage the stress that will be encountered in both their education and their career.

Coping and Stress

According to Folkman (1984) when individuals are faced with a potentially stressful situation they will inherently appraise the new environment they are in, determine if it is stressful or not, and then consider mechanisms inherent to oneself to cope with the stressor. Coping refers to cognitive and behavioral efforts to master, reduce, or tolerate the demands created by a stressful environment. If a student becomes overpowered by

daily hassles at the start of their career the coping mechanisms of the body will become overwhelmed. For instance, if a student appraises the outcome of an examination to be out of their control, he or she may not study. This leads to destructive behavior, resulting in greater levels of stress.

Wolf and Kissling (1984) examined the effects of inherent coping strategies on psychological stress in medical students. A sample of 104 medical students from Louisiana State University completed a lifestyle questionnaire during orientation and seven months later. The questionnaire included questions pertaining to lifestyle choices, coping mechanisms, eating behaviors, exercise, and perceived moods. Effective coping was measured based on the students own perceived effectiveness in dealing with stress on a regular basis, along with support from family and friends, positive attitude about life, level of perceived control over incidents in their life, and the availability of seeking advice from significant others. At the completion of the study the medical students reported an increase in stress, less control over events in their lives, decrease in positive attitude about themselves, and less time for physical and recreational activities. Students with high stress scores and a low number of effective coping mechanisms, enjoyed medical school less, felt less competent as a medical student, and more frequently questioned their decision to enter medical school. This same group also ate a less balanced diet and felt that medical school decreased their creativity. In contrast, students who reported having a higher number of effective coping

mechanisms had lower stress scores and displayed the opposite effect on the above variables. Interestingly, as stress increased, the most pronounced impact was on a student's psychological health. This study demonstrates that as a student's coping effectiveness increases, they are better able to handle stress and as their coping effectiveness decreases, they become more maladjusted.

Continuing the research on the effects of coping on stress Mosley, Perrin, Neral, Dubbert, Grothues, and Pinto (1994) sought to determine if students with effective coping skills would manage stress more successfully. After a six-week clinical clerkship in psychiatry, 69 medical students filled out several questionnaires that assessed stress levels (Medical Education Hassles Scale-R), coping (Coping Strategies Inventory (CSI)), and somatic distress (Wahler Physical Symptoms Inventory (WPSI)). The CSI is an 85 item self reported inventory designed to assess coping thoughts and behaviors in response to stress and categorizes the coping strategies into eight primary factors; the four Engagement strategies of Problem-Solving, Cognitive-Restructuring, Social Support, and Express Emotions; and the four Disengagement strategies of Problem-Avoidance, Wishful-Thinking, Social Withdrawal, and Self-Criticism. The most salient result was that Engagement strategies were negatively associated with depression and stress, whereas Disengagement strategies were positively associated with symptoms of depression and stress. Further, students that reported Disengagement

coping strategies were engaging in mechanisms that are more harmful than helpful to their psychological health. The study recommends that educational institutions assist students in developing Engagement coping strategies to help mitigate the negative consequences of psychological stress. However the authors did not suggest specific stress management techniques. They felt more research is necessary to further examine current coping strategies of students and what stress management strategies would be most beneficial for him or her.

Furthermore, Huebner, Royer, and Moore (1981) investigated the coping strategies students utilize when in stressful situations. The authors believe that students cope with stress in many different ways, some can be effective, while others can be counterproductive. One traditional method of dealing with stress includes one-on-one counseling after the student is overwhelmed and consumed by the stressors. The authors consider this to be remedial in nature as opposed to preventive and proactive. Interviews with 32 medical students from University of Missouri-Columbia School of Medicine were conducted to determine coping strategies utilized by the students when under stress. One cohort of students had various effective coping strategies that allowed them to manage their perceived stressors more effectively. Some of the effective strategies reported were having a strong science background, which in turn helped them to master the class material or having reliable and helpful family networks. One dean was cited as being

a particularly helpful resource for students when dealing with academic and personal problems. However, a majority of the coping strategies reported by the students were ones the authors did not view as particularly effective. For example, the most frequently reported technique was the passive acceptance that “things simply are the way they are” (p. 554). Many students took a leave of absence, displayed cynicism and sarcasm on the wards, and perhaps most poignantly, said they were “hoping things will improve” (p. 554). The authors believe the ineffective coping strategies reported are damaging to the student’s psychological health because instead of facing the stressful situation they are passively accepting it. If this behavior is carried into clinical rotations, it may eventually have an affect on the patients. The authors state students must identify which elements of school are the most stressful, develop coping mechanisms allowing them to adapt to their stressful environments, and ultimately become proactive in managing situations that lead to increased distress. Once again, the article suggests schools become proactive by identifying students’ current coping skills and offering stress management techniques to students at the start of the program.

Academic objectives and course workloads cannot be altered for students who are unable to handle increased stress caused by the educational demands of health science programs. In fact, the academic environment should mimic the clinical environment as much as possible in order to prepare students for what can be expected on clinical rotations

(Donohoe et al., 1993; Linn & Zeppa, 1984). It is difficult to determine how each student will handle a stressful situation, some may perceive it as a challenge, while others may perceive it as a threat (Rowe, 2006). Therefore, stress recognition and management is paramount in order to function optimally and avoid burn out that occurs in many healthcare professions. Stress management techniques will assist individuals in developing skills to handle stressors effectively and efficiently if they are currently having difficulty coping with the current stressors. In addition, for those who can cope with stress successfully, stress management techniques will only reinforce the individual's inherent effective coping strategies.

The Effects of Stress Management

Effective coping skills clearly help to mitigate some of the consequences of stress but not all students are aware of their own stress levels, have inefficient coping strategies, or simply do not have any techniques to help deal with stress. It is necessary to assist students in developing effective stress management techniques to help moderate the negative consequences of stress. As early as 1982, Kelly, Bradlyn, Dubbert, and Lawrence studied the effects of a three week stress management program on students' stress levels. A cohort of 34 medical students served as the stress management treatment group and 14 medical students served as the control group. The

students in the treatment group attended six 60- to 90-minute stress management sessions which discussed methods to identify stressors, different methods to management stress, and relaxation techniques. The control group did not participate in any scheduled stress management activities. At the completion of the program the students in the treatment group had significant reductions on the Jenkins Speed and Impatience Scale, as well as the Jenkins Hard-Driving Scale suggesting several indices of tension and stress behavior patterns improved following training. Scores on the Stress Knowledge Inventory Scale increased suggesting that the students in the treatment group were able to recognize and cope with stress more efficiently. The Daily Activity Records, which recorded the students' daily activities including the amount of time engaged in practicing relaxation training exercises, indicated that subjects in the treatment group reported more time participating in daily exercises during the program and also after its completion. The control group failed to show improvements on any of the scales when compared to the treatment group. The study supports the theory that stress management techniques are effective in reducing stress levels and provides an opportunity for students to develop adaptive coping strategies.

Similarly, Michie and Sandhu (1994) believe students are faced with stress during their education and that stress will only increase during their professional years. The authors recruited a sample of 57 medical students and offered them a stress management course that consisted of three 2-hour

weekly stress management sessions conducted by a clinical psychologist. A total of 40 self selected students served as the control group while 17 students served as the active group and attended stress management classes. All students in the study completed the shortened Spielberger State-Trait Anxiety Inventory and Satisfaction with Service questionnaire week one, week three, and one year later. The stress management group had higher baseline stress scores compared to the control group but interestingly, after the training and also one year later the stress management groups' stress levels were significantly lower than the control groups. The treatment group stated the stress management classes made them more aware of common stressors in their life, allowed them to identify what situations or circumstances were making them feel stressed, and then develop a structured approach to analyzing and solving some of their stress related problems. Stress management techniques appeared to benefit the attendees in the short and long run. The authors state students in medical programs have greater pressures and demands placed upon them because they are subjected to more sources of stress such as patient care, death, and dying. In conclusion, the authors suggest it would be beneficial to incorporate stress management courses into the educational objectives and curriculums.

Shapiro, Schwartz, and Bonner (1998) also believe stress management programs should be incorporated directly into curricula and enrolled 73 pre-medical and medical students into an eight week elective

Stress Reduction and Relaxation program modeled after the Kabat-Zinn Stress Reduction and Relaxation program. They sought to determine if stress reduction through meditation can prepare students for the stressful environment inherent to both their education and careers. Half of the students were assigned to the active meditation group while the remainder of the students were placed in the control group. The control group did not perform any of the interventions. Both groups of students had similar stress scores on the State-Trait Anxiety Inventory (Form Y) at the start of the study but after participating in the stress reduction program the intervention group had significantly less state and trait anxiety, decreased psychological stress scores on the Hopkins Symptom Checklist 90 (Revised), and increased empathy scores on the Empathy Construct Rating Scale (ECRS). It is important to note that both groups took the post-measure surveys during an examination period, but the intervention group still had significantly lower stress scores. The authors summarize their findings by stating that both medical school and the medical profession have inherent stressors therefore institutions should better prepare students to become clinicians. One recommendation is to complement their educational programs with the integration of mindfulness meditation for stress reduction.

The above research suggests stress management programs benefit students; therefore it is important to identify common stressors in health science education so programs can assist students in developing effective

stress management techniques. When students are already overly taxed by educational and clinical demands, hassles that would usually be ignored now become overwhelming (Kanner et al., 1981). During this stressful time positive experiences can buffer the negative affects of daily hassles. Examinations, deadlines, presentations, and clinical clerkships are an integral role of health science programs and since the students are unable to change the setting they are in, they need to identify stress management techniques to help cope with the stressful environment of school.

Research has suggested yoga and humor may be two effective coping techniques. Both methods can positively alter a person's mental state, in a safe, acceptable, and healthy manner (Malathi & Damodaran, 1999; Newman & Stone, 1996). Yoga and humor can serve as a "breather" from daily hassles and assist in attenuating the effects of chronic stress inherent to many health science programs (Kanner et al., 1981, p. 6).

Yoga and Stress

Yoga is one of the most recognized forms of exercise, stretching, and mediation. The definition of yoga is "to yoke or join together" (Taylor, 2003, p.116). It integrates the mind and body focusing on balance, posture, deep breathing, stretching, and relaxation. Yoga evolved from of the Hindu, Jaina,

and Buddhist religious traditions in India. In the 1970s the United States began to study the physiologic and psychological benefits of yoga. Yoga alters stress responses and a person's attitude towards stress, along with improving self-confidence, increasing one's sense of well-being, and creating a feeling of relaxation and calmness (Malathi & Damodaran, 1999).

One theory on the neuroendocrine response of yogic exercises suggests that after participating in the activity a decrease in cortisol levels occurs. To support this theory, West, Otte, Geher, Johnson, & Mohr (2004) compared cortisol and psychological stress levels after 90 minutes of participating in a college African dance class, *hatha* yoga class, or biology class. Sixty-nine college students submitted saliva samples 5 minutes before and 5 minutes after participating in one of the activities along with filling out stress and affect scales. There was a significant decrease in cortisol levels among the yoga group, while cortisol increased in the dance group, and remained unchanged in the biology group. Stress and negative affect scores on the Perceived Stress Scale (PSS) and Positive Affect and Negative Affect Scale (PANAS) significantly decreased in the yoga group demonstrating that 90 minutes of a relaxation and stretching can lessen a student's perceived stress level. It should be emphasized that although stress and negative affect only slightly increased in the biology group, positive affect had significantly decreased. The study supports the use of yoga as a method to decrease

cortisol levels and psychological stress, which can only benefit an individual's psychological health and well-being acutely and possibly even over time.

Continuing the research on the effects of yoga on both physiologic and psychological parameters, Ray et al. (2001) analyzed the effects of a one hour *hatha* yoga session three days a week for 10 months on 54 engineering students. The 28 students in experimental group practiced the yoga techniques for the full 10 months, while the control group practiced yoga between months 5 and 10. The yoga exercises consisted of various *asanas* (postures) and deep breathing techniques under the guidance of three instructors. Before and after the session, blood pressure, heart rate, and skin temperature were measured. The experimental group demonstrated a significant reduction in heart rate, blood pressure, and skin temperature from month 1 to 10, while the control group only demonstrated a reduction in these parameters after beginning the yoga exercises. Only during yoga instruction did both groups have a significant reduction in anxiety on the IPAT and an improvement in concentration and vigilance based on the two scales developed for this study. The study further supports the theory that by practicing yoga techniques, students will have reductions in physical and psychological stress along with having the ability to improve their concentration and focus when studying.

Similarly, Schell, Allolio, and Schonecke (1993) designed an experimental study to evaluate the influence of a one hour *hatha* yoga

session on stress hormone release, heart rate, and blood pressure as well as psychological stress on 14 trained yogis compared to 12 controls without experience in relaxation exercises. While the yoga group practiced *hatha* yoga for one hour, the control group sat comfortably and read the paper. After the yoga session, heart rate decreased in the yoga group only and blood pressure remained the same between groups. The significant finding was the difference in the results reported on the Stress Coping Questionnaire. The yoga group tended to reduce stress by self supporting strategies such as downplaying their situation, attempting to control the situation, and positive self-instruction. The control group had more destructive and negative reactions to stress and tended to react with aggression, resignation, self accusation, and self-pity. On the Freilburger Personality Inventory the yoga group had higher life satisfaction scores, and lower excitability and aggressiveness scores compared to the controls that tended to be less motivated and more irritable. It is difficult to say whether the acute yoga intervention changed the psychological parameters or whether the yogis cope with and have less stress because they choose this form of mediation as a technique of relaxation and stress management. A direct cause and effect relationship can not be concluded from the study due to the lack of baseline stress data, but it can be postulated that individuals who participate in regular yoga techniques have lower levels of stress.

Malathi, Damodaran, Shah, Patil, and Maratha (2000) continued to research the beneficial effects of yoga but focused more on mental well-being. The authors enrolled 48 male and female staff members from a local hospital and analyzed the effects of a one hour *hatha* yoga session 5 days a week, for a period of 4 months. Based on the scores of the Subjective Well-being Inventory (SWBI), after participating in yoga exercise, subjects reported a significant increase in feelings of success and satisfaction about their achievements in life, decreases in feelings of uselessness, and increases in confidence about coping with a crisis situation in life. The subjects reported an increased ability to deal more efficiently with aspects of daily life that are likely to cause a disruption in mental equilibrium and subsequently increase stress. The study supports the use of regular yoga exercise as a method of decreasing a person's stress as well as increasing well-being.

Also focusing on well-being, Wood (1993) analyzed the effects of 30 minute sessions of relaxation, guided imagery and *pranayama* yoga on 71 healthy adult volunteers. All subjects participated in all three of the exercises and completed visual mood analogue scales following each exercise. After the *pranayama* exercise, which consisted of a series of 12 yoga exercises in a simplified form along with a period of relaxation and observation of breath, there was a significant increase in perception of mental energy, physical energy, alertness, and enthusiasm on visual analogues scale compared to results after relaxation and visualization exercises. The *pranayama* exercise

also produced a marked reduction in the extent to which subjects felt sluggish or sleepy. In summary, 30-minutes of yogic stretching and breathing demonstrated a positive effect on mental and physical energy. Not to mention, the routine was simple and easy to learn, required only 30- minutes to perform the activity, and has the potential to be incorporated in to one's daily routine to help improve mood.

Further researching the beneficial psychological effects of yoga, Malathi and Damodaran (1999) developed a one-hour *hatha* yoga program, twice a week, for three months to determine the effect yoga had on medical students' anxiety levels. The authors randomly divided 50 students into a control group and yoga groups and measured anxiety levels using the Spielberger's Anxiety Scale before the start of the trial, and on the day of a scheduled examination. The baseline mean anxiety score for the yoga group significantly decreased on the day of the exam suggesting yoga practice was helpful in reducing the students' stress levels. The control group's anxiety score remained unchanged. The yoga group completed a subjective assessment using 14 parameters related to psychological and physical health at the end of the study in order to gain evaluative feedback on the yogic exercises they practiced and their overall feelings about the study. The students reported improved concentration, increased attentiveness, and an optimistic outlook on life. Also, 95% of the students indicated they enjoyed practicing yoga techniques. Some of the students opinions on the self-

assessment included “yoga should be a continuous on-going activity”, “yoga should be included as a part of the curriculum, in theory”, and “yoga should be started from the time of admission into professional colleges so students can benefit in the long run” (p. 223). The findings from the study further supports the use of yoga techniques in the management of stress.

A study by Smith, Hancock, Blake-Mortimer, and Eckert (2006) further confirms that yoga can help to reduce stress. The authors divided 119 adults into a *hatha* yoga group (intervention group) and a relaxation group (active control group). Each group met for one-hour per week for a total of 10 weekly sessions. At baseline and again at week 10, the subjects completed the General Health Questionnaire 12 (GHQ-12), State Trait Personality Inventory sub-scale anxiety (STPI), and the SF-36, which measures quality of life. The yoga and relaxation groups had similar scores at baseline on all scales, but after 10 weeks of training the yoga group reported less joint pain and improvement in mental health. Both groups had similar reduction on the STPI and GHQ-12 suggesting that both relaxation and active yoga are effective in reducing stress. The authors concluded that both techniques effectively reduce stress along with improving quality of life. Three weeks after the study the researchers questioned the subjects on whether or not they continued either one of the practices. Sixty four percent of the relaxation group participants and 42% of the yoga participants were still performing the techniques even after the conclusion of the study. The findings demonstrates

that both techniques help to manage stress and are practical strategies to incorporate into a person's daily schedule.

