THE EFFECTS OF SENSE OF COHERENCE AND RUMINATION ON SLEEP QUALITY

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Sleep quality is a problem for many adults. Poor sleep quality impacts daily function and overall health (American Academy of Sleep Medicine, 2008). The purpose of this study was to determine the effects of sense of coherence (SOC) and rumination on sleep quality. Rumination was measured as a mediating variable. Participants completed an on-line survey through snowball sampling and age ranged from 30-65 years. The majority of participants were female, 64.5% (n= 136), and most participants were Caucasian, 92.2% (n= 188). Results indicted a significant difference with rumination and gender $t(209)= 3.02$, $p= 0.002$. Structural equation modeling was used to determine the strength of the effects of SOC on sleep quality. Four path analyses were conducted: the SOC Sleep Quality Model that had a direct pathway between SOC on sleep quality, the Rumination Mediator Model that included rumination mediating SOC and sleep quality, the Complex Model that combined both the SOC Sleep Quality and Rumination Mediator Model, and the Comprehensive Model that incorporated the Complex Model and included sleep hygiene. The results indicate the SOC Sleep Quality Model had the best model fit. Rumination acting as a mediator did not strengthen the relationship between SOC and sleep quality, and sleep hygiene did not strengthen the overall model fit. It is possible that SOC may act as a mediator between rumination and sleep quality. More research is needed to determine the relationship between SOC and sleep quality and SOC and rumination. Sleep specialists and health educators may provide better resources for patients with sleep quality problems. The improvement of sleep quality will lead to better overall health and daily functioning.

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CHAPTER I

INTRODUCTION

Overview

In the United States, approximately 60% of the general population report sleep problems a few nights a week or more (National Sleep Foundation [NSF], 2008b). The NSF reports that thirty-eight percent of adults experience daytime sleepiness serious enough to impact their daily activities (2008b). Sleepiness is caused by inadequate sleep quality, which is defined as the depth or restfulness of sleep and the length of time spent sleeping (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Sleepiness can cause extreme fatigue effecting the accuracy of operating equipment. Fatigue is mental or physical exhaustion (Merriam-Webster Online Dictionary, 2009) and contributes to 100,000 car crashes that result in 71,000 injuries, 1,500 deaths and $12.5 billion per year (U.S. National Highway Traffic Safety Administration, 2008). With such serious consequences, it is important to understand what causes sleep deprivation and find solutions to improve sleep quality.

Among the several known factors that effect sleep quality, emotions and behaviors are paramount. Examples of behaviors that can decrease sleep quality include rumination (Guastella & Moulds, 2007) and poor sleep hygiene (Mastin, Bryson, & Corwyn, 2006). Rumination is the behavior of reflecting on past distressful events or worrying about future events (Nolen-Hoeksema, 1987). Rumination prevents problem

solving thinking to remedy problems and is considered unproductive. Sleep hygiene is defined as the habits, behaviors, actions and thoughts that impact sleep quality (American Academy of Sleep Medicine, 2009b). Poor sleep hygiene includes negative sleep behavior habits such as such as drinking caffeine close to bedtime or watching television in bed. These negative sleep behavior habits can impede the ability to fall asleep and stay asleep.

The Theory of Salutogenesis offers a strong foundation to conduct research on sleep quality while incorporating rumination and sleep hygiene as part of the research. The theory has been used previously to measure health because it offers insight into the origins of health, and why some people remain healthy while others do not (Eriksson & Lindstrom, 2006). Using the salutogenic theory to research sleep quality may offer greater understanding on how to improve poor sleep quality and lead to the development of health education programs for increasing sleep quality.

Theory of Salutogenesis

Aaron Antonovsky, an American sociologist, constructed the Theory of Salutogenesis in an effort to understand the origins of health. The Theory of Salutogenesis has become a major international theoretical framework in the field of health. The word *saluto* is the Greek word for health and *genesis* denotes Greek derivation (Antonovsky, 1979). Salutogenesis is defined as the origin of health and focuses on the movement towards health (Lindstrom, Eriksson, 2006). The Theory of Salutogenesis states health is a continuum; people are not in perfect health, but are on a

health ease/dis-ease continuum (Antonovsky 1979; Antonovsky, 1987). The salutogenic theory views health as dynamic in nature (Eriksson & Lindstrom, 2006). The search for salutogenesis is the main principle of the theory and indicates searching for healing and repair and finding the origins of health.

The Theory of Salutogenesis contends that stressors are everywhere. Stressors are defined by Hans Selye (1956) as "that which produces stress" (p. 64). Selye defined stress as the body's non-specific response to demands made upon it (1956). The human body attempts to adapt to stress to promote health (Antonovsky, 1987). Humans respond differently to stressors even if the stressors are similar. The individual responses to stress can cause variation in health.

Although stressors vary per person, the theory is universal across all cultures and ethnic contexts. All people fall somewhere on the health ease-disease continuum, despite the skilled or unskilled ability to manage chaos (Antonovsky, 1979). The global theoretical orientation yields itself to researching groups, rather than individuals. In the development of the theory, Antonovsky found that populations could be studied to determine health because everyone succumbs to being bombarded with stressors in this heterostatic environment. Simply studying one individual was not as productive because everyone responds to stressors differently, and viewing populations overall is more effective in determining successful coping.

> The Theory of Salutogenesis holds two main components to lend support to the idea of how humans can move towards health and manage stress: General Resistance Resources (GRR) and Sense of Coherence (SOC).

General Resistance Resources

General resistance resources (GRR) are biological, material and psychosocial factors that enable people to live life in a coherent, comprehensible and consistent manner (Antonovsky, 1987). GRR can accumulate through life and may be learned through socialization. Examples of GRR are money (material), intelligence (biological) and social support (psychosocial). These resources allow people to manage the challenges of life. However, GRR must be attainable for one's use. The resources offer the ability to manage life stresses and construct coherence of life experiences. GRR lead to experiences in life that encourage a strong SOC.

Sense of Coherence

Sense of coherence (SOC) is the belief that one can manage in any situation regardless of what else is occurring. SOC is a resource that offers people the ability to manage tension, to self reflect on their resources and use them (Eriksson & Lindstrom, 2006). SOC promotes effective coping, i.e., acknowledging solutions and resolving problems. SOC develops through childhood and adolescence, and by age 30, SOC is relatively stable. However, SOC can fluctuate throughout life. The salutogenic theory contends that by age 30 most people have found a career and have a general understanding of who they are (Antonovsky, 1987). SOC is flexible and is considered a skill set that is set in place (Antonovsky, 1993).

Sleep Quality Research

Sleep research has covered many topics such as sleep quality and sleep disorders. Sleep deprivation has been associated with several serious health conditions such as obesity, diabetes, myocardial infarctions, and high blood pressure (American Academy of Sleep Medicine, 2008). The American Academy of Sleep Medicine reported that being sleep deprived increases the risk of age-specific mortality (2008). Sleep quality is essential for maintaining good health, yet despite ample research on sleep quality, many Americans still experience sleep deprivation.

Sleep researchers have also reviewed behaviors with sleep disorders. Researchers have documented that emotions such as rumination can negatively impact sleep quality (Borkovec, 1982; Guastella & Moulds, 2007; Thomsen, Mehlsen, Christensen, & Zachariae, 2004). The intrusive negative thinking can depress an individual's quality of sleep and result in difficulties falling asleep and remaining asleep (Thomsen et al., 2004). While there has been ample research on sleep quality alone and some studies examining both sleep quality and rumination, there has been no previous research directly studying the relationship between sleep and sense of coherence. SOC has been found to be associated with perceived health (Eriksson & Lindstrom, 2006) and is important to consider when researching sleep quality.

Rumination Research

Rumination has been found to negatively impact health (Nolen-Hoeksema , 2000) such as increasing depression. Researchers must consider targeting rumination when

studying sense of coherence and sleep quality because rumination has been found to impede sleep quality due to intrusive thoughts and an active mind (Thomsen et al., 2004). Rumination is a common behavior, particularly among women (Nolen- Hoeksema, Morrow, & Fredrickson, 1993).

Statement of the Problem

Sleep quality is a major problem in the United States and impacts the ability to perform and function in society. Poor sleep quality increases the risk of health problems (American Academy of Sleep Medicine, 2008). Behavioral challenges such as rumination promote poor sleep quality. In a study by Thomsen et al., rumination was measured to determine the effects on sleep quality (2004). The study included the Rehearsal Scale of the Emotional Control Questionnaire to quantify rumination (Roger & Najarian, 1989). Researchers from the Thomsen et al., study (2004) reflect the following about using various rumination scales:

> The fact that the relationship is found for a healthy population illustrates the continuous relationship between rumination, subjective sleep quality and negative mood. Our results, however, need to be replicated possibly using several different measures of repetitive thoughts capturing different aspects of this concept. (p.1300)

In order to extend the body of knowledge regarding rumination and the effects on sleep quality, this study proposes measuring rumination through the Rumination-Reflection Questionnaire which has been designed specifically to measure rumination (Trapnell & Campbell, 1999).

A study on SOC and disease found an association with SOC and cancer mortality (Surtees, Wainwright, & Khaw, 2006). The study concluded with a quote stating,

> Future research should be guided by a biopsychosocial model—for example, establishing whether health and lifestyle behaviors are either intermediate or confounding factors and by including consideration of those other components central to Antonovsky's (1987) salutogenic model underlying SOC and inherent in mastery that concerns social adversity exposure (p.108) (Surtees et al., 2006).

SOC has been widely researched with respect to health outcomes but further research is needed to understand the effects of SOC on lifestyle behaviors such as rumination. Researchers have used the Theory of Salutogenesis and SOC to determine the relationship between SOC and perceived and mental health. However, no researcher has addressed how SOC may directly impact sleep quality as a health factor or how rumination may alter the relationship between sleep and SOC.

Purpose of the Study

The purpose of the study is to determine the effects of SOC and rumination on sleep quality among adults aged 30-65 in the United States. Rumination will be measured to conclude if ruminative thinking mediates the relationship between SOC and sleep quality.

Research Questions

The following research questions will be explored in this study:

Research Question 1. What impact does SOC have on sleep quality?

Research Question 2. What impact does rumination have in mediating SOC and sleep quality?

Research Hypotheses

Hypothesis 1. The SOC Sleep Quality Model will be significant (Figure 3).

Hypothesis 2. The Rumination Mediator Model will be significant (Figure 4).

Hypothesis 3. The Complex Model will be significant (Figure 5).

Hypothesis 4. The Comprehensive Model will be significant (Figure 6).

Hypothesis 5. The SOC Sleep Quality Model will be significantly different from the Rumination Mediator Model (Figures 3 and 4).

Hypothesis 6. The Rumination Mediator Model will be significantly different from the Complex Model (Figures 4 and 5).

Hypothesis 7. The SOC Sleep Quality Model will be significantly different from the Complex Model (Figures 3 and 5).

Hypothesis 8. The Comprehensive Model will be significantly different from all models (Figure 6 compared with Figures 3,4, and 5).

Basic Assumptions

Three assumptions listed below were made by the researcher in this study.

1) Participants responded honestly to the answers in the questionnaire.
2) Participants had accurate memory recollection about sleep quality over the past 30 days.

3) The materials used in this study measuring rumination, sleep hygiene, sleep quality and SOC were valid and reliable to determine the effects of SOC and rumination on sleep quality.

Delimitations

1) The data was collected one time from each participant.
2) Participants were limited to the age group of 30- 65.
3) The participant sample varied geographically due to the snowball sampling technique.
4) Survey data was collected during the winter, February 2009.
5) Internet access was required of participants to complete the on-line survey.

Limitations

1) Participants with sleeping disorders, using sleep medication or medication that impacts sleep were not included in the statistical analysis
2) Hunger, jet lag, exhaustion, addiction, undiagnosed sleep disorders, participants who are unaware of medication or medical conditions inducing sleep problems, postpartum and participants recovering from addictions were not measured in the survey. These conditions may impact sleep quality.
3) GRR was not measured in the study.
4) Participants were expected to recollect and reply honestly on the survey.

5) Survey results may vary slightly if participants had external circumstances impacting their thought process, sleep or emotions.
6) The homogenous population may negate generalizability to the mass population.
7) The format of the on-line survey may have caused a variation in survey results if participants had challenges employing computer and reading skills.

Significance of Study

Ample sleep is critical for survival and healthy functioning (National Center on Sleep Disorders Research, n.d.). Forty seven million adults in America are not meeting the minimum required amount of sleep per night in order to be fully alert the following day (NSF, 2008b). Daytime sleepiness can be so severe that it interferes with social and work functions (NSF, 2008b). The *2002 Sleep in America Poll* reported that adults aged 30-64 experience acute daytime sleepiness (NSF, 2008b). Adults in the age range of 30-64 are especially problematic because they are the bulk of the American workforce and the majority of parents raising children. The negative impact of loss of sleep in this age range can create a detrimental effect on the economy, health care system, and adults of tomorrow (NSF, 2008b). The age range of 30-65 is critical to research because not only is it one of the largest age ranges with sleeping problems but it is a section of the population that is the bulk of the American workforce.

Sleep is essential for maintaining survival, and it impacts mood (NSF, 2002). Participants who obtained inadequate amounts of sleep (sleeping less than 6 hours per night) reported feeling sadness, pessimism, anger, fatigue and stress. Sufficient amounts

of sleep (participants receiving more than 8 hours of sleep) were associated with feelings of peace, satisfaction with life and feeling energetic.

Researchers have found that many adults understand that the inadequate sleep they incur may cause health problems. In the *2002 Sleep America Poll*, adults (91%) agreed that lack sleep puts them at risk for injuries (91%), interferes with work performance (93%), makes it difficult to get along with others (44%) and increases likelihood of mistakes (65%) (NSF, 2008b). Yet, the knowledge adults have about sleep deprivation does not result in changes in behavior. Researchers and health educators must understand the contributing factors of what causes sleep deprivation in order to help adults maintain healthier sleeping habits. Researchers must continually uncover new factors that have not yet been researched with sleep quality. SOC is a key variable to study because it has been found in a plethora of research studies to impact perceived health (Johnsen, 2002; Kattainen, Merilainen, & Sintonen, 2006; Lundberg & Peck, 1994).

Knowledge of the relationship between SOC, rumination and sleep quality can lead to change and improvement in sleep quality among the population. If experts have a greater understanding of what causes problems with falling asleep, staying asleep and remaining in a deep sleep, education can be tailored to patients to improve sleep quality. Physicians, psychiatrists, sleep experts and psychologists could incorporate exercises to improve SOC and rumination by targeting GRR and SOC factors or ruminative thinking patterns. Patients would be able to have a higher quality of sleep but also a greater ability to manage through life's stressors.

Key Term Definitions

Comprehensibility. Comprehensibility refers to the cognitive factor of SOC. This is the ability of an individual to perceive stimuli and make sense of it (Antonovksy, 1987). Comprehensibility is the ability to understand events and circumstances one encounters, and the confidence that one will understand future happenings.

Daytime dysfunction. Daytime dysfunction is determining if the individual has trouble functioning during awake time to perform daily living activities such as driving, socializing, eating meals, etc. Daytime dysfunction is self-reported (Buysse et al., 1989).

Entropy. Entropy is considered the measure of chaos or uncertainty (Pincus, 1991) and in salutogenic terms, entropy is the interruption of homeostasis (Antonovsky, 1987).

Fatigue. Fatigue is defined as mental or physical exhaustion (Merriam-Webster Online Dictionary, 2009).

General resistance resources. General resistance resources (GRR) are biological, material and psychosocial factors that enable people to live life in a coherent, comprehensible and consistent manner (Antonovsky, 1987).

Habitual sleep efficiency. Habitual sleep efficiency is how efficient one sleeps by measuring the time gone to bed and the time one gets up in the morning. The measurement is based on total hours slept (Buysse et al., 1989).

Heterostatic. Heterostatic refers to maintaining physiological stability in times of change by adaptation (Mosby's Dictionary of Medicine, Nursing & Health Professions, 2005). The environment may be predictable or unpredictable.

Heterostatic disequilibrium. Heterostatic disequilibrium is defined as an ever changing, non-static environment in which the body continually seeks physiological stability through adaptation (Antonovksy, 1993). Humans live in a world where stressors and chaos continually exist causing internal and external bodily stresses. The body never reaches a point of homeostasis.

Manageability. Manageability is the behavior factor of SOC. This component refers to the resources one has and the perception that the available resources will meet the demands (Antonovksy, 1987).

Meaningfulness. Meaningfulness is the motivational SOC factor. Meaningfulness is the belief that life makes sense, and that there is a reason to continue living. The problems in life are perceived as challenges rather than problems that are too difficulty to overcome (Antonovksy, 1987).

Pathogenesis. Pathogenesis refers to searching for agents that cause disease. The commonly used pathogenic model proposes that disease is caused by agents or risk factors occurring microbiologically (Wong & Fry, 1998).

Polysomnography. Polysomnography is monitoring a patient during sleep to determine sleep disorders (Merriam Webster Medical Dictionary, 2009b). It can measure blood pressure, nasal and mouth air flow, blood oxygen, brain wave patterns, eye movement, electrocardiographic activity and any movement in the muscle and limbs.

Rumination. Rumination is defined by Nolen-Hoeksema and Jackson (2001) as "passively focused attention on distress and on all potential causes and consequences of these symptoms" (p.37). Rumination is a thought process that causes people to focus on past events and prevents problem solving thinking to remedy problems.

Salutogenesis. Salutogenesis is defined as the origin of health and focuses on the movement towards health and away from illness (Lindstrom, Eriksson, 2006). The word *saluto* is the Greek word for health and *genesis* means of Greek derivation (Antonovsky, 1979).

Second Law of Thermodynamics. The Second Law of Thermodynamics is a universal law that states that entropy will increase over time in an isolated system (Encyclopedia Britannica, n.d.).

Sense of coherence. Sense of coherence (SOC) is the belief that one can manage in any situation regardless of what else is occurring. SOC is a resource that offers people the ability to manage tension, self reflect on their resources and use their resources (Eriksson & Lindstrom, 2006).

Sleep disturbances. Sleep disturbances includes disruptions to sleep such as having bad dreams or experiencing pain (Buysse et al.,1989).

Sleep duration. Sleep duration is the length of time an individual slept (Buysse et al., 1989).

Sleep hygiene. Sleep hygiene refers to the behaviors, habits, thoughts and actions that impact sleep quality (American Academy of Sleep Medicine, 2009b). Sleep hygiene is also defined as having good sleep quality, being alert during the daytime and having adequate sleep duration (American Sleep Disorders Association, 1990). Good sleep hygiene consists of thoughts and actions that promote sleep quality. Behaviors such as exercising before bed or drinking caffeine shortly before bedtime can decrease sleep quality.

Sleep latency. Sleep latency is defined as the duration of time it takes to fall asleep (Buysse et al., 1989).

Sleep quality. Sleep quality consists of how well someone sleeps (Buysse et al., 1989). Sleep quality pertains to the ability to fall asleep and remain asleep for the necessary amount of sleep time the body requires for rejuvenation. An individual should obtain between 7-8 hours of sleep a night, although this may vary per person (Epstein & Maradon, 2007). According to Buysse et al., there are seven constructs that measure sleep quality: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction (1989).

