An Examination of the Relationship between Stress, Cognitive Rumination, Depression and Meditation

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The present study examines the relationships between stress, cognitive rumination, depression, and meditation. Two theoretical frameworks regarding stress were addressed: Selye's physiological aspects of stress and Lazarus' (Lazarus & Folkman) appraisal and coping concepts of stress. The Daily Hassles Scale (Lazarus & Folkman, 1989) was used to assess frequency and severity of minor stressors. In addition, the study addressed cognitive rumination using Nolen Hoeksema's theoretical framework relating rumination to depression. The Short Response Style Questionnaire was used to assess rumination.

Depression was assessed using the Beck Depression Inventory-II (Beck, Steer, & Brown). Furthermore, the study explored whether meditation was associated with reduced stress, rumination, or depression.

As predicted, stress, rumination, and depression were found to be positively correlated. The correlations between meditation and the experimental variables were in the direction predicted but not significant. Meditators as a group scored lower than non-meditators on stress and depression but not on rumination. Demographic variables such as age, gender, ethnicity, income, years of education, relationship status, and relationship satisfaction were analyzed. Statistical differences were found between males and females on depression. Those not in relationships were significantly higher on rumination than those not in relationships. Stress severity negatively correlated with relationship satisfaction, and meditation negatively correlated with income.

Future research may need to operationally define "meditation," so it has the same meaning for all participants. Future studies are also needed to examine the relationship between stress and rumination.

Abbreviations: GAS: Global Adaptation Syndrome; LAS: Local Adaptation Syndrome; ACTH: Adrenocorticotrophic Hormone; BDI: Beck Depression Inventory; HR.SD Hamilton Rating Scale for Depression and the Structured Clinical Interview for DSM-IV (SCID); BAI: Beck Anxiety Inventory; TM: Transcendental Meditation; SCL-90-R: Symptom Checklist-90 Revised; INSPIRIT: The Index Of Core Spiritual Experiences; GSI: General Severity Index; POMS: Profile of Mood States; SOSI: Symptoms of Stress Inventory; DHEA-S: Dehydroepiandrosterone Sulphate

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Chapter I

Introduction

Statement of the Problem

The amount of literature addressing the effects of stress on health has grown tremendously in the past few decades. Research has shown that stress is found to be involved directly or indirectly in the onset and maintenance of mental illness such as anxiety disorders and depression [1]. Many studies have shown that stress has considerable negative effects on one's physical and mental well-being [2-4]. Economically, stress and stress-related symptoms may contribute to the loss of hundreds of millions of dollars as a result of absenteeism and low productivity. Socially, stress has undeniable negative effects on familial relationships. In some instances, stress may be a factor in exacerbating an already volatile temper and abusive behavior on the part of parents and caregivers. For example, researchers have found that social stress is a significant factor in the murder of children committed by other family members [5].

As a result of the negative effects of stress, individuals as well as medical and mental health organizations have recognized the importance of creating and implementing programs aimed at reducing stress. Many hospitals offer classes and workshops on stress reduction. Many individuals engage in some form of stress reduction methods or techniques. Some people for example find that exercise relieves their stress. Others take vacations and engage in pleasant activities such as camping, hiking, mountaineering. Many people resort to medications, prescribed or non-prescribed to cope with their stresses. For example, some turn to herbal supplements such as kava kava to relieve their stress.

A significant number of people engage in some form of meditative practice as a spiritual practice and/or as a means to reduce stress. Meditation has been found effective in reducing stress and symptoms associated with it such as anxiety and depression. One form of meditation, mindfulness meditation, has been found effective in the treatment of anxiety disorders, self-regulation of chronic pain, reduction in psychological symptomology, stress reduction and increased levels of empathy in medical and premedical students, and decrease in total mood disturbance, depression, anxiety, anger, confusion, and lower stress levels in cancer outpatients [6-10].

Nevertheless, the psychological mechanisms by which meditation reduces stress remain unknown. Lazarus' theory of stress and coping affords significant weight to the cognitive process of appraisal and reappraisal of stress in determining whether the person experiences stress or not [11]. On the other hand, Selye proposes that continued resistance to stress leads to the breakdown in the person's ability to effectively cope with stress [2]. Both views are addressed in more detail below.

Given that appraisal and reappraisal of stress involve cognitive processes; such processes may include cognitive rumination. Moreover, experiencing one's repeated attempts to find solutions to the stress-problems as not being effective could lead to focusing instead on the short-comings and inadequacies of the self. That is the hallmark of rumination, which may play an important factor in depression. Therefore, cognitive rumination may be associated with depression and stress and may be mediated by meditation.

While many studies have addressed stress and meditation, no study to date has investigated the correlations between accumulated daily stress and cognitive rumination, or between meditation and cognitive rumination.

This study will draw on numerous studies that have addressed the concept of stress, cognitive rumination, and meditation [2,6,9-24]. An attempt will be made to explain how cognitive rumination might be associated with stress and how mediation, as a diversion process, might be associated with less stress, less depression, and less rumination.

Stress

There are different meanings for the word "stress", but it is loosely defined as the tension experienced by the organism in response to adverse situations, whether they are external or internal. Webster's Dictionary defines stress as "a bodily or mental tension resulting from factors that tend to alter an existent equilibrium; a physical, chemical, or emotional factor that causes bodily or mental tension and may be a factor in disease causation" [25]. Hans Selye defined stress as "the nonspecific response of the body to any demand" [2]. Building on the work of Selye, Lazarus and Folkman defined stress as "a particular relationship between the person and the environment that is appraised bythe person as taxing or exceeding his or her resources and endangering his or her well-being [11].

Selye's theory of stress

A study on stress will be incomplete without referring to the work of Hans Selye, who pioneered the studying of stress. In his ground-breaking book on stress, *The Stress of Life,* Selye coined two new terms to describe changes in the body in response to different types of stress [2]: global adaptation syndrome (GAS) and local adaptation syndrome (LAS). He described GAS as the manifestation of stress in the whole body. It is characterized by adrenal stimulation, shrinkage of lymphatic organs such as the thymus and lymph nodes, gastrointestinal ulcers, and loss of eosinophil cells (large white blood cells whose function is related to immunologic adaptive reactions). By contrast, Selye defined LAS as the manifestation of stress in a limited part of the body and is characterized by inflammation, degeneration, or death of cells in the directly affected-area. A cut or a wound on any part of the body is an example of local stress. In contrast, getting stuck in traffic and consequently being late for an important appointment are examples of general stress.

What distinguishes GAS and LAS is primarily the type of stress to which the organism is subjected. When the organism faces severe injury or is subjected to direct pathogens, it produces the so-called pro-inflammatory hormones, which stimulate inflammation. This is the LAS syndrome. The main purpose of inflammation is to barricade off and to contain the injurious agent. Selye refers to these hormones as catatoxic substances, which help defend against direct pathogens by inflammatory and immunologic reactions. However, in the GAS syndrome, the threat is not directed towards any specific tissue or organ.

Consequently, secreting pro-inflammatory hormones would be unnecessary and wastes resources. Instead, the body releases anti-inflammatory hormones, such as cortisol, epinephrine, and adrenocorticotrophic hormone (ACTH) to help the body prepare for fight-flight response. Cortisol, for example, acts to potentiate activities of the sympathetic nervous system, to increase the release of stored glucose and fats, and to suppress immune function [15]. Another major benefit of anti-inflammatory hormones is that they inhibit the immediate inflammatory defense reaction, which causes the damage to the tissues. Anti-inflammatory hormones are referred to as syntoxic, which help the body or tissue coexist with indirect pathogen or toxic agent without u IU1ecessary inflammatory or immunologic reactions.