For centuries yoga has been used as a form of meditation and stress management. More recently yoga has been westernized and it is now more of an aerobic activity compared to the original practices (De Michelis, 2004). Original practice consists of postures ("*asanas*"), regulation of breath ("*pranayama*"), concentration ("*dharana*"), and meditation ("*dhyana*"), with the goal of clearing and calming of the mind (Schell et al., 1993, p. 46). Yoga can induce a "euphoric state of mind" and yogis tend to report less negative emotions, vexation, and aggressiveness which is why it needs to be further investigated as a stress management technique in health science students (p. 50). Programs in health science are full of unexpected events, increased academic pressures, and deadlines. As a result a student can feel inadequate and stressed if they are unable to keep up with the fast-paced environment. By participating in yoga, the negative feelings that may result in psychosomatic dysfunction and increased distress can be mitigated. Given the benefits of traditional yoga on physiologic and psychological parameters, and the relatively small risk of participation, it should be further researched to determine if it is a viable technique to recommend to students to help manage acute stress.

In addition to yoga, literature also suggests that humor may be another effective stress management technique. Humor has received increased

attention in the past years by both health care providers and the general public because of its psychological and physiological benefits (Martin, 2001). Since it is safe and inexpensive programs should begin to consider using humor as another adjunctive stress management method.

Humor and Stress

Funk & Wagnalls *New Comprehensive International Dictionary of the English Language* (1980) defines humor as “the capacity to perceive, appreciate, or express what is funny, amusing, incongruous, or ludicrous” (p. 615). Laughter is the “response to a humorous situation” (Martin, 2001, p. 506). Each person has his or her distinct sense of humor and mirth is cultivated through life experiences (Fry, 1994). When a person laughs, various physiological functions are activated starting with the stimulation phase. During the stimulation phase the following physiological changes occur: heart rate increases, blood pressure rises, pulmonary ventilation increases, skin temperature rises, hormone production is stimulated, skeletal muscles are exercised, and the brain experiences electrochemical activity which is typically found with greater degrees of alertness. When laughter has ended the body recovers in a relaxation or refractory period (Fry, 1994).

During the relaxation phase most physiological functions drop back to baseline, except for immune system stimulation, which may stay elevated for hours. Subsequent to the relaxation phase greater alertness and animation

persists and feelings of psychological well-being improve. "The stimulatory and cathartic effects of humor can provide both physiologic and psychological protection and/or relieve the detrimental impacts of negative stress, thus enhancing survival and quality of life" (Fry, 1994, p. 118).

One potential mechanism for health-related effects of humor and laughter is the enhancement of immune system functioning. It is found that low concentrations of S-IgA are associated with high levels of self-reported life stress and illness. The decrease in S-IgA may be due to an increase in epinephrine and neuroepinephrine that occurs during stress which may blunt the release of S-IgA. Individuals who are able to use humor to cope with a stressful situation are less likely to appraise the situation as threatening resulting in less activation of the sympathetic-adrenal arousal system.

To test this theory Martin and Dobbin (1988) examined S-IgA saliva levels and psychological stress in 40 male and female college students. The students filled out the Daily Hassles Scale, Situational Humor Response Questionnaire, and Sense of Humor Questionnaire at the start of the study (time 1). At time 1 and six weeks later (time 2) 5 milliliters of saliva were collected, and the subjects completed the Daily Hassles Scale again. The authors found that subjects with low humor scores showed a strong negative relationship between hassles and S-IgA, whereas those with high humor scores revealed virtually no relationship between these variables. Thus, subjects with less of a sense of humor, as compared to those with a stronger

sense of humor, appeared to experience a greater depression in their immune function following stress resulting in a decrease in the release of S-IgA. Decreases in S-IgA release can subsequently cause an increase in both stress and physical ailments such as upper respiratory tract infections. The results support empirical evidence that humor buffers the effects of stress while enhancing physical and mental health.

Kuiper, Martin, and Olinger (1993) further explored the relationship between humor, coping, stress, and cognitive appraisals on academic examinations in 44 female college students. The authors developed a longitudinal study to investigate the ways in which cognitive appraisal may differ between students with high and low humor trait scores, specifically when they are faced with a potentially stressful event such as an examination. After reviewing the results of a regularly scheduled examination the students were asked to predict what they would get on their next test along with filling out three well-known scales that assess stress and coping. A significant inverse relationship was found between scores on the Perceived Stress Scale (PSS) and scores on the Coping Humor Scale (CHS). Subjects with high scores on the CHS had associated lower stress scores on the PSS, a greater perception of control over the events in one's life, and were better able to cope with stressful situations according to results of the Ways of Coping Scale. In an attempt to cope with academic evaluations, such as examinations, students with high humor scores dealt with these stressful

situations in a more direct fashion, while at the same time emotionally distancing themselves by downplaying the importance of the exam (e.g., “don’t let it get to me; refuse to think too much about it”) to a greater degree which can ultimately decreased stress levels (p. 93). When predicting their score on their next scheduled exam, subjects with high humor scores had higher future expectations when past performance exceeded initial expectations, but had lower future expectations when past performance was worse than expected. These results were in contrast to students with low humor scores who experienced greater stress when their actual performance exceeded initial expectations. Students with low humor traits appeared to be unable to benefit positively from unexpectedly good performance and even found it stressful. In conclusion, the study supports the theory that individuals with high humor trait scores tend to cope with academic stress better, have more realistic expectations of themselves, and use humor in a self-enhancing manner.

Continuing the research on humor and stress, Abel (2002) recruited 258 undergraduate students and had each student fill out five well-known surveys that analyze coping, stress, and daily hassles. Correlational statistics suggested students with high humor scores on the Multidimensional Sense of Humor Scale (MSHS) had lower stress scores on the Perceived Stress Scale (PSS) compared to the subjects with low scores on the MSHS. Interestingly, both groups reported the same number of everyday problems on the

Everyday Problem Scale (EPS). Based on the results of the Ways of Coping Scale the subjects with higher humor scores were more likely to use positive coping strategies, such as problem solving techniques, to resolve problems caused by stressful situations. This same group was more likely to realistically appraise stress in their lives and positively reinterpret negative events to assist in their own development of expanding and creating positive coping techniques. The study demonstrated a significant correlation between decreased stress levels and increased sense of humor implying that humor may buffer individuals against the effects of stress. Furthermore, the results support the role of humor in promoting problem focused coping strategies which appear to be more effective when dealing with stress.

Further analyzing the effects of humor Kuiper and Martin (1998) investigated the role of daily humor on stress levels in a sample of 80 adults from a local community. In this study, "positive affect" refers to how often an individual feels enthusiastic, inspired, attentive and excited, and "negative affect" refers to how often a person feels upset, irritable, or distressed. The subjects completed the Affect Intensity Measure (AIM) at baseline, the Positive and Negative Affect Scale (PANAS) each morning and night, the Daily Stress Inventory (DSI) at night, and the Daily Laughter record. The Daily Laughter record was a daily log on the frequency of laughter over a three day period and the subjects completed it throughout the day. After completing the scales daily for one month, the results of a multiple regression

analysis demonstrated that individuals with greater negative affect on the PANAS scale had higher stress scores on the DSI and lower levels of daily laughter. In contrast individuals who had high levels of daily laughter, negative affect did not increase with stressful life events. Once again, the study supports the stress buffering effects of humor on daily stress and the positive influence it can have on a person's affect and psychological health.

In addition to correlational research Rosenberg (1991) qualitatively examined how humor may serve as an adaptive method for coping with stress in a group of 19 paramedics. Paramedics experience stress on multiple levels because they are confronted with physical catastrophe, emotionally high-risk situations, the need to quickly respond to dangerous situations, and the constant facing of life and death issues. Sixteen of the subjects reported using humor to cope with stress, stating that humor allowed them to emotionally refocus and regain perspective when confronted with an upsetting or disturbing situation. Humor allowed them to forget about the last call, decreased the seriousness of the situation, and provided them with a mental break.

The subjects felt that their colleagues who did not participate in any type of humorous activity while working showed more signs of stress and these same coworkers were more high-strung, anxious, tense, and carried their stress into their personal time off (Rosenberg, 1991). The results of the study support the theory that humor can serve as a stress management

technique to help buffer stressful situations allowing a person to gain distance from, objectivity about, and mastery over a situation.

Moving from correlational to experimental research Newman and Stone (1996) determined the effects of humor production on a student's stress level, skin conductance, skin temperature, and heart rate on 500 male college students. All students completed both the Situational Humor Response Questionnaire (SHRQ) and the Coping Humor Scale (CHS) in order to measure their humorous traits. After matching for levels of humor, 80 subjects were selected and 40 were placed in the high trait humor group and 40 were placed in the low trait humor group. The individuals were then redivided and randomly assigned to two equivalent groups, each group consisting of a combination of 40 students with high and low humor traits. All of the students watched an industrial accident film. One group created a funny narration about the film, while the other group was told to make a serious narration about it. Continuous skin temperature, heart rate, and skin conductance were monitored and averaged. Immediately following the funny film narration, all subjects regardless of whether they were considered to have high or low humor trait scores, had lower negative affect scores, lower tension index scores, along with experiencing greater relaxation following the funny film narrative. This same group also demonstrated lower heart rate and significantly lower skin conductance levels along with significantly higher temperature to the funny film narration. In comparison, those in the serious

film narrative group had an increase in tension scores and appeared to have a delayed stress recovery response in all physiologic parameters. The findings suggest that the production of humor may be an effective stress-reducer for individuals who have either high or low baseline humorous traits along with decreasing sympathetic activity, creating a state of relaxation while lowering negative mood. The study further supports the role of humor as a method of stress reduction.

Continuing the experimental research on humor and stress, Moran (1996) conducted a single group repeated measures study to determine the impact humor had on anxiety in 66 health science students. After viewing a 4-minute humorous cartoon (Eek the Cat) selected by the author of the study there was a significant decrease in anxiety scores on the units of disturbance scale (SUDS). The weak negative correlation between the scores on the Coping Humor Scale and the anxiety scores indicated that students who use humor as a coping strategy were more likely to rate themselves as having less anxiety. Once again humor and laughter decreased stress and anxiety while serving as a coping strategy for students.

Similarly, White and Camarena (1989) investigated the effectiveness of humor as a stress reducer. A sample of 93 college students met for 90-minute sessions for six consecutive weeks. Twenty-six college students served as the laughter group and participated in laughter exercises including watching humorous media suggested by various laughter consultants and the

experiences described by Norman Cousins described in his book "Anatomy of an Illness". Thirty-four students participated in relaxation exercises while the remainder of the subjects served as the control group and watched health-education presentations developed by the Student Health Service pertaining to information on personal health, sexuality, alcohol, exercise, nutrition, and wellness. At the completion of the study, the laughter group did have a small decrease in anxiety scores on the State-Trait Anxiety test (STAI) compared to the control group. Although the study provides only marginal support that humor alleviates anxiety, the subjects in the laughter group reported feeling more excited, informed, energetic, creative, and interested on a mood adjective checklist compared to the control group. Since laughter did not increase stress scores, the information gained from the study offers the opportunity to further research the role of humor on stress.

Although much of the research on the effects of humor on stress is correlational, the experimental studies performed suggest humor does buffer the deleterious effects of stress when in a group atmosphere (Moran, 1996; White & Camarena, 1989). When humor is utilized during highly stressful times, individuals not only feel better, but they perform better (Rosenberg, 1991). Humor acts as a coping mechanism, allowing a person to distance themselves from stressful and emotional events. Even though humor may be beneficial in helping to decrease stress levels more experimental research on the effects humor is needed.

Most of our popular television shows including *Saturday Night Live*, *Friends*, *The Simpsons*, and even *Everybody Loves Raymond* revolve around humor. For many, watching humorous television programs can serve as a break from the constant pressure of daily hassles and common everyday stressors. For many years men and women would gather together to watch popular television shows such as *Friends*. In a group setting humor can create an enjoyable atmosphere, enhance relationships, reduce tension, and promote relaxation among the members (Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003). By having students participate in watching a humorous video as a group, the humorous stimuli may enhance the relationships with one another ultimately decreasing stress and increasing well-being. Humor can also serve as an adjunctive method of managing stress whereby increasing an individual's coping mechanisms. Humor will not take the place of coping strategies inherent to oneself, but given the benefits of humor on psychological and physiological parameters, further research is needed to determine if it is a viable stress management technique to offer to students.

Research suggests that individually yoga and humor have a protective effect against the consequences of stress and serve as stress management techniques. Participating in yoga decreases cortisol levels, blood pressure, heart rate, anxiety, and stress (Malathi & Damodaran, 1999; West et al., 2004). At the same time, it improves well-being, concentration, coping mechanisms and creates a euphoric, calm state of mind (Malathi &

Damodaran, 1999; Malathi et al., 2000; Schell et al., 1993). Laughter also improves concentration and coping mechanisms. Humor reduces sympathetic activity, creating a state of relaxation which can decrease stress levels (Newman & Stone, 1996; Fry, 1994). Further, individuals with high humor traits have a better psychological adjustment to stressful events which can result in better emotional and physical health (Kuiper et al., 1993). Since students who participate in stress management techniques feel more satisfied with themselves, are able to function optimally at school, and are less stressed it would be advantageous for educators to determine if yoga and/or humor can facilitate in decreasing a student's stress level (Michie & Sandhu, 1994).

Furthermore, although healthcare professional are suggesting yoga and humor as methods to reduce stress, few studies have analyzed their effectiveness in health science students to help manage acute stress. Individuals are unique, one specific coping strategy may not work for everyone. Therefore, more clinical research is needed to investigate the effects of yoga and humor as adjunctive stress management techniques for health science students.

Chapter III

Methods

Subjects

All students from the Seton Hall University Doctor of Physical Therapy (DPT) and Masters of Occupational Therapy (OT) program were asked to participate in a study analyzing the effects of yoga and humor on stress. Determination of the sample size was based on a pilot study of six subjects. (Appendix A). A g power of analysis indicated that for an effect size of 1.017, alpha of 0.05, and power of 0.80, 26 subjects were needed.

Exclusion Criteria

Exclusion criteria included the following: (1) pregnancy, (2) baseline systolic blood pressure less than 90 mmHg and/or diastolic blood pressure less than 60 mmHg, (3) a yes response to any question on the Physical Activity Readiness Questionnaire (PAR-Q), (4) active practice in restorative *hatha* yoga exercises, similar to the yoga exercises performed in the video instruction, or (5) any muscle-skeletal diseases or injuries that would limit them from practicing light stretching techniques.

Exercise during pregnancy should be done with physician knowledge and approval. It is not recommended for women in their second trimester of pregnancy to lie on their back for a prolonged period of time, therefore pregnant females were excluded (ACSM, 2006).

Based upon the findings of the pilot study, mean systolic blood pressure decreased by 12 mmHg and mean diastolic blood pressure decreased by 7 mmHg. Hypotension can cause dizziness, syncope, and fatigue. Therefore any subject with a baseline systolic blood pressure of less than 90mmHg and/or diastolic blood pressure less than 60 mm Hg at baseline was excluded from the study (ACSM, 2006).

To optimize safety during physical activity the Physical Activity Readiness Questionnaire (PAR-Q) was administered before the start of the interventions. The PAR-Q is a seven question survey designed to determine if subjects have signs or symptoms of underlying cardiopulmonary disease (ACSM, 2006) [Appendix B]. Subjects who answered yes to any of the seven questions on the PAR-Q were also excluded.

Design and Variables

The study was a quasi-experimental within-subject repeated measure design. The dependent variables included psychological stress scores as measured by the Daily Stress Inventory and heart rate and blood pressure measured simultaneously using a Critikon Dinamap XL 9340 Vital Signs Monitor. The independent variables were time and the intervention which had

three levels: (1) yoga intervention, (2) humor intervention, and (3) reading intervention.

Measurements

Demographic data, stress scores, coping scores, heart rate, and blood pressure were assessed. The demographic survey was designed by the author of the study. The stress and coping surveys included three well known instruments with reliable and valid psychometric properties. The Daily Stress Inventory measured psychological stress and coping was analyzed using the Coping Humor Scale and the Coping Style Scale.

Demographic Data

The demographic survey collected general information from the students and also helped to gain additional sociodemographic information which could account for any confounding effects that were observed on the dependent variables. The demographic survey yielded the following information: age, gender, program affiliation, marital status, whether or not the student has children, if applicable ages of children, tobacco and alcohol use, exercise habits, types of exercise the student participates in, and yoga habits. Questions regarding prescription medication, over the counter medication, herbal supplements, along with whether the student uses a rescue medication during and/or after exercise were included in the survey. Hypertensive agents, psychotropic agents and inhaled short-acting bronchodilators may or

may not affect psychological stress levels, blood pressure, and heart rate so it was important to determine if the students were using any of these medications (ACSM, 2006). Also one additional question asked the subjects if they read to help reduce stress (Appendix C).