Stress. Stress is the body's non-specific response to demands made upon it. (Selye, 1956). Stress responses vary per person and may cause physical, mental and emotional reactions.

Stressors. Stressors are "that which produces stress" (Selye, 1956, p.64).

Subjective sleep quality. Subjective sleep quality is how well someone perceives he or she is sleeping over the past month (Buysse et al., 1989).

Use of sleeping medication. The use of sleeping medication involves the individual taking prescription or over the counter sleep aid medication.

CHAPTER II

LITERATURE REVIEW

In the Theory of Salutogenesis, SOC is an integral component to determine perceived physical and mental health, and is a focal point of this research. For the purposes of this study, perceived physical health is discussed as a function of perceived sleep quality. Additionally, the effects of SOC on mental health is examined through rumination. This chapter begins with a brief history of the Theory of Salutogenesis, continues with previous health research on SOC using salutogenic theoretical framework, moves into rumination studies and concludes with sleep quality findings. The salutogenic theory has the ability to extend the body of knowledge on sleep quality and assist practitioners in focusing on elements critical for improved sleep quality and thus, better quality of life.

Theory of Salutogenesis

The Theory of Salutogenesis was developed by Aaron Antonovsky after conducting an epidemiological study on menopausal women and their health problems (Antonovsky, 1987). Some of the female participants had spent time in concentration camps. Antonovsky inquired if the women believed themselves to be in good health. Of

the women who had experienced concentration campus, fifty percent reported themselves to be in good health, and twenty-nine percent of the women whom had not lived through concentration camps perceived they were in good health. Antonovsky was perplexed that so many women who had lived through a horrible, unimaginable experience considered themselves still in good health (Lindstrom & Eriksson, 2006). Antonovsky believed that there were more factors to health than previously understood.

The Theory of Salutogenesis contends that humans are surrounded by stressors (Antonovsky, 1987). While some people may encounter more severe problems in life such as starvation or poverty, other people may battle minor stressors. The theory states stressors are ubiquitous, and that the severity of the stressor is individually based, not categorically based. The outcome of the stressor is determined by how the individual handles the tension. Stressors can be neutral, pathogenic or promote health. Some people may not find certain occurrences stressful while other people may find the same experience highly stressful. Other circumstances may promote a healthy stress such as winning a prize and feeling excitement. The Theory of Salutogenesis proposes that humans live in a dynamic heterostatic disequilibrium that is defined as an ever changing, non-static environment in which the body continually seeks physiological stability through adaptation (Antonovksy, 1993). Humans live in a world where stressors and chaos continually exist causing internal and external bodily stresses. The body never reaches a point of homeostasis and disease is not considered abnormal.

The salutogenic theory concurs with the Second Law of Thermodynamics that the disorder, or entropy, of a closed system will constantly increase (Antonovsky, 1987). The Second Law of Thermodynamics is a universal law that states that entropy will

increase over time in an isolated system (Encyclopedia Britannica, n.d.). Entropy is considered the measure of chaos or uncertainty (Pincus, 1991) and in salutogenic terms, entropy is the interruption of homeostasis (Antonovsky, 1987). Humans are an open system, which results in reverse entropy; reverse entropy is defined as finding order from chaos. As people encounter stressors, they may or may not accumulate resources to assist in coping with stress. If people are able to respond with resources to manage through stressors, they may be able to maintain health on the healthier end of the health ease/dis-ease continuum (but still will not reach perfect health). However, those individuals who have more severe health problems would be part of a space on the continuum further towards the disease end.

As humans age, the ability to find and use coping mechanisms expands in order to satisfy the need for stability (Antonosvky, 1987). Infants begin to evolve in their social environment by determining what behaviors will ensue in having a need satisfied. Once learned, the infant will continually conduct certain behaviors and learn that the behaviors offer consistent, unchanging results. In childhood and adolescents, humans may find effective coping behaviors that they carry throughout life and also may find other behaviors that are not successful. Depending on the person, the coping mechanisms that are helpful can promote health or decrease health if the coping mechanisms are detrimental and unsatisfactory.

Salutogenesis differs from pathogenesis which is a commonly used model (Antonovsky, 1987). Pathogenesis refers to searching for agents that cause disease, and the pathogenic model proposes that disease is caused by agents or risk factors occurring microbiologically (Wong & Fry, 1998). The body then strives to reach homeostasis

through the work of the immune system. When the immune system fails to respond or succeed in fighting foreign objects, disease results. The Theory of Salutogenesis is a major change in the framework of how health is viewed. Determining the origin of health rather than searching for disease, pathogenesis, is a marked contrast.

The Theory of Salutogenesis focuses on three areas. Refer to Figure 1 for a model of the Theory of Salutogenesis. First, salutogenesis focuses on problem solving and finding solutions. Second, individuals must identify GRR's to aid in moving toward the direction of health, instead of disease. Third, there must be a strong perception in people or groups that allows for this process of salutogenesis. In order to maintain equilibrium in life, the process is heterostatic. It is adaptive in various circumstances and functions to maintain physiological stability (Eriksson & Lindstrom, 2006). Salutogenesis is a process that develops over a life span and can be learned. Salutogenesis has a strong relationship with mental well being and perceived health (Lindstrom & Eriksson, 2006).

Sense of Coherence

SOC was defined by Antonovsky as a way that people view the world (1993b). SOC has three main components: comprehensibility, manageability and meaningfulness.

Comprehensibilty. Comprehensibility refers to the cognitive factor of SOC. This is the ability of an individual to perceive stimuli and make sense of it (Antonovksy, 1987). Comprehensibility is the ability to understand events and circumstances one

encounters, and the confidence that one will understand future happenings. Antonovsky (1987) describes comprehensibility as the following:

> It refers to the extent to which one perceives the stimuli that confront one, deriving from the internal and external environments, as making cognitive sense, as information that is ordered, consistent, structured, and clear, rather than as noise- chaotic, disordered, random, accidental, inexplicable. The person high on the sense of comprehensibility expects that stimuli he or she will encounter in the future will be predictable or, at the very least, when they do come as surprises, that they will be orderable and explicable. (p16-17)

Manageability. Manageability is the behavior factor of SOC. This component of SOC refers to the resources one has and the perception that the available resources will meet the demands (Antonovksy, 1987). As Antonovsky (1987) states it as, "the extent to which one perceives that resources are at one's disposal which are adequate to meet the demands posed by the stimuli that bombard one" (p.17). Manageability can refer to resources in a variety of meanings such as spouse, God, a party leader, a doctor, a boss or a friend. When an individual has a high sense of manageability, it indicates a feeling that one is treated fairly in life and that one is not a victim of negative events. The individual has the ability to cope and manage through the situation.

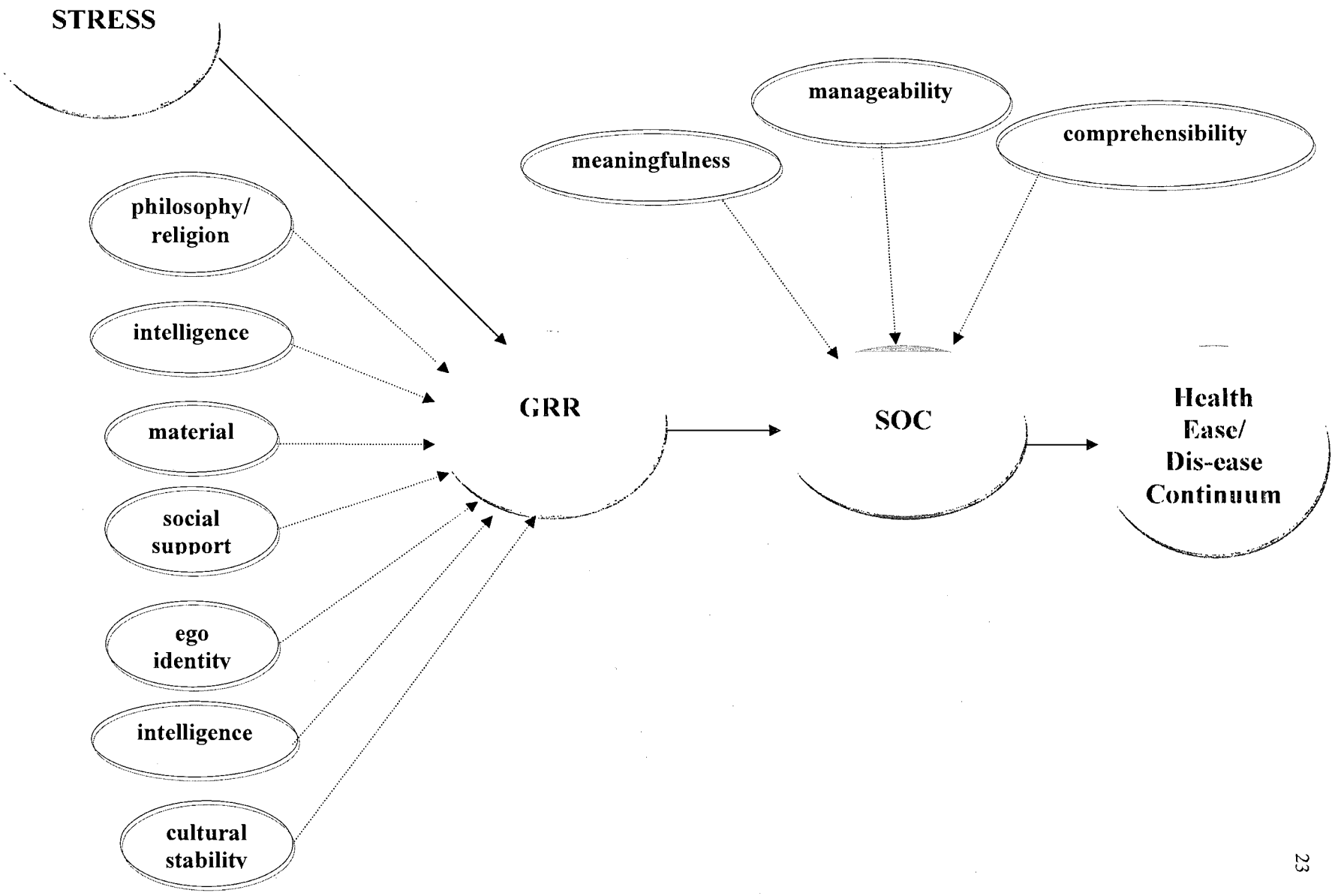
Meaningfulness. Meaningfulness is the motivational factor of SOC. Meaningfulness is the belief that life makes sense, and that there is a reason to continue living. The problems in life are perceived as challenges rather than problems that are too difficulty to overcome (Antonovksy, 1987). Antonovsky (1987) describes meaningfulness as:

> The extent to which one feels that life makes sense emotionally, that at least some of the problems and demands posed by living are worth investing energy in, are worthy of commitment and engagement, are challenges that are "welcome" rather than burdens that one would much rather do without. (p.18)

Meaningfulness does not imply a sensation of happiness. For example, an individual who encounters a tragic event may mourn but will face the challenge and not be overcome by it. The individual will find meaning in what happened and will be able to overcome the tragedy and move forward in life.

The three components of SOC, comprehensibility, manageability and meaningfulness, work together. SOC means that people are able to understand their lives and believe others understand them. People with high levels of SOC believe themselves to be capable of managing life's challenges and that life is meaningful enough to find motivation to continue (Lindstrom & Eriksson, 2006). Meaningfulness is perhaps the most important component as stated by researchers Wong and Fry (1998).

Figure 1. Theory of Salutogenesis Model



A strong SOC can assist in an individual being healthier. When people view the world being meaningful, manageable, understandable and having predictability, the brain is sending these communications to the immune system and endocrine system. When this occurs, the body is managing stress and attempting to bring the body back into homeostasis (Antonovsky, 1993b). SOC performs as a protective barrier against outside stressors. With a strong SOC, there is greater understanding of threats and what resources are successful in coping with the threats. SOC influences the coping and appraisal process of the threat. Individuals with a strong SOC are able to receive feedback on whether their coping strategies are successful and change the coping skills to what is necessary (Wong & Fry, 1998). People with a high SOC will also be more likely to engage in healthy behaviors such as exercising and eating nutritious foods (Wong & Fry, 1998).

Stressors will continually be encountered but physiological reactions vary between individuals with high SOC versus those with low SOC. For example, in the Helsinki heart study, patients with high SOC were found to have lower diastolic blood pressure, lower resting heart rate, lower serum triglycerides and higher oxygen uptake capacity (Poppius, Tenkanen, Kalimo, & Heinsalmi, 1999). Low levels of SOC were associated with circulatory and mental health problems. Individuals with the lowest incidence of heart disease had the highest levels of SOC. It is well known that stress can increase the risk of heart disease. The Helsinki study reflects the ability of people with high SOC to manage the stress levels instead of absorbing stress internally. For individuals with low SOC, inability to mitigate or manage the stress successfully causes increased morbidity and mortality.

SOC is a phenomenon that can be measured across cultures and ethnicities (1993b). Anotonovsky created the Orientation to Life Questionnaire to measure SOC (1987). In studies spanning across several countries including Sweden (Nilsson, Holmgren, & Westman, 2000), Canada (Stephens, Dulberg, & Joubert, 1999), Finland (Suominen, Bloomberg, Helenius, Uutela, & Koskenvuo, 1999), England (Surtees, Wainwright, Luben, Khaw, & Day, 2003), and France (Gana, 2001), a stronger SOC has been associated with perceived good health. SOC is not only applicable to a variety of people in various geographic locations, SOC effects health in several different dimensions.

SOC has been found to have a main, mediating and moderating effect on health (Eriksson & Lindstrom, 2005). SOC can be a moderator between stressful situations and health (Richardson & Ratner, 2005). Researchers found that a strong SOC buffered the effect of recent stressful life events on perceived health status, and a higher SOC led to a higher perceived health status. Other researchers have found that SOC can moderate the effects of job strain on sleep quality (Nasermoaddeli, Sekine, Hamanishi & Kagamimori, 2002). Job strain has a direct, negative relationship on sleep quality. Among Japanese civil servants, a high SOC was found to moderate negative effects of job strain on sleep quality compared with workers who had low SOC and high job strain.

SOC can also create a mediating effect among variables. In a study with 550 municipal employees over a seven year span, hostility was measured with health status of absentee records and perceived health (Kivimaki et al., 2001). It was found that SOC mediated the existing relationship between hostility and perceived health. A low SOC was an underlying factor strengthening the indirect relationship of hostility and perceived

health. Thus, a high SOC buffers stress and protects health while a low SOC can increase health problems.

In a Finnish study, researchers analyzed SOC in a four year longitudinal study among adults (Suominen et al., 2001). SOC was found to be predictive of perceived health status, and a strong SOC was found to predict good health among both men and women. Not only has SOC been found to be predictive of future perceived health but it has also been associated with reducing mortality rates (Surtees et al., 2003). In the EPIC-Norfolk study that took place in the United Kingdom, data were collected over a six-year span. Researchers studied all causes of mortality along with cancer and cardiovascular disease. It was found that individuals with a strong SOC had a 30% reduction in mortality from all causes as well as cancer and cardiovascular disease (Surtees et al., 2003). The results were similar across genders. Thus, a strong SOC not only changes one's perception of his or her health but can improve the likelihood of survival.

In a large UK cohort study of 20, 921 people, SOC was found to be a measure of one's social stressor adaptive abilities (Surtees, Wainwright, & Khaw, 2006). The study measured significant adverse events experienced in life and SOC. Individuals with lower SOC had more difficulty adapting to stressful life events compared to people with strong SOC. In the longitudinal study of almost 7 years, over 1,000 deaths were reported. Statistics demonstrated that one standard deviation increase in mean adaptation score, which indicates slower adaptation to stressful events, resulted in a 6% increase in mortality rate. Thus, SOC can be a predictor of mortality and can buffer mortality rates.

SOC has been found to have a relationship in many different measurements of health and has been widely studied over the years. SOC has been studied in 458 articles

up to December 2003 (Eriksson & Lindstrom, 2006). Although researchers have widely held that SOC has a relationship with health such as mental, physical, emotional health and quality of life, one variable of behavioral and mental health has yet to be studied with SOC- rumination.

Rumination

Rumination is a concept that gained momentum in the early 1990's by Nolen-Hoeksema (1987, 1991). Rumanitive behavior is described by Nolen-Hoeksema, Morrow, and Fredrickson (1993) as the following:

> Ruminative responses can be defined as thoughts and behaviors that focus the depressed individual's attention on his or her symptoms and the possible causes and consequences of those symptoms. These behaviors and thoughts are thus symptom-focused and contemplative (p.20).

An individual's thinking controls rumination. Examples include wondering why one feels upset about oneself, worrying about what will happen in the future, continuing to reflect on past stressful events or focusing on feelings of being unmotivated (Nolen-Hoeksema et al., 1993).

Rumination contrasts from other thought processes that are considered negative or reflective. Rumination is different from negative thinking (Hollon & Kendall, 1980). Negative thinking can imply skewed thoughts such as distorted memory recollection. Conversely, ruminative thoughts may recall accurate occurrences and be a correct reflection on one's feelings. Ruminative thoughts dwell on symptoms of depression with no action plan to resolve the negative feelings. Rumination is distinctly different from reflecting on a situation or problem and creating problem solving ideas. Ruminative

thinking does not produce productive results. Individuals who tend towards ruminative responses are much less likely to offer problem solving coping skills (Carver, Scheier, & Weintraub, 1989; Nolen-Hoeksema & Morrow, 1991).

Rumination is not considered to be the same concept as worrying, although it is closely related (Hong, 2007). Worry as defined by Borkovec, Robinson, Pruzinsky and DePree, "represents an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes; consequently, worry relates closely to the fear process" (p.10, 1983). Worry is defined as being uncontrollable. Rumination differs from worry because rumination does not contain problem-solving thoughts. Worry focuses on future events (Borkovec, et al., 1983), whereas rumination generally focuses on past events (Papageorgiou & Wells, 1999).

A study completed by Hong, found worry and rumination were highly correlated (2005). Undergraduate students in Singapore participated in a repeated-measures study in which students completed a survey on worry and rumination and repeated the survey one-month later. During the second session, participants were asked to recall a stressful event that occurred during the one-month interval. The results suggest that worry and rumination are closely related, yet manifest distinct differences in symptoms and coping styles. Worry was found to predict anxiety and depression while rumination predicted only depression. While worry and rumination both were found to have a negative correlation with perceived coping effectiveness and a positive correlation with disengagement coping, only worry predicted lower perceived coping effectiveness and only rumination predicted disengagement. This study demonstrates that the difference

between worry and rumination exists in behavioral and thought process outcomes. While both worry and rumination focus on thinking, only rumination can predict depression among people.

In several studies, rumination has been highly associated with depression (Nolen-Hoeksema, 2000; Nolen- Hoeksema & Morrow, 1991; Nolen-Hoeksema et al., 1993). One study researching depression and post traumatic stress symptoms found that participants with rumination style responses had more depression and stress symptoms compare to participants without rumination style responses (Nolen-Hoeksema & Morrow, 1991). Styles of responding and emotional health were measured among college student participants in the San Francisco area before and after the Loma Prieta earthquake of 1989. Participants who had more rumination thoughts about the natural disaster ten days afterward were more likely to have high levels of depression and stress symptoms seven weeks after the earthquake. Thus, rumination is a style of response and appears to remain consistent within individuals.