Selye based his theory on experimenting with rats where he found that after exposure to cold, the rats developed resistance to the cold and were able to live in refrigerated rooms where non exposed rats could not live. However, when the rats were moved into still more cold temperatures with prolonged exposure, they had lost their acquired resistance and the stage of exhaustion set in. They had lost the ability to survive even in the moderate cold they once lived in. The finding of the experiment suggests that in the event of excessive demands, usually adequate adaptive responses no longer suffice. This will enhance our understanding about the detrimental effects of prolonged exposure to stress, which is not dissimilar to what modem humans have to endure every day in their lives.

Lazarus' theory of stress and emotion

Although Selye proposed that the initiator of the GAS may be psychological as well as physical, nevertheless, he overemphasized the physical aspects, that is the environmental stimuli and how the organism develops what he terms "non-specific response" to deal with the physical stressors. It may be helpful to distinguish between physical and psychological stress. Lovallo defines physical stressors as events having a direct physical threat value to one's well-being. He cites examples as cold, heat, infection, or toxic substances. In the same paragraph, Lovallo refers to psychological stressors as "challenges to our well-being, not because they are physically threatening but because of how we perceive them [14-15]".

Selye's theory of stress has been challenged by many researchers. Lazarus and Folkman agree that certain environmental demands and pressures produce stress in substantial numbers of people. However, they state that individuals differ in their sensitivity and vulnerability to certain types of events, as well as in their interpretations and reactions [11]. In Lazarus' view, stress, appraisal, coping, and emotions must be viewed as existing in a partnership. They belong together and form a conceptual unit. According to his theory of stress, cognitive appraisal is an important mediation process that determines whether the individual experiences stress or not. He defined cognitive appraisal "as the process of categorizing an encounter, and its various facets, with respect to its significance for well-being". According to Lazarus, cognitive appraisal is associated with three types of psychological stress: harm/loss, threat, and challenge [11,14]. Harm/loss deals with damage of loss that has already taken place. Threat has to do with harm or loss that has not yet occurred, but it is possible or likely in the future. Challenge consists of the belief that difficulties can be overcome with persistence and self-confidence. Lazarus states that it is the cognitive appraisal of threat that is associated with most harmful effects ofstress.

In addition to cognitive appraisal, Lazarus believes that coping is another essential aspect of the emotion process, which altogether forms what he refers to as "unity of stress." He considers coping and appraisal mediators of the emotional reaction. Lazarus defines coping "as constantly

changing cognitive and behavioral efforts to manage specific external and /or internal demands that are appraised as taxing or exceeding the resources of the person" (1999) [2]. He points that coping is influenced by personality dispositions, goals, cognitive beliefs about self and the world, and personal resources. Examples of resources include intelligence, education, money, social skills, and supportive family and friends. To summarize Lazarus' view on stress, experiencing stress does not only require the presence of a stressor as Selye has stipulated, but that appraisal, coping, and the emotions experienced, all determine whether effects of stress are experienced and to what degree.

In addition to Lazarus' criticism of Selye' s theory of stress, Levine, et al. argue that non-specificity of the stimuli that activate the pituitary adrenal system in the alarm stage is actually due to the psychological factors underlying the situation more than the stressors themselves; that is, whether the situation is in itself psychologically unpleasant or threatening. This is similar to Lazarus' concept of cognitive appraisal. Both positions assign a significant weight to the psychological factors that interpret the environmental stimuli [12].

Other researchers have built on Levine's argument and adopted similar views to Lazarus. In his book *Stress and Health: Biological and Psychological Interactions,* Lovallo agrees that the appraisal of a stressful event is what remains important. He adds that the appraisal happens in the prefrontal cortex giving it meaning and considering possible consequences or actions [15].

Further, Lovallo suggests that the evaluation processes form the basis for emotions and for the formulations of behavioral, autonomic, and endocrine responses to threatening events. Similarly, the June edition of *The Monitor,* the journal of the American Psychological Association (DeAngelis, 2002), reported that a team from the University of California at San Francisco and Los Angeles headed by Margaret Kemeny challenged Selye's general theory of stress and reported their findings that people respond to the same stressful event in different physiological ways depending on how they appraise it. In the same paragraph, Kemeny stated: "The body is responding to what's going on in the brain, not to what's going on in the environment [26]".

Based on the previous findings, it becomes easier to understand how people interact with stress. According to Selye, they first enter the alarm stage, with physiological changes occurring, followed by resistance. The resistance stage provides means for coping with the stressors. However, prolonged exposure to stress will eventually lead to the loss of resistance and what seemed to be adapting and coping with previous levels of stress is no longer effective or adequate. Instead, exhaustion sets in. So, what does the individual usually do?

Only a few options present themselves to deal with the situation:(1) continuation of exposure to the stressors and ignoring the warning signs of the consequences, such as falling sick; (2) stepping out of the stressful situations, taking time off and changing the situations and the conditions that are contributing to stress; or (3) engaging in stress reduction activities and/or utilizing stress reduction methods and techniques. Most people unfortunately act in accordance with option one not because anything is wrong with them, but because living in a modern fast-paced society entails facing a wide range of stressors as a result of hurried and busy life style.

This study examines the effects of general stress. General stress here is defined as the experience of and coping with the accumulation of daily annoyances of life (daily hassles) that can impair morale, social functioning, and health. Lazarus and Folkman (1984) speak of three types of stressors: major changes, often cataclysmic and affecting large numbers of persons; major changes affecting one or a few persons; and daily hassles [11]. They define daily hassles as the little things that can irritate and distress people, such as having too many responsibilities, feeling lonely, having and argument with a spouse, and so on. In contrasting major life events with daily hassles, Lazarus (1999) reported: "We found, surprisingly that daily hassles were even more important factors in negative health outcomes than major life events [15]".

This study assumes that daily hassles constitute general stress, which in Selye's view entails nonspecific changes in the body. As mentioned above, Selye referred to the nonspecific changes as global adaptation syndrome (GAS) [2].

According to him, the GAS consists of three stages. The first stage is the alarm reaction, which is a generalized call to for defensive forces. Initially, the blood becomes concentrated and there is a marked loss of body weight. This is followed by adrenal cortical secretion of anti-inflammatory hormones in the blood stream, a rise in blood pressure and temperature, and enlargement of the adrenal cortex. The second stage is resistance, which is characterized by increased resistance to the stressor agent and a decreased resistance to other stimuli. It is also called the adaptation stage. This is the stage of adapting to stress where the body's resources are mobilized to cope with the stressors. However, adaptation to one agent appears to occur at the expense of resistance to other agents [11]. For example, the body secretes anti-inflammatory hormones such as cortisol in response to stress. However, the cortisol circulating in the blood system inhibits the function of eosinophil white blood cells, which are necessary for immune functions. Moreover, after prolonged

exposure to stressors, the acquired adaptation is lost. This is the third stage, exhaustion. This stage is similar to the first stage and is marked by fatigue and susceptibility to illness, because the adaptable energy is greatly diminished. Selye believed that adaptable energy is finite. Sooner or later, adaptability runsout.

Stress is inevitable in modern life and it cannot be eliminated totally.

Ursin (1978) believes that if an individual tries to avoid all challenges and "stresses" of everyday life, he many decrease his ability to meet these unavoidable challenges. He considers challenge and stress as necessary for fitness, both physically and mentally. In the same paragraph he writes: "The absence of challenge and stress may cause disease, just as over-load may produce pathology." Likewise, Lazarus and Folkman (1984) write: "The persistence of a chronic stressor can give the person the opportunity to learn to deal with its demands, or to deal with it by avoidance or distancing. New skills can be developed, commitments reordered, old goals abandoned, and new ones created." Consequently, stress motivates us to attempt to remedy the situation that is causing our stress. For example, if lack of money is the source of continued stress, then one will attempt to obtain money by seeking a job, getting an education, and whatever other creative solutions the person might come up with. However, too much stress is unhealthy and harmful [11,12]. Since stress is unavoidable, what course of action is available in order to maybe find the balance?