Stress Survey

The Daily Stress Inventory (DSI) is a 58 item self-report measure that allows a person to indicate how often a specific stressful event has affected him or her over the past 24 hours (Brantley, Waggoner, Jones, & Rappaport, 1987). After identifying which events occurred, the individual rates the stressfulness of those events on a Likert scale from 1 (“occurred but was not stressful”) to 7 (“caused me to panic”). Sample questions include “hurried to meet deadline”, “interrupted during task”, “forgot something”, and “had a confrontation with an authority figure” (Appendix D).

From the DSI three scores can be derived for each individual: (1) the number of stressful events that occurred (FREQ), (2) the sum of the total impact rating of these events (SUM), and (3) the average impact rating of events (AIR; SUM divided by FREQ). For this project, only the SUM rating was used. The SUM score demonstrates the total impact the stressors had on the individual, compared to the FREQ score which only identifies the stressors the subject found stressful in the past 24 hours. When analyzing the FREQ score each individual question must be analyzed separately compared

to measuring the SUM rating, in which a total stress score can be calculated allowing for an analysis of the impact daily stress has had on the student. Subsequently the SUM score can be compared between subjects. The SUM measurement of the DSI is significantly correlated to the Daily Hassles and Uplift Scale (0.57 for hassle frequency and 0.56 for hassles intensity) demonstrating concurrent validity. The SUM measurement is significantly correlated to the State-Trait Inventory (0.42) supporting the construct validity of the SUM measurement. The reliability across items for the SUM is 0.87 (Brantley et al., 1987). The lowest and highest SUM score possible is 0 to 406, respectively. Higher scores on the scale indicate a greater psychological stress.

The DSI is conceptually different from the Daily Hassles and Uplift Scale because it identifies acute changes in stress over a 24 hour period compared to the Daily Hassles and Uplift Scale which assesses changes in stress over the past month (DeLongis et al., 1988). By assessing stress over the past 24 hours, the DSI is more sensitive to detecting immediate changes in stress levels (Brantley et al., 1987). The Daily Hassles and Uplift Scale has 4-point Likert scale compared to the DSI which has a 7-point Likert scale allowing the subjects to more accurately assess the impact the stressor has had on him or her.

Coping Surveys

The Coping Humor Scale (CHS) is seven item self-reported scale that assesses the degree to which subjects report using humor to cope with stress (Martin, 1996). Test-retest reliability of the instrument ranges from alpha 0.60 to 0.70 and the validity is about 0.50 (Martin, 1996). The items are self-descriptive statements such as “I have often found that my problems have been greatly reduced when I tried to find something funny in them”, and “I often lose my sense of humor when I’m having problems”. The subjects are asked to indicate the degree to which they agree or disagree with the statements using the following scale 1 (strongly agree), 2 (mildly disagree), 3 (mildly agree), and 4 (strongly agree) [Appendix E].

The Coping Style Scale is a 20 item self-reported scale which is part of the Stress Profile published by Western Psychological Services (WPS) (Nowack, 1999). The scale is conceptually based on the work of Richard Lazarus at University of California- Berkeley and assess four coping styles including: (1) Positive Appraisal (M = 17.17, SD = 2.95, alpha 0.72), (2) Negative Appraisal (M = 13.01, SD = 3.56, alpha 0.79), (3) Threat Minimization (M = 15.66, SD = 2.79, alpha 0.70), and (4) Problem-Focused Coping (M = 15.82, SD = 2.67, alpha 0.69). These scales have shown criterion-related validity with a variety of self-reported health outcomes (Nowack, 1999) [Appendix F].

The Coping Style Scale lists common ways of coping with daily stressors, irritants, annoyances, and challenges using the following statements, “I think about happier times, events, and experiences when confronted with problems and frustrations”, “blame, criticize, and put myself down for somehow creating or causing my problem”, and “change the situation or modify my own behavior to minimize or alleviate my frustration and dissatisfaction”. After reading the statements, the subjects rate how often they tend to use the techniques and approaches using a 5 point Likert Scale ranging from 1 (never), 2 (Rarely), 3 (Sometimes), 4 (Often), to 5 (always). The scores can range from 20 to 100 with high scores corresponding to better established coping traits or higher levels of satisfaction with coping behavior (Nowack, 1999). For the purpose of the study only the total coping score was analyzed.

Physiologic Measurements

Vital signs, including blood pressure (BP) and heart rate (HR) were taken before and after each intervention simultaneously using an automatic Critikon Dinamap XL 9340 Vital Signs Monitor. Each subject’s BP and HR were measured with the student in a seated position both feet flat on the floor. The blood pressure was taken from the subjects right arm, and the cuff bladder encircled 80% of the subjects arm to ensure accuracy of the measurement (Chobanian et al., 2003). During the pilot study, the blood pressure and heart rate had elevated immediately after laughter. Similar to exercise, humor can

have stimulatory effect on these parameters (Fry, 1994). Past research suggests that after vigorous exercise a hypotensive effect can be observed as soon as 10 minutes after the end of an exercise bout and can last for 80 minutes (Forghieri et al., 2006). Literature examining the effects of humor on blood pressure and heart rate had a 10 minute delay before recording these parameters (White and Camarena, 1989). Therefore, a 10 minute delay occurred before re-assessing blood pressure and heart rate after all three interventions.

Interventions

All subjects participated once in each of the three interventions over the course of three weeks. Each intervention lasted a maximum of 30 minutes to prevent any influence of differences in duration on the dependent variable.

Intervention 1 (Yoga)

Three sections from the Yoga for Meditation DVD, with Rodney Yee, developed by GAIAM were used. The entire 30 minutes of the DVD is narrated by Rodney Yee and included soft music in the background. The clips from the DVD incorporated elements of *hatha* yoga. Only clips that practiced restorative yoga, which included light stretching, deep breathing, and meditation were taken. The sections of the DVD that included active aerobic types of yoga techniques were excluded.

The program started with the students in a standing position. The students inhaled and exhaled while moving their arms over their head and then bringing their arms back to the center of their chest focusing on balance, breathing, releasing tension, and posture. Next the students bent forward at the waist and inhaled, followed by moving both feet back, stretching out the lumbar spine forming an inverted “V” also called a “downward dog” position.

In the next series of movements the students rested on his or her hands and knees, focusing on their breath and stretching out the spine, followed by bringing their head towards the ground resting it on his or her hands, also called “child’s pose”. The students sat on the heels of their feet, once again inhaling and exhaling, stretching the right arm out, then extending the left arm. He or she sat on the ground bringing their knees into their chest, stretching, and focusing on their breath. “Cobblers pose” (legs crossed in front of him/her) began and the student leaned forward, taking in a deep breath.

In the next series of movements, the students laid on his or her back with their knees flexed, feet flat on the ground, focusing on their breath and relaxing. The students further flexed their knees towards their chest, moving the knees to the left, then to the right, followed by sitting back in a crossed legged position, focusing on their center, observing their breath, and the stillness of the moment. This ended the first section.

The second section started with the students in a supine position, knees bent, and their hands were placed on the abdomen focusing on their breath, inhaling and exhaling, letting their minds follow their movements. The students extended their legs and relaxed. They then flexed their legs letting their knees fall to the opposite sides. The students moved their arms close to their thorax, allowing for greater relaxation. The students' hands returned to the abdomen, once again feeling for natural inhalation and exhalation. The students closed their eyes allowing their eyes to relax. They moved their hands back towards the sides of their body, observing their breath, followed by extending their legs. Their hands returned to the abdomen, once again channeling the breath into the chest cavity, allowing for deepening relaxation. The students placed their hands on their chest, focusing on the tranquility of the exhalation. The students were asked to relax their body starting with their face and moving towards the ribs, abdomen, torso, legs, and feet. The focus was on their breath, as it moved throughout their bodies.

The third section started in a standing position, allowing tension to further drain from the head and arms. Next the students sat down, legs crossed or uncrossed, with both hands on their thighs and palms up. The focus was on sounds, colors, and channeling energy throughout the body. The students were asked to relax while visualizing waters flowing, releasing attachments to the past, focusing on the moment, and the sound of their

breath. The students focused on releasing tension while listening to the narrator. This ended the yoga program.

Intervention 2 (Humor)

The humorous videos consisted of 30 minute clips including 3 different performers from the Best of Saturday Night Live including Will Farrell, Chris Farley, and Jimmy Fallon and clips from the Bill Cosby Live comedy show. In past humor trials, the researcher selected the humorous material for the students to watch (Moran, 1996). However, there is no current literature that supports or refutes whether humorous material should be selected by the subjects or the researcher. Since humor is unique to the individual, the subjects were allowed to select the video they wanted to view (Fry, 1994). The videos were in congruence with the mission of Seton Hall University and did not contain any nudity or profanity.

Intervention 3 (Reading)

During the reading intervention session the subjects read articles about historical events and innovative technology for 30 minutes. Articles were taken from Newsweek magazines and various internet sites. The material was non-provocative, and it did not relate to any health maintenance topics.

Procedures

Following approval of the research protocol by the Seton Hall University's Institutional Review Board, subjects were solicited through flyers and emails (Appendix G and Appendix H). Before signing the informed

consent a series of questions were asked to determine if the student met the inclusion/exclusion criteria (Appendix I). If eligible, the subject signed an informed consent and were assigned their own confidential unique identification number (Appendix J). To maintain confidentiality, all questionnaires and release forms were marked with the subjects' identification number. Subjects were provided with verbal instructions regarding the activities they would perform and the principle investigator answered any questions. The study took place during the first four weeks of class to avoid mid-term or final examination times. The study conduction of the study occurred in the performance laboratories in Alferi Hall, Duffy Hall, and Corrigan Hall, located on the Seton Hall University's campus.

Screening Visit

During a screening visit the students completed the PAR-Q and subjects that answered yes to any of the questions were excluded. All eligible subjects then had their blood pressure taken. If systolic blood pressure was greater than 90 mm Hg and diastolic blood pressure was greater than 60 mm Hg they completed the baseline scales including the demographic survey, the Coping Style Scale, and Coping Humor Scale. By completing the baseline data during the first visit, all subsequent intervention sessions were exactly the same.

The subjects were then assigned to one of three intervention session sequences: A, B, or C. Each subject performed each of the intervention sessions in a difference sequence to control for order effects (see Appendix K).

Each subject was exposed to each level of the independent variable and performance was compared across treatment conditions within each subject to help control for intersubject differences. Therefore any differences observed among the treatment conditions can be attributed to the intervention (Portney & Watkins, 1993). Over a three week period each student participated in all three intervention sessions. All data and intervention sessions were recorded and performed on the same day of the week and at the same time which promoted consistency while controlling for variations in stress, BP, and HR that may occur throughout the day or week. Each intervention lasted a total of 30 minutes.

Sessions 1, 2, and 3

During the three intervention sessions stress was assessed using the Daily Stress Inventory, blood pressure and heart rate. The completion of the weekly summary sheet took place before the start of the intervention sessions (Appendix L). The actual intervention did not start until all subjects completed the surveys and vital signs were recorded.

Next the students participated in one of the interventions immediately. Following the intervention the DSI was completed and 10 minutes later BP and HR were recorded. After stress levels were reassessed, the students filled out a two question survey to gain feedback on the intervention they participated in and if they would consider using the intervention as a method to decrease stress (Appendix M).

Data Analysis

Frequency counts and descriptive statistics were used to analyze the demographic data, the Coping Style Scale, Coping Humor Scale and the Daily Stress Inventory. After psychological stress scores were calculated from the DSI they were entered into a logarithmic regression in order to normalize the data. To determine if yoga and humor decreased stress more than reading a One-Way Within Subjects Repeated Measures ANOVA was computed. For within group comparisons, if the Mauchly's Test of Sphericity for compound symmetry resulted in significant differences, the Greenhouse-Geiser correction to decrease the degrees of freedom was used to determine the F statistic and to control for type 1 error. Where appropriate, post hoc analyses utilized a Pair-Wise correlation with a Bonferroni correction of $p < .003$. (Munro, 2005; Portney and Watkins, 1993). The Statistical Package for the Social Sciences (SPSS) software, version 15.0 for Windows (2007), was utilized for computations.

Chapter IV

Results

Demographic Profile

Twenty-four full-time students from the Seton Hall University's School of Graduate Medical Education DPT and OT programs volunteered for the study. After the initial screening visit, one student withdrew for an unspecified reason. One other student did not complete the yoga intervention nor yoga post-tests due to cervical pain unrelated to the present study. Of the 22 who completed the study, 14 subjects (64%) volunteered from the PT program and 8 subjects (36%) from the OT program. The sample included 20 (86%) female students and 4 (14%) male students, with a mean age of 23 years (range 20 to 37 years). Additionally 20 students (91%) were single and 2 (9%) were married with one student a parent of two children. No students smoked tobacco, 10 students (46%) reported no alcohol use, and 12 students (54%) reported drinking an average of one drink per week. Eight students (36%) used prescription medications including birth control, cetirizine HCl (Zyrtec), and one student took sertraline hydrochloride (Zoloft). Two (9%) students used over the counter medication, none of the students used

medication before or after exercise, and 2 students (9%) stated they used some form of herbal supplements. Seventeen students (77%) exercised at least three days a week, for an average of 50 minutes per session. Types of exercise included predominately running, walking, elliptical machine, and strength training. Only 3 students (14%) participated in an aerobic form of yoga once per week. When asked if the students read to reduce stress, 12 (54%) responded yes. The results indicate that this sample consisted of healthy college students that exercise regularly, do not abuse alcohol or smoke tobacco, and do use medications to control blood pressure. A summary of demographic and personal habits is presented in Table 1.

Table 1

Demographic Characteristics and Personal Habits of the Sample

Variable	N	%
Gender		
Male	3	14
Female	19	86
Program		
Physical Therapy	14	64
Occupational Therapy	8	36
Marital Status		
Single	20	91
Married	2	9
Alcohol intake		
Yes	10	46
No	12	54
Prescription medication use		
Yes	8	36
No	14	64
Exercise		
Yes	17	77
No	5	23
Yoga		
Yes	3	14
No	19	86
Read to Reduce Stress		
Yes	12	54
No	10	46

Weekly Summary Sheets and Intervention Feedback

Weekly summary sheets indicated that following intervention session 1 three students began techniques to help reduce stress. These included

meditating, increasing sleep, and music lessons while two of the students started exercise programs. Following intervention session 2 two more students started a new stress management program and one student started a new exercise program. Following intervention session 3 no students began any new stress management or exercise programs. Throughout the duration of the study none of the students changed their current medications, started any new medications nor made any changes to their weekly routines.

After the yoga intervention session 20 students (91%) indicated they enjoyed the video and would use yoga as a method to reduce stress. The two students who did not enjoy the video and responded that they would not use yoga as a stress management technique stated that they did not take the video seriously and would rather meditate. All 22 students indicated they enjoyed the humorous video intervention session and would use humor as a method to reduce stress. After the reading intervention session 20 students (91%) indicated they enjoyed the reading session, and 21 students (96%) would use reading in the future to help cope with stress. The students who did not enjoy the reading intervention session stated they were too stressed to read and that they had enough to read with class work. In summary the results of the feedback sheets suggest that the students enjoyed all three intervention sessions and would use yoga, humor, and reading to reduce stress.

Coping Scales

The Coping Humor Scale indicated 4 of the students scores correlated with an above average level of humor when coping with stress, 12 of the students scores correlated with an average level of humor when coping with stress, and six of the students scores correlated with a below average level of humor when coping with stress (Figure 1). The Coping Style Scale had a mean average of 62 (SD=7.09) [Figure 2]. The results of the Coping Style Scale suggest the students had well developed coping skills or traits at the start of the study.