Rumination may predict, intensify and prolong depression, and depression is thought to distort memory retention focusing more on negative memories (Blaney, 1986; Nolen-Hoeksema & Jackson, 2001). When people ruminate about the same thoughts and if the thoughts are negative, people may be more likely to continue in depressed mood (Nolen- Hoeksema, 1991; Nolen-Hoeksema et al., 1993; Nolen- Hoeksema, Parker & Larson, 1994). Studies have found that participants with depression who were subject to rumination were more likely to hold feelings of hopelessness (Needles & Abrahamson, 1990), and people with high rumination were less likely to practice forgiveness (Barber, Maltby, & Macaskill, 2005). Depression and rumination work together to perpetuate

one's negative feelings and thoughts. Furthermore for patients with severe depression, research has found that patients need more sessions of Cognitive Therapy to overcome depression due to rumination (Jones, Siegle & Thase, 2008). Rumination can create a barrier for mitigating depression because of the constant, negative, repetitive thoughts.

Rumination can also cause a roadblock to problem solving because attention is spent on past events, rather than future action oriented thinking. As a result, people who ruminate may be less likely to help themselves with problems. One study found that depressed participants who were asked to ruminate offered lower quality resolutions to interpersonal predicaments than participants who were initially assigned a distracting task and did not ruminate (Lyubomirsky & Nolen-Hoeksema, 1995). Rumination appears to impede the ability to create solutions. For the rumination group, they not only had lower quality resolutions compared to the solutions created by participants with a distracting task but also were unable to offer many solutions. People who have the tendency to ruminate may have greater success in problem solving after the rumination subsides rather than during ruminating.

In the study by Lyubomirsky and Nolen-Hoeksema (1995), rumination prevented active coping strategies; however, this has not been found in all studies. In a study by Maxwell & Siu (2007), rumination was not been found to correlate with passive adaptive coping. An example of passive coping is to believe that fate will control the future and that the individual does not have control of his or her future (Maxwell & Siu, 2007). Maxwell and Siu's study researched coping skills among residents of Hong Kong by interviewing men and women with questionnaires. Males were found to have higher rumination when angry as compared with females, and males had lower active coping

skills than females. It is possible that people who have higher rumination tend to have lower active coping skills; however, it does not suggest that lower rumination leads to passive coping skills.

Several studies have found that women and girls ruminate significantly more than men and boys (Allgood-Merten, Lewinsohn, & Hops, 1990; Blanchard-Fields, Sulksy, & Robinson, 1991; Nolen- Hoeksema et al., 1993). Age does not bear a role in rumination but gender does dictate the likelihood for rumination. In 2001, a study by Nolen-Hoeksema and Jackson offered more insight into gender differences in rumination and offered an updated description of rumination as "passively focused attention on distress and on all potential causes and consequences of these symptoms" (p.37). In the Nolen-Hoeksema and Jackson study, women were found to have higher rumination. Both men and women ranged from 25- 75 years of age and resided in the San Francisco bay area. Researchers used questionnaires to determine mediators among rumination that would account for the differences in rumination among gender. It was determined that beliefs about controlling emotions, the ability to master negative events and the responsibility for the emotional tone of relationships mediated the gender difference. This is an important finding because these three components that mediate the relationship between gender differences and rumination may be considered socially based.

Emotion coping, using emotions to reduce stressful events, is a socially based behavior because as one research study reports, parents encourage sons to suppress fear and sadness and use action based coping skills to overcome these negative emotions (Dunn, Bretherton & Munn, 1987). Females are socialized to verbalize more than are boys (Fivush, Brotman, Buckner, & Goodman, 2004). Research has found that parents

use more interpersonal context when communicating with daughters than with sons (Fivush et al., 2004). Also, parents use more emotional utterances when communicating sad events to daughters than with sons. Mothers, specifically, engage in more conversations of sadness and fear with daughters than with sons (Hops, 1995). Because women are encouraged to express negative emotions, this may lead to open communication and processing of emotions. However, it also may lead to rumination by focusing on negative emotions, preventing active coping from occurring and a lack of experience in mastering negative events. In the study by Nolen-Hoeskema and Jackson (2001), women were perceived to have less control over emotions experienced than compare to the control of emotions experienced by men. This may be due to socialization because daughters are strongly encouraged to express negative emotions and not encouraged to use active coping skills similar to boys.

Researchers have also found that women can be hypervigilant about emotions relating to one self and others. Women report more distress (Helgeson, 1994) and report a higher quantity of life stressors regarding relationships compare to men (Gore, Aseltine, & Colten, 1993). Women's hypervigilance about relationship concerns leads to greater psychological distress (McGrath, Keita, Strickland, & Russo, 1990).

Lack of mastering negative events, lack of feeling in control of one's emotions, and the feelings of responsibility for emotional tones in relationships may cause women to ruminate more than men. When researching rumination, it is important to consider the gender differences but also have a socially based theoretical foundation. The majority of rumination gender differences stem from differences in socialization of gender. The salutogenic theory frames socialization as an integral component of health. For example,

such resources such as SOC and GRR can be learned and significantly impact one's health.

Even though rumination is influenced by socialization, research has found that people have the ability to control rumination (Koole, Smeets, Van Kippenberg & Dijksterhuis, 1999). In one study, college students participated in a randomized experimental control study. The college students participating in the treatment group practiced self-affirmation. Self-affirmation included allowing the participants to affirm an important component of their self-concept. Compared to the control group, the treatment group reduced rumination due to self-affirmation after a failure or self-affirmation prior to a failure. The researchers concluded that practice of self-affirmation can decrease rumination. Also, self-affirmation led to increased positive affect which mediated the effect of rumination.

Rumination has been found to have a gender variance that may be due to a social learning component. Ruminative thinking also causes several negative health problems such as depression and reduced sleep quality. It is important to further understand behaviors and beliefs that can mitigate rumination to offer better health and more specifically, better sleep quality.

Sleep Quality

Sleep quality is critical to understand because it impacts health psychologically and physiologically. Sleep quality consists of how well someone sleeps. An individual should obtain between 7-8 hours of sleep a night, although this may vary per person (Epstein & Maradon, 2007). Time spent sleeping accounts for about one third of human

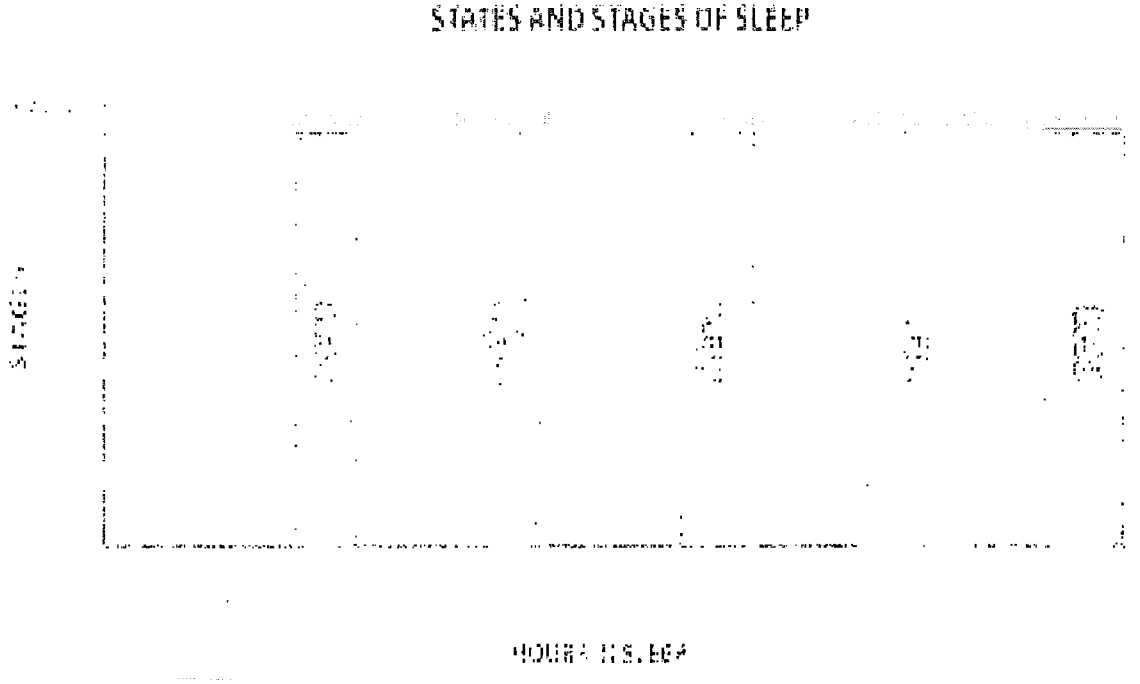
life (Lavie, 1996). There are many variables that can impede sound sleep quality such as interruptions during sleep, inability to fall asleep and inability to achieve necessary sleep cycles.

There are five stages of sleep, stages 1 through 5 (Epstein & Maradon, 2007). A model of sleep stages can be seen in Figure 2. With good sleep quality, an individual will pass through each stage of sleep, beginning with stage 1 and end with stage 5, also known as rapid eye movement. Normally, an individual will repeat the stages 4-5 times per night, and each sleep cycle will last for 90-110 minutes. Prior to stage 1, the pre-sleep stage, a person will transfer into an alpha wave pattern where nerve cells do not receive visual input but a person's brain waves are steady and rhythmic. The wave patterns run about 8-10 cycles every second. In alpha sleep, a person is still awake but is calm and relaxed. Next, a person transitions into stage 1 sleep and loses awareness of the surroundings. Body temperature and blood pressure drop in stage 1 while eyes move slowly from side to side. A person spends five minutes in stage 1. In stage 2, the first cycle of stage 2 lasts 10- 25 minutes, and this stage is considered sleep. Brain activity is irregular while heart rate and breathing slow down.

Stage 3 is considered a deeper sleep and the brain's processing center remains less active, and the brain centers that remain active are more coordinated (Epstein & Maradon, 2007). Stage 4 occurs when delta waves make up at least half of the brain waves. External stimuli have less impact on the individual, and it is harder to awaken. Breathing becomes more regular and slows down, and blood pressure falls 20-30% from average awake blood pressure. Stage 4 is considered deep sleep and in this stage, the body repairs and renews itself. The pituitary gland releases hormones for muscle repair

and tissue growth. The immune system is also thought to receive interleukin that helps the body fight infection (Epstein & Maradon, 2007). Most people will remain in stage 4 for half-hour periods. After the age of 65, time spent in stage 4 decreases drastically. This is may be due to a decrease in melatonin, the hormone promoting sleep, and older adults may be more sensitive to their environment while sleeping (American Academy of Sleep Medicine, 2009).

Figure 2. Sleep Stages Model



Note. From *Let sleep work for you,* National Sleep Foundation, 2008. Retrieved on February 25, 2009, from http://www.sleepfoundation.org/site/c.huIXKjM0IxF/b.2421185/k.7198/Let_Sleep_Work_for_You.htm. Reprinted with permission.

In stage 5, also known as rapid eye movement (REM), eyes are closed but roll rapidly from one side to the other and the brain races. The sympathetic nervous system doubles its activity compare to awake levels. Body temperature rises, blood pressure increases, breathing and heart rates increase to normal awake levels. The body remains completely still except for a few muscle twitches. Dreaming in this stage is thought to help clear the mind. REM promotes memory retention and learning ability. While people cycle through the REM stage several times, the first REM cycle lasts only a few minutes while the last REM (the fourth or fifth REM) may be up to a half-hour (Epstein & Maradon, 2007).

When individuals have interruptions from sleep such as a loud noise, the individual may awake and the sleep cycle will begin all over again. If the individual was in stage 3, the individual will start back at alpha and move into stage 1. People that have constant interruptions through the night may never reach stage 4 or REM stages of sleep, causing fatigue the next day.

Sleep deprivation prevents an individual from obtaining a sufficient amount of sleep cycles or disruptions to the sleep cycles. When the body does not have enough sleep, the body is unable to fully repair itself and can cause memory loss (Epstein & Maradon, 2007), poor blood sugar control (Krakow, 2007) and the inability to perform tasks (Martin, 2002). Poorly performing skills can include social abilities, accurate judgement, attentiveness and fluid communication (Martin, 2002). Major consequences can result from sleep deprived people because lack of sleep can create cloudy foresight. According to Martin, Exxon Valdex and Chernobyl are thought to be actions caused by people with sleep deprivation (2002). More commonly, the U.S. National Highway

Traffic Safety Administration has reported motor vehicle accidents are caused by sleep deprived drivers (2008).

Sleep is so imperative that even one night of poor sleep quality can impact mental performance (Martin, 2002). Sleep helps regulate hormone levels of gherlin and leptin that control feelings of being satiated and hungry (NSF, 2008c). Sleep deprivation has been associated with myocardial infarctions, high blood pressure, obesity and diabetes (American Academy of Sleep Medicine, 2008). Also, ongoing sleep deprivation increases the risk of age-specific mortality (American Academy of Sleep Medicine, 2008). Thus, sleep is a vital component to living healthy and can be used as a measurement of one's health.

Sleep Hygiene

Research indicates that one factor that can significantly impact sleep quality is sleep hygiene (LeBourgeois, Giannotti, Cortesi, Wolfson, & Harsh, 2005; Kirmil-Gray, Eagleston, Gibson, & Thoresen, 1984). Sleep hygiene consists of the habits, thoughts and behaviors that have an effect on sleep quality (American Academy of Sleep Medicine, 2009b). Sleep hygiene is also defined as having good sleep quality, being alert during the daytime and having adequate sleep duration (American Sleep Disorders Association, 1990). Sleep hygiene habits include but are not limited to napping during the daytime, exercising within one hour of bedtime, worrying about work while in bed or sleeping in an uncomfortable bed.

Researchers have found that in a study involving college students, participants that were educated on positive sleep hygiene practices such as maintaining a consistent sleep schedule, improved sleep practices and increased overall sleep quality (Brown, Buboltz & Soper, 2002). Having the knowledge about what habits and behaviors improve sleep quality is essential to increase sleep.

One study found that sleep hygiene predicts sleep quality across cultures (LeBourgeois et al., 2005). A study reviewed American and Italian adolescents sleep quality and sleep hygiene habits. Over thirteen hundred adolescents in public schools in Rome, Italy and Hattiesburg, Mississippi completed a self-reported sleep quality and sleep hygiene questionnaire. The study found that cross-cultural differences in sleep quality were due to sleep hygiene. Sleep hygiene is an important element for sleep quality among various ages and cultures.

Rumination & Sleep Quality

Rumination has been linked to reduced sleep quality (Guastella & Moulds, 2007). Researchers have also found that negative emotions and depressive mood are frequently related to problems with sleep (Borkovec,1982; Guastella & Moulds, 2007; Thomsen et al., 2004). In a Guastella and Moulds research study, researchers induced rumination among participants in the pre-sleep stage (2007). College students were instructed to follow rumination instructions regarding a stressful college examination taken the prior day. High trait ruminators reported poor sleep quality while low trait ruminators reported no impact on sleep quality. Participants were considered high trait ruminators if the score on the rumination scale used was above the median. Low trait ruminators were

participants that scored the median or below the median on the rumination scale (Guastella & Moulds, 2007). Participants who were subject to rumination but did not demonstrate high trait rumination overall did not report an impact on sleep quality. The study suggests that rumination is habitual and not easily induced.

Rumination has been found not only to be associated with depressed mood, but also angry mood and sleep quality (Thomsen et al., 2004). Researchers have found that even after controlling for negative mood, rumination was still significantly associated with reduced sleep quality (Thomsen et al., 2004). Participants with high rumination were more likely to have trouble falling asleep, have poorer sleep quality and a greater number of sleep disturbances.

Additional research has found that anger rumination and negative affect mediated the relationship between forgiveness and sleep quality (Stoia-Caraballo et al., 2008). Anger rumination is the behavior of reflecting back on angry thoughts, unlike general rumination that may include reflections of worrisome, stressful or sad thoughts (Stoia-Caraballo et al., 2008). Negative affect is having negative emotions, and in the Stoia-Caraballo et al., study negative affect was measured by results of a depression and anxiety questionnaire (2008). Participants with negative affect that ruminated about events angering them were not as likely to forgive or to have good sleep quality. In another study, rumination was negatively related to forgiveness (Barber, Maltby, & Macaskill, 2005). Furthermore, researchers have found that forgiveness is associated with improved sleep quality (Lawler et al., 2005). Thus, rumination can impede sleep quality and forgiveness. Because forgiveness is associated with better sleep quality, it is important to research what factors may decrease rumination. Researchers and health

educators can offer behavior change programs to assist in decreasing rumination habits. It is important to determine if SOC can reduce rumination in order to improve sleep quality. If SOC can decrease rumination than health educators can target increasing SOC in people to reduce rumination and increase sleep quality.

Summary

Overall, sleep quality is problematic for many Americans. People are not obtaining enough hours of sleep due to problems falling asleep or interruptions during sleep. Lack of sleep prevents bodies from being replenished during the night as needed. The ability to mentally and physically function during the daytime decreases and can lead to serious injury such as automobile accidents. The need for research to improve sleep quality is essential in order for sleep specialists and health educators to better serve their patients.

Rumination is a behavior that has been found to decrease sleep quality. However, the impact of rumination being a mediating variable with sleep quality has not been determined. One factor that has not been researched with sleep quality but has been found to predict health is SOC (Eriksson, & Lindstrom, 2006). Research shows that SOC has a significant impact on health such as high SOC decreasing the likelihood for cardiovascular disease (Surtees et al., 2003). Research to determine how SOC impacts sleep quality and assess if rumination is a mediator with sleep quality is important in order to extend the body of knowledge on sleep quality and improve patients with sleep quality problems. It is also important to include measurements of sleep hygiene when

measuring sleep quality because of the negative impact poor sleep hygiene can have on sleep.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine the effects of SOC and rumination on sleep quality using the Theory of Salutogenesis as the framework. The study researched personal beliefs one has about his or her ability to manage in life and the impact personal beliefs have on health. The study utilizes sleep quality as the measure of health. The study also sought to determine if rumination mediated the relationship between SOC and sleep quality, and if sleep hygiene improved the relationship between SOC, rumination and sleep quality.

Study Design

The research study is an exploratory cross-sectional survey design researching the effects of SOC and rumination on sleep quality among adults ages 30-65. The survey included scales for SOC, sleep hygiene, rumination, sleep quality and demographics.

Participants

Participants mainly consisted of a convenience sample including people affiliated with the researcher's university. Participants were recruited through email solicitation. The email solicitation contained the survey link that participants could copy and paste

into the Internet browser or click on the survey link in the email in order to be directed to the first page of the survey. Participants were then asked to complete the survey and, if interested, forward the email link to friends or co-workers that ranged in age from 30-65. The age of 30 was selected because participants will have developed a stronger SOC according to Antonovsky (1987). As a limit, age 65 was selected because sleep quality can decrease over the age of 65 due to chemicals emitted in the brain decreasing the ability for sound sleep (American Academy of Sleep Medicine, 2009). The snowball sampling effect was used to gain a sufficient amount of participants for the study. The goal was to obtain a sample size of at least 123 participants based on statistical power analysis results. Participants that completed the pilot study were not contacted to complete the main study in order to avoid duplicate responses. Participants of the main study were informed in the email solicitation that if they participated in the pilot study, not to complete the survey again.