Some possibilities for solving the stress problem, that include both Selye's and Lazarus' views, are to intervene before exhaustion stage sets in, and/or to change the coping from problem-focused to emotion-focused if progress is not being made with the former coping function. From Selye's perspective, intervention should be aimed at the first two stages of response to stress, which are the alarm reaction and resistance. However, the first stage is difficult to control since it is almost automatic response to stress, and there exists less control over the autonomic nervous system. In contrast, choices lie in the resistance stage. According to Selye's theory of GAS, if resistance continues in the face of continued stress, then eventually the organism will become exhausted and the body vulnerable to infections and illness. We can maneuver around resistance by surrender and/or deviation. Selye wrote: The tweezers of stress have three prongs. Whether we suffer from a boil on the skin, a disease of the kidney, or a troubled mind, careful study of the condition usually reveals it to consist of three major elements:

1. The stressor, the agent which started the trouble, for instance, by acting directly upon the skin, the kidney, or the mind.
2. The defensive measures, such as the hormones and nervous stimuli which encourage the body to defend itself against the stressors as well as it can. In the case of bodily injuries, this may be accomplished by putting up a barricade of inflamed tissue in the path of the invading stressor (the microbe, allergen, and so forth) or destroying a poison. Mental stressors (orders, challenges, and offenses) are met with corresponding complex emotional defensive responses, which can be summed up as the attitude of attacking and not giving in (catatoxic responses).
3. The mechanism for surrender, such as hormonal and nervous stimuli which encourage the body not to defend itself, for instance, not to put up barricades of inflamed tissue in the path of invaders nor to destroy them chemically but to ignore emotional stressors (syntoxic responses) [2].

Although Selye refers to surrender as hormonal and nervous stimuli reactions, he nevertheless, implies that people have a choice to eliminate the stressors themselves by adjusting the proportion between active defensive attitudes and measures of surrender. Surrender and not resisting could mean many things and it dependson each individual to come up with definition of what constitutes non-resistance. Meditation, religious faith and/or certain personal beliefs could be considered some forms of non-resistance or surrender.

Selye also suggests that deviation is important in combating mental stress, such as worry. He writes: "lf there is proportionately too much stress in any one part, you need diversion". Similarly, addressing attention diversion, Lazarus and Folkman (1984) cite a study that reported that encouraging subjects threatened with shock to think about something else was effective in reducing autonomically measured stress levels. Based on the citations above, meditation, hypnosis, relaxation, yoga, Zen, and many others could be considered some methods of achieving self-induced altered states of conscious by means of diversion.

Another option to effectively deal with the stress problem is to change coping to stress. Lazarus and Folkman (1984) argue that stress alone is not sufficient cause of disease. They state that to produce stress-linked disease other conditions must also be resent, such as coping processes that inadequately manage the stress [11]. Lazarus assigned two major functions of coping: problem-focused and emotional-focused. With respect to problem-focused function, a person obtains information about what to do and mobilizes actions for the purpose of changing the reality of the troubled person-environment relationship. Emotion -focused function is aimed at regulating the emotions tied

to the stress situation. For example, avoiding thinking about the threat or reappraising it, without changing the realities of the stressful situation [15].

Mindfulness meditation may be one example of emotion-focused coping. Mediation may serve as an opportunity for regulating the emotional process and to reappraise the threat by constructing a new relational meaning to the stressful encounter.

Cognitive Rumination

A common symptom of several affective disorders is the occurrence of "repetitive and unwanted thoughts" [27]. Many studies on rumination have utilized clinical samples of depressed individuals [28]. A significant number of these studies have been carried out by Nolen-Hoeksema, a researcher at Stanford University and now at University of Michigan, Ann Arbor. However, Harrington and Blankenship (2002) cite studies that relate rumination to posttraumatic stress disorder, increased fear, lower behavioral inhibition, and higher levels of aggression.

There is no consensus as to the operational definition of rumination. Webster's Dictionary defines the word to ruminate as "to go over the mind repeatedly and often casually or slowly" [25]. Nolen-Hoeksema (1993) considers rumination as a response style to depression. She defines it "as behaviors and thoughts that focus one's attention on one's depressive symptoms and the implications and consequences of these symptoms". A different definition was advanced by Martin and Tesser (1996) [17,29]. They defined rumination as "a class of conscious thoughts that revolve around a common instrumental theme and that recur in the absence of immediate environmental demands requiring the thoughts".

Martin and Tesser' s definition focused on the concept of goal attainment [28]. Further, some define rumination as related to unintended thoughts about the past. Gold and Wegner (1995) defined rumination as "repeated thoughts unexpectedly and automatically dominate our awareness to the point that they become noticeable and bothersome [30]".

Although the various definitions relate rumination to different variables i.e., depression, attainment of goals, or focusing on the past, it seems safe to assume that rumination involve unwanted, disturbing, and intrusive thoughts. Moreover, rumination seems to have a core theme that it revolves around focusing on the self. To further complicate matters, rumination may overlap with different forms of thoughts such as worry, obsession, and even reflection. For the purposes of this study, rumination is defined as unwanted and repetitive thoughts that have self-focus and self-evaluation components.

Some researchers attempted to find out who ruminates. Spasojevic and Lauren (2001) found that among a sample of 137 participants, those who reported higher levels of negative cognitive styles, self-criticism, dependency, neediness, and a history of major depressive episodes tended to ruminate more when depressed [20]. The researchers concluded that the depressive risk factors such as self- criticism, dependency, neediness, and a history of past depressive episodes and the subsequent major depressive episodes were mediated by ruminative response style. Further, they conclude that the results of their study provide strong support for the role of rumination as a common proximal mechanism relating depressive risk factors to depression. Since, stress may be considered a risk factor for depression; rumination may also mediate stress and depression. In other words, rumination may act as a mechanism relating stress to depression. Moreover, since depression and stress are correlated, it is possible that stress and rumination are also correlated at least in depressed people. According to Nolen Hoeksema's views, it may be that rumination is what actually maintains the depressive states. It is not uncommon to see that even when stressful or other conditions that may have caused depression in the first place have ended depression persists [1,3,31].

There is strong evidence that people who engage in rumination have higher levels of depressive symptoms over time [19]. Nolen-Hoeksema and Morrow measured students' emotional health and styles of responding to negative moods 14 days before the Loma Prieta earthquake, 10 days after the earthquake, and again after 7 weeks. The goal was to test predictions about which students would show the most enduring symptoms of depression and posttraumatic stress. Results showed that students who before the earthquake already had elevated levels of depression and stress symptoms and a ruminative style of responding to their symptoms had more depression and stress for both follow-ups.

Analyses from another study showed that rumination predicted depressive disorders and anxiety symptoms [18]. Nolen-Hoeksema administered measures for depression that included the Beck Depression Inventory (BDI), Hamilton Rating Scale for Depression (HR.SD), and the Structured Clinical Interview for DSM-IV (SCID); rumination (the Response Style Questionnaire); and anxiety (Beck Anxiety Inventory*:* BAI) for a sample of 1317 people. Of these, 1132 people were given the same measures one year later. The results indicated that respondents who were diagnosed with depression on Time 1 and those who were diagnosed with depression on Time 2 had significantly higher scores on ruminative responses at both Time 1 and Time 2 than respondents who were not diagnosed with major depressive disorder. Moreover, Time 1 ruminative responses predicted

the severity of depressive symptoms at Time 2 among people who were not depressed at Time 1. Similarly, ruminative responses at Time 1 and Time 2 were found to be significantly correlated with anxiety symptoms.

