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A Study Of Perceived Stress, Anxiety, Somatic Symptoms, And Spirituality In Practitioners Of The Martial Art Aikido

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A STUDY OF PERCEIVED STRESS, ANXIETY, SOMATIC SYMPTOMS, AND SPIRITUALITY IN PRACTITIONERS OF THE MARTIAL ART AIKIDO

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ABSTRACT

The purpose of this study was to examine relationships between physical, mental and spiritual health. An additional purpose was to determine if the practice of aikido was associated with measurable levels of somatic symptoms, perceived stress, anxiety and spirituality. Measurement instruments included Cohen's 10-item Perceived Stress Scale (PSS), Spielberger's 20-item Trait Anxiety Inventory (TAI), the Patient Health Questionnaire-15 (PHQ-15), and the 16-item Daily Spiritual Experiences Scale (DSES).

A cross-sectional research design was utilized in this study to test the following hypotheses: 1) After controlling for demographic variables, daily spiritual experience will explain variability in perceived stress, anxiety and somatic symptoms, and 2) After controlling for demographic variables, aikido experience level as measured by belt rank will explain variability in perceived stress, anxiety, somatic symptoms and daily spiritual experiences. Hierarchical (sequential) regression was performed using SPSS version 15.0. The results did not support either hypothesis. Additional analysis, however, indicated that daily spiritual experience was associated with trait anxiety. More daily spiritual experience was associated with less trait anxiety ($r = .131$, $p = .035$). Specifically, more daily spiritual experience was associated with feeling pleasant, having less nervousness and restlessness, more satisfaction with self, fewer wishes to be as happy as others, more happiness, less discontentment and more steadiness ($r = .124$ to

.205, p<.05). More daily spiritual experience also was associated with less trouble sleeping (r = .126, p<.05) as measured using the PHQ-15.

Belt rank in aikido was associated with 2 individual items on the PHQ-15. More experience in aikido was associated with more pain in the back (r = .191, p<.05), and more pain in the arms, legs and joints (r = .224, p<.05). Belt rank in aikido also was associated with 1 item on the TAI. More experience in aikido was associated with more feelings of steadiness (r = -.199, p<.05). When compared with normative data, female aikido students presented with lower perceived stress (t = 2.02, p<.05) as measured using the PSS. Aikido students presented with less daily spiritual experience (t = 4.83, p<.05) when compared with normative data for the DSES.

DEDICATION

I wish to dedicate this work to the memory of the late Morihei Ueshiba, who not only created the art known as aikido but also worked tirelessly to promote peace and harmony across our sometimes troubled world. The world is a better place because of his example.

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Most of all I would like to thank my family. My father, Raymond Tapley, now deceased; and my mother, Ercelle Tapley, now deceased; were my two most loyal fans who never failed to offer verbal and emotional support. To my wife and son I owe the greatest debt, for they were the ones who endured with me throughout the ups and downs of this experience. I offer my greatest heartfelt thanks to them in hopes that I will someday be able to repay them for their tremendous gift of patience.

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LIST OF ABBREVIATIONS

DSE	Daily Spiritual Experiences
DSES	Daily Spiritual Experiences Scale
DSESSUM	Daily Spiritual Experiences Scale Summary Score
GST	General Systems Theory
PHQ-15	Patient Health Questionnaire-Somatic Symptom Subscale
PHQSUM	Patient Health Questionnaire Summary Score
PSS	Perceived Stress Scale
PSSSUM	Perceived Stress Scale Summary Score
STAI	State/Trait Anxiety Inventory
TAI	Trait Anxiety Inventory
TAISUM	Trait Anxiety Inventory Summary Score

CHAPTER 1

INTRODUCTION

Holistic health is emerging as a popular way of viewing our own state of well-being. As a reaction against the narrow, mechanical views of reductionism which characterizes the medical model, holism calls upon individuals to widen their angle of view and look at all possible influential components comprising the concept of health. Increasing interest in the scientific community has arisen in recent years for studying the cognitive, emotional and spiritual elements of individuals as they relate to the more easily understood physical health parameters. At the heart of this movement lies a belief that the structure of our current society creates undo psychological stress on its citizens leading to possible linkages between mental and physical health.

Stress is a modern epidemic in the United States of America. As individuals work harder and harder in futile attempts to "keep up with the Jones" and acquire more and more material possessions, they unknowingly stretch themselves to the extreme limits of their bodies and minds. Our modern society has created many conveniences and improved quality of life in a multitude of ways, yet the price we pay is in the increased complexity of life. Mental tensions run high as individuals sacrifice simple pleasures for the excitement of the innovative and new. A cozy spot on the front porch swing is overlooked in favor of television and video games. It would seem that Americans have forgotten how to relax. They multitask in order to squeeze as much activity as possible into every moment. It is not uncommon to see someone driving down a crowded

interstate while simultaneously listening to the radio, eating a donut and talking on a cellular telephone. This incessant, uninterrupted activity of our bodies and minds may have dire consequences for health.