Participants of the research study ranged geographically from twenty-one states or districts: Alabama, Arkansas, California, Colorado, Delaware, Florida, Illinois, Maine, Maryland, Mississippi, New Jersey, New York, North Carolina, Tennessee, Ohio, Pennsylvania, Texas, Virginia, Washington, Washington D.C., and West Virginia.

Instrumentation

Four scales and a demographic section were combined into one large survey. The four scales included the Orientation to Life Questionnaire (Antonovsky, 1987), Pittsburgh Sleep Quality Index (Buysse et al., 1989), Rumination-Reflection Questionnaire (Trapnell & Campbell, 1999), and the Sleep Hygiene Scale (Mastin et al., 2006).

Instrumentation was selected based on scales that comprehensively measured the effects of SOC and rumination on sleep quality.

Orientation to Life Questionnaire. The Orientation to Life Questionnaire (OLQ) measures SOC and was designed by Antonovsky in 1987. Studies have used the scale to measure SOC in 33 languages and 32 countries (Eriksson & Lindstrom, 2005). The OLQ has 15 different versions ranging from those used in South Africa and Thailand to the United States. The OLQ contains 13 questions with a choice of 7 Likert-type responses. Responses vary based on each question. An example of the responses for one question ranged from 1 ("never happened") to 7 ("always happened"). A copy of the OLQ can be viewed in Appendix C.

The OLQ contains 13 questions measuring three factors of SOC: manageability, comprehensibility and meaningfulness. A total of five questions measure comprehensibility (questions 2, 6, 8, 9, and 11), four questions measure meaningfulness (questions 1, 4, 7, and 12), and four questions measure manageability (questions 3, 5, 10, and 13).

The scoring is determined by summating all scores and averaging the summation by 13. There are five reverse coded items out of the 13 questions: questions 1, 2, 3, 7, and 10. The lower the score, the weaker the SOC, and the higher the score, the higher the SOC.

In a Finnish study, the OLQ was found more structurally sound with people over the age of 30 (stability coefficient 0.81) than with younger adults (stability coefficient 0.70) through the use of structural equation modeling (Feldt et al., 2007). The SOC mean

level was higher among people 30 years of age SOC = 65.2 (*SD* = 11.3) than for the younger age group SOC = 61.2 (*SD* = 11.3). This is in agreement with Antonovky's belief that SOC tends to stabilize for people aged 30 and older (Antonosvky, 1993b). The Finnish repeated measure design study also completed confirmatory factor analysis that supported having the 3 factors for SOC: meangingfulness, manageability and comprehensibility. The study concluded that when measuring SOC, the OLQ is a psychometrically sound survey tool to use (Feldt et al., 2007).

Studies have found the OLQ to be predictive of future health outcomes, and that SOC can have a main, mediating or moderating effect (Eriksson & Lindstrom, 2005). Also, Cronbach's alpha was used to determine internal consistency. The Cronbach's alpha ranged from 0.77 when measured after eighteen months to 0.5 following ten years (Eriksson & Lindstrom, 2005). Antonovksy found that alpha's ranged from 0.74 to 0.91 in sixteen different studies using the 13-point OLQ scale (1993b).

OLQ has revealed high reliability for internal consistency and test-retest reliability (Gana & Garnier, 2000). The lowest alpha coefficients have been 0.82. Test-retest results have ranged from 0.97 after a few weeks to 0.54 after a 2-year interval of retirees (Antonovsky, 1993b; Antonovsky, 1996). OLQ has also shown to have strong convergent validity with similar measures (Antonovsky, 1993) and strong construct validity (Antonosvky, 1996).

The Pittsburgh Sleep Quality Index. The Pittsburgh Sleep Quality Index (PSQI) measures sleep interruptions and sleep quality over a 1-month period (Buysse et al., 1989). It contains a 19-item, self-reported questionnaire and five questions rated by a bed

partner or roommate (if available). Responses vary per question and are in the form of 4 Likert-type responses; for example, a question on sleep latency includes responses ranging from "not during the past month" to "three or more times a week". The PSQI can be examined in Appendix C.

The index contains seven equally weighted component scores of subjective sleep quality (question 6), sleep latency (questions 2 and 5a), sleep duration (question 4), habitual sleep efficiency (questions 1,3 and 4), sleep disturbances (questions 5b- 5j), use of sleeping medication (question 7), and daytime dysfunction (questions 8 and 9). Subjective sleep quality is how well someone perceives he or she is sleeping (Buysse et al., 1989). Sleep latency is the amount of time is takes to fall asleep. Sleep duration is the length of time an individual slept. Habitual sleep efficiency is how efficient one sleeps by measuring the time gone to bed and the time one gets up in the morning. Sleep disturbances includes disruptions to sleep such as having bad dreams or experiencing pain. The use of sleeping medication involves the individual taking prescription or over the counter sleep aid medication. Daytime dysfunction is determining if the individual has trouble functioning during awake time to perform daily living activities such as driving, socializing, eating meals, etc.

Scoring of the scale ranges from 0-21, and a score of twenty-one is considered having severe difficulties sleeping in all areas. A global PSQI score is determined by the summation of all seven component scores. The component scores are determined by completing calculations necessary based on PSQI scoring instructions (Byusse et al., 1989).

The PSQI is highly regarded and used frequently in the sleep research community (Mastin et al., 2006). The index is based on clinical experience and intuition derived from working with patients having sleep disorders, previous sleep quality questionnaires and 18 months of field testing the instrument through clinical testing (Byusse et al., 1989). The PSQI has high internal consistency. The Cronbach's alpha used for the reliability coefficient was 0.83 for the seven component scores (Byusse et al., 1989). The individual items were highly correlated.

The test-retest reliability was strong reflecting stability in the seven factors. The time 1- time 2 correlation coefficient for the seven component scores was 0.85 ($p < .001$) (Byusse et al., 1989). The diagnostic groups between the two time measurements were also strongly related with correlations of 0.40 ($p < .005$) for each group.

The validity of the PSQI is strong. The validity assessment measured the extent to which the PSQI index recognized differences between groups that would be detected clinically (Byusse et al., 1989). The analysis assumed that the index was able to detect differences among groups at the same point as a clinical diagnosis through structured interviews, clinical interviews and polysomnographic data. Polysomnography is monitoring a patient during sleep to determine sleep disorders (Merriam Webster Medical Online, 2009b). It can measure blood pressure, nasal and mouth air flow, blood oxygen, brain wave patterns, eye movement, electrocardiographic activity and any movement in the muscle and limbs.

The analysis of covariance (ANCOVA) was performed to measure patient groups for component and global scores. For pairwise comparisons, the Student-Neuman-Keul's procedure was used. Age and sex were used as covariates due to group differences in the

sex and age ratios. (Byusse et al., 1989). ANCOVA (MANCOVA) was used for the PSQI global score with age and sex as covariates.

Global PSQI scores differed significantly between subject groups, and group differences yielded distinct component and global score profiles (Byusse et al., 1989). A significant MANCOVA resulted for component scores across groups (Hotelling's T^2 = 2.62, $p < 0.001$). Age was a significant covariate for daytime dysfunction and was inversely related. Daytime dysfunction was greater in younger participants than older participants. Sex was a significant covariate for sleeping medications and habitual sleep efficiency, and males had higher scores for both of these components. Sex and age were also significant covariates for the global PSQI score although group differences were significant after covarying age and sex.

The distribution of PSQI scores differed between groups (Byusse et al., 1989). Group differences were determined by polysomnographic results. PSQI scores showed significant group differences for sleep efficiency ($F = 5.78$, $p < 0.001$), sleep duration ($F = 4.82$, $p < 0.003$), sleep latency ($F = 4.53$, $p < 0.001$) and number of arousals ($F = 2.87$, $p < 0.04$).

PSQI scores and polysomnographic results were measured for further validity calculations. PSQI measures were compared with similar polysomnographic measures using t tests and Pearson product-moment correlations. T tests showed no differences between PSQI scores and polysomnographic results for sleep latency. PSQI estimates for sleep duration and efficiency were greater than laboratory results ($t = 9.98$, $t = 4.50$, respectively), and both were $p < 0.001$. Pearson correlation reflected no significant positive correlation relationship between PSQI and laboratory results with the exception

of two categories: sleep latency ($r = 0.33$, $p < 0.001$), depressive subgroup ($r = 0.37$, $p < 0.02$).

Sleep Hygiene Scale. The Sleep Hygiene Scale is a 13-item instrument that measures self-reported behaviors that can negatively impact sleep quality (Mastin et al., 2006). Behaviors being measured on the survey include but are not limited to taking daytime naps, going to bed at various times, exercising within one hour of going to bed, sleeping in an uncomfortable bed and going to bed feeling stressed. The scale has a 5-point Likert response choice with responses ranging from 1 ("always") to 5 ("never"). The Sleep Hygiene Scale was created from insufficient sleep criteria based on the International Classification of Sleep Disorders (American Sleep Disorders Association, 1990). Refer to Appendix C for a copy of the Sleep Hygiene Scale.

The validity and reliability for the Sleep Hygiene Scale are considered strong (Mastin et al., 2006). The reliability for Cronbach's alpha was found to be strong at 0.66. The test- retest reliability was also good (r (139) = 0.71, $p< 0.01$).

The validity test of the Sleep Hygiene Scale demonstrated a positive correlation with all components of inadequate sleep hygiene (American Sleep Disorders Association, 1990). The range of Pearson r values was from 0.371 to 0.458. The Sleep Hygiene Scale positively correlated with the Pittsburgh Sleep Quality Index total score (r (269) = 0.481, $p < 0.01$) and the Epworth Sleepiness Scale (r(599) = 0.244, $p < 0.01$). The scale positively correlated with all PSQI Index component scores and ($p < 0.05$).

Rumination Scale. The Rumination-Reflection Questionnaire (RRQ) was used to measure rumination (Trapnell & Campbell, 1999). It is a two- section questionnaire with a rumination component and a reflection component. There are twenty-four total questions, 12 questions for each section. The first twelve questions are ruminative thinking questions and the next twelve questions are reflection questions. The questionnaire has a 5-point Likert scale ranging from 1 ("strongly disagree) to 5 ("strongly agree). The rumination scale has three reversed coded items (questions 6, 9, and 10). The rumination component scores were used for the measurement of rumination. Reflection scores were not included in the statistical calculation of this study. A copy of the RRQ is in Appendix C.

This scale was originally designed to distinguish the difference between inquisitive and anxious thoughts focusing on the self (Trapnell & Campbell, 1999). Factor analysis was completed, and the correlation between reflection and rumination was small ($r = 0.22$, direct oblimin rotation) (Trapnell & Campbell, 1999). Rumination and reflection appear to function as separate, independent tendencies. The psychometrics for internal consistency demonstrated an alpha estimates for reliability. Reliability for the scale is high for both rumination ($\alpha = 0.90$) and reflection ($\alpha = 0.91$). The mean inter-item correlation is greater than 0.40 for both scales, rumination ($r_{ii} = 0.43$) and reflection ($r_{ii} = 0.48$).

Demographics. A demographic questionnaire consisted of sixteen questions varying between open-ended questions and yes/no responses. Demographic information included age, gender, state residing, height, weight, race, marital status and occupation.

It also included factors that may impact sleep quality such as pregnancy, diagnosed sleep disorders, bedtime partners, chronic conditions, medication, and shift work. Height and weight questions were designed for the researcher to determine body mass index. A high body mass index can cause sleeping disorders such as sleep apnea and reduce quality of sleep (Nieto et al., 2000). A copy of the demographic questionnaire is provided in the Appendix C.

Procedures

The scales and questionnaires were combined and typed into the on-line survey web-site named SurveyMonkey.com. Refer to Appendix C for a copy of the full on-line survey. Participants entered the web-site SurveyMonkey.com to complete the survey. The web-site for the survey was given through an email solicitation sent out to participants. Participants were eligible to complete the survey if they were between 30-65 years of age. Survey participation took approximately fifteen minutes.

The Internal Review Board (IRB) of Middle Tennessee State University was contacted to approve this study. Approval was obtained (approval number 09-181) and can be viewed in Appendix A. The IRB approved the Altered Informed Consent that can be seen in Appendix B. Altered Informed Consent was necessary in this study to maintain anonymity of participants and allow participants to understand their rights as a volunteer of the study and be given researcher contact information. The Altered Informed Consent notified participants that the age range for participating in the survey was between 30-65 years of age. The Altered Informed Consent included a description of the study, procedures and anonymity assurance. Once a participant completed reading

the letter, he or she could proceed to the on-line survey. The researchers selected the option in SurveyMonkey.com to eliminate tracking the IP host address of computers that participants used to complete surveys. By not tracking the IP host computer addresses, participants were ensured complete anonymity.

Pilot Study

A pilot study was conducted by emailing colleagues and friends in various states including Tennessee, Delaware, California and Maryland. Participants that were emailed for the pilot study were different from participants that were emailed for the main study. The email contained the SurveyMonkey.com electronic link. Participants were able to click on the link and proceed to the Altered Informed Consent and survey. The survey results included 46 participants. Of the participants, 23.9% (n = 11) were male, and 76.1% (n = 35) were female. Age ranged from 30 to 63 years, and 6.5% (n = 3) were 30 years of age, 8.7% (n = 4) were 54 years of age and 2.2% (n = 1) were 63 years of age. The scales accurately measured the variables in the study based on correct responses to open-ended questions. Participants accurately responded to open-ended demographic questions such as age and occupation. Sleep quality questions were answered accurately such as time it took to fall asleep and time spent in bed. The on-line survey functioned properly as determined by surveys being completed in full. Also, the researcher asked a few test takers if any computer problems arose, if directions were clear and if response choices were understandable. All participants asked agreed the questionnaire was clear, easy to use and without computer problems.

Power Analysis

A power analysis was completed using the G*Power 3.0 program (Faul, Erdfelder, Lang, & Buchner, 2007). There were two independent variables, SOC and rumination, and one independent variable, sleep quality. The power analysis was set to achieve a 95% power level. The alpha level was set to 0.05 to control for Type 1 errors. This analysis determined that 123 participants were needed in the main study to reach a power level of 95% and a medium effect size of 0.31. This sample size and power level were to reflect an R^2 increment of 0.097 in the main study that is based on SOC and rumination.

Data Entry

Participants took the survey on-line using Survey Monkey.com. This web-site automatically saved user responses. The web-site enabled the researcher to compile accumulated survey responses in the form of a spreadsheet. After two weeks, the necessary amount of survey responses was achieved, and the spreadsheet of data were downloaded to a laptop computer in Microsoft Excel.

The data needed to be cleaned and made ready for analyzing. Responses for each question were given a title with abbreviated code names for each question. The same code names for each question were also used in SPSS 15.0. Responses that needed to be calculated for component scores or factors were completed based on the directions for each scale. For example, meaningfulness, manageability and comprehensibility were factors of SOC. Scores from questions for each factor were summated using Microsoft Excel. PSQI component scores were manually calculated using Excel formulas.

The data were cleaned for analysis. If a participant selected more than one response for each question, the lowest Likert-scale response was used during statistical analysis. The mean replacement across items methodology was used to overcome missing values for participants that did not respond to certain questions within a section that required a response. The mean replacement across items method uses the mean from the rest of the participants' responses within a scale. The missing score is replaced with the mean score. The mean replacement across items method was used when participants completed a minimum of 80% or more of any scale. Participant data were not used in the statistical analysis if 79% or less of any one scale was completed. Upon completion, 211 total participant survey responses were used for statistical analysis. The data were then exported to SPSS 15.0 for analysis. AMOS 7.0 was used to create path analyses and complete a structural equation modeling analysis.

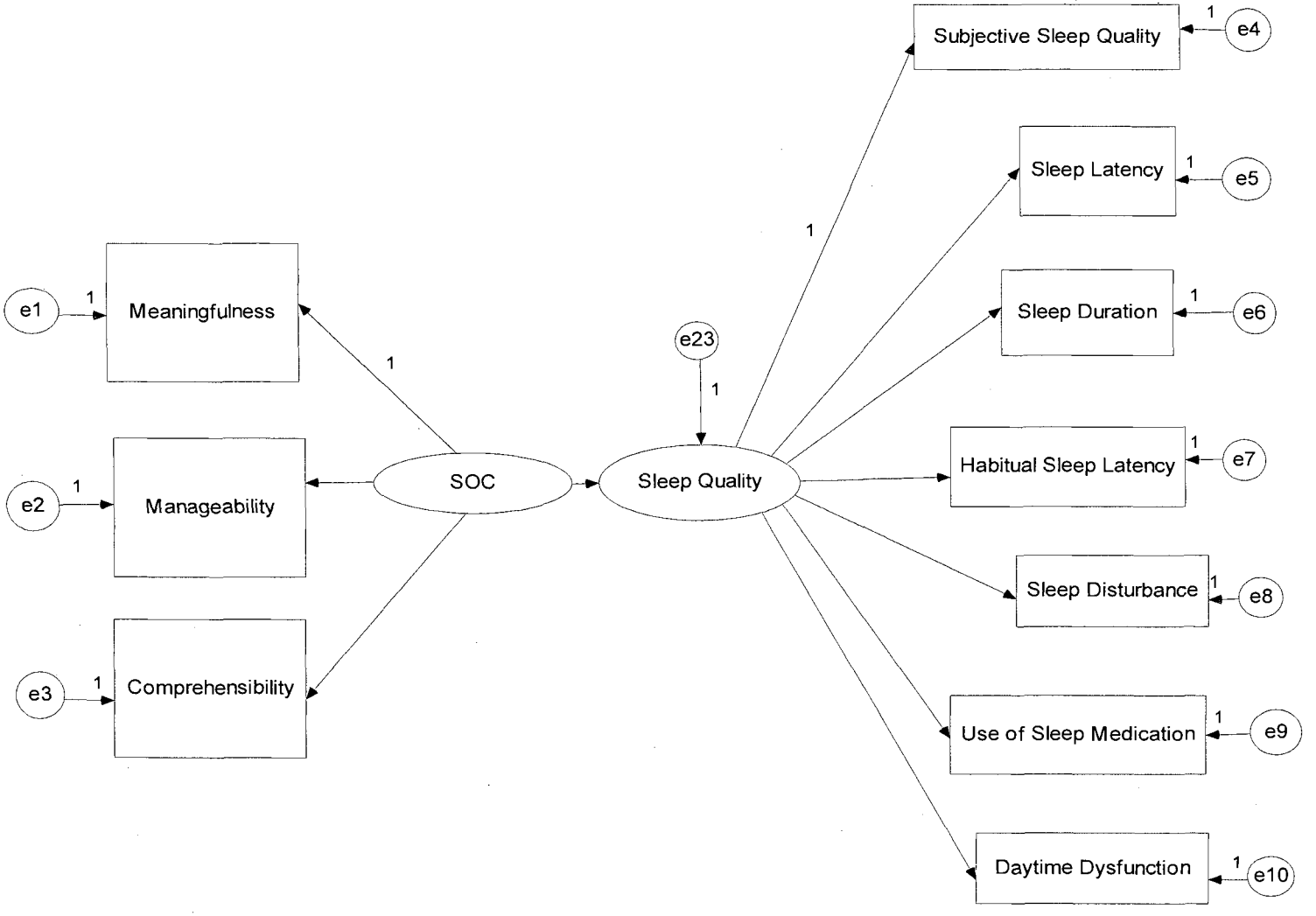
Data Analysis

Structural equation modeling (SEM) was used to determine the relationship between SOC, rumination and sleep quality. Figure 3, the SOC Sleep Quality Model, depicts the path diagram for the relationship between SOC and sleep quality. Figure 4, the Rumination Mediator Model, represents the path diagram for the effects of SOC on rumination on sleep quality. Figure 5, the Complex Model, demonstrates the path diagram with three relationships present: SOC, rumination and sleep quality. Figure 6, the Comprehensive Model, includes all variables: SOC, rumination, sleep quality and sleep hygiene. Sleep hygiene was added to the path analysis to determine if the relationship between SOC, rumination and sleep quality was stronger by incorporating

sleep hygiene. Because the pilot study data was small, under 100 participants, goodness of fit measures were only tested on main study data using SEM.