From reviewing the literature on rumination, there appears to be a strong link between rumination and depression. Therefore, it is logical to assume that the areas involved in depression and stress, such as the prefrontal cortex, hippocampus, and amygdala, may also be involved in rumination. It is known that the amygdala is an important nuclei associated with generating appropriate responses to threatening situations. It is essential for matching environmental cues with negative emotions such as disgust, fear, or anger. Lovallo (1997) writes that it is the prefrontal cortex that begins evaluating and appraising the stressful situation. It automatically begins to engage in planning a course of action in response to the situation. Moreover, it coordinates its activities with the hippocampus and the amygdala in the temporal lobe where memories of similar events have taken place. Continuation of stressful conditions lead to continued appraisal and reappraisal and planning of course of actions as necessary means for coping and coming up with solutions to the perceived problems or stressful situations. Stress may require therefore heightened attention and preparation for an action plan. As a result, the attention and the preparation for the execution of a plan may activate mental areas of the brain such as memory and emotional circuits that in animals are beneficial to remind them of previous danger and the best way of escaping from predator or coping with danger [15].

In humans, the continued stress causes these circuits to be overactive.

Thus, the amygdala and the hippocampus, the centers for emotions and memory, cause the organism to experience negative emotions, which in tum produce more negative thoughts. Harrington and Blankenship write: "According to semantic network theory, a negative mood activates a network of negative memories, enhancing accessibility and probability of retrieval of these memories, as well as the retrieval of negative beliefs and schemas about the self and the world" [28].

Thus, with continued exposure to stress, the evaluation of the situation shifts to the evaluation of the self. Consequently, failing to come up with a successful strategy and an effective coping to the stressful conditions may lead to increased focus on short-comings, failing, and other negative feeling states. Therefore, it will no longer be just the stressful situations that cause negative mood, but it becomes more about the perception of success or failure on the part of the individual in dealing with the situation. This may give rise to increased rumination. As a result, attempts to appraise and evaluate the stressors and continuously struggling to find solutions may lead to increased rumination and focus on the negative feelings experienced by the self. Therefore, one option to dealing with the tendency to ruminate on the self is to not focus on the self. That could be accomplished my means of distraction. Distraction could be defined as purposefully turning one's attention away from one's self to pleasant or natural thoughts or actions. Nolen-Hoeksema found that depressed subjects who engaged in distracting tasks became less depressed [17]. In contrast, depressed subjects who engaged in ruminative tasks became more depressed. Thus, rumination may increase depression by virtue of continued negative self- statements. Therefore, successful coping strategies for dealing with stress, which may have caused the depression in the first place, are to engage in distracting tasks. Stress reduction methods such as meditation may be the most helpful way to offer pleasant distraction.

Meditation

With the new understanding of the dangerous effects of stress, and with the awareness of how one' s own ways of attempting to manage and cope with stress may be making the negative impact of stress even worse, it is important to seek more effective methods of handling stress at its early stages. Stephen McDaniel (1996) reports numerous studies that investigated interventions that were designed to reduce stress [21]. Among the studies reported were relaxation training, writing about personal traumas for 20 minutes a day, viewing humorous films, and physical exercise. The author reports that these intervention studies show some evidence that psychological interventions may enhance or protect immune functions, although he acknowledges that the mechanism by which these changes occur remain elusive.

Mediation has been associated with a general sense of well-being and has long been recognized as a tool for stress reduction. Many stress reduction programs utilize meditation as a method for stress management. Before venturing further into the study of the effects of meditation, it may be useful to briefly identify some forms of meditation and present some definitions. In the glossary of *Mind Science: An East-West Dialogue,* Goleman and Thurman (1991) describe meditation as a general term for the methodical utilization of attention, thought or concentration to realize specific understandings or insights [32,33].

Miller (1999) writes that although mediation practice is often identified as a relaxation response, the focus is on meditation as an approach to developing mindfulness, whether at a physical, psychological, or spiritual level. Miller describes two basic types of meditation practice: mindfulness meditation and concentrative mediation [23]. In mindfulness

practices, the mediator develops an awareness of any mental content, including thoughts, imagery, physical sensations, or feelings, as they consciously occur on a moment-to moment basis. Concentrative practices focus on a specific object of attention, such as a candle flame, mandala, repeated word or a mantra, or awareness of the breath. An example of concentrative meditation is transcendental meditation (TM), where the practitioner repeats a Sanskrit term as the focus of his/her meditation. Mindfulness meditation is another form of mindfulness practice, where the meditator pays attention to his/her immediate experience in an attitude of acceptance. Still, there are less known types of meditation. One form, gTum-mo, sometimes called "furor meditation", because of the heat it generates, is a sophisticated visualization program that can direct intense heat to generate specific desired inner experiences [33].

Effects of Meditation

There are many studies that report positive effects of meditation on stress management and on physical and mental health and well being. One study showed that regular meditation reduces psychological stress, enhances functional status and well-being, and reduces physical symptoms [24]. Reibel, et al. collected pre-and post-intervention data from 136 subjects who participated in an 8-week stress reduction program that required them to practice 20 minutes of meditation daily. The results showed reduction on psychological distress as indicated by the Symptom Checklist-90 Revised (SCL- 90-R). There was a 38% reduction on the Global Severity Index, a 44 % reduction on the anxiety subscale, and a 34 % reduction on the depression subscale. One-year follow up revealed maintenance of initial improvement. The researchers did not address why meditation helped. It is also noteworthy to mention that the study did not have a control group, a significant weakness that reduces generalizability. Nevertheless, the findings, when taken into consideration with many other studies that found meditation to be effective, can be meaningful.

Mindfulness meditation has been found to be effective in the treatment of anxiety disorders [6]. The study examined the efficacy of stress reduction programs such as mindfulness meditation and relaxation program treating patients diagnosed with anxiety and depressive disorders according to the DSM-III-R criteria. Out of 321 patients who were referred to the stress reduction and relaxation program, 192 patients satisfied the initial screening criteria of the SCL-90-R and the Medical Symptom Checklist for panic and anxiety-related symptoms. However, only 24 met the criteria of the DSM-III-R for generalized anxiety disorder or panic disorder with or without agoraphobia. Of these 24, 22 subjects completed the program. Subjects were evaluated on the following measures at weekly intervals from the time of recruitment through the end of treatment and at monthly intervals for 3 months after treatment: *Beck Depression Inventory, Beck Anxiety Invent01y, Hamilton Scale for Anxiety, Hamilton Rating Scale for Depression, Fear Survey Schedule,* and the *Mobility Jnvent01y for Agoraphobia.* Repeated measures ANOVAs indicated that the Hamilton and Beck anxiety and depression scores significantly decreased over the course of the intervention and these changes were maintained from post-treatment to follow up after three months. Moreover, the number of subjects experiencing panic symptoms was also substantially reduced. Kabat-Zinn, et al. believe that mindfulness meditation achieve its effects by helping participants to cultivate greater concentration and relaxation. Kabat-Zinn, et al. write that "patients who were able to identify anxious thoughts as thoughts, rather than as " reality" report that this alone helps reduce their anxiety and increases their ability to encounter anxiety-producing situations more effectively" [6].

In another study, Shapiro, et al. (1998) examined the short-term effects of mindfulness meditation on medical and premedical students (N === 78) [9]. Subjects were randomly assigned to a 7-week mindfulness-based intervention group and a wait-list control groups. The measures used were: *Empathy Construct Scale* which measures overall levels of empathy, SCL-90-R, which measures psychological distress such as anxiety, depression, and hostility, *The State and Trait Anxiety Inventory,* and the INSPIRIT *(The Index of Core Spiritual Experiences).* A MANOVA was conducted to compare the intervention and control groups along six outcome variables: depression, state anxiety, trait anxiety, hostility, empathy, and spirituality. The study found significant results. The intervention group reported less depression, less state and trait anxiety, decrease in the GSI (General Severity Index) of the psychological symptoms measured by the SCL-90-R, increase in empathy, and increase in spirituality. The researchers provided many possible explanations for these findings. Among them was that mindfulness training may have provided a powerful cognitive-behavioral coping tool, since cognitive-emotional appraisal of situations is what determines the stress. Moreover, mindfulness meditation could have invited participants to view stress as a challenge instead of a threat. Further, mindfulness meditation could have facilitated physiological relaxation, which might partially contribute to reduction in psychological symptomatology. Finally, Shapiro, et al. made a strong case for self-regulation as a crucial mechanism, which might have contributed to the changes in psychological and physical health.