Figure 1. Results of the Coping Humor Scale

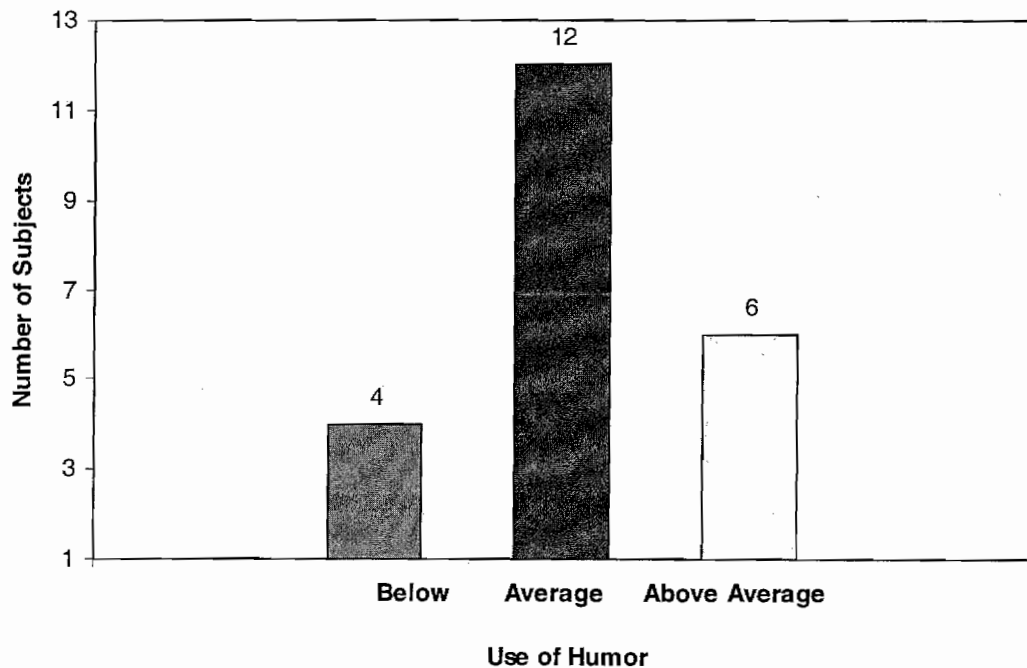
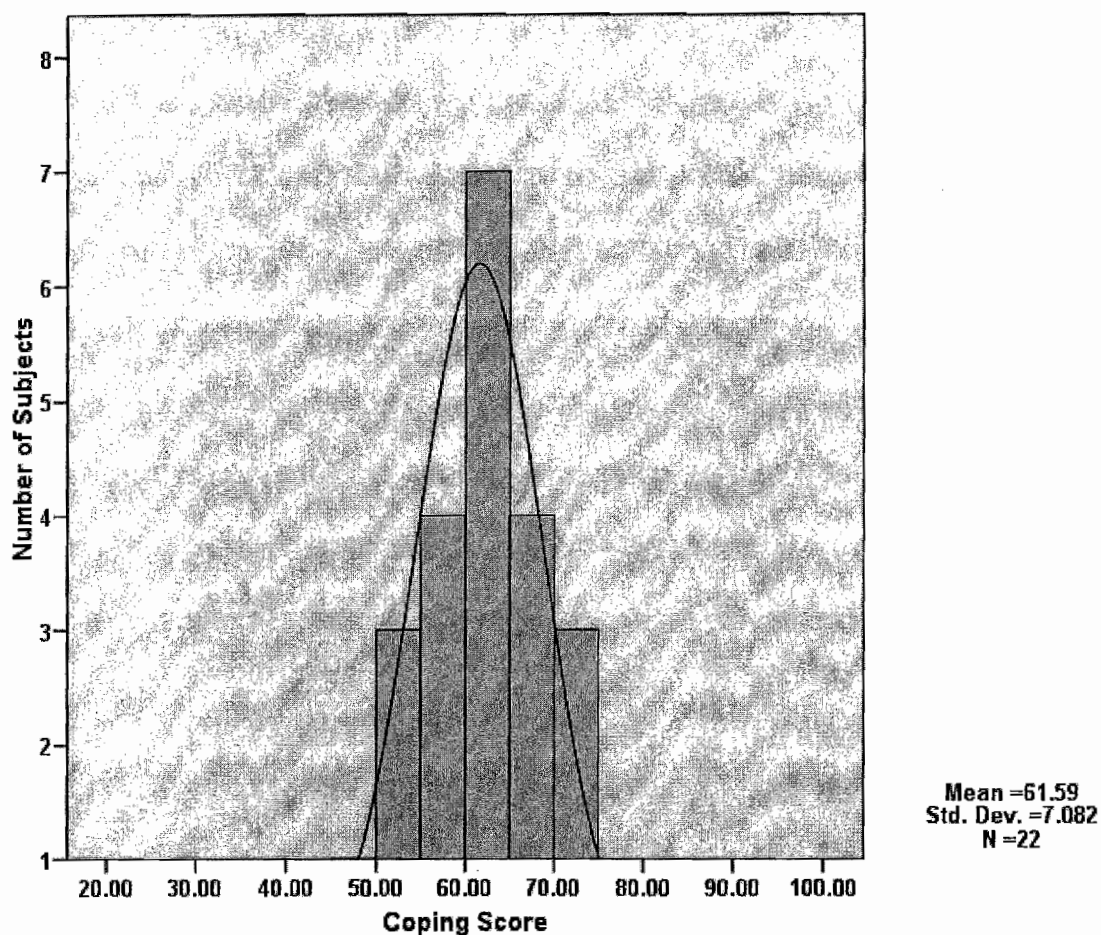


Figure 2. Results of the Coping Style Scale



Effects of Yoga, Humor, and Reading on Stress

The median DSI scores before and after each intervention session are displayed on Table 2. Calculated means and standard deviations for blood pressure and heart rate appear on Table 3. The mean blood pressure and

heart rate results suggest the sample of students had normal to low blood pressure and heart rate levels once again suggesting that they were healthy young adults. (Chobanian, et al. 2003).

It was found that the standard deviation of the DSI scores were greater than their means before and after each of the interventions. Therefore the DSI scores were entered into a logarithmic transformation to normalize the impact of the outliers during statistical analysis. The transformed data was then analyzed to determine the effect of yoga, humor, and reading on DSI scores.

Table 2

Summary of the Pre-and Post-Median DSI scores by Intervention

	Intervention					
	Yoga		Humor		Reading	
	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>	<u>Pre</u>	<u>Post</u>
Median	36.5	23.5	36.5	21.5	34.5	25.5
Minimum	13	0	12	8	12	6
Maximum	246	237	301	240	255	240

Table 3.

Summary of Pre and Post Mean Blood Pressure and Heart Rate by Intervention

	Intervention		
	Yoga Mean (SD)	Humor Mean (SD)	Reading Mean (SD)
Pre Systolic BP	117.00 (10.88)	113.95 (10.03)	110.68 (11.21)
Post Systolic BP	108.14 (11.42)	110.45 (12.08)	105.82 (12.88)
Pre Diastolic BP	68.09 (8.06)	70.05 (7.72)	65.18 (7.76)
Post Diastolic BP	64.77 (8.74)	65.09 (8.83)	62.05 (6.58)
Pre HR	73.73 (11.33)	77.41 (9.64)	70.09 (12.25)
Post HR	70.09 (10.64)	73.41 (8.75)	68.73 (9.94)

Note. BP=Blood pressure in mm/Hg
HR=Hear rate in beats/min

Repeated measures analysis of variances (ANOVA), were conducted on the following dependent variables: DSI scores, systolic blood pressure, diastolic blood pressure, and heart rate. Intervention acted as the

independent variable to determine if the yoga, humor, or reading had an effect on stress. Time refers to the difference between the pre-test and post-test averages of the dependent variables and determined if there was an change from Time 1 to Time 2. Intervention x Time represents the interaction between intervention and time and determined if one intervention significantly reduced the stress variables more than another.

There was no significant main effect of intervention on DSI scores. A significant main effect of time on DSI scores was found ($F(1) = 18.56, p = .000$). However, there was no significant interaction between intervention x time, indicating that no one intervention reduced DSI scores more than another.

There was a significant main effect of the intervention ($F(2) = 5.27, p = .009$) and time ($F(1) = 32.12, p < .05$) on systolic blood pressure. The interaction between intervention x time approached but did not reach significance ($F(1.511) = 3.403, p = .056$), indicating that no one intervention reduced systolic blood pressure more than another.

There was a significant main effect of the intervention ($F(2) = 3.48, p = .04$) and time ($F(1) = 41.90, p = .000$) on diastolic blood pressure. Yet, there was no significant interaction between intervention x time indicating that no one intervention reduced diastolic blood pressure more than another.

A significant main effect of the intervention ($F(2) = 5.56, p = .008$) and time ($F(1) = 12.33, p = .002$) on heart rate was also found. Yet, there was no

significant interaction between intervention x time indicating that no one intervention reduced heart rate more than another (Table 4).

Table 4

ANOVA: *Effects of the Interventions and Time on DSI Scores, Blood Pressure, and Heart Rate*

Variable	Df	MS	F	P
DSI Scores*				
Intervention ^a	2	.021	.290	.750
Time ^a	1	1.082	9.847	.005
Intervention x Time ^b	1.826	.038	1.027	.362
Systolic Blood Pressure				
Intervention ^a	2	252.394	5.267	.009
Time ^a	1	1088.189	32.172	.000
Intervention x Time ^b	1.511	113.116	3.403	.058
Diastolic Blood Pressure				
Intervention ^a	2	182.394	3.476	.040
Time ^a	1	477.280	41.898	.000
Intervention x Time ^a	2	11.030	1.188	.315
Heart Rate				
Intervention ^a	2	399.667	5.459	.008
Time ^a	1	297.000	12.334	.002
Intervention x Time ^a	2	22.455	1.788	.180

Note. ^aSphericity Assumed

^bGreenhouse-Geisser

*Analysis performed after logarithmic transformation

Results of a post hoc pair-wise comparison suggests at the 0.03 level the effects yoga intervention were not significantly different from either the humor or reading intervention respectively on systolic blood pressure ($p = .912$, $p = .191$), diastolic blood pressure ($p = .625$, $p = .227$) and heart rate ($p = .254$, $p = .414$). Additionally the effects of the humor intervention were not significantly different from the reading intervention on systolic blood pressure ($p = .230$), diastolic blood pressure ($p = .092$), or heart rate ($p = .053$). This indicates that all three interventions had a similar effect on the dependent variables

Chapter V

Discussion

The present study sought to determine if yoga and humor acutely decreased stress more than reading in a sample of 22 full-time students enrolled in Doctor of Physical Therapy and Master of Occupational Therapy programs at Seton Hall University School of Graduate Medical Education. All of the students participated in one 30-minute yoga, humor, and reading intervention session over the course of three weeks. Psychological and physiological stress were measured before and after each intervention session using the Daily Stress Inventory, blood pressure, and heart rate. The sample consisted of young, healthy college students with well developed coping skills. Most of the students engaged in regular exercise programs, did not smoke tobacco and used alcohol sparingly. Almost all of the students had normal to low blood pressures and heart rates.

The hypothesis that yoga and humor would significantly reduce stress more than reading was not supported. The results suggest that no one

intervention session significantly reduces stress more than another. The lack of support for the hypothesis may be due to several factors. First, the final sample size recruited was smaller than initially projected. One student withdrew at the beginning of the study and one student did not complete the yoga intervention session, therefore their data could not be included in the final statistical analysis. Also, the recruitment period was limited, since the conduction of the study occurred during the first four weeks of the semester in attempt to avoid the confounding effects of midterms. In order to avoid the influence of midterms, the author refrained from recruiting more subjects, which would may have enabled her to reach the proposed n of 26. Since 22 of the subjects completed the trial by the fourth week of class, if four more students were recruited sporadically throughout the semester, their stress levels may have vastly differed from the original sample of students whereby skewing the data. A larger sample size would have increased the level of power, thus leading to a significant interaction between interventions.

A second explanation for the findings may be related to the recruitment of a homogenous sample. Most of the students' blood pressures, heart rates and DSI scores were similar before and after each intervention session. Not only did most of the students have similar physiologic pre-intervention measurements, but they were young, healthy, and exercised regularly. The mean score 61 out of 100 on the Coping Style Scale suggests the students coping skills are well-developed at baseline. Also, the median scores of the

pre Daily Stress Inventory ranged from 35 to 39 out of a potential score of 406, further suggesting that the students stress levels were not high at baseline and it appeared as though the students were handling the stress of school effectively. Since the study was voluntary, students who were already stressed, may have been too overwhelmed to volunteer to a three week study, therefore they may have not volunteered. If the group was less homogenous with a larger percentage of students presenting with borderline hypertension, less developed coping skills, or even higher stress scores, a significant interaction between the interventions and time may have occurred.

Another explanation for the lack of a significant interaction between the interventions is that while the author viewed the reading intervention session as a control, it ultimately became an intervention. The reading intervention session to the surprise of the authors was just as effective as the yoga and humor intervention session in reducing stress. The neutral reading material may have relaxed the students, thereby significantly decreasing both systolic and diastolic blood pressure. The demographic survey indicated that 12 of the 22 students read to reduce stress however this did not significantly influence the effect of any intervention on the dependent variables ($p = 0.66$). Selecting an appropriate intervention to serve as a control is challenging in a within subjects study design therefore future clinical trials are needed to identify different control treatments.

Also, of importance the interventions did not significantly effect the DSI scores. Even after controlling for outliers, no significant effect was found. One possible explanation for this may be that sensitization occurred since the subjects were exposed to the same instrument repeatedly due to the repeated measures study design (Munro, 2005). The students may have become complacent when completing the post DSI, filling out their responses carelessly. When reviewing the literature regarding the psychometric properties of the DSI, the authors of the scale suggest the instrument is reliable and valid in detecting immediate changes in stress levels. This means the DSI would be the ideal instrument for a repeated-test study design. However, the scale still may not have been sensitive enough to detect the current stressors and acute changes in stress in this sample of students.

While the current hypothesis was not supported, the results still suggest the three intervention sessions had an effect on the physiologic dependent variables. Participation in a single session of yoga significantly reduced students' blood pressure and heart rate. DSI scores also decreased. After the yoga intervention session the changes in the physiologic variables could be attributed to the decrease in sympathetic arousal that occurs when subjects participate in this type of activity (Schell et al., 1993). The results are congruent with the findings by Ray et al. (2001) who reported a significant decrease in blood pressure and heart rate after engineering students participated in a yoga program. Schell, Allolio, and Schonecke (1993) also

demonstrated a slight decrease in blood pressure and a marked decrease in heart rate after a 90 minute yoga session. In the present study the light stretching and quiet mediation during yoga intervention session caused a decrease in physiologic parameters, which in turn may have contributed to a decrease in the psychological perception of stress. Yoga had a calming effect, allowing students to feel less hassled by daily stressors.

Almost all of the students stated that they enjoyed participating in the yoga intervention session and would consider using yoga as a method to reduce stress. The subjective feedback is consistent with previous studies where students considered yoga exercises enjoyable, relaxing, and would like to see yoga incorporated into the curriculum (Malathi & Damodaran, 1999). The yoga intervention session may have served as a coping mechanism for the students while acutely decreasing their stress levels. This is important since high levels of stress have been associated with hypertension, peptic ulcer disease, and even coronary artery disease (Seyle, 1956)

Similar to the decrease in stress seen after the yoga intervention session, the humor intervention session clinically decreased psychological stress and significantly decreased physiologic stress. The 30-minute humor intervention session may have created a state of relaxation for the students by providing them with an outlet to release tension (Fry, 1994). The results are consistent with some of the findings by White and Camarena (1989) who

found students who watched a humorous cartoon had a significant decrease in anxiety scores on the (STAI), but no difference in heart rate or blood pressure. Following her initial work on humor and stress, White and Winzelberg (1992) again found that after a group of students watched a humorous video for 20 minutes a significant decrease on the State-Trait Anxiety Inventory (STAI) occurred along with an observed reduction in blood pressure. The authors concluded that laughter can positively impact a person's response to stress and they believe that laughter "appears to be a universally observed behavior in humans", therefore giving it an advantage as a stress management technique for students (p. 343).

The ten minute delay before re-measuring blood pressure and heart rate appeared to be a sufficient amount of time to observe a reduction in these variables. Since humor initially stimulates an individual's sympathetic system determining the optimal time to measure post intervention blood pressure and heart rate is a challenge for researchers. However, the present study demonstrated a reduction of acute physiologic stress within ten minutes of completing the humor intervention session.

At the end of the humor intervention session all of the students stated they enjoyed the humorous video and would use humor as a method to help reduce stress. Watching the video may have allowed the students to take a break from their studies while decreasing the current strain they felt from their

workloads which ultimately reduced their stress. Also contributing to the decrease in stress may have been the influence of watching the video with fellow classmates. The small group setting could have increased the impact of the funny video by causing a chain reaction to laughter. It is believed that when one person laughs others will laugh as well, even if one person in the group does not perceive the humorous stimuli as funny (Fry, 1994).

Interestingly, after the reading intervention session the students also had a decrease in the stress variables. The results were not unexpected since almost half of the sample stated on their demographic surveys that they read to reduce stress and almost all the students stated on their weekly summary sheets they would consider reading to help reduce stress. While reading some of the students may have found the neutral material to be relaxing, decreasing sympathetic nervous system arousal, thus resulting in a reduction of stress. Similar to the present findings, Yin (1992) also found that after a group of 24 healthy male and female adults participated in a stressful task then read for 60 minutes, they experienced a significant reduction in anxiety, heart rate, and blood pressure.

Findings from the present study demonstrate that individually a 30-minute yoga, humor, and reading session is equally effective in reducing acute stress. The means that there are many ways one can significantly reduce the effect of an acutely stressful situation. Furthermore since time

constraints are one of the most frequently cited reasons for high stress levels by health science students, a 30-minute session is a reasonable amount of time to incorporate into a busy day. A 30-minute intervention session can be easily integrated into the students' schedule, while not diverting a large amount of time away from their studies. Finally, the combination of a significant reduction in stress in a short amount of time is of importance because yoga, humor, and reading can be suggested to students for immediate stress reduction before examinations, practicals, presentations, and even during a highly stressful day.

Limitations and Future Research

The author recognizes there are limitations to the present study. First, a sample of convenience was recruited that included occupational and physical therapy students for the School of Graduate Medical Education at Seton Hall University, thus limiting the generalizability of the results. Also an unequal number of subjects from these two programs participated in the study however their stress levels appeared to be similar. Future studies may consider comparing stress levels between programs, but in the present study the larger percentage of students from the physical therapy program precluded this type of analysis.

Another limitation is that the students who participated in the study may have been unsure of their own ability to effectively handle stress and were

interested in finding stress management techniques. Another consideration is that those students who recognized they were highly stressed may have not signed up for the study for fear that the added pressures of participating in the study would further increase their workload and potentially increase their already high stress levels.