SPSS was used to determine descriptive statistics of the main study data and multivariate normality assumptions. Exploratory Factor Analysis (EFA) was calculated on one variable, sleep hygiene. Sleep hygiene was the only variable that had no previous EFA analysis completed. AMOS calculated goodness of fit measures for the SOC Sleep Quality Model, Rumination Mediator Model, Complex Model, and Comprehensive Model. Hu and Bentler recommendations were used for goodness of fit measurements (1999). SEM was completed on all four models, and models were compared with one another to determine if significant differences existed.

Figure 3. SOC Sleep Quality



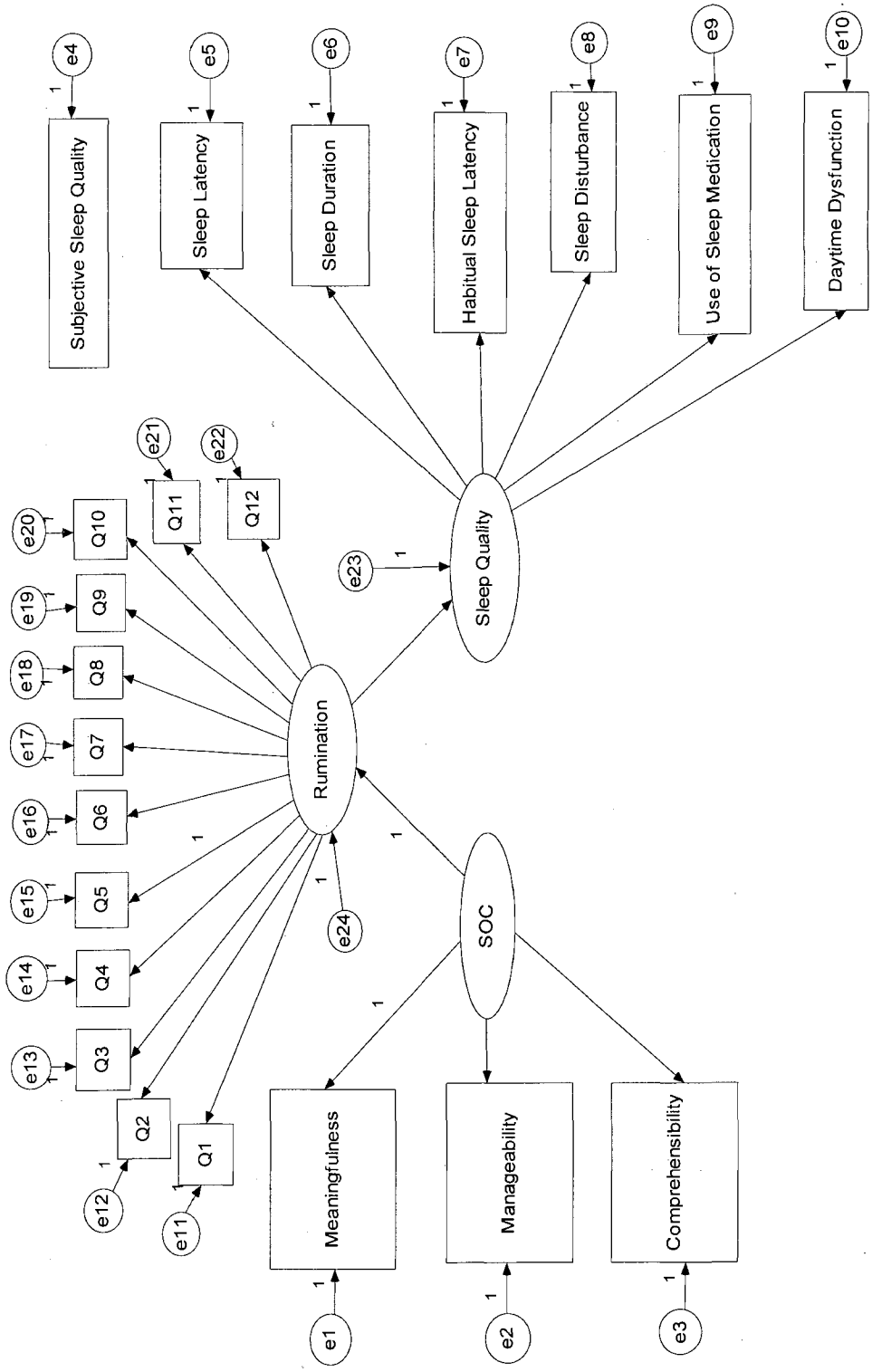


Figure 4. Rumination Mediator Model

Figure 5. Complex Model

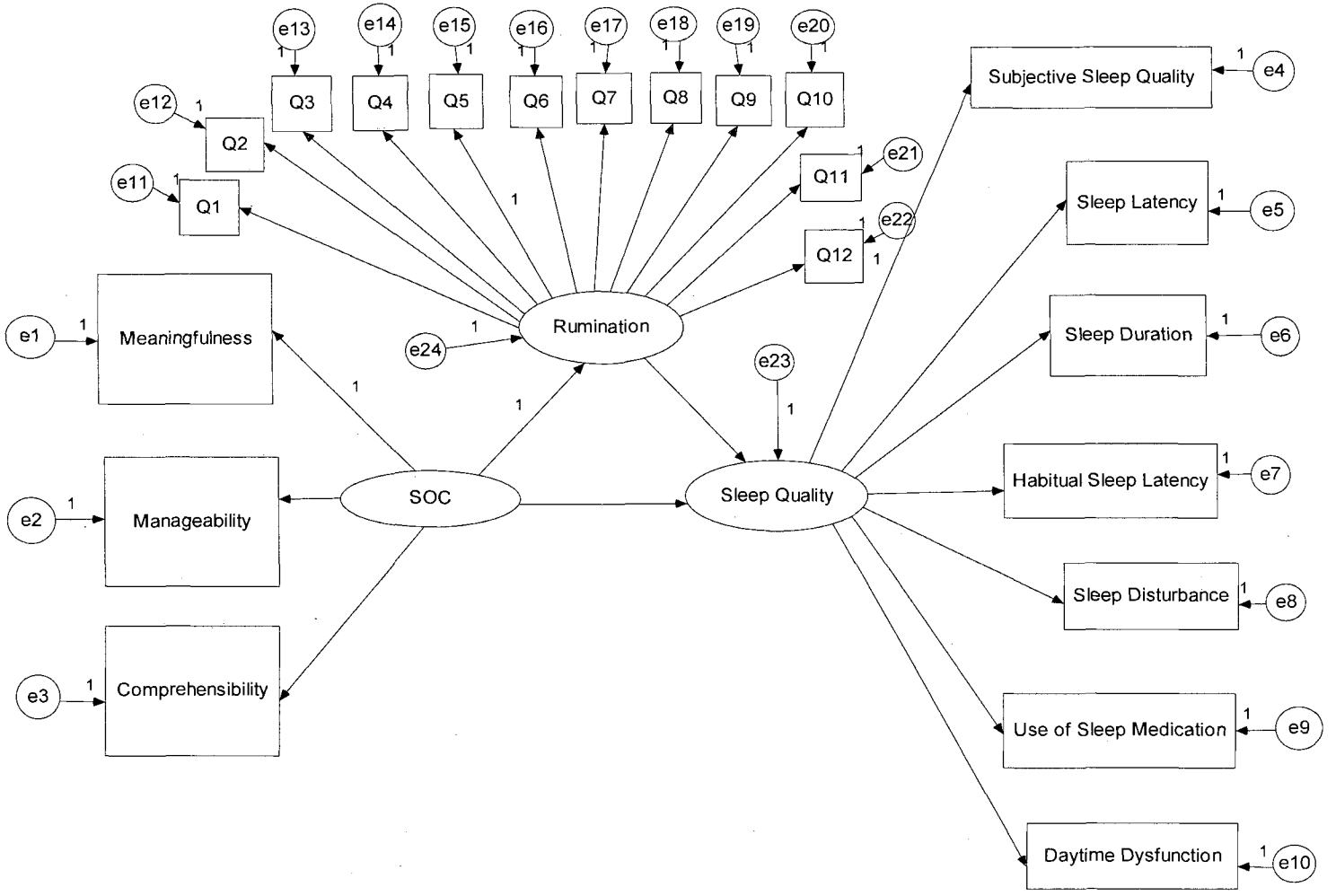
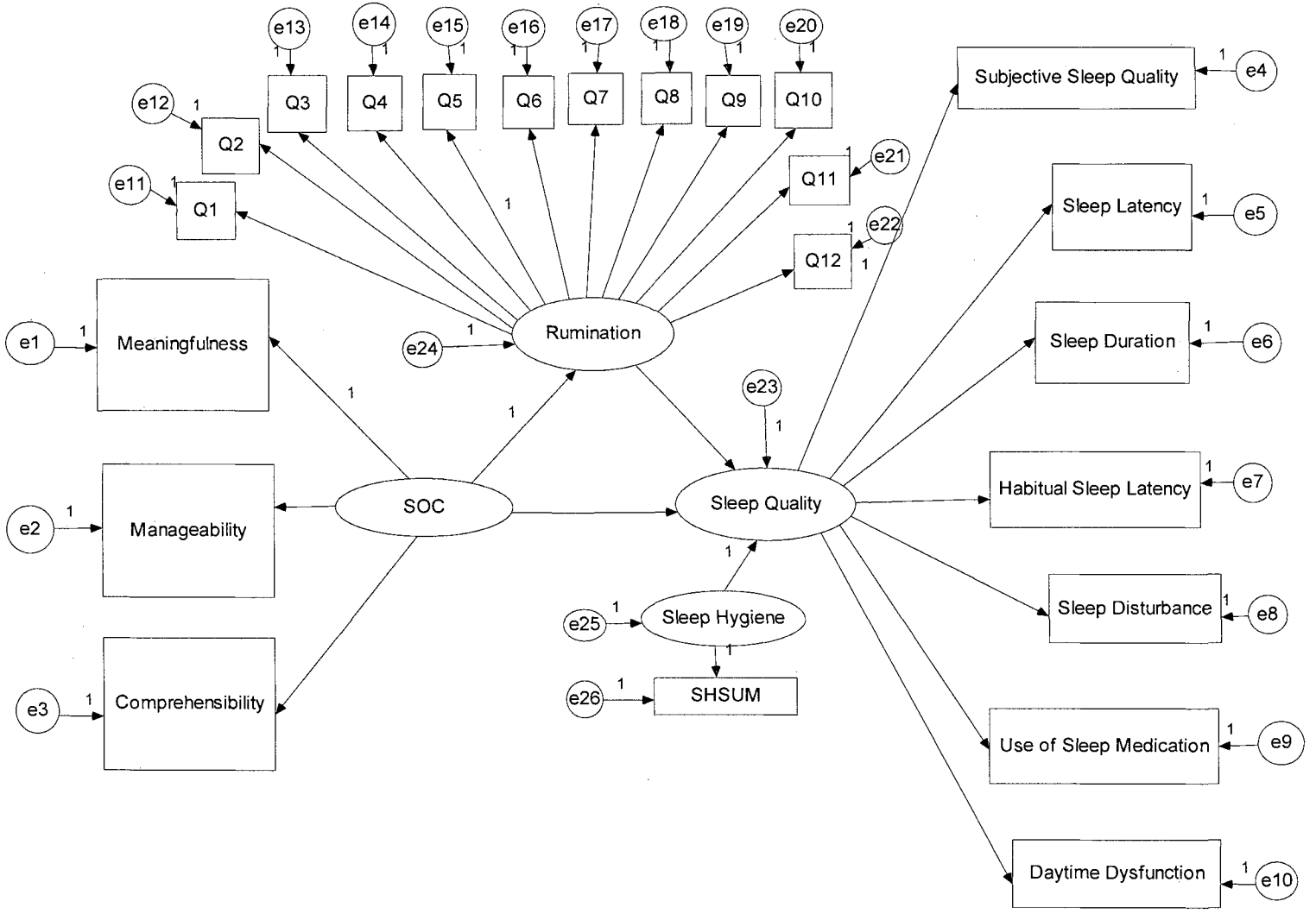


Figure 6. Comprehensive Model



CHAPTER IV

RESULTS

The purpose of this study was to determine the effects of SOC and rumination on sleep quality. The following chapter includes the statistical analyses from the survey data and tests the hypotheses. First, demographic information regarding the sample size is provided. Secondly, exploratory factor analysis was performed on sleep hygiene. Thirdly, structural equation modeling was used to test the eight hypotheses to determine if the SOC Sleep Quality Model (Figure 3), Rumination Mediator Model (Figure 4), Complex Model (Figure 5) and Comprehensive Model (Figure 6) were individually significant and if models were significantly different from one another.

Data Collection

The snowball sampling method yielded a total of 238 surveys completed. A total of twenty-seven surveys were not included in the statistical analyses due to incomplete data. The data was incomplete due to participants skipping 21% or more of each scale. Mean replacement across items was used to determine missing data for surveys with 21% or less of any scale incomplete.

Participants

A total of two hundred eleven participants' data were used for statistical analyses. The majority of participants were female, 64.5% (n = 136), and 35.5% (n = 75) were male and can be reviewed in Table 1. Age ranged from 30 to 64 years, the mean was 41 years of age, *SD* = 8.78, and the mode was 34 years of age. Participants ranged from 42% (n = 21) of the various states and District of Columbia within the U.S.A, mainly from the south and northeast regions. The most common state was Tennessee, 29.9% (n = 63), and some states such as Alaska had one participant, .50%. The majority of the participants were married, 71.6% (n = 149) and 28.4% (n = 59) were single, divorced or widowed. Almost all participants were Caucasian, 92.2% (n = 188) and 2.9% were Latino (n = 6), 2.9% were Black (n = 6), 1.0% was Asian (n= 2) and 1.0% was "other" (n = 2).

There were a few participants, 2.8%, that were pregnant (n = 6) when taking the survey. Almost 20% (n = 40) of the participants completed shift-work while over 80% (n = 168) did not complete shift-work. Of those participants that have a bed partner, 71.1% (n = 150) were not disturbed during sleep by their bedtime partner. A small group of participants, 12.3%, do not have bedtime partners (n = 26). Based on body mass index (BMI), the average participant had an overweight BMI, *M* = 26.75, *SD* = 6.13. BMI ranged from 18.5 to 51.5. Almost one quarter, 22.7% (n = 48), of the participants were interrupted during sleeping by their children. Of the parents that answered the frequency of being awakened by their children during sleep, most parents, 44.4% (n = 8) responded they are awakened two times during the night.

Table 1

Demographic Characteristics of Participants

Characteristic	*n*	%
Gender		
Male	75	35.5
Female	136	64.5
Age		
30- 39	107	51.2
40- 49	62	29.7
50- 59	33	15.8
60- 65	7	3.3
State of Residence		
AK	1	0.5
AL	32	15.2
CA	13	6.2
CO	1	0.5
DC	3	1.4
DE	36	17.1
FL	2	1.0
IL	1	0.5
MD	18	8.6
ME	1	0.5
MS	1	0.5
NC	4	1.9
NJ	1	0.5
NY	2	1.0
OH	2	1.0
PA	10	4.8
TN	63	30.0
TX	4	1.9
VA	5	2.4
WA	8	3.8
WV	2	1.0
Race		
White/Caucasian	188	92.2
Hispanic/Latino	6	2.9
Black/African American	6	2.9
Asian	2	1.0

Table 1 (continued)

Demographic Characteristics of Participants		
Characteristic	*n*	%
Marriage Status		
Married	149	71.6
Single/Widowed/Divorced	59	28.4
Pregnant		
Yes	6	2.9
No	201	97.1
Shift-work		
Yes	40	19.2
No	168	80.8
Bed Partners That Disturb Sleep		
Yes	35	16.6
No	150	71.1
N/A	26	12.3
Children that interrupt sleep		
Yes	48	22.86
No	162	77.14
Diagnosed Sleep Disorders		
Yes	13	6.19
No	197	93.81
Use prescribed sleep medications		
Yes	9	10.23
No	79	89.77
Medication that impacts sleep patterns		
Yes	14	6.73
No	194	93.27
Medical problems that impact sleep quality		
Yes	41	19.52
No	169	80.48

Table 2

Scale scores determined by SOC, Rumination, Sleep Hygiene and Sleep Quality

	SOC		Rumination		Sleep Hygiene		Sleep Quality	
Characteristic	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Gender								
Male	66.93	10.32	34.56	8.87	48.35	4.97	5.05	2.59
Female	65.72	13.23	38.66	9.63	48.34	6.48	5.94	3.57
Marriage Status								
Married	66.54	12.46	37.31	9.65	48.53	5.99	5.47	3.11
Single/Divorced/Widowed	65.49	11.93	36.61	9.47	47.85	6.10	5.95	3.64
Age								
30-39	65.73	12.11	38.22	9.56	47.16	6.29	5.59	3.37
40-49	65.11	13.08	36.65	9.91	49.29	4.98	5.60	2.97
50-59	68.79	11.16	36.03	9.21	49.97	5.41	5.79	3.42
60-65	68.14	14.06	34.43	8.18	51.57	8.62	6.43	4.43

Note: SOC= sense of coherence.

Variable Frequencies

Descriptive variables were tested with the independent and dependent study variables: SOC, rumination, sleep hygiene and sleep quality. Descriptive variables included age, gender, marriage status, race, pregnancy, shift-work, bed partners that disturb sleep, BMI, being awakened by children at night, diagnosed sleep disorders, using prescribed sleeping medications, using medications that impact sleep, and having medical problems that impact sleep quality. Test comparisons were completed by using ANOVA and t-tests to determine significance levels.