Furthermore, there is evidence that mindfulness

meditation lower stress levels, depression, anger, and anxiety in cancer patients [10]. The study assessed the effects of mindfulness meditation on mood disturbance and symptoms of stress in 90 cancer outpatients who were assigned to treatment group and a wait-list control group. Instruments used were: The *Profile of Mood States* (POMS), a measure widely used to assess fluctuating affective states, and *Symptoms of Stress Inventory* (SOSI), designed to measure physical, psychological, and behavioral responses to stressful situations. The treatment groups received a 7-week, 90 minute sessions of didactic and experiential learning in addition to mindfulness meditation. Scores were analyzed using one-way ANOVA to compare the treatment and control groups at two time periods pre intervention and post-intervention. Results showed that mindfulness meditation reduced mood disturbance, fatigue, and stress related symptoms in cancer patients. Spica, et al. attributed the effects to expectancy effects, trust in the instructors, and giving participant's active role in their own care. However, the study's limitation was the absence of other intervention or control groups. The study combined mindfulness meditation with other experiential and didactic exercises. Moreover, it did not follow up on the subjects to assess whether the long-term benefits are lastingeffects.

Explanations of Meditation Effects

Miller (1999) considers five models that explain the beneficial effects of meditation: (1) as a physiological relaxation technique; (2) as a way of changing neurological function; (3) as a type of positive addiction; (4) as a metacognitive intervention; and (5) as promoting spiritual and existential growth. The first model considers meditation effective to the extent that it elicits a deep physical relaxation [23]. Benson (1991) attached intravenous catheters, intra-arterial catheters, electrodes to healthy meditators to measure their heart rate and rhythm, electrodes to measure brain waves, and masks to capture expired breath to measure metabolism [34]. He divided the experiment into three periods: a pre-meditation period, meditation period, and a post-meditation period, each lasting twenty minutes. After meditating, there were decrease in metabolic activity, dramatic changes in oxygen consumption, and changes in elimination of carbon dioxide. Benson writes: "We believe that what was occurring during mediation was a response that is opposite to the stress response. During the stress response, the so-called 'fight-o r-flight' response, there are increases in metabolism, blood pressure, heart rate, and respiration rate." Benson termed the response that occurs during meditation the 'relaxation response'. He argues that when this response is elicited repeatedly, it can counter the harmful effects ofstress.

Miller (1999) cites studies that have documented electroencephalographic changes that occur during meditation. For example, he lists studies that have shown changes in right-hemispheric functioning, changes in hemispheric laterality, and changes in hemispheric brain activity [23]. Goldberg (1995), claims that meditation produces a balanced state in the neurochemical environment of the body and reduces stress related hormone levels such as dehydroepiandrosterone sulphate (DHEA-S) [30]. Regarding meditation as positive addiction, Miler (1999) writes: "As with exercise and other lifestyles habits, the regular practice of meditation can become intrinsically rewarding." In the same paragraph, Miller writes that as a result of repetitive meditation, a gradual shift in one's attitude toward thinking, particularly in terms of how cognitions may give rise to negative or disturbing emotions, appears central to many reports of therapeutic benefit [23]. Finally, Miller writes in the same section that meditation as spiritual and existential practice cultivates a sense of inner calm, harmony, and transcendence. He writes: "Meditation may accomplish this by providing a technique that 'turns off' or 'bypasses' cognitive preoccupations and concerns, allowing access to these other aspects of living."

It is also possible that meditation lowers cortisol levels in the blood, which is released in response to stress. Cortisol is released into the blood stream when the hypothalamus signals to the pituitary gland to release corticotrophin factors, which in turn instruct the adrenal glands to secrete cortisol in response to stressful situations. With stress abating, the hypothalamus signals to the pituitary and the adrenal glands to stop releasing stress hormones such as cortisol. Thus, the individual feels relief. With lower levels of stress experienced by the individual, negative emotional arousal goes back to base rate and activities pertaining to coping strategies and planning will not be necessary and will be diminished. As a result, the individual focus on self-negative statements will be reduced, and in a sense, there will be fewer tendencies for rumination. Future studies of neuroimaging of the prefrontal cortex and the emotional complex nuclei are needed to compare individuals while under stress, while meditating, and while ruminating. Such studies will lend credible scientific evidence to the previous arguments.

Purpose of the Study

There have been no studies on the relationship between meditation and cognitive rumination and there is only one study that attempted to find a relationship between stress and cognitive rumination [35]. The study measured cortisol secretion in the saliva in response to a stressful situation in subjects who were either high ruminators or low ruminators. The investigators compared females who scored high on rumination to those who scored low on rumination. The stressful condition

was a mock job interview in front of a panel of judges (the Trier Social Stress Test). Saliva cortisol was collected to assess neuroendocrine response. Although there was a clear effect of the stressor on saliva cortisol secretion, there was no difference between the two groups. The researchers attribute the lack of significant difference to the fact that the stressful task itself may not have been optimal for testing their hypothesis. It is noteworthy to mention that the stressful situation that was included in the study entailed a one-time induction of stress, a mock job interview in front of a panel of judges. This type of stressful situation is very different from everyday stress that this study intends to assess. In addition, the stress measure that will be used in the study pertains to accumulated daily stressors. The relationship between the frequency and severity of daily stressors, as measured by the *Daily Hassles Scale,* and cognitive rumination, as measured by the *Short Response Style Questionnaire,* will be investigated.

To date, no study has investigated the relationship between meditation and rumination. Therefore, one of the current study's aims is to explore the possibility that a relationship exists between the two variables. Furthermore, no one has been able to explain how meditation produces its positive effects and how stress is relieved. This study proposes that rumination may be one possible link that may connect meditation and stress. It is expected that there is a positive correlation between stress and rumination and that there is a negative correlation between meditation and rumination.

Hypotheses

- There will be significant positive correlations between stress and cognitive rumination, stress and depression, and depression and cognitiverumination.
- There will be significant negative correlations between meditation (hours of meditation in the past week) and cognitive rumination, meditation and stress, and meditation and depression.
- Non-meditators will score higher than meditators on stress, depression, and rumination.
- When the effects of depression are statistically removed, a significant positive correlation between stress and rumination, and significant negative correlations between meditation and stress, and between meditation and rumination will remain.

Chapter II

Method

Design

A demographic questionnaire and three self-report measures were given to participants. Measures of daily stress, cognitive rumination, and depression were included so that the relationships among these three variables could be assessed. Demographic information included current meditative practices, age, gender, ethnicity, income, occupation, years of education, relationship status, and relationship satisfaction.

Participants and Procedures

The sample was composed of community residents from the San Francisco Bay Area. By power analysis it was estimated that the minimum number of participants needed in the study was 64.

Measures and demographic questionnaire were given to participants through in-person direct solicitation to community residents at locations such as grocery stores and college "hang-outs." Participants were asked to answer the questionnaire on the spot. All elements of informed consent were provided in the letter of introduction (see Appendix A). Confidentiality was ensured through anonymity. There were no names or other identifying personal information required. Participants were told that they could receive a written summary of the results at the completion of the study upon request.

Measures

Demographic Questionnaire

This questionnaire (included in Appendix B) gathers information on personal demographics such as age, gender, ethnicity, education, income, relationship status, relationship satisfaction, current meditation and stress reduction practices.