Additionally, the psychological questionnaire is a self-reported survey which can be open to biased responses. The students may have wanted to assist the researcher in finding a significant decrease in stress after the interventions, therefore answering the post-test questions accordingly. In attempt to control for this, the primary researcher left the room while the surveys were being completed..

As the study progressed over the four weeks stress may have increased or decreased. Conducting the study before midterms and controlling for order effects helps to counterbalance stress levels, but it is difficult to completely control these inevitable fluctuations. Since the time frame of the study was limited to the first four weeks of class, the author could not generalize the effects of the intervention sessions to potentially more stressful times in the academic year. Along with limiting the time frame of the study, the subjects only participated in each intervention session once, thus only the acute changes in stress were analyzed. Consequently, the author can not conclude that the effects of the interventions are enduring. It is beneficial to examine

each intervention repeatedly over the course of four to six weeks in order to determine if yoga, humor, and reading decrease stress in both the short and long run.

The reading material selected by the author was considered neutral and easy to read. Some students may have found the articles boring while others may have enjoyed them. Those who found the material interesting could have felt more relaxed and less stressed, while the opposite could be true for those who found the reading uninteresting. Regardless of whether students used reading to reduce stress prior to the study, it did not have an effect on the outcomes of the three intervention sessions. While the reading intervention was viewed as a control, the results suggest that it acted as an intervention. Thus the study lacked a true control group.

In the future, physiological measurements should be taken as the student engage in the intervention and after the completion of the interventions to determine short and long-term effects of yoga, humor and reading on stress. Adding more physiological measurements including skin temperature and hormone levels would allow researchers to objectively analyze the effects of these interventions on stress. The study should be performed on a larger sample from multiple disciplines so the results can be generalized to a larger population of students. Also, the addition of new

psychological stress surveys may aide help analyze subjective stress in the students.

Chapter VI

Conclusions

Programs in health science place students in demanding, fast-paced, and stressful academic environments. It is well known that students in health science programs perceive their academic environment to be stressful (Frazer et al., 1991; O'Meara et al., 1994). While professors teach students pathology, diagnosis, and treatment they do not generally teach them how to cope with the stress frequently encountered in many health science professions. The stress they face during their education may continue throughout their careers, ultimately leading to burnout (Balogun et al., 2002). Given the high prevalence of burnout among physical therapists and occupational therapists as a whole, it is important for programs to begin to focus their attention on the students stress so they can learn how to cope and manage stress before they enter their professional fields (Rowe, 2006). In addition to preparing students for their work as clinicians, educators should help students identify stressors. Early self identification of stress is important in order to develop coping methods essential for managing the high stress

position of a professional practitioner. Hopefully by dealing with stress effectively as a student ,and then as a practicing clinician, some of the adverse physiological and psychological effects of stress will be mitigated.

Arguably, the best time to screen students' for stress is at the start of their health science programs, during program orientation sessions. It is important to screen students for stress because to cope with stress effectively one must first recognize he or she is stressed. (Michie et al., 1994). When students become stressed they may withdraw from their studies and become hesitant to pursue a career in a specialty they were previously passionate about. Once overwhelmed by stress students can become less empathic, cynical, or may even isolate themselves from friends, family and peers. Students who have been sensitized to their own stress levels and who have been instructed in coping strategies will be better able to handle the demands of not only their educational program but also of their professional lives.

Since 1948 when Hans Selye described the negative effects of stress, studies have consistently supported his theory that stress can adversely affect an individual both psychologically and physically. Furthermore, research continues to find that students in health science programs are more stressed than their working counterparts. Yet, the integration of stress management techniques into curricula has remained stagnant. Since it is well known that the stressors inherent to health science education can not be

entirely eliminated, techniques to deal effectively with the demanding workloads need to be identified. The present study analyzed the acute effects of yoga, humor, and reading on stress and the data indicate that all three interventions reduced self reports of stress and resulted in a significant reduction in blood pressure and heart rate. While the authors can not comment on the long term affects of these three techniques, they can suggest that yoga, humor, and reading would be effective methods for acute stress reduction.

Based upon the above results, it is reasonable to believe that these adjunctive techniques would similarly, and perhaps more importantly, have the same effect on individuals suffering from hypertension. An estimated 50 million or more Americans are hypertensive and warrant treatment due to the average of 7.1 million deaths per year associated with the diagnosis (Hajjar & Kotchen, 2003). Not only do a significant number of individuals suffer from hypertension, but many require two to three medications to help control their blood pressure. A reduction in systolic blood pressure by even 5 mm/Hg leads to a 14% reduction in stroke and a 9% reduction in coronary heart disease (Whelton, He, Appel, Cutler, Havas, Kotchen, et al., 2002). By decreasing the stress levels of those suffering from hypertension, both lives and money could be saved, especially using techniques such as yoga, humor, and reading which are fairly simple to perform and also inexpensive to execute.

The mechanisms of stress reduction implemented upon this group of students was the result of a decrease in sympathetic nervous system arousal which subsequently caused a decrease in stress levels. If these results occurred amongst healthy students who showed no real need for a decrease in blood pressure and/or heart rate, assumedly the same results should be expected to occur within patients who require a physical need for the reduction. If a 30-minute yoga, humor, or reading session can reduce physiologic variables in a healthy sample, there exists the high potential for similar results to occur within a sample of hypertensive adults. A decrease in these physiologic variables would surely lessen the number of medications individuals may need to control blood pressure and in turn would lessen the overall economic burden regarding basic healthcare costs. As an alternative, the present study provides support for a holistic approach to reducing stress that would cost little to implement but would have far-reaching benefits to students, clinicians, society, and even the economy. Future studies should continue to investigate the effects of engaging in various durations of yoga, humor, and reading on stress in individuals with both higher and lower levels of stress than those in this study and differing coping mechanisms.

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APPENDIX A
PILOT STUDY

Yoga, Humor, and Stress: Implications for Future Research

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Abstract

Introduction: Psychological stress has been recognized as an important factor in the development of many health disorders. Stress can have negative effects on both psychological and physical well-being. Health science is recognized as a demanding and difficult endeavor for many students, which can lead to high levels of psychological stress. Unfortunately, stress does not diminish with the completion of the educational program, but continues throughout most of one's professional career. Past and current literature suggests that both yoga and humor are inexpensive and simple methods to manage stress. Research needs to be performed to evaluate the use of these methods to alleviate stress in students and become an integral part of health science programs.

Methods: Six physical therapy students from the School of Graduate Medical Education Doctor of Physical Therapy program were recruited. Each subject filled out the demographic survey and completed the Daily Stress Inventory (DSI), the Coping Style Scale and the Coping Humor Scale (CHS) for baseline data. Each cohort completed a pre-intervention assessment of stress level using vital signs, and the DSI. Subjects were randomly divided into three equal cohorts. Cohort A viewed a humorous video, cohort B participated in a yoga session, and cohort C studied.

Prior and following each exposure repeated measures of stress levels were reassessed using the means noted above. Each of the three cohorts was exposed once to each intervention on a weekly interval to assess their relative effects on stress level.

Results: Descriptive statistics revealed a decrease in stress after participating in the yoga activity and watching the humorous video. The control group's stress level remained almost the same.

Discussion: Yoga and humor appear to be effective methods in alleviating stress and they need to be further analyzed using a larger sample. The conclusion thus far is that yoga and humor may serve as methods of stress management.

Introduction

Psychological stress can have a negative effect on personality, performance, daily functioning, and mental well-being (Linn & Zeppa, 1984; Shapiro, Schwartz, & Bonner, 1998). This can put a strain on personal and professional relationships, leading to decreased self-satisfaction and poor psychological adjustment (Linn, et. al, 1984; Kanner, Coyne, Schaefer, & Lazarus, 1981; Wolf & Kissling, 1984). Over the past thirty years an increasing amount of research has been done focusing on stress and the adverse effects it has on psychological and physical health.

The cost of psychological stress has great implications for society, both economically and socially. Individuals with stress related complaints have significantly high healthcare visits contributing to the escalating costs of medical care (Frosthalm, et al, 2005). An estimated 60% to 90% of doctor visits are stress-related, and the economic cost of stress is approximated at 10% of the United States' gross national product (Perkins, 1994; Tucker, Sinclair, & Thomas, 2005).

The effects of stress are of particular interest in students enrolled in health science programs. Programs in health science are recognized as a demanding and difficult environment for many students, an environment that can lead to increased psychological stress (Malathi & Damodaran, 1999; Mosley, Perrin, Neral, Dubbert, Groughues, & Pinto, 1994). Particularly high

levels of psychiatric stress were found in students enrolled in a United States graduate medical school, with 15-20% of the students meeting criteria for a diagnosis of psychiatric illness (Firth, 1986). Unfortunately, psychological stress does not stop upon completion of a student's education. Among physicians, there are reports of stress resulting from malpractice concerns, the need to upgrade competency, time pressures, and even high rates of suicide for females (Kelly, Bradlyn, Dubbert, & St Lawrence, 1982).

Literature suggests that humor and yoga are inexpensive and simple methods to help mitigate the deleterious effects of stress on health science students, medical students, and the general population. Given the negative affects stress has on a student's psychological and physical health, humor and yoga need to be further explored to determine if they are viable methods to manage stress in students in health science programs.

Review of the Literature

Rosch (1989) clearly describes the problem with studying stress as...

Stress has become the modern metaphor, the buzz word of the 1980's. Despite its ubiquitous popularity, however, the word stress remains very difficult to define, at least to a scientist's satisfaction.... Much of the confusion stems from the fact that stress means or represents something different for each on of us (p. 103-105).

Psychological stress is defined as a physical or psychological stimulus which, when impinging upon an individual, produces strain or disequilibrium (Stedman's, 1997, p. 1497). Psychological stress is encountered almost every day and is a normal component of life. Historically, the phrase "psychological stress" was equated with a life threatening situation, but it is becoming more apparent that daily hassles can contribute to increased levels of stress (p. 105). Most individuals develop coping mechanisms to help deal with ordinary stress and consequently are able to function. A problem occurs when psychological stress exceeds a person's coping mechanism or when an individual is unable to adapt to an excessively stressful situation (Greenwood, 1990). This type of maladaptation to stress puts a strain on both a person's professional and personal life and results in both physical and psychological consequences (Lynn & Zeppa, 1984).

Extensive research has examined the relationship between an individual's stress level and daily hassles. Kanner, Coyne, Schaefer, and Lazarus (1981) define daily hassles as the irritating, frustrating, distressing demands that occur in everyday life. Arguments, traffic jams, disappointments, and even inclement weather can be considered to be daily hassles. Some hassles may be situationally determined and rare. Others may be predictable and constant, which can lead to an accumulation of stress that can overwhelm a person's coping mechanism (Selye, 1946).

Stress and Health Science Students

Health science programs are demanding and fast-paced in that a large amount of material must be mastered in a short period of time. It may be the first time that the responsibility for learning is placed wholly upon the student. He or she may not be accustomed to the pressures that are inherent in most advanced degree programs. Some students have a difficult time functioning optimally under these pressures. As a result they may fall behind in class, lose sleep, become easily agitated, give up activities they find enjoyable, and alienate family and friends due to the lack of free time (Wolf & Kissling, 1984). Competition to get into school, along with competition during training can be high, and the fear of failure can cause students significant distress. Once in the program clinical rotations are incorporated into many of the programs. This may be the first experience in which a student has had to examine and treat a patient. When working with patients, mistakes can have detrimental consequences. The fear of making a mistake, along with all of the other demands required from many programs can cause increased levels of psychological stress.

Sources of Perceived Stress

O'Meara, Kostas, Markland, and Preivity (1994) believe that physical therapy students have similar academic and clinical demands compared to other medical health professions. They designed a study to determine

sources of perceived stress and the relationship between health and illness in physical therapy students. Three hundred and five students filled out the Academic Stress Scale developed by Kohn and Frazer and the Health Index. The results of the Academic Stress Scale revealed the most common stressor reported by the students were studying for examinations, final grades, forgotten assignments, incomplete assignment, and fast paced learning. The students felt that they would study wrong material and at times they were unprepared to answer questions during class when called upon. Based on the results of the health index scores students ranked neurological and emotional problems as the highest health related complaint.

Using a multiple regression analysis, physical therapy students were found to be significantly more stressed when compared to other general college age students. The authors further state that it is important to emphasize stress management techniques to students during their educational process in order to develop strategies to manage it successfully in order to avoid burnout when becoming an actively practicing physical therapist. They suggest including instruction about stress management techniques and the correlation between burnout and elevated stress levels into the curriculums of physical therapy programs.

Frazer and Echternach (1991) believe that stress can play an important role in physical therapy education and also sought to determine

which parts of the educational process students found most stressful. The authors believe that physical therapy programs are academically intensive and as a result of the inherent pressure in many of these programs there is an increased probability students will become psychologically stressed. The authors understand that few students actually leave programs because the inability to adapt to the stress academia has caused them, but they believe ultimately that the inability to cope with high levels of stress during school will have a negative impact on personality, performance, and lead to burnout when students become clinicians.

The authors developed a study in order to identify stressors experienced by physical therapy students. Sixty five first-year and forty eight second-year physical therapy students completed Kohn's and Frazier's Academic Stress Scale, Holmes and Rahe's Student Stress Scale, and Cammer and Cammer's Freedom from Compulsion Scale. The most common reported stressors based on the results from the Academic Stress Scale were taking notes, studying, learning new skills, fast-paced lectures, examinations, and excessive homework. The events in their lives that they found most stressful based on the Student Stress Scale were change in sleeping habits, increased workload at school, change in social and eating habits, and change in the number of family get-togethers. The majority of students that were stressed, were subject to high health risks from stress and

had the tendency to be moderately or severely obsessive-compulsive based on the Freedom from Compulsion Scale (p. 76).

The study highlights the important point that students in physical therapy programs find the educational process to be stressful. Faculty need to be aware of this and attempt to integrate coping strategies to reduce stress to a level that is more manageable to students. Curriculums cannot be altered because students can not manage the fast-paced learning inherent to physical therapy education, but programs can begin to integrate alternative methods of stress management to help mitigate the deleterious effects of stress.

Effects of Stress Management Programs

Kelly, Bradlyn, Dubbert, and Lawrence (1982) studied the effects stress management programs had on students. The study employed a sample of 34 medical students in the stress management treatment group and 14 students that served as controls. All students involved in the study completed the Stress Knowledge Inventory, Jenkins Activity Schedule, Spielberger State-Trait Anxiety Inventory, and Stress Situations Rating at the beginning and end of a three-week time frame. The participants in the treatment group attended six 60- to 90-minute stress management sessions held over a three week period. Each session consisted of three general parts: (1) listening to didactic information on specific stress reduction techniques, (2)

discussing situations where the techniques could be used, and (3) assignments so that they could practice the stress reduction skills at home. The control group did not participate in any scheduled stress management activities over the three week period. All participants completed Daily Activity Records which recorded the students' daily activities including the amount of time engaged in relaxation leisure activities, and practicing relaxation training exercises. At the end of the treatment period both groups continued to fill out the logs for three more days for further comparison. The experimental design in this study permitted a comparison of pretraining and posttraining scores between the stress management group and control group, a comparison of the two groups, and a comparison of changes in daily activities for subjects in both groups.

The results of the study reveal significant overall differences between the pre-training and post-training measures. The students in the active stress management group had significant reductions on the Jenkins speed and impatience scale, as well as the Jenkins hard-driving scale. Scores on the Stress Knowledge Inventory Scale increased indicating that the students were able to handle stress better. Thus, individuals who participated in the stress management programs were able to handle and cope with stress more efficiently. The Daily Activity Records indicated that subjects in the stress management group reported more time participating in daily relaxation and exercise activities during the program and also after its completion.

Individuals in the active stress management group also demonstrated a decrease in Type A personality, and indicated that they were able to handle personal stressors more effectively. The control group failed to show improvement on any of the scales when compared to the stress management group. The study helps to support the theory that stress management techniques are effective in reducing stress levels and provide an opportunity for students to develop adaptive stress reduction strategies.

The above authors agree that graduate medical education can cause a significant increase in stress levels for many students, and it is evident that stress can negatively affect mood, well-being, and performance. The above research exemplifies how imperative it is to identify common stressors and help to devise coping mechanism for students. Examinations, deadline, presentations, and clinical clerkships are an integral role of graduate medical educations and since the students are unable to change the setting that they are in, they need to find methods to help cope with the stressful environment of school.

Over the past twenty years research has been investigating the role of humor and yoga and their relationship to psychological stress. Both are methods that can help positively alter a person's mental state, in a safe, acceptable, and healthy manner (Malathi & Damodaran, 1999; Newman & Stone, 1996). Since the above literature demonstrates the need to explore stress coping techniques that can be recommended to graduate medical

students, researchers should further investigate humor and yoga as potential adjunctive therapies to manage stress.

Yoga and Stress

Yoga is one of the most recognized forms of exercise, stretching, and mediation. The definition of yoga is “to yoke or join together” (Taylor, 2003, p.116). It integrates the mind and body and focuses on balance, posture, deep breathing, stretching, and relaxation. Yoga evolved from of the Hindu, Jaina, and Buddhist religious traditions in India, and in the 1970s the United States began to focus on the system of integrated health and the physiologic benefits of mediation. It has been found to modify stress responses and a person’s attitude towards stress, while improving self-confidence and efficiency, increasing one’s sense of well-being, and creating a feeling of relaxation and calmness (Malathi & Damodar, 1999).