Participants scored on the upper end of SOC scores with $M = 66.15$, $SD = 12.26$, as displayed in Table 3. Possible SOC scores could range from 13 to 91, 45.5 being the median point. The higher the SOC score, the greater the sense of coherence within the individual. Actual score ranged from 16 to 88 with the mode being a score of 69 (n = 13). SOC scores were not normally distributed. There were no significant differences with descriptive variables and SOC. However, SOC and gender means were compared, and men had a slightly higher SOC score, $M = 66.9$, $SD = 10.32$ as compared to women, $M = 65.7$, $SD = 13.23$. Refer to Table 2 for mean and standard deviation statistics. SOC scores based on age ranged with the lowest average SOC scores, $M = 65.73$, $SD = 12.12$, for the 30-39 year old age range and the highest average SOC scores, $M = 68.79$, $SD = 11.16$, for the 50-59 year old age range.

Table 3

Independent and Dependent Variable Means and Standard Deviations (N= 211)

Variable	*M*	*SD*
SOC	66.15	12.26
Rumination	37.20	9.55
Sleep Hygiene	48.34	5.98
Sleep Quality	5.63	3.28

Rumination scores could range from 12 to 60 with a score of 30 being the possible median. Actual rumination scores averaged on the higher end of rumination, $M = 37.20$, $SD = 9.55$. A higher rumination score represents greater tendency to ruminate. The rumination mode score was 43 (n = 13), and the second most common score was 44 (n = 11). Rumination scores were not normally distributed. There was a significant difference with rumination and gender $t\ (209) = 3.02$, $p = 0.002$. Rumination scores for men were lower, $M = 34.56$, $SD = 8.87$, as compared to women, $M = 38.66$, $SD = 9.63$. No other descriptive variables had a significant difference with rumination. Although, mean scores reflected different averages based on age and decreased with age. The 30-39 years old were the highest ruminative thinkers, $M = 38.22$, $SD = 9.56$ and the 60-65 years old group had the lowest ruminative scores, $M = 34.43$, $SD = 8.18$. No other descriptive variables had a significant difference with rumination.

Sleep Hygiene possible scores ranged from 13 to 65 with a median point of 32.5. The average Sleep Hygiene score was on the upper end of the median point, $M = 48.34$, $SD = 5.98$. The higher the sleep hygiene score, the poorer the sleep habits of the

participant. Sleep Hygiene scores ranged from 26 to 65 with a mode score of 50 (n = 23). Sleep Hygiene scores were not normally distributed. Sleep hygiene was significantly different with diagnosed sleep disorders, t (208) = -2.33, p= 0.021. There is also a significant difference with age and sleep hygiene, t (208) = 2.66, p= 0.03. Participants with diagnosed sleep disorders had a lower mean score of sleep hygiene compare to participants with no sleeping disorder. Sleep hygiene was significantly different with age. The oldest participants, age range 60-65, had the highest sleep hygiene scores, M = 51.57, SD = 8.62, and the lowest age range, 30-39 years of age, had the lowest sleep hygiene scores, M = 47.16, SD = 6.29. Although there was not a significant difference, married participants had slightly higher sleep hygiene scores, M = 48.53 (SD = 5.99) as compared to single/divorced/widowed, M = 47.85, SD = 6.10. No other descriptive variables had a significant difference with sleep hygiene.

Possible PSQI scores could range from 0- 21 with a median point of 10.5. Participants scored lower on the PSQI scores. The lower the PSQI score, the better the overall sleep quality. The actual PSQI scores ranged from 0- 16 with a mode score of 3 (n= 26) and M = 5.63, SD = 3.28. The overall PSQI scores were not normally distributed and were positively skewed. Sleep quality had a significant difference with pregnancy, use of prescription sleep medications, medical problems that disrupt sleep, bed partners that disrupt sleep and medications that impact sleep. All groups with a significant difference had higher sleep quality scores. For example, participants that were pregnant had higher sleep scores. Although there was not a significant difference with age and sleep quality, the highest PSQI scores were among the oldest participants, aged 60-65, M = 6.42, SD = 4.43. The lowest PSQI scores were found with the youngest participants

aged 30-39, $M = 5.59$, $SD = 3.37$. No other descriptive variables had a significant difference with sleep quality.

Sleep Hygiene Exploratory Factor Analysis

Exploratory factor analysis was used to analyze the Sleep Hygiene variable. Exploratory factor analysis had not been completed in previous research and was necessary to determine the number of observed variables. Initial analysis by principal component analysis (PCA) determined six factor loadings. Factor 1 explained 25.29% of variance, factor 2 explained 10.79% of variance, factor 3 explained 9.71% of variance, factor 4 explained 9.43% of variance, factor 5 explained 7.94% of variance and factor 6 explained 7.76% of variance. The proposed six-factor structure did not offer a strong relationship between the items and observed concepts. The correlation matrix did not demonstrate strong correlations among all thirteen sleep hygiene items. Refer to Table 4 for correlations between items.

Principle Component Analysis was analyzed again using two factors and again using a one factor loading based on results for the initial PCA. The eigenvalues displaying the variance between items using factor analysis can be seen in Table 5. The highest value stemmed from factor one explaining 25.30% of the variance among all the variables and factor thirteen denoting 1.94% of the variance among items. The 1-factor solution was most efficient due to a lack of strong correlation among any of the items and low eigenvalues. Based on results, the researcher opted to use one factor for the sleep hygiene unobserved variable in the path analysis and SEM calculations.

Table 4

Intercorrelations for Scores on the 13-Item Sleep Hygiene Scale

Item	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Q1	--												
Q2	0.235	--											
Q3	0.219	0.665	--										
Q4	0.033	-0.055	0.084	--									
Q5	0.297	0.469	0.426	0.061	--								
Q6	0.09	0.096	0.139	0.009	0.099	--							
Q7	0.063	0.347	0.317	0.173	0.256	0.312	--						
Q8	0.182	0.263	0.098	-0.004	0.255	0.196	0.307	--					
Q9	0.019	0.014	0.004	0.44	-0.045	-0.024	-0.008	0.065	--				
Q10	0.164	0.186	0.116	-0.004	0.233	0.127	0.185	0.222	0.017	--			
Q11	0.086	0.174	0.233	0.008	0.16	0.134	0.21	0.169	-0.06	0.562	--		
Q12	-0.03	0.246	0.09	0.069	0.293	0.073	0.44	0.119	0.055	0.18	0.134	--	
Q13	0.136	0.239	0.142	-0.037	0.182	0.206	0.198	0.516	0.186	0.233	0.149	0.218	--

Table 5

Eigenvalues, Percentages of Variance, and Cumulative Percentage of Variance for Components of the 13-Item Sleep Hygiene Scale

	Eigenvalue	% of Variance	Cumulative %
Item			
1	3.29	25.30	25.30
2	1.40	10.80	36.10
3	1.26	9.72	45.82
4	1.23	9.44	55.26
5	1.03	7.95	63.20
6	1.01	7.77	70.97
7	0.88	6.74	77.71
8	0.76	5.87	83.58
9	0.59	4.50	88.08
10	0.52	4.03	92.12
11	0.42	3.20	95.32
12	0.36	2.74	98.06
13	0.25	1.94	100.00

Multicollinearity

An image factor analysis was conducted to determine if any independent variables were highly correlated with one another. SOC, rumination and sleep hygiene were tested for multicollinearity. Factor loadings for covariance or correlation were extremely low and did not warrant any adjustments to the model. Due to the results, all independent variables remained in the path analysis for statistical calculations.

Confirmatory Factor Analysis

Using AMOS, the SOC Sleep Model (Figure 3) was analyzed for goodness of fit. Results were reported based on Jackson, Gillaspy and Purc- Stephenson (2009) and Hu and Bentler (1999). Jackson, Gillaspy and Purc- Stephenson recommend using indices including chi-square (χ^2), chi square/df value (χ^2/df), Tucker- Lewis index (TLI), comparative fit index (CFI), root mean square error of approximation (RMSEA) that offers measures for residuals, goodness-of-fit index (GFI), and adjusted goodness-of-fit index (AGFI). A summary of the fit indices and recommendations are listed below in Table 6. The various indicator recommendations have been selected based on previous research (Hu & Bentler, 1995, 1999).

Chi-square, degrees of freedom and significance levels offer an explanation of the model fit (Byrne, 2000). The higher the probability value is for a model, the closer the model fit is to a perfect fit, and thus a significant chi-square indicates a poor model fit (Bollen, 1989). The TLI measurement denotes a non-normed fit index, and is relatively independent of sample size but penalizes the fit based on complexity. CFI compares the current model fit with the null model. The null model assumes that unobserved variables in the model are uncorrelated. RMSEA indicates the mean absolute value from the covariance residuals. GFI and AGFI are both considered absolute indexes because they do not compare the hypothesized model with a null model (Hu & Bentler, 1995). Values closer to 1.00 denote a closer model fit (p. 90) (Byrne, 2000). GFI is measuring covariance and variance in the sample size. AGFI adjusts for degrees of freedom unlike GFI and penalizes the model fit if the model has additional parameters.

Each model was tested for significance. Refer to Table 6 for goodness of fit indicators. Significance was determined by the chi-square/degrees of freedom ratio being close to the recommendation of 2.0 (Hu & Bentler, 1999) and goodness of fit measures: TLI, CLI, GFI, AGFI and RMSEA. Models were also compared with one another to determine if a significant difference exists. Delta chi-square and delta degrees of freedom were used to determine the difference between models. A model was considered significant if the model had a relative chi-square close to 2.0 and strong goodness of fit indicator results. Significant differences existed between models if delta chi-square value was significant.

Table 6

Summary of selected goodness-of-fit indexes and corresponding cutoffs.

Variable	Description	Cutoff
$\chi 2$	Chi-square	>. 05, should not be significant (Hu and Bentler, 1999)
$\chi 2$/df	Chi-square/degrees of freedom ratio or Relative Chi-Square	< 2.0 (Hu and Bentler, 1999)
TLI	Tucker-Lewis index	> .95 (Hu and Bentler, 1999)
CFI	Criterion fit index	> .95 (Hu and Bentler, 1999)
RMSEA	Root-Mean-Square Error of Approximation	< .05 (Hu and Bentler, 1999)
GFI	Goodness-of-fit index	> .90 (Hu and Bentler, 1995)
AGFI	Adjusted goodness-of-fit index	> .90 (Hu and Bentler, 1995)

The SOC Sleep Quality Model with SOC and sleep quality had two latent variables. The SOC Sleep Quality Model was used as a base model for this study, and all other models included additional variables that were added to the base model. The latent variable of SOC had three observed variables: comprehensibility, manageability and meaningfulness. The model initially yielded $\chi^2(34) = 108.10, p < 0.001$. The chi-square test is sensitive to sample size and should not be the sole criterion for model fit. Model

misspecification was detected by analyzing modification indices (MI) and expected parameter change (EPC) for covariances and regression weights. MI and EPC indices are used to better understand the degree that the SOC Sleep Model is described correctly (Byrne, 2000). Based on modification indices, minimum adjustments were made for a better model fit by allowing for covariance between subjective sleep quality and sleep latency errors, sleep duration and sleep disturbance errors, sleep latency and use of sleep medication errors and subjective sleep quality and use of sleep medication errors.

After modifications were made, the SOC Sleep Quality Model yielded, $\chi^2(30) = 65.41, p < 0.001$. Refer to Table 7 for goodness of fit results. The modified SOC Sleep Quality Model is in Figure 7. The revised model was just over the standard for goodness of fit with relative chi-square ($\chi^2/df = 2.18$). The TLI was slightly under the preferable standard of 0.95 and was an acceptable fit (TLI= 0.911). The closer the results are to 1.0, the closer the fit reflects a perfect fit. TLI is somewhat independent of sample size and measures the model against a null model (p.103) (Schumacker & Lomax, 2004). The CFI measure (CFI= 0.941) is a closer fit than TLI and is a relatively good fit. The CFI results indicate that 94.1% of the covariation in the data can be replicated in the SOC Sleep Quality Model. RMSEA does not use a null model for comparison and is a commonly used measurement (p.103) (Schumacker & Lomax, 2004). RMSEA results were over the ideal standard of 0.05 (RMSEA= 0.075), and this denotes adequate model fit (Schumacker & Lomax, 2004). An acceptable range for RMSEA ranges between <0.05 to 0.08 (Byrne, 2000). GFI and AGFI are both in acceptable ranges (GFI= 0.942, AGFI= 0.894). GFI and AGFI both denote good model fit. The overall goodness-of-fit

measures for the revised SOC Sleep Quality Model with two unobserved variables was adequate.

The Rumination Mediator Model was analyzed for fit and included one more latent variable, rumination, as a mediator between SOC and Sleep Quality. Rumination had twelve observed variables leading to one unobserved variable. The initial results were $\chi^2(204) = 649.4$, $p < 0.05$. After review of the MI and EPC, adjustments were made to improve model misspecification. Adjustments were made for covariance between question 1 and question 3 errors, question 5 and question 6 errors, question 6 and question 9 errors, question 7 and question 8 errors, question 9 and question 10 errors, and question 11 and question 12 errors. The revised Rumination Mediator Model is in Figure 8. The revised Rumination Mediator Model did not meet chi-square minimums $\chi^2(198) = 516.1$, $p < 0.05$ and were slightly over the minimum relative chi-square recommendations ($\chi 2/\underline{df} = 2.61$). The goodness of fit indicators TLI and CFI both were slightly under optimal model fit measurements (TLI = 0.828, CFI = 0.852). TLI and CFI results indicated adequate fit for the revised model. RMSEA measures were slightly above recommendations (RMSEA = 0.088) indicating adequate model fit. GFI and AGFI indicators decreased in closeness of fit (GFI = 0.818, AGFI = 0.769) from the initial model, SOC Sleep Quality. Overall, the revised Rumination Mediator Model offered an adequate model fit but not as strong a fit as the basic model. The Rumination Mediator Model was not significant.

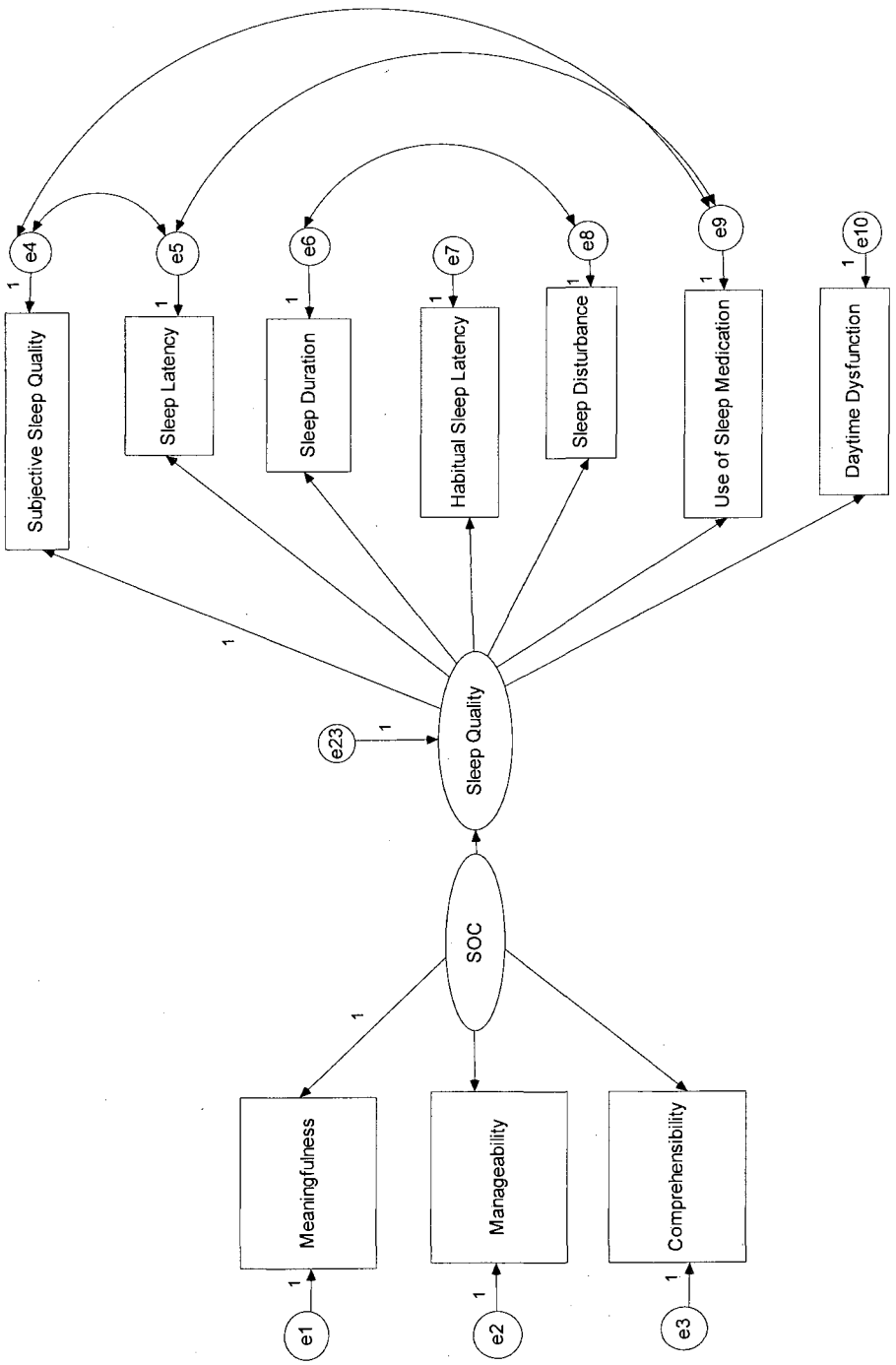


Figure 7. SOC Sleep Quality Model (revised)