Beck Depression Inventory-Second Edition The BDI-II is a self-report measure used to screen for depression. It consists of 21 statements, each scored 0-3. The total score is obtained by adding the highest score circled for each of the items [36]. The BDI-II requires between 5 and 10 minutes to complete, and assesses depressive symptoms over the preceding *two weeks.*

Normative data were collected from four different psychiatric outpatients clinics (N = 500) and one college-student group (N = 120). In terms of reliability, the coefficient alpha of the BDI-II for the outpatients was .92 and .93 forthe college students ($p < .05$) (Beck, et al., 1996, p. 15). Test-retest correlation of a subsample of 26 out patients who took the test twice, with retest approximately one week later, was .93 ($p < .001$). To estimate the convergent validity, 191 outpatients were administered the amended *Beck Depression Inventory* (BDI-IA) and BDI-II, with at least one other instrument given between the administration of the two versions of the BDI. The correlation between the BDI-IA and BDI-II was .93 ($p < .001$). Moreover, the manual provides evidence of positive correlations between the BDI-II and several other depression measures such as the Hamilton Rating Scale for Depression.

Daily Hassles Scale

The *Daily Hassles Scale* is a 117-itemquestionnaire that assesses frequency and severity of minor stressors [37]. Minor stressors are conceptualized as frequently-occurring annoying or unpleasant events rather than major life events. The *Daily Hassles Scale* is one of the scales of the "The Hassles and Uplifts Scales." According to the manual, administration of the *Daily Hassles Scale* takes roughly 5-10 minutes. Respondents use a four-point scale: none or did not occur, somewhat severe, moderately severe, or extremely severe. An example item is "worries about decisions to change jobs." The instrument can be given with various time frames (past month, past week, yesterday, and today). The most commonly used time frames are one month and one week; this study will use the time frame of *one week.*

The original item pool of the *Daily Hassles Scale* consisted of a list of hassles that was believed to be representative of the sources of daily life stress.

The list was tested for its adequacy with a sample of Kaiser Permanente Health Maintenance Organization. On the basis of the data, the set was revised to include 117 items.

The revised set was used in a yearlong study of 100 men and women who self-administered the questionnaire oncea monthfor nineconsecutive months.

Normative data provided in the test manual were collected from three different samples (N = 980). One sample was the group studied over nine repeated administrations (N = 100 white, middle-class adults) and the other two samples were 432 college students and 448 community adults.

Reliability and validity data included in the manual provide support for the soundness of the scale. Reliability, as measured by stability (the correlation of scores in successive time periods), was higher for the Frequency measure (.79) than for the Severity measure (.48) [38].

In regard to its validity, the *Daily Hassles Scale* has shown moderate but significant correlations with the hassles portion of the Combined Hassles and Uplifts Scales (.43 for frequency and .54 for severity). Moreover, daily hassles were related to somatic health problems (.30-.40) and psychological symptoms scores (.50-.60). In addition, when daily hassles and life events were used as predictors of psychological and somatic health, the daily hassles explained more variance than did life events.

Short Response Style Questionnaire

The *Short Response Style Questionnaire* is a 10-item that measures cognitive rumination [16,19]. It is a brief form of the original questionnaire (RSQ) developed by Nolen-Hoeksema in 1991. The questionnaire uses a 4-point Likert scale ("never" to "always") and participants are asked to indicate the frequencies of depressed mood that are self-focused. (e.g., "Think about all your shortcomings, failings, faults, mistakes").

Previous research has shown that the original 22 item rumination scale on the RSQ has good internal consistency (Cronbach's alpha coefficient a= .89; Nolen-Hoeksema & Morrow, 1991), (a =.88; Siegle, Steinhauer, Carter, & Thase, 2000), 5-month retest reliability (r = .80; Nolen-Hoeksema, Parker, & Larson, 1994). The 10-item SRSQ had a coefficient alpha of .87 [38,39]. In regard to validity, concurrent validity of the original 22-item scale have been shown to correlate significantly (r = .62) with another measure of ruminative responses in a 30-day-diary study [19]. Scores on the 10 item SRSQ correlated at $r = .54$ ($p < .001$) with *Beck Depression Inventory* scores and at $r = .44$ ($p < .001$) with *Hamilton Rating Scale for Depression* [35].

Data Analyses

Demographic variables (age, gender, ethnicity, income, years of education, relationship status, and relationship satisfaction) were examined to determine the relationship between these variables and the experimental variables. Correlations, t-tests, and ANOVAs were used to examine these relationships.

Demographic variables were assessed as potential confounds.

The hypotheses were examined by a correlational design. The specific statistical procedures that were used to tests the hypotheses are:

- Pearson correlations were used to test the hypotheses that there would be significant positive correlations between (a) stress (as measured by DHS frequency and DR S-severity) and cognitive rumination (as measured by SRSQ), (b) stress and depression (as measured by BDI-II), and (c) depression and cognitive rumination.
- Pearson correlations were used to test the hypotheses that there would be significant negative correlations between meditation (as measured by hours of meditation in the past week) and cognitive rumination, meditation and stress, and meditation and depression.
- T-tests were used to test the hypothesis that non-meditators would score higher than meditators on stress, depression, and rumination.
- Multiple regression analyses were used to test the hypotheses that when the effects of depression are statistically removed, a significant positive correlation between stress and rumination, and significant negative correlations between meditation and stress, and meditation and rumination, would remain.

Chapter III

Results

Participants

Seventy seven packets were filled out by participants in person at two colleges, two meditation centers, and in front of grocery stores. Of these 77, five were unusable because the materials were not fully completed. Demographic information is presented in Tables 1 and 2. In general, the sample was primarily Caucasian females with a high level of education. Age varied greatly from a minimum of 18 and a maximum of70 years old *(M*= 37, *SD*= 12.96). Income level also varied considerably *(SD* = 39,847.29). One professional reported a yearly income of $200,000, four students and one unemployed individual reported zero income, and one skilled individual reported an income of $1800. Eight percent reported income higher than 100,000. Students made up the largest occupational group in the sample (46%). Finally, about half of the sample said they were in relationships whereas the other half indicated they were not. Those who said they were in relationships generally reported high level of relationship satisfaction *(M* = 8.60, *SD*= 2.29), with 10 being the maximum number that can be endorsed. There were more non-meditators than meditators represented in the sample, and the majority of meditators and non-meditators alike used other stress reduction methods.

Variable Gender	N	%
Female	50	69.44
Male	22	30.56
Ethnicity		
African American	1	1.39
Asian/Pacific Islander	8	11.11
Caucasian	48	66.67
Hispanic	6	8.33
Multi/Other	9	12.5
Income		
None	6	9.23
from 1-25000	19	29.23
from 25001-50000	15	23.08
from 50001-75000	12	18.46
from 75001-100000	8	12.31
over 100000	5	7.69
Occupation		
Clerical/Sales	4	5.56
Professional	24	33.33
Skilled	8	11.11
Student	33	45.83
Unemployed/Retired	3	4.17
Currently in Relationship?		
Yes	35	49.3
No	36	50.7
Meditator?		
Yes	29	41.43
No	41	58.57
Other Stress Reduction Methods?		
Yes	59	84.06
No	11	15.94

Table 1: Demographic Characteristics of the Sample

Variable	N	M	SD
Age	72	37.44	12.96
Income	65	47675 .38	39847.29
Years of Schooling	72	17.71	2.96
Relationship Satisfaction	35	8.6	2.29

Table 2: Additional Demographic Characteristics of the Sample

Table 3 presents the means and the standard deviations of the various experimental variables among participants. The mean for stress frequency in this sample is higher than the overall mean of a similar sample (M= 20.5, *SD*= 17.7) reported in the Manual for the Hassles and Uplifts Scale [37]. This difference is statistically significant, $t(70) = 5.24$, $p < .0001$. Similarly, the overall mean for stress-severity is higher than the mean reported in the manual *(M* = 1.47, *SD*= 0.39), t (70) = 10.08, p <.0001. It appears that the group of participants in this study is more stressed than the group reported by Lazarus and Folkman (1989) [37]. The sample reported by Lazarus and Folkman dates back to 1981. Therefore, the

22 years difference between the two samples may account for the increased stress reported by the participants in the present study, as modern life is more complex and may entail more demands and higher stress.