Malathi and Damodaran (1999) analyzed the effects of a one-hour yoga program, twice a week, for three months on medical students’ anxiety levels. The authors believe that under optimal stress students may perform their best, but extreme levels of stress can result in a decrease in performance. They postulated that yoga could calm the mind and optimize performance, even when a student is under high levels of stress, such as when a student takes an examination. To test this belief, the authors randomly divided 50 students into a control group and a yoga group. The authors measured anxiety levels in both groups using the Spielberger’s

Anxiety Scale before the start of the yoga practice, and again on the day of a scheduled examination. The yoga group completed a subjective assessment using 14 parameters related to psychological and physical health at the end of the study in order to gain evaluative feedback on the yogic exercises they practiced and their overall feelings about the study. The subjective assessment was created by the authors of the study.

The mean anxiety score was 46.75 prior to yogic practice, and 30.84 on the day of the exam. Overall, students who participated in the yoga group had lower mean anxiety scores, reported improved concentration, increased attentiveness, and an optimistic outlook on life. Also, 95% of the students indicated they enjoyed practicing yoga techniques. Some of the students' opinions on the self-assessment included "yoga should be a continuous ongoing activity", "yoga should be included as a part of the curriculum in theory", and "yoga should be started from the time of admission into professional colleges so students can benefit in the long run" (p. 223). The study supports the use of yoga techniques in the management of stress.

The evidence as presented above demonstrates that traditional yoga practice has a stress-modifying effect. By participating in yoga, the negative feelings that may result in psychosomatic dysfunction and increased distress can be mitigated. Given the benefits of traditional yoga, and the relatively small risk associated with participating in yoga exercises, it should be further researched and recommended to more students.

Literature also suggests that humor may be another effective stress management strategy. Although the two techniques are completely different, research supports the use of humor as a stress management technique. Humor has received increased attention in the past years by both health care providers and the general public because of its psychological and physiological benefits (Martin, 2001). Since it is safe and inexpensive it deserves to be considered as another stress management method.

Humor and Stress

Each person has his or her distinct sense of humor, and mirth is cultivated through life experiences (Fry, 1994). When a person laughs, various physiological functions are activated. The first physiological response to a humorous situation is the stimulation phase. During the stimulation phase the following physiological changes occur: the heart rate goes up, blood pressure rises, pulmonary ventilation increases, skin temperature rises, hormone production is stimulated, skeletal muscles are exercised, and the brain experiences electrochemical activity which is typical found with greater degrees of alertness. When laughter has ended the body recovers in a relaxation or refractory period. During the relaxation phase most physiological functions drop back to baseline, except for immune system stimulation, which may stay elevated for hours. Subsequent to the relaxation phase greater alertness and animation persists and feelings of psychological

well-being improve. Humor be beneficial, providing both physiologic and psychological protection against the negative affects of stress.

Kuiper, Martin and Olinger (1993) explored the relationship between coping, humor, stress, and cognitive appraisals on academic examinations. The authors theorized that individuals with a sense of humor may be able to cope more effectively with stress by developing a benign reappraisal of a stressful event. As a result, individual with reported high scores on humor scales may have a better psychological adjustment to stressful events which will result in better emotional and physical health.

The authors developed a study to investigate the ways in which cognitive appraisal may differ between individuals characterized as having high and low humor traits when they are faced with a potentially stressful event such as examinations. The authors hypothesized that students with positive cognitive appraisals would view their examinations as a challenge, not a threat. They also expected that high humor subjects would report less feelings of stress and greater feelings of control following the examinations.

Forty four female college students participated in the study. Psychological stress was measured using the Perceived Stress Scale (PSS) and humor was measured using the Coping Humor Scale (CHS). Students with high ratings on the CHS were called high humor subjects and those with low ratings were called low humor subjects. In addition, the authors administered the Ways of Coping Scale and the Dysfunctional Attitudes Scale

to determine the different coping strategies between subjects and the degree to which respondents endorse unrealistic standards for self-evaluation. The students were tested weekly over a three week time period. At the start of the study (time 1), they filled out the Dysfunctional Attitudes Scale and a Student Ratings Form, which contained questions regarding the appraisal of the challenges and threats of the upcoming test. One week later (time 2), immediately following the examination, the subjects again filled out the Student Rating Form. One week after the exam (time 3), subjects completed the CHS, PSS, Ways of Coping Scale, and Student Ratings Form. They also were asked to predict the grade they would receive on their next examination.

The results showed a significant inverse relationship between perceived stress and humor. Higher humor subjects were linked to lower levels of stress and a greater perception of control over the events in one's life. Students with high humor scores were better able to cope with stressful situations according to the Ways of Coping Scales. In an attempt to cope with academic evaluations, such as examinations, individuals with high humor scores deal with these stressful situations in a more direct fashion, while at the same time emotionally distancing themselves by downplaying the importance of the exam to a greater degree which ultimately decreases stress levels (p. 93).

Individuals with low humor scores experienced greater stress when their actual performance exceeded initial expectations. This indicates that

low humor individuals appear unable to benefit positively from unexpectedly good performance and can even seem to find it stressful. In contrast, high humor subjects had higher future expectations when past performance exceeded initial expectations, but had lower future expectations when past performance was worse than expected. This appears to be a realistic approach to adjusting personal expectations in accordance to past performance.

Overall, the study supports the theory that individuals with a high humor scores tend to cope with academic stress better, have more realistic expectations of themselves, do not place undue burden on themselves or their performance, and use humor in a self-enhancing manner. Graduate medical education is demanding with frequent oral and written examinations. Thus, it would be beneficial to determine if humor and laughter could help buffer some of the anxiety and stress that develops in many students when faced with these tasks.

Humor can be tailored to the individual and it can take multiple forms, such as watching videos, creating funny narrations, and even reading comics or jokes. There is not a set time it needs to be performed, but rather it can occur during short intervals throughout the day, before an examination, or during a particular stressful class or clinical clerkship. Many studies looked at humor traits and their relationship to stress, but only a few studies performed clinical trials in order to measure the impact humor has on stress. Given the

benefits of humor on psychological parameters in many different groups of individuals, further research is needed to determine if it is a viable stress management option for students.

The above literature review suggests that laughter and yoga have a protective effect against the consequences of stress and can strengthen coping mechanisms. Participating in yoga decreases cortisol levels, blood pressure, heart rate, anxiety and stress (Malathi & Damodaran, 1999; West et al., 2004). At the same time, it improves well-being, concentration, coping mechanisms and creates a euphoric, calm state of mind (Malathi & Damodaran, 1999; Malathi, et al., 2000; Schell, et al., 1993;). Laughter also improves concentration and coping mechanisms. Further, individuals with high humor traits have a better psychological adjustment to stressful events which can result in better emotional and physical health (Kuiper, et al., 1993). Humor reduces sympathetic activity, creating a state of relaxation which can decrease stress levels (Fry, 1994 Newman & Stone, 1996). When students participate in stress management techniques they feel more satisfied with themselves and life, function better at school, and overall feel less stressed (Michie & Sandhu, 1994). Not to mention students find stress management techniques to be helpful and beneficial at reducing stress.

Most of our popular television shows including Saturday Night Live, revolve around humor. The 30 to 60 minutes they are on at night serve as a break from the constant pressure of daily for many people. Steinfield was a

beloved show by many for over ten years, and one obvious reason the show was created was to make people laugh. Literature supports the role of humor as a buffer to deleterious effects of stress and although many individuals watch humorous shows at night, they may not realize the benefits of 30 minutes of comic relief. Humor will not take the place of coping strategies inherent to oneself, but it deserves further consideration as adjunctive method of managing stress. It can be tailored to the student, allowing them to choose a video or activity that he or she find humorous. Similar to humor yoga is being advocated as another stress management technique.

Yoga can calm a person minds and create stillness throughout the body. People have been practicing yoga for years, but only over the past decade or so has it been advocated as a stress management technique. Light stretching, imagining, and deep breathing, which are all parts of yoga exercises, have been not been associated with unfavorable outcomes, therefore yoga along with humor deserve to be considered as adjunctive methods to manage stress. Although humor and yoga may be different technically, both can serve as coping strategies to help manage stress, specifically in students.

Problem Statement

Stress is a growing problem public health concern, affecting many individuals both physically and psychologically (Smith, Hancock, Blake-Mortimer & Eckert, 2006; Sobel, 1995). Many individuals are able to cope with small exposures to psychological stress, and for some they become more productive when under pressure (Folkman, 1984). The problem occurs when stress becomes overwhelming and the individual begins to suffer from the adverse consequences of stress such as developing increased anxiety and depression, complaining of multiple somatic complaints without an organic cause, and even engaging in unhealthy behaviors such as smoking, poor diet, and poor sleep habits. (Folkman, 1984; Friedman, Meyers, Sobel, Caudill, & Benson, 1995; Seyle, 1946). These behaviors result in poor daily functioning, strained relationships with family and friends, and even increased physician visits for multiple somatic complaints (Friedman, et al., 1995; Lynn & Zeppa, 1984; Wolf & Kissling, 1984)

Research suggests students in health science programs have increased levels of stress (Kelly, et al., 1982; Linn & Zeppa, 1984; Wolf & Kissling, 1984). Although this subset of students have similar pressures as other students, such as examinations, financial difficulties, and career decisions, students in the health professions have the responsibility of diagnosing and treating patients in which poor decisions can have grave

consequences (Michie & Sandhu, 1994). This group of students often have to deal with life and death issues that can cause increased levels of stress in many individuals.

Almost all graduate medical education programs are demanding, fast-paced, and stressful academic environments. The inability of students to cope with stress successfully will lead to a cascade of negative consequences on both a personal and professional level. Stress can lead to academic decline, poor relationships with peers and family members, and overall dissatisfaction with life (Linn & Zeppa, 1984).

It is postulated that stress begins during the educational process and continues throughout one's professional career (Kelly, et al., 1982; Shapiro, et al., 1998). It would be beneficial and advisable to begin teaching stress management techniques at the start of a student's education, thereby assisting in developing platform from which healthy behaviors can be created (Wolf & Kissling, 1984). Yoga and humor are two adjunctive techniques that when practiced among both students and professional demonstrate a stress mitigating affect. Therefore, strategies to manage psychological stress, such as humor and yoga, need to be further explored so they can be integrated into programs as adjunctive stress management techniques for students at the beginning of their educational process. These methods can help students

manage stress not only during their education, but hopefully throughout their professional careers.

Purpose Statement

The purpose of this study is to determine if yoga and humor will decrease psychological stress in this group of Doctor of Physical Therapy students at Seton Hall University. To date, no other study has investigated the impact of yoga and humor in DPT students. By offering stress management techniques early in a student's career it will give them the framework for adapting effective coping strategies. Since it is difficult to eliminate stress entirely, adjunctive stress management techniques need to be investigated and offered to students. Research supports the stress mitigating effects of both humor and yoga. Since research suggests psychological stress has a negative impact on a student's psychological and physical health, humor and yoga need to be further explored to determine if they are viable stress management techniques that can be integrated into the SHU DPT program.

Hypothesis

H1: Students who participate in yoga techniques will have lower levels of stress.

H2: Students who watch a video they find humorous will have lower levels of stress.

H3: Students who study for 30 minutes will have no change in stress levels.

Operational Definitions

Humor- Funk & Wagnalls *New Comprehensive International Dictionary of the English Language* (1980) defines humor as “the capacity to perceive, appreciate, or express what is funny, amusing, incongruous, or ludicrous” (p. 615).

Laughter- Laughter is the “response to a humorous situation” (Martin, 2001, p. 506).

Psychological Stress- Psychological stress is defined as a physical or psychological stimulus which, when impinging upon an individual, produces strain or disequilibrium (Stedman’s, 1997, p. 1487).

Yoga- The definition of yoga is “to yoke or join together” (Taylor, 2003, p.116). It integrates the mind and body and focuses on balance, posture, deep breathing, stretching, and relaxation.

Methods

Subjects

Six male and female students from Seton Hall University Physical Therapy program were asked to volunteer in an observational study to evaluate the impact yoga and humor have on psychological stress.

Variables

The dependent variables are psychological stress, heart rate, and blood pressure. The independent variables are yoga, humor, and the control session.

Measures

Demographic Data-The following demographic variables were collected: age, gender, program affiliation, year in graduate school, marital status, whether or not the student has children, whether or not the students are engaging in clinical site rotations, along with exercise and yoga habits.

Daily Stress Inventory- The Daily Stress Inventory (DSI) is a 58 item self-report measure that allows a person to indicate how often a specific stressful event has affected him or her over the past 24 hours (Brantley, Waggoner, Jones, & Rappaport, 1987). After identifying which events occurred, the individuals rate the stressfulness of those events on a Lickert scale from 1 ("occurred but was not stressful") to 7 ("caused me to panic").

Three daily scores are derived for each individual: (1) the number of events that are endorsed as having occurred (FREQ), (2) the sum of the total of the impact rating of these events (SUM), and (3) the average impact rating of events (AIR; SUM divided by FREQ). Sample questions include "hurried to meet deadline", "interrupted during task", "forgot something", and "had confrontation with an authority figure." The concurrent validity of the SUM measurement of the DSI is significantly correlated to the Daily Hassles and Uplift Scale (.57 for hassle frequency and .56 for hassles intensity). The construct validity of the SUM measurement is significantly correlated to the State-Trait Inventory (.42). The reliability of the SUM is 0.87. The lowest and highest SUM score possible is 58 and 406 respectively. Higher scores on the scale correspond with higher levels of psychological stress. For this project, only the SUM rating was used. The SUM scores demonstrates the total impact stress has on the individual, compared to the FREQ score which only identifies which of the questions the subject found stressful in the last 24 hours. When analyzing the FREQ score, each topic checked off must be analyzed separately in order to determine which topic caused the subject stress that day. When analyzing the SUM rating, the overall level of stress and the impact it had on the person can be analyzed more easily.

Coping Humor Scale- The Coping Humor Scale (CHS) is 7 item self reported scale that assesses the degree to which subjects report using humor to cope with stress (Martin, 1996). The items are self-descriptive statements

such as “I have often found that my problems have been greatly reduced when I tried to find something funny in them,” and “I often lose my sense of humor when I’m having problems.” The subjects rate how much they agree or disagree with the statements on a 4-point Likert scale from . Reliability of the instrument has ranged from $\alpha=.60$ to $.70$. In order to obtain the score, responses to questions two, three, five six and seven need to be added, then the responses to questions one and four need to be subtracted. Next 10 was added to the subtotal. Scores greater than 23 are categorized as having above average use of humor in coping with stress, scores 18-22 are categorized as average use of humor in coping, and scores less than 18 are categorized as having below average use of humor in coping with stress.

Coping Style Scale- The Coping Style Scale is a 20 item self reported scale and it part of the Stress Profile Research Scale (Nowack, 1990). The scale is conceptually based on the work of Richard Lazarus at U.C. Berkeley and assess four coping styles including: 1) Positive Appraisal (M=17.17, S.D.=2.95, $\alpha .72$); 2) Negative Appraisal (M=13.01, S.D.=3.56, $\alpha .79$); 3) Threat Minimization (M=15.66, S.D. 2.79, $\alpha .70$); and 4) Problem-Focused Coping (M=15.82, S.D. 2.67, $\alpha .69$). These scales have shown criterion-related validity with a variety of self-reported health outcomes. The scale lists common ways of coping with daily stressors, irritants, annoyances, and challenges such as “I think about happier times, events, and experiences when confronted with problems and frustrations”, “blame, criticize, and put

myself down for somehow creating or causing my problem”, and “change the situation or modify my own behavior to minimize or alleviate my frustration and dissatisfaction”. The subjects rate how often they tend to use the techniques and approaches on a 5 point Lickert Scale ranging from 1 (never) to 5 (always). The lowest and highest score possible is 20 and 100 respectively. High scores correspond to more effective coping behaviors or higher levels of satisfaction with coping behavior.

Vital signs-Blood pressure (BP) was taken on the subject’s right arm. Heart rate (HR) was taken using the right radial pulse.

Interventions

Yoga techniques-The yoga session was a 30 minute video based instruction using the Yoga Meditation for Stress Management DVD.

Humorous Video Clips- The humorous videos consisted 30 minute clips from 4 different performers that have been on Saturday Night Live including Will Farrell, Chris Farley, and Jimmy Fallon. There was also clips from the Bill Cosby Live comedy show. Since humor is unique to the individual, the subjects were able to select which video they would like to view. The videos are in congruence with the mission of Seton Hall University and do not contain any nudity or profanity. Nor do they make any references to religion. The students were asked to rate the video as very funny, funny, not funny after viewing it.

Control Intervention- During the control session, the subjects sat in a well lit room and studied for 30 minutes.

Procedure

The subjects were solicited during their regular scheduled class and the study was performed at the end of their regular class time. Once subjects were self selected, a unique confidential identification number was given to each student. They were then randomly assigned into three cohorts consisting of two students per group. All questionnaires were entered into Seton Hall University ASSET system along with hard copies.

On their first visit they completed the demographic information, DSI, CHS, and the Coping Style Scale. Blood pressure and heart rate were recorded. During the first session each group participated in one of the following; 1) watched a humorous video 2) participated in the yoga technique via video instruction 3) the control intervention. When they finished the 30 minute session their stress levels were reassessed using the DSI , HR and BP. HR and BP was recorded before the completion of the DSI survey tool.