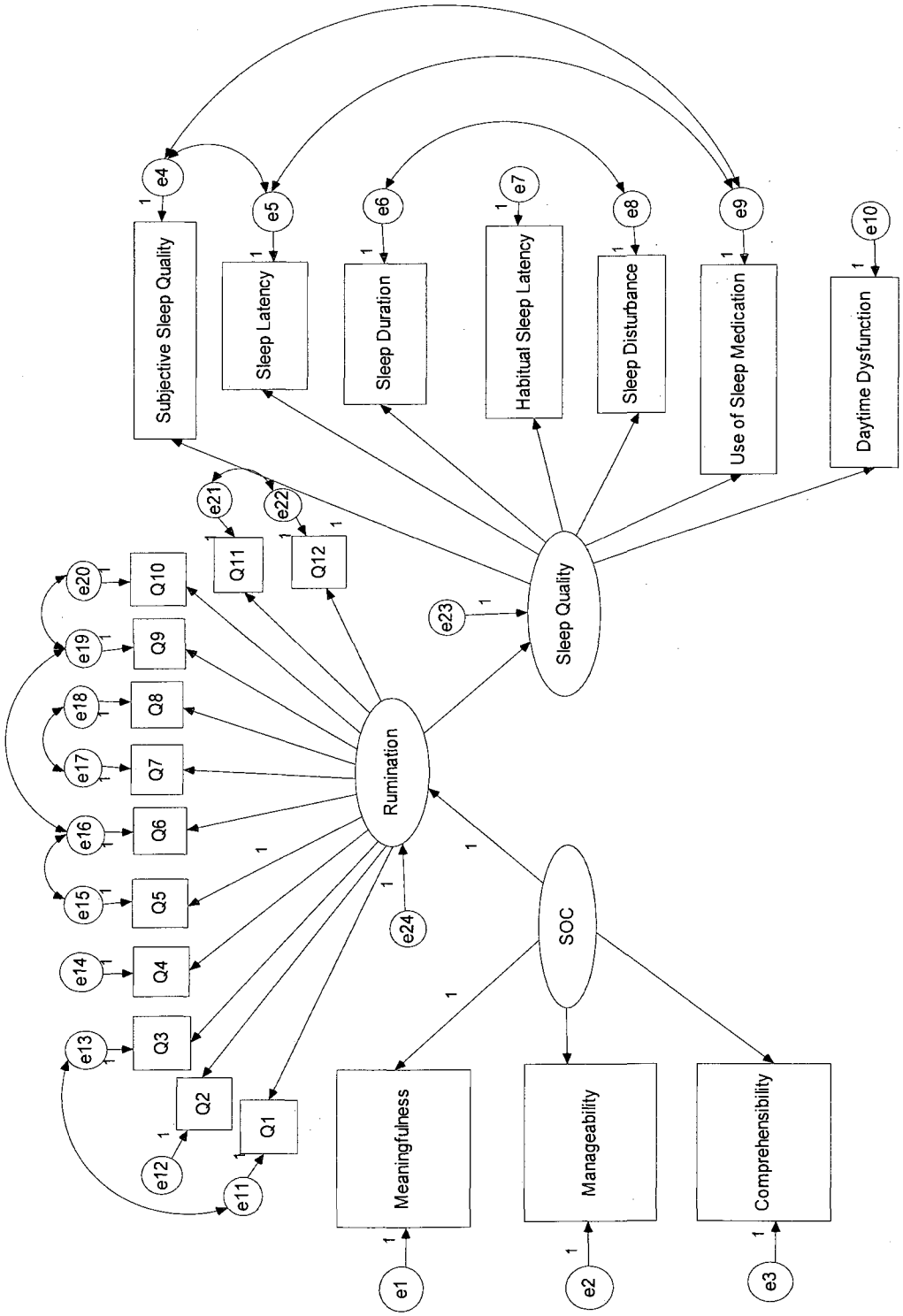


Figure 8. Rumination Mediator Model (revised)

Figure 9. Complex Model (revised)

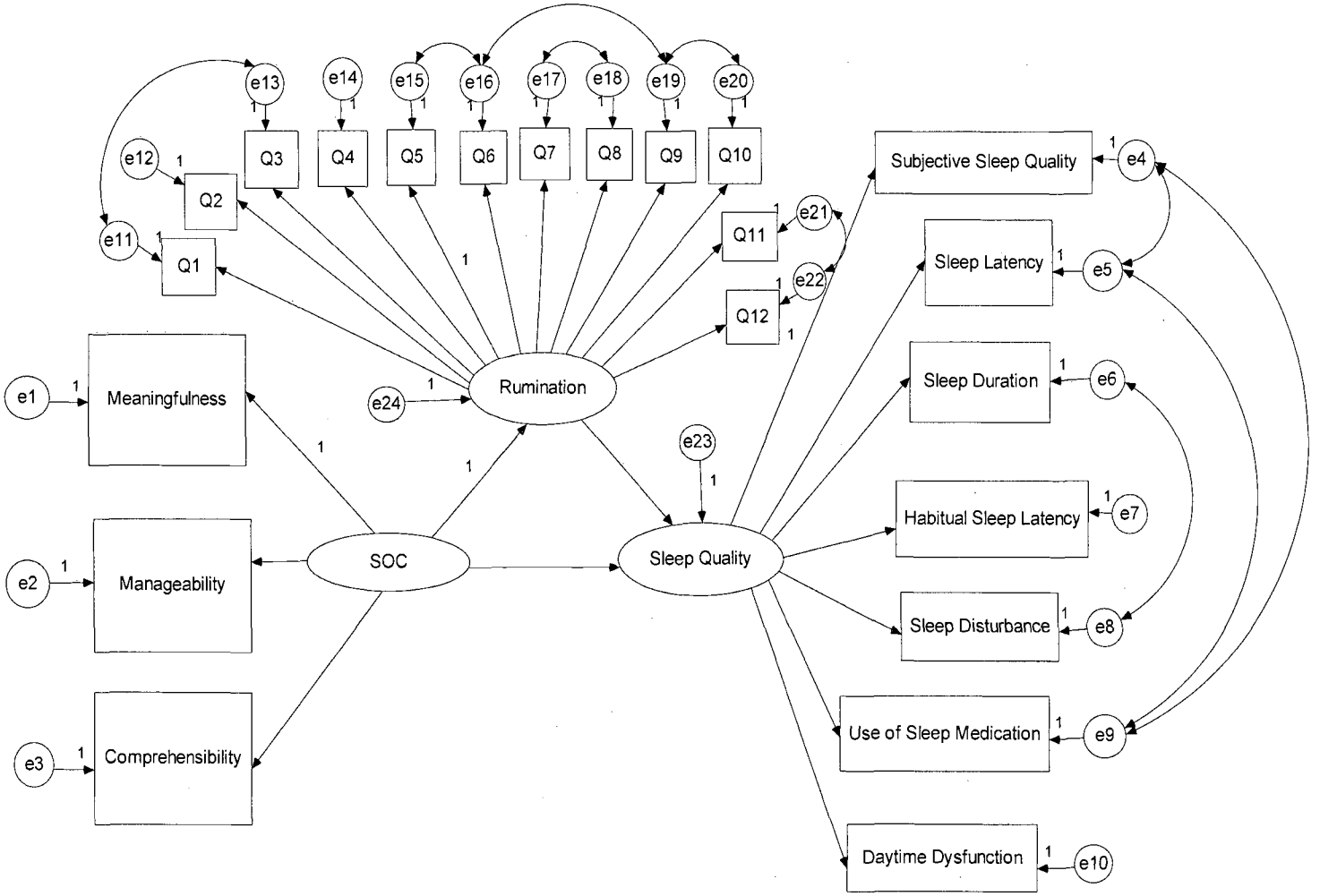


Figure 10. Comprehensive Model (revised)

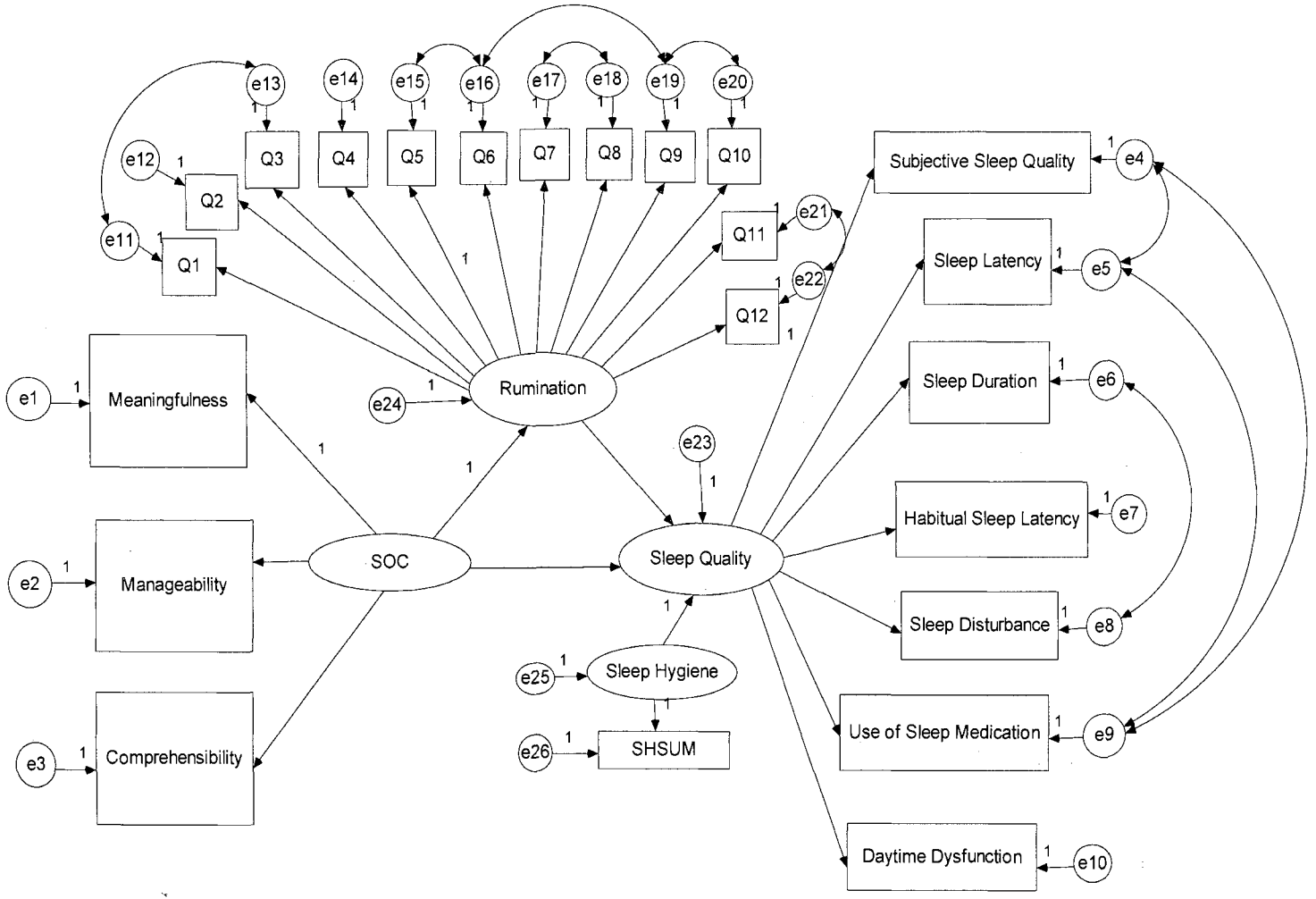


Table 7

Goodness-of-Fit Indicators for All Models

Model	df	$\chi 2$	$\chi 2/df$	CFI	GFI	AGFI	TLI	RMSEA
SOC Sleep Quality Model	30	65.4*	2.18	0.941	0.942	0.894	0.911	0.075
Rumination Mediator Model	198	516.1*	2.61	0.852	0.818	0.769	0.828	0.088
Complex Model	197	511.3*	2.60	0.858	0.822	0.772	0.833	0.087
Comprehensive Model	218	598.5*	2.75	0.834	0.795	0.74	0.807	0.091

Note. CFI = criterion fit index; GFI = goodness-of-fit index; AGFI= adjusted goodness-of-fit index; TLI = tucker-lewis index; RMSEA = root-mean-square error of approximation.

*$p < 0.05$

The next model tested for goodness of fit was the Complex Model. No adjustments were made to the model for MI or EPC needs. The Complex Model included a similar path diagram to the Rumination Mediator Model but also included a direct pathway between SOC and Sleep Quality. The Complex Model resulted in a significant chi-square $\chi^2(197) = 511.3, p < 0.05$. The relative chi-square was slightly over the recommended cutoff of 2.0 ($\chi 2/\underline{df} = 2.60$). The TLI and CLI measurements were higher than recommendations and slightly higher than Rumination Mediator Model results (CLI = 0.858, TLI = 0.833). The RMSEA results were slightly lower than the Rumination Mediator Model results (RMSEA = 0.087). GFI and AGFI increased (GFI = 0.822, AGFI = 0.772) slightly from the Rumination Mediator Model. The GFI and AGFI denote an adequate model fit. The overall Complex Model fit results were adequate and not significant. The model's goodness of fit offered a slightly better model fit as compared to the Rumination Mediator Model but still not as close a fit as the base model, SOC Sleep Quality Model.

The Comprehensive Model was the last model analyzed that included all variables: SOC, rumination, sleep quality and sleep hygiene. Sleep hygiene included one latent variable and one observed variable. No additional MI or EPC adjustments were made to the model. The chi-square was significant $\chi^2(218) = 598.5, p < 0.05$, and relative chi-square was the highest of all models ($\chi 2/\underline{df} = 2.75$). The CLI and TLI measurements were slightly improved over the Complex and Rumination Mediator Model (CFI = 0.834, TLI = 0.807), offering an adequate model fit. The RMSEA measurement was the highest of all models (RMSEA = 0.091). GFI and AGFI indicators were the lowest out of all models (GFI = 0.795, AGFI = 0.74). GFI and AGFI denote adequate model fit. The

overall model is not significant and indicates an adequate model fit. Compared to the other three models, the Comprehensive Model has the lowest goodness of fit.

The SOC Sleep Quality Model was compared with the Rumination Mediator Model. Results are displayed in Table 8. The delta chi-square results were significant $\Delta\chi^2(168) = 450.7, p < 0.05$. The delta chi-square and delta degrees of freedom were high due to the increase in data points from the SOC Sleep Quality Model to the Rumination Mediator Model. The models are significantly different. The Rumination Mediator Model was also compared with the Complex Model. There was a significant delta chi-square $\Delta\chi^2(1) = 4.8, p < 0.05$. The Complex Model had an additional parameter estimate. The models were significantly different.

Table 8

Model Comparisons using Delta Chi-Square

Comparison Models	$\Delta\chi2$	Δdf
SOC Sleep Quality & Rumination Mediator Model	450.7*	168
Rumination Mediator & Complex Model	4.8*	1
SOC Sleep Quality & Complex Model	445.9*	167
Complex Model & Comprehensive Model	87.2*	21

Note. $\Delta\chi2$= differnces in $\chi2$ values; Δdf= differences in degrees of freedom.
*$p < 0.05$

The SOC Sleep Quality Model was compared with the Complex Model. The results offered a significant chi-square, $\Delta\chi^2(167) = 445.9, p < 0.05$. The Complex Model included the rumination variable that increased the data points causing a large difference in chi-square and degrees of freedom between the two models. The SOC Sleep Quality

Model and the Complex Model were significantly different. The Complex Model was also compared with the Comprehensive Model. The delta chi-square results were significant, $\Delta\chi^2(21) = 87.2$, $p < 0.05$. The Comprehensive model had more data points due to the inclusion of the sleep hygiene variable. The models were significantly different from each other.

Summary

The analysis of data in this study offered a description of the sample size, an exploratory factor analysis of the sleep hygiene variable and a structural equation modeling calculation of four models: the SOC Sleep Quality Model, Rumination Mediator Model, Complex Model and Comprehensive Model. The descriptive statistics indicated that most of the population surveyed were Caucasian and married. A majority of the sample size was female and between 30-39 years of age. The geographic distribution ranged mainly between the southeastern and northeastern United States. A significant difference was determined between rumination and gender. Sleep quality indicated significant results with pregnancy, diagnosed sleep disorders, use of prescription sleep medications, medications that impact sleep quality, medical problems impacting sleep, and bed partners that prevent the participant from falling asleep. Sleep quality results denote that variables known to prevent sleep quality were found to significantly impact sleep quality negatively.

An exploratory factor analysis completed on sleep hygiene reflected a weak association with six factor loadings, it was deemed best to utilize one factor loading in the path analysis. Results from the structural equation modeling yielded adequate model fits

with all four models. The best overall results for goodness of fit measures were with the SOC Sleep Quality Model. The SOC Sleep Quality Model indicates a strong and clear relationship with SOC and sleep quality. Models were compared with each other using delta chi-square. All models indicated a significant difference with one another.

CHAPTER V

DISCUSSION

The cross sectional study researched the effects of SOC and rumination on sleep quality. A sample size was collected through snowball sampling via email. Participants completed a one time, anonymous, on-line survey. The overall majority of the sample size was female, married, between 30-39 years of age and Caucasian. Geographically, the participants spanned the United States but the majority of the sample resided in the south or northeast regions.

Hypotheses Results

The study results indicate that SOC predicts sleep quality but that rumination does not have a significant effect as a mediating variable between SOC and sleep quality. The SOC Sleep Quality Model had the best goodness of fit rating. The SOC Sleep Quality Model demonstrated a clear and strong relationship between SOC and sleep quality. The sample size of the study was relatively large indicating that other fit statistics such as RMSEA, CFI and TLI may offer better indices of model fit. The goodness of fit measures CFI, RMSEA and TLI had the best results under this model. The overall model fit was adequate. The measures denote that SOC adequately predicts sleep quality.

The Rumination Mediator Model did not yield a good fit. The chi-square value and degrees of freedom were large. The large increase in chi-square as compared with the SOC Sleep Quality Model is due to adding in the observed rumination variable. The rumination latent variable had twelve observed variables deriving from twelve items on the Rumination-Reflection Questionnaire. As a result of more data points being added, the degrees of freedom and chi-square value increased. The RMSEA, CFI and TLI measures were also adequate indicating that rumination as a mediator does not fit the model well. Rumination acts as a weak mediator in the relationship between SOC and sleep quality, and the relationship between SOC and sleep quality is stronger without including rumination.

The Complex Model did not offer a good model fit. The degrees of freedom and chi-square value were high and not reflective of goodness of fit. RMSEA, CFI and TLI measures offered an adequate fit and a slightly better fit than the Rumination Mediator Model. However, the Complex Model did not offer the closeness of fit that the SOC Sleep Quality Model had. The Complex Model offered a direct pathway from SOC to sleep quality that caused a slightly better model fit than the Rumination Mediator Model but the rumination variable decreased the overall model fit.

The Comprehensive Model did not have a strong model fit. The Comprehensive Model had the highest chi-square value and degrees of freedom. The CFI, TLI and RMSEA indicators were the lowest goodness of fit indicators out of all the models. Although the overall model fit is considered adequate, the best model fit was SOC Sleep Quality Model. The Comprehensive Model included a latent sleep hygiene variable. Sleep hygiene increased the data points and did not improve the goodness of fit. Sleep

hygiene did not offer a stronger relationship between SOC and sleep quality. The Comprehensive Model also included rumination that did not improve the strength of the relationship between SOC and sleep quality. The Comprehensive Model was the most inefficient model fit out of all four models.

When models were tested for comparison to determine if there was a significant difference, the SOC Sleep Quality Model was found to be significantly different from the Rumination Mediator Model. The results were statistically significant which may be due to a large chi-square and degrees of freedom. The large sample size may have impacted these results causing the chi-square statistic to be large. The SOC Sleep Model was also significantly different from the Complex Model. The chi-square from the SOC Sleep Model may have caused a lack of significant difference between the two models.

The Rumination Mediator Model was significantly different from the Complex Model. The models did not reflect a significant difference. The two models had similar results with high chi-square values and high degrees of freedom compared to the SOC Sleep Quality Model. Both models included the rumination variable that did not serve as a strong mediator between SOC and sleep quality. The Complex Model offered a slightly better fit because of the direct pathway from SOC to sleep quality.

The Comprehensive Model was significantly different from the Complex Model. The Comprehensive Model and the Complex Model both achieved high degrees of freedom and high chi-square results. Both models did not offer the closeness of fit as the SOC Sleep Quality Model. Although all model comparisons offered a significant difference, the model fits did not improve with additional variables as anticipated based

on previous research findings. Both rumination and sleep hygiene did not have a strong effect on sleep quality.