As for rumination, the overall mean indicates a mode rate amount of rumination. There was no published comparable sample available for purposes of comparison. The lowest possible rumination score that can be obtained is 10 and the highest possible score is 40. In regard to depression, the overall mean indicates minimal depression. The mean is not statistically significantly different than the mean of a normative sample (M = 7.65, *SD*== 5.9) (Beck, Steer, & Brown, 1996, pp: 11). Eighty-one percent of the sample in this study reported minimal depression (0-13), 12% reported mild depression (14-19), 6% reported moderate depression (20-28), and 1.3% reported severe depression (29-63).

Variable	N	M	SD
Stress-Frequency	**71**	31.66	17.96
Stress-Severity	71	46.59	37.7
Cognitive Rumination	72	20.79	5.3
Depression	72	7.58	7.34
Hours of Meditation in Past Week	27	2.55	2.46

Table 3: Descriptive Statistics for Experimental Variables

Correlations Among Stress, Rumination, Depression and Meditation

It was hypothesized that individuals who score high on stress as measured by DRS-frequency and DRS-severity would also score high on rumination as measured by SRSQ. Moreover, it was hypothesized that individuals who score high on stress would also score high on depression as measured by BDI-II. Finally, it was expected that amount of meditation as measured by hours of meditation in the past week would correlate negatively with frequency and severity of stress, correlate negatively with rumination, and correlate negatively with depression. As shown in Table 4, most of these hypotheses were supported. In other words, the higher the frequency and severity of stress were, the higher the rumination and depression. Moreover, the correlations between meditation and the experimental variables were in the direction predicted but notsignificant.

	Cognitive Rumination (n = 71)	Depression (n = 71-72)	Hours of Meditation in Past Week (n = 26-27)
Stress - frequency	.52 *	.64 *	-0.22
Stress - severity	.62 *	.74 *	-0.21
Cognitive Rumination		.68 *	-0.21
Depression			-0.32

* p < .0001

Table 4: Correlations among Stress, Rumination, Depression and Meditation in Past Week.

Differences between Meditators and Non-Meditators

It was hypothesized that non-meditators would score higher than meditators on stress, higher on depression, and higher on rumination. As shown in Table 5, these hypotheses were supported. Non-meditators reported higher stress frequency and severity and higher depression. The results of meditators and non-meditators in relation to cognitive rumination were in the direction predicted but not significant.

	Meditators(n=28-29)		Non-Meditators (n=41)		
	M	SD	M	SD	t
Stress - frequency	25.04	17.54	35.63	17	-2.51 *
Stress - severity	33.04	28.1	53 .12	36.52	-2.45 *
Cognitive Rumination	19.45	4.9	21.59	5.31	-1.71
Depression	4.79	5.28	9.29	7.68	-2.73 **

Table 5: Differences between Meditators and Non-Meditators on Stress, Rumination and Depression.

Controlling for Depression

It was expected that when the effects of depression are statistically removed, a significant correlation between stress and rumination would remain. Depression appears to be the strongest predictor variable in the relationships among depression, stress, and rumination, as shown in Table 4. When taking depression out of the relationships, there is no variance left over for rumination to contribute to variation in stress. Curiously, no significant correlation was found between hours of meditation and the other variables. Because there was no significant correlation between meditation and depression, there was no need to remove depression from rumination, stress, and meditation.

Demographics as Potential Confounds

There was a significant difference between males and females on depression with females scoring higher *(M* = 8.92, *SD*= 8.12) than males *(M* = 4.55, *SD*= 3.81), *t* (70) = -2.41, p = .02. There was a significant difference between those in relationship and those not in relationship on cognitive rumination, with those in relationship ruminating less *(M* = 19.51, *SD*= 5.03) than those not in relationship *(!vf* = 22, *SD*= 5.34), *t* (70) = -2.03, *p* = .046. Moreover, stress severity negatively correlated with relationship satisfaction, *r* (33) = -.40, *p* = .0154. Furthermore, hours of meditation negatively correlated with income, *r* (23) = -.41, *p* = .04. These two correlations should be interpreted with caution. A total of 20 correlations between demographic variables and experimental variables were attempted. Therefore, they may be significant by chance.

As Table 6 shows, correlations between depression and the other experimental variables are higher in females than in males. Although there was gender differences in level of depression, for both males and females considered separately, the relationship between depression and rumination persisted. Therefore, there does not seem to be any interaction between gender and depression and the other variables.

Females		Males	
r	n	r	n
Stress - frequency .69 ****	50	.52 *	
Stress - severity .78 ****	50	.56 **	21
Cognitive Rumination .72 ****	50	.46 *	21
Hour s of Meditation -.33 This Week	18	-0.28	11

Table 6: Correlations by Gender between Depression and Stress, Rumination and Meditation.

Chapter IV

Discussion

This study provides evidence of the positive correlations between stress and cognitive rumination, stress and depression, and depression and rumination. The study did not provide evidence for any significant negative correlations between meditation and stress, meditation and rumination, or meditation and depression. There were differences between non-meditators and meditators in relation to stress and depression. As for the differences in relation to rumination, the results were in the direction predicted but not significant, $p == .0914$. The implications of this study to the field of psychology will be discussed. Finally, the limitations of this study and suggestions for future research will be discussed as well.

Findings of the Study

The major focus of this study was the assessment of the relationships between stress and rumination, stress and depression, and depression and rumination. The findings suggest that there are significant positive correlations between both the frequency and severity of stress and rumination. As predicted, individuals who scored higher on stress measures also scored higher on rumination measures. The findings lend support for Lazarus' views on stress, coping, and emotions. Lazarus suggested that appraising and reappraising stress were behind experiencing stress and not the presence of the stressors themselves [14]. Appraising and reappraising stress are purely cognitive processes, which occur in the prefrontal cortex [15]. This study suggested that the appraisal of stress along with failed coping strategies would lead to rumination, which the study defined as negative self-evaluation.

Moreover, Lazarus added coping, especially when it is problem-focused, as another variable that contribute to stress. He suggested shifting the coping process to emotion-focused, which aims at regulating the emotions rather than trying to solve the stress-problem. Since the findings suggest that stress, depression, and rumination are positively correlated, any amount of increased stress would more likely involve increased depression and rumination.

The above findings are important in that could pave the way for future research on stress and rumination. Previous research found significant relationships between depression and rumination [19]. Other research found similar correlations between stress and depression [1,3]. As a result of this study's findings, future research may want to address the potential role of rumination as a factor in depression, which may be affected by the increase or decrease of stressful conditions.

Nevertheless, one much-vaunted stress reduction method, meditation, was not found to have significant correlations with stress, rumination, or depression. The findings did not confirm the hypotheses that significant negative correlations exist between meditation and stress, meditation and rumination, or meditation and depression. This was surprising since previous research reported that meditation did in fact reduce stress and depression [9,10,24]. It is plausible that because the design of this study was different than the aforementioned studies, the results were also different. For example, the studies cited earlier were experimental in nature. The researchers had control of the meditation method that was practiced. Their studies consisted of mindfulness meditation, which was based on a specific manual that participants practiced for eight weeks under the supervision of a qualified meditation facilitator. In the current study, participants were asked about meditation in general and how many hours they practiced in the past week if they were meditators. Therefore, it is possible that because many participants might have different concepts about what was meant by meditation, the amount of time spent of meditation may not be comparable.

To illustrate the significance of this point, one participant wrote that his meditation consisted of gardening. Another participant mentioned playing his guitar. While these methods may have meditation-related effects or benefits for the persons practicing them, they don't constitute what is meant by meditation here, which is deliberate and consistent effort to control thoughts by means of quieting the mind.