Each subject participated in each intervention once a week on the same day and at the same time of the day to promote consistency and to control for variations of stress, BP, and HR that may occur throughout the day or week. The DSI, BP, and HR were recorded before and after each

intervention. When the each subject completed all three interventions he or she was finished with the trial.

The scales were completed in six different orders to determine if the administration of the scale had any effect on the dependent variables. Also to avoid any affect the interventions could have on the dependent variables the interventions were performed in three different orders.

The scales were completed on both the ASSET system and via hard copy to determine students' preference when completing the scales. Open ended questionnaires were given to the students during the study to illicit feedback regarding the humorous videos, yoga video, the scales, and the order of the interventions.

Statistical Analysis

All data was analyzed using SPSS software. Frequency counts and descriptive statistics were used to analyze the demographic data, scales, and vital signs.

Results

All six students were from the third year Physical Therapy program at Seton Hall University. Three were males and three were females, ages 25 to 33 and the mean age was 27. One student was married and the rest were

single. None of the students had children. Two students did not exercise, one student exercised three times a week, two students exercised four times a week, and one student exercised everyday. The average number of days the students exercised was three. Only one student participated in yoga, and she practiced yoga techniques once per week. All students are currently going out to clinical sites.

Coping Humor Scale

Based on the interpretation supplied by the author of the coping humor scale, three students had an above average score on the CHS and two students have average score on the CHS and one student had a below average score on the CHS.

Coping Style Scale

The scores on the Coping Style Scale ranged from 53 to 75 with a mean score of 63 (Table 1).

Table 1.

Coping Style Scores

	<u>Scores</u>
Mean	63
Subject 1	70
Subject 2	75
Subject 3	66
Subject 4	69
Subject 5	71
Subject 6	53

Humor Video

All students selected the video featuring Will Ferrell and rated the video as very funny.

Stress Parameters Week One

The stress levels on the DSI before the interventions ranged from 26 to 106 (mean of 63). The pre intervention systolic and diastolic blood pressures and heart rate ranged from 110 to 120mmHg (mean 116mmHg), 60 to 80mmHg (mean 73mmHg), 64 to 78 beats per minute (mean 73 beats per minute) (Table 2).

Table 2.

Pre Stress Levels Blood Pressure and Heart Rate Week One

	<u>Pre Stress Level</u>	<u>Pre SBP*</u>	<u>Pre DSP*</u>	<u>Pre HR^</u>
Mean	63	116	75	73
Subject 1	48	110.00	80.00	64.00
Subject 2	76	120.00	80.00	78.00
Subject 3	26	110.00	80.00	69.00
Subject 4	106	120.00	60.00	78.00
Subject 5	59	118.00	80.00	72.00
Subject 6	65	120.00	70.00	77.00

SBP=Systolic Blood Pressure DBP=Diastolic Blood Pressure HR=Heart Rate * measured in mmHg=millimeters of mercury ^measure in bpm=beats per minute

Stress Parameters Week Two

The stress levels on the DSI before the interventions ranged from 22 to 106 (mean of 59). The pre intervention systolic and diastolic blood pressures and heart rate ranged from 108 to 138mmHg (mean 118mmHg), 70 to

80mmHg (mean 78mmHg), 62 to 72 beats per minute (mean 67 beats per minute) (Table 3).

Table 3.

Pre Stress Levels Blood Pressure and Heart Rate Week Two

	<u>Pre Stress Level</u>	<u>Pre SBP*</u>	<u>Pre DSP*</u>	<u>Pre HR^</u>
Mean	59	116	75	73
Subject 1	41	125.00	80.00	62.00
Subject 2	106	138.00	80.00	64.00
Subject 3	22	108.00	70.00	68.00
Subject 4	67	110.00	78.00	68.00
Subject 5	28	120.00	80.00	68.00
Subject 6	92	110.00	80.00	72.00

SBP=Systolic Blood Pressure DBP=Diastolic Blood Pressure HR=Heart Rate * measured in mmHg=millimeters of mercury ^measure in bpm=beats per minute

Stress Parameters Week 3

The stress levels on the DSI before the interventions ranged from 22 to 106 (mean of 59). The pre intervention systolic and diastolic blood pressures and heart rate ranged from 108 to 138mmHg (mean 118mmHg), 70 to 80mmHg (mean 78mmHg), 62 to 72 beats per minute (mean 67 beats per minute) (Table 2).

Table 4.

Pre Stress Levels Blood Pressure and Heart Rate Week Three

	<u>Pre Stress Level</u>	<u>Pre SBP*</u>	<u>Pre DSP*</u>	<u>Pre HR[^]</u>
Mean	34	116	75	73
Subject 1	33	108.00	76.00	76.00
Subject 2	46	134.00	90.00	92.00
Subject 3	26	110.00	70.00	60.00
Subject 4	54	120.00	78.00	80.00
Subject 5	11	110.00	82.00	84.00
Subject 6	33	118.00	78.00	64.00

SBP=Systolic Blood Pressure DBP=Diastolic Blood Pressure HR=Heart Rate * measured in mmHg=millimeters of mercury ^measure in bpm=beats per minute

Effects of Yoga on Psychological Stress Levels

The mean stress levels went from 56 to 20 after the yoga exercise. The pre and post systolic blood pressure, diastolic blood pressure, and heart rate went from 114, 77, and 74 to 103, 71, and 68 respectively (Table 5).

Table 5 .

Pre and Post Stress Levels Blood Pressure and Heart Rate With Yoga

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>Mean Level</u>
Pre Stress	33	76	22	54	59	92	56
Post Stress	22	4	15	32	10	39	20
Pre SBP mmHg	108	120	108	120	118	110	114
Post SBP mmHg	104	118	98	92	90	100	103
Pre DBP mmHg	76	80	70	78	80	80	77
Post DBP mmHg	72	82	62	70	70	70	71
Pre HR bpm	76	78	68	80	72	72	74
Post HR bpm	72	78	60	60	64	72	68

SBP=Systolic Blood Pressure DBP=Diastolic Blood Pressure HR=Heart Rate mmHg=millimeters of mercury bpm=beats per minute

Effects of Humor on Psychological Stress Levels

The mean stress levels when from 37 to 26 after watching the humorous video. The pre and post systolic blood pressure, diastolic blood pressure, and heart rate went from 118, 78, and 75 to 116, 82, and 85 respectively (Table 6).

Table 6.

Pre and Post Stress Levels Blood Pressure and Heart Rate With Yoga

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>Mean Level</u>
Pre Stress	41	13	26	67	11	63	37
Post Stress	38	10	10	63	2	33	26
Pre SBP mmHg	125	134	110	110	110	120	118
Post SBP mmHg	122	128	118	118	102	110	116
Pre DBP mmHg	70	90	80	78	82	70	78
Post DBP mmHg	82	88	80	80	80	80	82
Pre HR bpm	62	92	69	68	84	77	75
Post HR bpm	72	92	90	72	92	90	85

SBP=Systolic Blood Pressure DBP=Diastolic Blood Pressure HR=Heart Rate mmHg=millimeters of mercury bpm= beats per minute

Effects of a Control Intervention on Psychological Stress Levels

The mean stress levels when from 58 to 57 after studying. The pre and post systolic blood pressure, diastolic blood pressure, and heart rate went from 119, 77, and 66 to 109, 75, and 68 respectively (Table 7).

Table 7.

Pre and Post Stress Levels Blood Pressure and Heart Rate With a Control Intervention

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>Mean Level</u>
Pre Stress	48	56	106	107	26	28	58
Post Stress	106	94	28	17	33	41	57
Pre SBP mmHg	110	138	110	120	120	118	119
Post SBP mmHg	100	130	100	104	108	110	109
Pre DBP mmHg	80	80	70	60	80	78	75
Post DBP mmHg	80	80	70	77	80	70	76
Pre HR bpm	64	64	60	78	68	64	66
Post HR bpm	60	68	60	86	64	72	68

SBP=Systolic Blood Pressure DBP=Diastolic Blood Pressure HR=Heart Rate mmHg=millimeters of mercury bpm= beats per minute

Discussion

Although only descriptive statistics were performed on the data, it is evident that stress levels decreased in the humor and yoga groups, and had a minimal change in the control group. The vital signs decreased in both the yoga and control groups with the yoga group seeing a greater decline after the intervention was completed. The humor group had a slight decrease in the systolic pressure, but an increase in the diastolic pressure and heart rate after the humorous video. This is consistent with the physiologic changes that occur with laughter that was described by Fry (1994). Immediately after laughing vital signs are elevated and then decline during the relaxation phase of the laughter cycle. During the clinical trial the vital signs may need to be repeated after ten minutes of rest following the humorous video, in order to see if there is a change in physiologic markers or if they remain the same.

The yoga group had a marked decline in stress levels after participation in the yoga technique. This is consistent with the results of Malathi and Damodaran (1999) that saw a significant decrease in anxiety scores after participation in an one hour yoga program three times a week. The results are also similar to a study by Ray, et al. (2001), who also found decreases in stress and vital signs after a ten week yoga program. What is of interest in this study is that there was a dramatic drop in stress after one session. A larger scale study is needed to confirm these observations, but

the current descriptive data provides support that yoga can contribute to changes in stress levels. The subjects participated for a total of 30 minutes which is a reasonable amount of time to incorporate into the academic schedule.

The humor group had a significant decrease in mean stress level, but not quite as large as the yoga group. This would make sense because although humor has a stress mitigating effect, it does not have the element of relaxation that yoga offers which can further reduce stress. Never the less, the results are consistent with a study by Newman and Stone (1996), in which students with either high or lower humor traits had decreases in stress levels and physiologic parameters after developing and articulating a humorous narrative about an industrial film. The proposed future study will be one of the few research trials in the literature assessing psychological and physiological parameters before and after watching a humorous film. Most research regarding humor correlates humorous traits to coping mechanisms and stress levels.

The mean coping score was 64 with 100 being the maximum score possible. The mean score indicates the students are employing effective and self protective coping mechanisms. What is of interest in the future is to correlate coping scores with stress levels in order to see if students with more effective coping skills have lower levels of stress. One way to do this would

be to administer a coping scale and stress scale during the first year in the graduate program. This would allow the faculty to identify current coping skills, levels of stress, and who may be at risk for future stress if his or her coping skills are poor and stress levels are already elevated. From there, during an introductory class coping strategies can be introduced and among them the techniques of yoga and the use of humor can be practiced. Just as all students perceive and cope with stress differently, there is no one stress management technique that is a panacea. The key to managing stress is to prevent it. By integrating one or more of these techniques into a classroom experience even just once a week, may help decrease stress in students with pre-existing high stress levels and prevent stress in students that are already coping with stress well.

The above work is a platform to continue to develop and improve the research questions and it assists in designing a clinical trial to further evaluate the effects of yoga and humor on psychological stress. The pilot study allowed for trial and error and illuminated some key points to consider for future research. For example, it would be beneficial to have more blood pressure cuffs to facilitate objective measurements. Also, there should be a period of rest before repeating vital signs in the humor group. More demographic data should be added including whether or not the students smoke, because this may elevate blood pressure. More humorous videos can be designed to ensure that there are enough videos to suite each

subject's sense of humor. Further discussion is needed to determine whether to have people perform the interventions independently or as a group. If integrated into a curriculum, the students would have to participate in a group setting, so it may be beneficial to have them perform some of the activities together. The results allowed for an approximation of the sample size needed. Based on the above information a sample size of 26 will be needed to have an effect size of 1.017, alpha of 0.05 and power of 0.80. It is likely that a larger sample size will be utilized in the trial.

The pilot study suggests yoga and humor may have the ability to decrease psychological stress in Physical Therapy students. Given the results of the pilot work there is the opportunity to take the design and apply it to a larger sample in order to gain statistically significant information regarding these strategies as potential stress mitigating techniques. This will be one of the first studies in which stress is assessed before and after watching a humorous video, along with integrating stress mitigating modalities directly into a graduate medical education program. The goal is that on a larger scale these results will be replicated so that educational institutions can incorporate these stress reducing techniques into their curriculum.

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APPENDIX B

PAR-Q FORM

Please mark YES or No to the following:	YES	NO
1. Has your doctor ever said that you have a heart condition and recommended only medically supervised physical activity?	_____	_____
2. Do you frequently have pains in your chest when you perform physical activity?	_____	_____
3. Have you had chest pain when you were not doing physical activity?	_____	_____
4. Do you lose your balance due to dizziness or do you ever lose consciousness?	_____	_____
5. Do you have a bone, joint or any other health problem that causes you pain or limitations that must be addressed when developing an exercise program (i.e. diabetes, osteoporosis, high blood pressure, high cholesterol, arthritis, anorexia, bulimia, anemia, epilepsy, respiratory ailments, back problems, etc.)?	_____	_____
6. Are you pregnant now or have you given birth within the last 6 months?	_____	_____
7. Have you had a recent surgery?	_____	_____

APPENDIX C

Demographic Questionnaire

The following is a Demographic Questionnaire. It will be used to gather general information about your past medical history, family history, social history, and medication use which may or many not influence some of the results of the study.

The information gained from the questionnaire will be confidential. The questions on the survey will be utilized for the purposes of this research project only.

Directions: Please answer the following questions.

1. How old are you? _____

2. Gender: Male Female

3. What program are you enrolled in?

Physical Therapy
Occupational Therapy

4. Are you: married divorced single

5. Do you have any children? Yes No

If yes, how many children do you have? _____

If yes, what are their ages? _____

6. Do you exercise? Yes No

If yes, how often:

Once a week 2 times/week 3 times/week 4 times/week 5 times/week

6 times/week Everyday

If yes, how long do you exercise for per session?

Less than 20 minutes 20-30 minutes 30-40 minutes 40-50 minutes

50-60 minutes Greater than 60 minutes

If you do exercise what type of exercise do you participate in?

Circle all that apply

Running

Walking

Elliptical Machine

Stair Master

Group Aerobics

(Step aerobics, Kickboxing, Dancing)

Cycling

Strength Training

Pilates

Tai Chi

Other, please list _____

7. Have you ever practice yoga techniques? Yes No

When did practice the technique? _____

How often did you practice the technique?

Once a week 2 times/week 3 times/week 4 times/week 5 times/week

6 times/week Everyday

8. Are you currently taking any prescription medications? Yes No

If yes, what are you taking? _____

If yes, how often do you take the medication? _____

9. Are you currently taking any over the counter medications? Yes No

If yes, what are you taking? _____

If yes, how often do you take the medication? _____

10. Do you take any medications such as an inhaler before and/or after you exercise?

Yes No

If yes, what do you take? _____

11. Are you currently taking any herbal supplements? Yes No

If yes, what are you taking? _____

If yes, how often do you take the supplements? _____

12. Do you smoke tobacco? Yes No

If yes, how many cigarettes do you smoke per day? _____

13. Do you drink alcoholic beverages? Yes No

If yes, how many alcoholic beverages do you drink per week? _____

14. Do you read to help reduce stress? Yes No

APPENDIX D

DAILY STRESS INVENTORY

Below are listed items that describe daily events that can be upsetting or stressful. Think about the events of the past 24 hours and then read each time carefully. If that event occurred, rate how stressful it was for you. If the event did not occur during the past 24 hours, do not make a rating. Should you make an error when rating an item, erase the incorrect rating completely and enter the correct rating.

- | | |
|-----------------------------------|----------------------------|
| 1= occurred but was not stressful | 4= caused some stress |
| 2= caused very little stress | 5= caused much stress |
| 3= caused a little stress | 6= caused very much stress |
| | 7= caused me to panic |

Dates of Ratings

- | | | |
|-----|--|---------|
| | | ___/___ |
| 1. | Was interrupted while talking. | ___ |
| 2. | Performed poorly due to others. | ___ |
| 3. | Experienced problem with kid (s). | ___ |
| 4. | Was ignored by others. | ___ |
| 5. | Was forced to socialize. | ___ |
| 6. | Someone broke a promise/appointment. | ___ |
| 7. | Did not hear from someone you expected to hear from. | ___ |
| 8. | Someone borrowed something without your permission. | ___ |
| 9. | Argued with spouse, boyfriend, girlfriend, etc. | ___ |
| 10. | Argued with another person. | ___ |
| 11. | Experienced confrontation with an authority figure. | ___ |
| 12. | Was embarrassed. | ___ |
| 13. | Performed poorly at task. | ___ |
| 14. | Spoke or performed in public | ___ |
| 15. | Did something you are unskilled at | ___ |
| 16. | Was unable to complete a task | ___ |

17. Was late for work/appointment. _____
18. Performed poorly at sport/game. _____
19. Was unable to complete all plans
for today. _____
20. Was unorganized. _____
21. Failed to understand something. _____
22. Stopped unwanted personal habit
(overeating, smoking, nail biting). _____
23. "Pet peeve" was violated (someone fails
to knock, etc.). _____
24. Thought about the future. _____
25. Heard some bad news. _____
26. Worried about another's problems. _____
27. Thought about unfinished work. _____
28. Was interrupted during task/activity. _____
29. Experienced unwanted physical contact
(crowded, pushed). _____
30. Was interrupted while thinking/relaxing. _____
31. Was exposed to upsetting TV show, movie,
book. _____
32. Your property was damaged. _____
33. Had a minor accident (broke something,
tore clothing). _____
34. Experienced money problems. _____
35. Had car trouble. _____
36. Experienced bad weather. _____
37. Had difficulty in traffic. _____
38. Experienced unexpected expenses (fines,
traffic ticket, etc.). _____
39. Waited longer than you wanted. _____
40. Had your sleep disturbed. _____
41. Was exposed to a feared situation or object. _____
42. Someone spoiled your completed task. _____
43. Was criticized or verbally attacked. _____
44. Dealt with rude waiter, waitress,
salesperson, etc. _____
45. Was misunderstood. _____
46. Someone "cut" ahead of you in line. _____
47. Feared illness/pregnancy. _____
48. Misplaced something. _____
49. Hurried to meet a deadline. _____
50. Forgot something. _____
51. Store lacked a desired item. _____

52. Competed with someone. _____
53. Experienced illness or physical
discomfort. _____
54. Was stared at. _____
55. Ran out of food/personal article. _____
56. Did something that you did not want to do. _____
57. Was concerned over personal appearance. _____
58. Experienced narrow escape from danger. _____

References

- Brantley, P. J., Catz, S. L., & Boudreaux, E. D. (1997). Daily Stress Inventory: In C. P. Zalaquett & R. J. Wood (Eds.), *Evaluating stress: A book of resources* (pp. 97- 112). Lanham, MD: Scarecrow Press.
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- Brantley, P. J., & Jones, G. N. (1989). *The Daily Stress Inventory: Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Brantley, P. J., Waggoner, C. D., Jones, G. N., & Rappaport, N. B. (1987). A Daily Stress Inventory: Development, reliability, and validity. *Journal of Behavioral Medicine, 10 (1)*, 61- 74.