Findings

The results indicate that SOC is the best predictor of sleep quality. The two other models that included rumination or rumination and sleep hygiene did not offer a better model fit. The results of the study correlate with previous research findings indicating that SOC is a predictor of perceived health status (Suominen et al., 2001). Perceived health status is similar to the dependent variable of sleep quality in the current study. Sleep quality is a component of health status and has been found to have a relationship with health (Epstein & Maradon 2007; Krakow, 2007; Martin, 2002). It is critical that adults receive adequate, restful sleep in order to replenish the body and be able to perform necessary awake functions. Sleep is important for maintaining long term health.

Sleep quality items were based on recollection of sleep quality in the past month. Sleep quality results were based on perceived responses to sleep quality questions. SOC has not been researched with sleep quality in previous research but results indicate similar findings that SOC predicts health status such as sleep quality. Also, Antonovsky reported that while SOC is flexible it stabilizes over age and strengthens through age (1987). While there was not a significant difference with age and SOC, the mean SOC increased with age.

Sleep quality had expected significant differences with pregnancy, use of prescription sleep medications, medical problems that disrupt sleep, bed partners that disrupt sleep and medications that impact sleep. It is expected that well-known sleep hindering circumstances will cause a decrease in the sleep quality score.

When rumination was included in the model, it did not offer a better model fit. The results did not correlate with previous research findings about rumination and sleep. Rumination has been found to decrease sleep quality (Guastella & Moulds, 2007). In a sleep study involving college students, students instructed to practice rumination prior to sleep had lower levels of sleep quality. The current study did not demonstrate a strong relationship between rumination and sleep quality. It is possible that a small sample size and other factors contributed to a weaker relationship. Factors impacting sleep quality such as sleep medication, undiagnosed sleep problems such as sleep apnea and other medical conditions can impact sleep quality.

Although there was not a statistically significant difference, rumination decreased with age. Research has found that some older adults are more calm than younger adults (Schieman, 1999). It is possible that adults surveyed were calmer than the younger adults and as a result, ruminated less about stressors.

There was a statistically significant difference between gender and rumination. Females had higher rumination scores than men, and results indicate females have more ruminative behavior than men do. These results are similar to research findings from several studies that have found women and girls ruminate more than men do (Allgood-Merten et al., 1990; Blanchard-Fields et al., 1991; Nolen- Hoeksema et al., 1993).

Sleep hygiene had a significant difference with diagnosed sleep disorders. Participants with diagnosed sleep disorders had a lower mean score. Participants with sleeping disorders have received a medical diagnosis from most likely a sleep doctor specialist. As a result, participants have been educated on how to improve sleep hygiene to reduce the sleep quality problems sleeping disorders cause. Other participants without sleeping disorders have most likely not been educated on sleep hygiene, or their sleep quality may not be as sensitive to poor sleep hygiene habits such as eating before bedtime. Older adults, aged 60-65, and sleep hygiene scores were significant. Research states that older adults are more easily disturbed from their environment during sleep such as noise (American Academy of Sleep Medicine, 2009).

The overall participant sleep hygiene score was high, and the overall participant sleep quality score was low. It is possible that the population surveyed is not very sensitive to poor sleep habits and can maintain poor sleep hygiene without a detrimental effect to sleep quality. Although not statistically significant, the older participants were, the higher the sleep quality score was. It is possible that people closer to the age of 65 have trouble sleeping due to the chemical changes in the brain that are known to cause reduced sleep quality after age 65 (American Academy of Sleep Medicine, 2009). As age increased both sleep quality scores increased and sleep hygiene scores increased. As research indicates, sleep quality and sleep hygiene are directly related (LeBourgeois et al., 2005; Kirmil-Gray et al., 1984).

Sleep hygiene did not offer a stronger model fit when used in the Comprehensive Model. These findings conflict with previous research that indicates sleep hygiene can significantly predict sleep quality (LeBourgeois et al., 2005; Kirmil-Gray et al., 1984).

The habits that people have prior to sleep have a direct relationship on the ability to fall asleep and stay asleep. Stimulants such as caffeine can prevent people from falling asleep. While some descriptive variables demonstrated a significant relationship with sleep hygiene such as diagnosed sleep disorders, previous research indicates a direct relationship with sleep quality and sleep hygiene. Caution should be used in generalizing these results. It is possible with a larger sample size that sleep hygiene would have a stronger fit with sleep quality, and that the homogeneous population is not indicative of the overall population.

Chi-square is sensitive to sample size and the population used for this study was relatively large (N = 211). However, CFI is one measure that is least affected by the size of the sample (Fan, Thomson & Wang, 1999). In all models, CFI was close to the ideal standard measurement. It is possible that with a smaller sample size that chi-square results would offer a stronger model fit with the SOC Sleep Quality Model. SOC and sleep quality may also have an even stronger fit if variables that impact sleep quality were included. Variables that may commonly impact sleep quality include medications, diagnosed or undiagnosed sleep disorders and medical problems. The study does not offer a strong relationship between SOC and rumination but it is possible a relationship exists with a different combination. Because SOC has been found to have main, mediating and moderating effects on health (Eriksson & Lindstrom, 2005), it is possible that SOC may moderate the relationship between SOC and sleep quality. Previous research has found an existing relationship between rumination and sleep quality (Hong 2007).

Future Research & Implications

It is recommended that future research regarding SOC include sleep quality. Sleep quality is a common problem that can impact health and cause problems such as daily functioning. SOC has been found to have main effects on health (Eriksson & Lindstrom, 2005). When considering sleep quality, SOC should be included to determine what improvements can be made with poor quality sleep patients regarding meaningfulness of life, manageability of stress and comprehensibility of minor and major aspects of life. It is possible that one or more factors may have a larger role with impacting sleep quality. By identifying what factors are most important, health educators and sleep practitioners can better help patients by creating methods to improve specific components of SOC.

Future research should also include determining the relationship between SOC and rumination. Rumination has been found to decrease mood, sleep and increase depression (Hong 2007; Nolen-Hoeksema, 2000; Nolen- Hoeksema & Morrow, 1991; Nolen-Hoeksema et al., 1993). Because SOC has been found to have a main, mediating and moderating effect on health, it is important to understand the relationship between SOC, a variable that can improve health, and rumination, a variable that can decrease health (Eriksson & Lindstrom, 2005). Research has found that SOC can be a moderator in stressful situations. It is possible that SOC may be a moderator of rumination and sleep quality and is important to research.

The researcher recommends future research survey a more heterogeneous sample size. A sample with a greater amount of racial and ethnic diversity and a more comprehensive variation of age is important. Future research may want to include a broader geographic population within the United States.

There are large implications for sleep specialists and health educators if more research can be done on sleep quality. Patients that suffer from poor sleep have difficulty in daily functioning. Overall health may decline over time due to poor sleep. It is important that doctors and educators include behavioral changes for patients such as ways to decrease rumination and improve SOC. If patients have the tools to alter thought patterns and increase coping skills when stress is encountered, patients may improve sleep quality and long term health.

Conclusion

This research sought to identify the effects of SOC and rumination on sleep quality. The overall findings indicate that SOC has a clear and strong effect on sleep quality. The best model fit was indicated by the basic model, the SOC Sleep Quality Model results. Sleep hygiene did not improve the fit of the model. Past research indicates a strong correlation between sleep hygiene and sleep quality. It is possible that a larger, more heterogeneous sample size may reflect these results, and caution should be used in generalizing these results. Along with past research, rumination and gender had a significant difference. Women ruminate more than men do.

Future research should consider a more diverse population and studying the relationship between SOC and rumination and SOC and sleep quality. Also, more

research is needed to determine how practitioners and health education can educate patients with sleep problems on improving SOC. It is possible that certain factors of SOC will play an integral role in improving sleep quality and may vary per individual. It is plausible that rumination may be the moderator between SOC and sleep quality. More research is needed to better understand how rumination and SOC are related and how experts can decrease rumination, improve SOC and improve sleep quality to increase health and overall quality of life.

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APPENDIX A. Middle Tennessee State University Internal Review Board Approval

February 11, 2009

Christine Williams
Protocol Title: The Effect of Sense of Coherence on Rumination on Sleep Quality
Protocol Number: 09-181

Dear Investigators,

The MTSU Institutional Review Board, or a representative of the IRB, has reviewed the research proposal identified above and has determined that the study poses minimal risk to participants and qualifies for an exempt review under 45 CFR 46.101(b)(2). This is based on the fact that the research is involving survey procedures, information obtained will not be recorded in such a manner that human subjects can be identified, and disclosure of human subjects' responses could not reasonably place subjects at risk.

Approval is granted for three (3) years following the date of this letter.

According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to provide a certificate of training to the Office of Compliance. If you add researchers to an approved project, please forward an updated list of researchers and their certificates of training to the Office of Compliance before they begin to work on the project. Any change to the protocol must be submitted to the IRB before implementing this change.

You will need to submit an end-of-project report to the Office of Compliance upon completion of your research. Complete research means that you have finished collecting and analyzing data. Should you not finish your research within the three (3) year period, you must submit a Progress Report and request a continuation prior to the expiration date. Please allow time for review and requested revisions. Your study will expire on **February 11, 2012.**

All research materials should be retained by the faculty researcher and stored securely in his office on campus for three (3) years following the completion of the project.

Please note that any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918.

Sincerely,

Lisa M. Pritchett, Graduate Assistant to
Tara M. Prairie, Compliance Officer
MTSU Institutional Review Board

APPENDIX B. Altered Informed Consent

Dear Participant,

You are invited to participate in a research study conducted by Christine Williams from Middle Tennessee State University. If you decide to participate, you will be asked to complete a survey. Your participation will help us to further understand the effects of stress on sleep quality. We will collect no information with this study that can be identified to you. Results will also be averaged so that responses of a particular survey can not be traced back to any specific participant. Your participation is voluntary. Your decision whether to participate or not will not affect your standing with Middle Tennessee State University. If you chose to participate you are free to withdraw from the study at any time without consequence or penalty.

If you are under the age of 30 or over the age of 65, please do not complete the survey.

If you have any questions, please feel free to contact Christine Williams via e-mail at caw4w@mtsu.edu or via phone at 615-898- 8238, or contact Dr. Helen Binkley via e-mail at hbinkley@mtsu.edu. You may also contact Tara Prairie with any concerns or questions about this investigation via e-mail at tprairie@mtsu.edu.

Sincerely,

Christine Williams, M.S., CHES

APPENDIX C. Participant Survey

Here is a series of questions relating to various aspects of our lives. Each question has seven possible answers. Please select the number which expresses your answer, with numbers 1 and 7 being the extreme answers. If the words under 1 are right for you, click on answer 1; if the words under 7 are right for you, click on answer 7. If you feel differently, click on the number which best expresses your feeling. Please give only one answer to each question.

1. Do you have the feeling that you don't really care what goes on around you?

☐ 1 very seldom or never ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very often

2. Has it happened in the past that you were surprised by the behavior of people whom you thought you knew well?

☐ 1 never happened ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 always happen

3. Has it happened that people on whom you counted disappointed you?

☐ 1 never happen ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 always happen

4. Until now, your life has had:

☐ 1 no clear goals or purpose ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very clear goals and purpose

5. Do you have the feeling that you're being treated unfairly?

☐ 1 very often ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very seldom or never

6. Do you have the feeling that you are in an unfamiliar situation and don't know what to do?

☐ 1 very often ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very seldom or never

7. Doing the things you do every day is:

☐ 1 a source of deep pleasure and satisfaction ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 a source of pain and boredom

8. Do you have very mixed-up feelings and ideas?

☐ 1 very often ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very seldom or never

9. Does it happen that you have feelings inside you would rather not feel?

☐ 1 very often ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very seldom or never

10. Many people--even those with a strong character--sometimes feel like sad sacks (losers) in certain situations. How often have you felt this way in the past?

☐ 1 never ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very often

11. When something happened, have you generally found that:

☐ 1 you overestimated or underestimated its importance ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 you saw things in the right proportion

12. How often do you have the feeling that there's little meaning in the things you do in your daily life?

☐ 1 very often ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very seldom or never

13. How often do you have feelings that you're not sure you can keep under control?

☐ 1 very often ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 very seldom or never

Please respond by typing in your answers in the blank provided or clicking on the appropriate response.

1. What is your age?

2. What is your gender?

- ◯ Male
- ◯ Female

3. What state do you reside in?

4. What is your height? Please respond in inches and feet.

5. What is your weight?

6. What is your occupation?

7. Do you complete shift work?

- ◯ Yes
- ◯ No

8. Do you have children that interrupt your sleep?

- ◯ Yes
- ◯ No(skip the next question-#9)

9. If yes to the previous question, how many times per night are you awakened?

10. Are you pregnant?

- ◯ Yes
- ◯ No

11. Do you have a diagnosed sleeping disorder?

- ◯ Yes
- ◯ No (skip the next 2 questions, #12 & #13)

12. If yes to question 11, do you use a mechanical devise for your sleeping disorder?

- ◯ Yes
- ◯ No

13. Do you use prescribed sleep medication at least once per week?

◯ Yes

◯ No

14. Do you take medication regularly that impacts your sleep patterns (example: sleeping longer, sleeping less, interruption of sleep, etc.)?

◯ Yes

◯ No

15. Do you have any conditions or medical problems that impact the quality of your sleep (menopause, fibromyalgia, migraines, arthritis, etc.)?

◯ Yes

◯ No (skip question #16)

16. If yes to question 15, what is your condition?

17. What is your ethnicity (optional to answer)?

☐ 1 White or Caucasian ☐ 2 Hispanic or Latino ☐ 3 Black or African American ☐ 4 Asian ☐ 5 Native Hawaiian or Other Pacific Islander ☐ 6 Other

18. Are you married?

☐ 1 Yes

☐ 2 No

19. If you have a bed partner, does he or she keep you from falling asleep or staying asleep?

☐ 1 Yes

☐ 2 No

☐ 3 N/A

Section 1: Sleep Quality

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, when have you usually gone to bed at night?

2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?

3. During the past month, when have you usually gotten up in the morning?

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)

For each of the remaining questions, click on the best response. Please answer all questions.

1. During the past month, how often have you had trouble sleeping because you... Cannot get to sleep within 30 minutes

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

2. During the past month, how often have you had trouble sleeping because you... Wake up in the middle of the night or early morning

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

3. During the past month, how often have you had trouble sleeping because you...Have to get up to use the bathroom

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

4. During the past month, how often have you had trouble sleeping because you...Cannot breathe comfortably

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

5. During the past month, how often have you had trouble sleeping because you...Cough or snore loudly

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

6. During the past month, how often have you had trouble sleeping because you...Feel too cold

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

7. During the past month, how often have you had trouble sleeping because you...Feel too hot

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

8. During the past month, how often have you had trouble sleeping because you...Had bad dreams

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

9. During the past month, how often have you had trouble sleeping because you...Have pain

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

10. If you answered question #9, please respond to the following...
How often during the past month have you had trouble sleeping because of this?

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

11. During the past month, how would you rate your sleep quality overall?

☐ Very good ☐ Fairly good ☐ Fairly bad ☐ Very bad

12. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

13. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week

14. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

☐ No problem at all ☐ Only a very slight problem ☐ Somewhat of a problem ☐ A very big problem

15. Do you have a bed partner or roommate?

☐ No bed partner or roommate ☐ Partner/roommate in other room ☐ Partner in same room, but not same bed ☐ Partner in same bed

16. If you have a roommate or bed partner, has he or she mentioned in the past month you have had... Loud snoring

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week ☐ never mentioned

17. If you have a roommate or bed partner, has he or she mentioned in the past month you have had...Long pauses between breaths while asleep

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week ☐ never mentioned

18. If you have a roommate or bed partner, has he or she mentioned in the past month you have had...Legs twitching or jerking while you sleep

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week ☐ never mentioned

19. If you have a roommate or bed partner, has he or she mentioned in the past month you have had...Episodes of disorientation or confusion during sleep

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week ☐ never mentioned

20. If you have a roommate or bed partner, has he or she mentioned in the past month you have had...Other restlessness while you sleep: please describe

☐ not during the past month ☐ less than once a week ☐ once or twice a week ☐ three or more times a week ☐ never mentioned

This section of the survey asks you to indicate what you generally do and feel, when you experience stressful events. Different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress. Then respond to each of the following items by selecting the answer for each, using the response choices listed just below. There are no "right" or "wrong" answers, so choose the most accurate answer for YOU--not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

1. My attention is often focused on aspects of myself I wish I'd stop thinking about.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

2. I always seem to be rehashing I my mind recent things I've said or done.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

3. Sometimes it is hard for me to shut off thoughts about myself.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

4. Long after an argument or disagreement is over with, my thoughts keep going back to what happened.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

5. I tend to "ruminate" or dwell over things that happen to me for a really long time afterward.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

6. I don't waste time rethinking things that are over and with.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

7. Often I'm playing back over in my mind how I acted in a past situation.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

8. I often find myself reevaluating something I've done.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

9. I never ruminate or dwell on myself for very long.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

10. It is easy for me to put unwanted thoughts out of my mind.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

11. I often reflect on episodes in my life that I should no longer concern myself with.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

12. I spend a great deal of time thinking back over my embarrassing or disappointing moments.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

13. Philosophical or abstract thinking doesn't appeal to me that much.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

14. I'm not really a meditative type of person.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

15. I love exploring my "inner" self.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

16. My attitudes and feelings about things fascinate me.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

17. I don't really care for introspective or self- reflective thinking.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

18. I love analyzing why I do things.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

19. People often say I'm a "deep", introspective type of person.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

20. I don't care much for self analysis.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

21. I'm very self- inquisitive by nature.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

22. I love to meditate on the nature and meaning of things.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

23. I often love to look at my life in philosophical ways.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

24. Contemplating myself isn't my idea of fun.

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

This section of the survey asks you to indicate what you generally do and feel, when you are going to sleep. Then respond to each of the following items by selecting the answer for each, using the response choices listed just below. There are no "right" or "wrong" answers.

1. I take daytime naps lasting two or more hours.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

2. I go to bed at different times from day to day.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

3. I get out of bed at different times from day to day.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

4. I exercise to the point of sweating within 1 hour of going to bed.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

5. I stay in bed longer than I should two or three times a week.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

6. I use alcohol, tobacco, or caffeine within 4 hour of going to bed or after going to bed.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

7. I do something that may wake me up before bedtime (for example: play video games, use the internet, or clean).

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

8. I go to bed feeling stressed, angry, upset, or nervous.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

9. I use my bed for things other than sleeping or sex (for example: watch television, read, eat,or study).

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

10. I sleep on an uncomfortable bed (for example: poor mattress or pillow, too much or not enough blankets).

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

11. I sleep in an uncomfortable bedroom (for example:too bright, too stuffy, too hot, too cold,or too noisy).

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

12. I do important work before bedtime (for example: pay bills, schedule, or study).

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

13. I think, plan, or worry when I am in bed.

☐ always ☐ frequently ☐ sometimes ☐ rarely ☐ never

The End! Thank you!

APPENDIX D. National Sleep Foundation Approval

PERMISSION AGREEMENT FOR THE REPRODUCTION OF NATIONAL SLEEP FOUNDATION PRODUCTS

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