Another important point worth mentioning is that, as described in chapter I, meditation could be considered as a distracting tool, which reduces stress. This notion was based on Selye's assertion that deviation is important in combating mental stress, such as worry [2]. Similarly, Lazarus and Folkman cite a study that reported that encouraging subjects threatened with shock to think about something else was effective in reducing autonomically measured stress levels. Moreover, Nolen-Hoeksema and Morrow report that distraction shortened depressed moods [17].

However, in the same article, Nolen-Hoeksema and Morrow report that women are less likely to use distraction than men. As a result, it becomes an interesting point to think about whether women in this study conformed to the view advanced by Nolen-Hoeksema and Morrow. If so, then it could be argued that women may not have used meditation as a distracter, but rather used it primarily for purposes of visualization, relaxation, or imagery for instance. If this might be the case, then it could be considered one possible explanation why significant negative correlations between meditation and the experimental variables did not exist. It becomes a strong argument given that women make up 69% of the sample population in this study.

As for the results pertaining to meditation, although hours of meditation practiced was not correlated with stress, rumination, and depression, meditators as a group scored lower on stress and depression. Non-meditators and meditators did not differ on rumination. To explain the fact that non-meditators and meditators did not differ on rumination, it is possible that meditation may not have any significant relationship with rumination. Alternatively, the way meditation was measured could have impacted the results of any relationship where the meditation variable was involved.

While hours of meditation in the past week was not significantly associated with less stress, less rumination, and less depression, differences have been found between those who meditate and those who do not. Not surprisingly, a large number of participants, 72%, indicated that they would like to increase their meditation. This point to a belief that may be common among people that meditation has many health and spiritual benefits.

The most frequently used meditation methods reported by participants included Mindfulness meditation, chanting, focusing on the breath, and visualization. Interestingly, many participants said that they included prayer in their meditation. Eighty-two percent of meditators indicated they used other stress reduction methods in the past week while 85% of non-meditators said they used other stress reduction methods in the past week. The most frequently used other methods for reducing stress as reported by both meditators and non- meditators were yoga practice and exercise.

Implications of the Present Study

The present study provides useful information about the relationship between stress and rumination. Since rumination is implicated in depression, it may be helpful to investigate the role of rumination as a factor in depression, which is affected by stress. Moreover, it may become necessary to investigate whether stress reduction methods inversely affect rumination and depression. A potential area for future research would be to examine whether rumination, with its emphasis on intellectual processing of appraising stressful conditions, may impede emotional processing. Engaging in rumination in spite of its ineffectiveness as a coping method may indicate inflexible core beliefs and thought patterns. Thus, it would be of interest for future research to examine the similarities between rumination and maladaptive thought patterns, frequently referred to as automatic thoughts in cognitive behavioral therapy. Automatic thoughts often arise in response to certain conditions and situations that are distressing to the individual. These automatic thoughts are usually accompanied by intense emotional distress. If future research finds that similarities between rumination and automatic thoughts do exist, then it would be also useful to investigate whether cognitive behavioral techniques that are successful in reducing automatic thoughts would be also useful in reducing rumination.

Moreover, it will be important to pursue the question of whether or not practicing meditation helps reduce rumination. Since this study found positive correlations between rumination and stress and rumination and depression, utilizing methods that reduce rumination may have the added benefit of reducing stress and depression. It will be important in future research in this area to more thoroughly define meditation, and to measure the frequency and duration of meditation .Comparing the frequency and the duration of meditation would permit recommendations to clients what is most helpful in that regard.

Because the current findings are based on self-report measures, future studies may want to include daily logs and observation to enhance the validity of the self-report measures. Moreover, experimental studies are needed because such studies tend to have more control over the methods of meditation practiced. The meditation technique would be based on a specific manual and all participants would meditate the same amount of time. Furthermore, future research could also benefit from including participants like monks and other people who spend a considerable time meditating.

Limitations of the Study

This study was based primarily on middle-age Caucasian women. As shown in Table 1, females make up 69% of the sample and Caucasians make up 67%. This somewhat skewed sample places limitations on the generalizability of the results. A better sample might be more gender-and ethnicity-balanced, as well as including an equal number of meditators and non-meditators.

Included in the sample are individuals who answered the meditation questions in a way that raises doubt about the validity of the section pertaining to meditation. Many participants reported activities that they considered meditation but may not be considered as such by a more clear definition. Moreover, the sample of meditators may not be representative of the community of meditators. Had this study targeted monks or serious meditators who practice meditation intensely, the results may have been different. Likewise, had this study had an experimental design, in which meditation methods and duration were the same, other variables controlled, and participants randomly assigned to conditions, the results might have been very different. One difficulty in designing a correlational study compared to an experimental one was how to operationally define the term meditation, so it would have the same meaning for all participants. Clearly, this attempt was not successful. Although the sample of meditators included students of meditation in two Bay Area mediation centers, some concerns remain. The students may have not been serious meditators or may have been novices. More effective steps to address these concerns would have been to visit some monasteries and have monks fill out the questionnaires. In that case, the sample of meditators would be more representative of the meditation community than the sample included in this study.

In addition, because this is a correlational study, the results can only indicate that a relationship does or does not exist between the variables.

Causation could not be inferred or asserted. Therefore, experimental studies are needed where this type of causation is studied under much stricter controls that permit manipulation of the independent variables.

Moreover, the questionnaires used in this study are crude measures. They are situational. Participants were asked about a time frame of the past week. As a result, what participants reported may have not been an accurate representation of what they are normally like or what they usually do. Furthermore, there are some questions about the suitability of the SRSQ measure. The SRSQ is used to measure rumination within depressive symptoms. A more suitable measure would be one that is not specifically designed to focus on depressed mood. Other measures were located but were rejected because they were inappropriate for the purposes of the present study. For example, the Scott-McIntosh Rumination Inventory Scott & McIntosh was not used because, as stated by Harrington and Blankenship, of its focus on goals. More precise measures could be developed in futurestudies [28,40].

A total of 9 Pearson correlations are in Table 4. Thus if the classic Bonferroni correction is done, we should not consider any of the 9 correlations meaningful unless we get a p-value of less than .05/9 or .0056. However, it seems that all of the significant correlations had $p < .0001$, so even with the Bonferroni correction, the pattern of significant results is the same. If we also apply the correction to the 4 t-tests shown in Table 5, then we should only consider a difference meaningful unless we get a p-value of less than .05/4 or .0125. In table 5, it's shown that the stress variables were significant $p < .05$ but since the exact p-values are not given, we don't know if they meet the more stringent criterion of $p < .0125$. As for testing whether the assumptions for multiple regression analysis are satisfied, it's impossible to determine since the original datasets were lost due to unfortunate circumstances. This's yet another limitation of the study, although this could have been easily rectified if the original data is available using SPSS or similar statistic program.

Conclusion

The study found significant positive correlations between stress, rumination, and depression. The findings suggest that participants who reported high stress-frequency and high stress-severity tended to ruminate more than those who reported less stress-frequency and less stress-severity. Moreover, the findings point to negative, but not significant, correlations between meditation and stress, mediation and rumination, and meditation and depression. However, meditators on general scored lower than non-meditators on stress and depression. These findings present an opportunity that could inspire future experimental research about the relationship between stress and rumination. Such studies would then permit conclusions about causal relationship among these two variables. Since rumination is also associated with depression, it becomes important to find methods that could reduce rumination. The ultimate goal would be to reduce states of depression and stress. One suggestion mentioned earlier is to investigate whether cognitive behavioral techniques that reduce automatic thoughts would also reduce rumination. This suggestion is based on the premise that automatic thoughts processes are similar to rumination. Further studies are needed to research whether they are similar ornot [18,41,42].

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