APPENDIX E

The Coping Humor Scale

Instructions:

This questionnaire is concerned with the way you express and experience humor. Obviously, there is wide variation among individuals and therefore no right or wrong answers to these questions. Below you will find a list of seven statements. In the space at the beginning of each sentence, please indicate the degree to which you agree or disagree with that statement by printing a number from 1 to 4, using the following scale:

- 1 = strongly disagree
- 2 = mildly disagree
- 3 = mildly agree
- 4 = strongly agree

- ___ 1. I often lose my sense of humor when I'm having problems.
- ___ 2. I have often found that my problems have been greatly reduced when I tried to find something funny in them.
- ___ 3. I usually look for something comical to say when I am in tense situations.
- ___ 4. I must admit my life would probably be easier if I had more of a sense of humor.
- ___ 5. I have often felt that if I am in a situation where I have to either cry or laugh, it's better to laugh.
- ___ 6. I can usually find something to laugh or joke about even in trying situations.
- ___ 7. It has been my experience that humor is often a very effective way of coping with problems.

 Scoring: Reverse scoring for items 1 and 4, and sum across all 7 items.
 (i.e., Add up the responses to questions 2, 3, 5, 6, and 7, then subtract the responses to questions 1 and 4, and finally add 10 to the total.)

Interpretation: > 23 : above average use of humor in coping with stress
 18-22 : average use of humor in coping
 < 18 : below average use of humor in coping

APPENDIX F

Coping Style Scale

Directions: Although each problem or stressor we experience may be handled differently, most of us use characteristic ways to cope with them on a day-to-day basis. Below is a list of common ways of coping with daily stressors, irritants, annoyances, and challenges. Circle how often you tend to use these techniques and approaches in generally coping with your work and personal life where: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, and 5=Always.

		Never	Rarely	Sometimes	Often	Always
1.	Focus my thoughts on the most positive aspects of the event or situation (e.g., what I can learn from the event or situation or what positive consequences may result).	1	2	3	4	5
2.	I think about happier times, events, And experiences when confronted with problems and frustrations.	1	2	3	4	5
3.	I imagine things improving, getting Much better, and feeling confident that I can handle it.	1	2	3	4	5
4.	Focus on what's bothering me until I feel more secure or comfortable about it in some way.	1	2	3	4	5
5.	Say and think positive things to myself to make me feel better about the stressful event or situation (e.g., "Everything is going to be all right").	1	2	3	4	5
6.	Blame, criticize, and "put myself down" for somehow creating or causing my problem.	1	2	3	4	5
7.	Dwell on what I should have done or not done in a particular situation.	1	2	3	4	5
8.	Think about and focus on the very worst thing that could happen in a particular situation.	1	2	3	4	5

9.	Talk about it and bring it up with others excessively (i.e., "beating a dead horse").	1	2	3	4	5
10.	Think about it constantly during the day and night (i.e., not being able to "let go" and avoid dwelling on what is bothering me).	1	2	3	4	5
11.	Minimize the significance of what is bothering me by making fun about it or joking about it (i.e., using humor to put the event or situation into perspective).	1	2	3	4	5
12.	Avoid thinking about it when it crosses my mind (i.e., able to put it out of my mind and stop dwelling on what is bothering me).	1	2	3	4	5
13.	Tell myself to get on with my life and to channel my energy into more productive approaches to minimize my frustration and dissatisfaction.	1	2	3	4	5
14.	Say things like, "That's enough thinking about this" or "Now is not the time to dwell on it" when I feel frustrated, irritated, or annoyed.	1	2	3	4	5
15.	Regard it as something that has happened and is over (i.e., "water under the bridge").	1	2	3	4	5
16.	Talk with others and ask for their opinion, advice, recommendations, ideas, or suggestions.	1	2	3	4	5
17.	Ask others to modify or change their behavior to make things better for me.	1	2	3	4	5
18.	Develop an action plan and implement it to cope more effectively with the situation in the future.	1	2	3	4	5
19.	Change the situation or modify my own behavior to minimize or alleviate my frustration and dissatisfaction.	1	2	3	4	5

20. Draw on my past experiences and figure out the best way to solve the problem or improve the situation in a productive and effective manner.
- | | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

APPENDIX G
IRB APPROVAL LETTER

September 5, 2007

Denise Rizzolo
52 Independence Way
Jersey City, NJ 07305

Dear Ms. Rizzolo,

The Seton Hall University Institutional Review Board has reviewed the information you have submitted addressing the concerns for your proposal entitled "The Effects of Yoga and Humor on Psychological Stress". Your research protocol is hereby approved as revised through expedited review. The IRB reserves the right to recall the proposal at any time for full review.

Enclosed for your records are the signed Request for Approval form, the stamped recruitment flyer, and the stamped original Consent Form. Make copies only of this stamped Consent Form and recruitment flyer.

The Institutional Review Board approval of your research is valid for a one-year period from the date of this letter. During this time, any changes to the research protocol must be reviewed and approved by the IRB prior to their implementation.

According to federal regulations, continuing review of already approved research is mandated to take place at least 12 months after this initial approval. You will receive communication from the IRB Office for this several months before the anniversary date of your initial approval.

Thank you for your cooperation.

In harmony with federal regulations, none of the investigators or research staff involved in the study took part in the final discussion and the vote.

Sincerely,

Mary F. Ruzicka, Ph.D.
Mary F. Ruzicka, Ph.D.
Professor
Director, Institutional Review Board

cc: Dr. Genevieve Pinto-Zipp

Office of Institutional Review Board
Presidents Hall
Tel: 973.313.6314 • Fax: 973.275.2361
400 South Orange Avenue • South Orange, New Jersey 07079-2641

APPENDIX H

FLYER

VOLUNTEERS NEEDED!!!

SUBJECTS ARE NEEDED FOR A RESEARCH STUDY ON YOGA, HUMOR, AND STRESS

If you are between the ages of 18-39 and a first year student in the SHU Physical Therapy or Occupational Therapy program, we need your help. Males and females welcome!

Volunteers will participate in a yoga session, watch a funny video, and read for 30 minutes per session. Sessions will occur once a week for a total of three weeks. You will be asked to fill out surveys on stress before and after the sessions. **All information will be kept confidential and destroyed after data extraction.**

If interested, please contact Denise Rizzolo
rizzolde@shu.edu

Seton Hall University
Institutional Review Board

SEP 17 2007

Approval Date

Expiration Date

SEP 17 2008

APPENDIX I

Inclusion Criteria

The following questions will be asked before the subject participates in any of the interventions. If a potential answer is the same as the one written after the question within the parentheses, the person will be thanked for his/her interest, but informed that he/she does not meet the inclusion criteria for the study.

- 1) Are you between the ages of 18 and 35 years old? (No)
- 2) Are you currently a first year student in the SHU DPT or OT program? (No)
- 3) Are you pregnant? (Yes)
- 4) Have you been practicing hatha yoga 1 or more days per week regularly for the past 3 months? (Yes)
- 5) Do you have any muscle-skeletal problems such as neck, back, or knee pain/pathologies (arthritis, disc disease, knee ligament surgery/tears), which would limit you from lying in a supine position or sitting with your knees crossed? (Yes)
- 6) Do you have any muscle-skeletal problems such as neck, back, or knee pain/pathologies (arthritis, disc disease, knee ligament surgery/tears), which would limit you from remaining on your hands and knees for 2-3 minutes? (Yes)
- 7) Do you have any muscle-skeletal problems such as neck, back, or knee pain/pathologies (arthritis, disc disease, knee ligament surgery/tears), which would limit you from rising a seated to standing position? (Yes)
- 8) Would you like to be a subject in this study? (No)
- 9) Are you willing to attend 3 consecutive sessions scheduled 1 week apart?
(No)

Meets inclusion and exclusion criteria _____ Yes _____ No

APPENDIX J
INFORMED CONSENT

Seton Hall University
Institutional Review Board

Expiration Date

SEP 05 2007

SEP 05 2008

Informed Consent Form

Approval Date

Researchers Affiliation: The primary researcher is Denise Rizzolo who is a faculty member in the Seton Hall University Physician Assistant program and PhD student in the Graduate School of Health Science.

Purpose and Duration: The purpose of the study is to determine the effects yoga and humor have on stress. There will be one screening visit followed by 3 interventions sessions. The screening visit will last on average 45 minutes. Subjects will then be asked to meet once a week, for a total of 3 weeks, on the same day and at the same time, for an estimated 60 minutes per session.

Procedures: There will be one screening visit followed by 3 intervention sessions.
Screening visit: During the screening visit, subjects will be asked a series of questions to verify that they are eligible to participate in the study. If eligible, the subjects will sign the informed consent and have his or her blood pressure and heart rate taken simultaneously using an automatic cuff. Next, the subjects will fill out 3 questionnaires including a demographic survey, Copying Style Scale and Coping Humor Scale. The screening visit will take an average of 45 minutes. The subjects will then be asked to schedule 3 additional interventions sessions based on what day and time is most convenient for him or her. During the intervention sessions, the subjects will be asked to participate in all of the following interventions: watch a humorous video of his or her choice from a pre selected video library for 30 minutes, participate in yoga for 30 minutes, and read for 30 minutes. During the yoga session, the subjects will be asked to perform light stretching and silent meditation. The videos will be from Saturday Night Live and Bill Cosby himself. Reading material will be provided and the articles will be taken from internet sources and Newsweek. The average visit will take about 60 minutes.

Session 1, 2 and 3: During each session, the subjects will first complete the Daily Stress Inventory and then his or her blood pressure and heart rate will be recorded. Subjects will then participate in 1 of the above mentioned interventions. Upon completion of the intervention, stress will be reassessed using the Daily Stress Inventory, blood pressure and heart rate. Subjects will also complete a weekly summary sheet along with an assessment sheet on whether he or she enjoyed the intervention or not. Over the 3 week period, subjects will perform each intervention once.

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Once the subjects have completed the study the primary researcher will give him or her a diagram showing all their pre-test and post-test measurements. This will be provided in order for subjects to identify measures to best reduce stress his or her stress.

Instruments: Subjects will be asked to fill out a demographic survey, the Daily Stress Inventory, the Coping Humor Scale, and the Coping Style Scale. The demographic survey asks questions pertaining to personal history, exercise and yoga habits, prescription and over the counter medication use, and alcohol and tobacco use. If on the demographic survey, if subjects admit to behaviors that may cause imminent harm to him or her self or someone else, by law, the primary researcher will have to forward this information to the student health center or appropriate authority. The Daily Stress Inventory asks 58 questions pertaining to daily activities that may cause a person to feel stressed. Subjects will be asked to rate whether the event occurred or not over the past 24 hours, and indicate how much stress it caused him or her on a 7 point scale. An example of a question is “hurried to meet a deadline.” The Coping Humor Scale asks 7 questions pertaining to whether or not subjects agree that they use humor as a coping mechanism. An example of a question is “I can usually find something to laugh or joke about even in trying situations.” The Coping Style Scale asks 20 questions regarding how subjects cope with problems or stressors in his or her life currently. Subjects will be asked to rate how often he or she use certain techniques to cope with stress on a 5 point scale. An example question is “I think about happier times, events, and experiences when confronted with problems and frustrations”. At the end of each intervention, subjects will complete a weekly summary sheet to determine if he or she changed any of his or her exercise habits, medications, or began engaging in any activities to help alleviate stress.

Volunteering: Participation in the study is voluntary and subjects have the right to discontinue participation at any time without repercussions. Refusal to participate or discontinuing participation at any time will involve no penalty or loss of benefits to which the subject is otherwise entitled.

Confidentiality: Information from the study will be coded with a unique identifying number to ensure confidentiality and will not be identified in any publication that may result from the study. Complete effort will be made to protect the subject’s identity at all times. The primary researcher along with the dissertation committee members will be the only individuals to have direct contact with the information. Any paper work will be locked in a cabinet in the primary investigators office and the primary investigator will be the only one to have the key.

Anonymity: There is no anonymity.

Access: The primary investigator along with the dissertation committee members are the only individuals with access to contact information, which will be destroyed once data collection is completed.

SEP 05 2007

Expiration Date

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Approval Date

Risk and Discomforts: There are minimal foreseeable risks to the study. During the yoga exercise, the subjects will participate in light stretching and rising from a seated position. If at anytime discomfort is felt, the activity can be stopped. In the event that the Daily Stress Inventory causes mild psychological distress, the University Counseling Center at 973.761.9175 is available to further assist subjects.

Benefits: The potential benefits of the study will help subjects along with other health science students by demonstrating a decrease in stress when participating in yoga and/or watching a humorous video, thus promoting these two modalities as an aide to help decrease stress levels. The results will be offered to subjects upon completion of the study.

Compensation for Participation: There is no cost associated with any part of the study. There is no financial compensation for participation in this research

Alternatives to Participation: None

Contact Information: Denise Rizzolo (primary researcher) can be contacted at 973.275.2843 and Dr. Genevieve Pinto Zipp (research advisor) can be contacted at 973-275-2457 and will be available to answer any questions the subjects may have. Ms. Rizzolo and Dr. Zipp are located at McQuaid Hall on the Seton Hall University Campus, 300 South Orange Avenue, South Orange, NJ 07079. If the subjects have any additional questions regarding the right as human subjects, he or she may call Dr. Mary Ruzicka, Director of the IRB, at 973-313-6314. The office is located at Presidents Hall on the SHU campus.

Statement: A copy of the consent form will be given for the subject's records. Consent to participate is indicated by signing and submitting the informed consent to the investigator.

Name (please print)

Date

Signature

Seton Hall University
Institutional Review Board

SEP 05 2007

Approval Date

Expiration Date

SEP 05 2008

APPENDIX K

Prior to the students returning and without the students' knowledge, I will randomly assign each student to one of the following intervention session sequences. Three different sequences were developed to control for order effects.

The proposed sequences are as follows.

	A	B	C
Week 1	Yoga	Humor	Read
Week 2	Humor	Read	Yoga
Week 3	Read	Yoga	Humor

APPENDIX L

Weekly Summary Sheet 1 2 3

Directions: Please answer the following questions.

1. Since your last visit have you stopped any of your chronic medications including prescription medications, over the counter medications, and/or herbal supplements?

Yes No Not on any chronic medications

2. Since your last visit have you started any new medications that have been prescribed by your physician?

Yes No

If yes, what medication have you started?

If yes, how often do you take it?

3. Since your last visit have you changed any of your behaviors? Check off all that apply

_____ Started an exercise program

If yes, what have you started? _____

_____ Started any new herbal supplements

If yes, what have you started? _____

_____ Started taking any over the counter medications

If yes, what are you taking? _____

_____ Began participating in any activities to help decrease stress

If yes, what have you started? _____

4. List your top 3 stressors that have occurred in the last 24 hours.

1. _____

2. _____

3. _____

APPENDIX M

Intervention Feedback: Yoga

Directions: Please answer the following questions.

1. Did you find the yoga video to be relaxing?

Yes No

If no, please explain why _____

2. Would you consider participating in yoga to help decrease stress?

Yes No

If no, please explain why _____

Intervention Feedback: Video

Directions: Please answer the following questions.

1. Did you think the video was funny?

Yes No

If no, please explain why _____

2. Would you consider watching or participating in an activity that you found humorous to help decrease stress?

Yes No

If no, please explain why _____

Intervention Feedback: Reading

Directions: Please answer the following questions.

1. Did you find reading the articles to be relaxing?

Yes No

If no, please explain why _____

2. Would you consider reading to help decrease stress?

Yes No

If no, please explain why _____