The review of literature included later in this proposal will offer overwhelming evidence that high levels of stress and anxiety are associated with deteriorating health status (Cohen, Frank, Doyle, Skoner, Rabin & Gwaltney, 1998; Schnall, Schwartz, Landsbergis, Warren, & Pickering, 1998). From simple complaints such as headaches and insomnia, to serious life-threatening illness, the relationship of high stress to health status is becoming widely recognized and accepted. This rising health crisis must be addressed by individuals and the healthcare industry.

Indeed, it would seem that the American public is preoccupied with the search for stress management solutions. This is suggested by the fact that "Stress management" articles are regular occurrences in most popular magazines. In addition, internet searches using "stress" as a search item reveal an overwhelming number and variety of websites available to the general public for the purposes of health education.

One way individuals may try to deal with the harsh reality of stress is through spirituality. There is growing interest in our country for various types of spiritual practices. Eastern practices in particular are increasing in prevalence in western countries. For example, Buddhist meditation, yoga, tai chi, and various martial arts are growing in popularity and are now commonly used for physical, mental and spiritual development. Many westerners find they can incorporate these activities into their lives in a meaningful way without disrupting their traditional belief systems.

The martial arts are now commonly believed to affect both physical and mental health. They are growing in popularity in Western countries and offer the potential of serving as effective primary prevention strategies. Aikido, a unique martial art which emphasizes peaceful conflict resolution and non-violence, has great potential for both personal and societal growth and development. Aikido trains individuals to remain calm, relaxed and focused during adversity, and possesses the necessary ingredients for a powerful recipe for stress management. Aikido is also considered by many to be a spiritual discipline (Brawdy, 2001; Kohn, 2001). Its practice therefore has the potential to influence three of the common holistic health parameters: the physical, mental and spiritual.

Summary of the Problem

There is limited research linking spirituality with physical and mental health parameters. A relatively new method for assessing spirituality is "daily spiritual experiences". This concept has received little attention in the scientific literature. There has been no published study linking daily spiritual experiences with the physical symptoms commonly associated with stress and anxiety.

The martial art of aikido is practiced by millions of individuals across the globe, and its popularity is growing. There exist anecdotal claims of reduced stress and anxiety associated with its practice, yet there is very little empirical research to support these assertions. An analysis of the educational foundations of aikido training reveals a complex system of mental discipline which transcends its obvious utility as a means for physical development and self-defense. Is prolonged and dedicated adherence to this art

associated with a more relaxed, calm and peaceful state of mind? Quantitative data is not available to support these claims.

The spiritual health of martial artists has not been reported in the scientific literature despite anecdotal claims that its practice is associated with spiritual development. Aikido schools offer an excellent population to study this aspect of health since it is generally believed to be one of the more spiritually-based martial art forms.

Purpose of the Research

The purpose of this research was twofold: 1) to examine relationships between physical, mental and spiritual health, and 2) to determine if the practice of aikido is associated with perceived stress, anxiety, somatic symptoms, and spirituality.

The present study attempted to answer the following research questions:

1) After controlling for the effects of demographic variables, does daily spiritual experience explain variability in perceived stress, anxiety and somatic symptoms?
2) After controlling for the effects of demographic variables, does the practice of aikido as measured by experience level explain variability in perceived stress, anxiety, somatic symptoms, and daily spiritual experiences?

The Hypotheses for this study included the following items:

1) After controlling for demographic variables, daily spiritual experience will explain variability in perceived stress, anxiety, and somatic symptoms. Higher levels of daily spiritual experience will be associated with lower levels of perceived stress, anxiety and somatic symptoms.
2) After controlling for demographic variables, aikido experience level as measured by belt rank will explain variability in perceived stress,

anxiety, somatic symptoms and daily spiritual experiences. Higher levels of aikido experience will be associated with lower levels of perceived stress, anxiety, and somatic symptoms and higher levels of daily spiritual experience.

Significance of the Problem

The concept of holistic health has the potential to transform both the practice of health promotion and our modern healthcare system. More scientific research is needed to support the basic premises of holistic health which state that health is multidimensional and the various dimensions are interrelated. Specifically, the relationship between spirituality and physical health has not been adequately studied. Very limited research has been published assessing the relationships between the practical, "daily" experiences of spiritually and other areas of health.

A review of the literature revealed significant cause for concern regarding the negative health effects of stress. Psychological stress and anxiety were found to be associated with multiple disease processes and subjective complaints of physical symptoms (Fernandez & Sheffield, 1996; Thomason, Brantley, Jones, Dyer, Morris, 1992). Individuals in industrialized societies are in need of knowledge about stress management. The results of this research may serve to raise awareness of the possible health-enhancing properties of martial arts practice. Perhaps a fellow health professional or educator will read this published research and subsequently refer his/her clients to aikido schools as a trial in stress management. This study has the potential of encouraging further research to investigate causative links between aikido practice and reduced stress. The potential transformation of character and personality associated with

martial arts training is worthy of recognition and further investigation since it is possible that experienced practitioners may possess more resiliency to life stress.

Unmanaged stress affects individuals negatively on so many different levels including links to the number one killer of people in industrialized nations, cardiovascular disease (Cossette, Frasure-Smith, Lesperance, 2001; Frasure-Smith & Prince,1985). Effective stress management used as primary prevention has the potential to save millions of dollars in medical costs and prevent much unnecessary physical and mental suffering. Continued research efforts are desperately needed in this important aspect of modern healthcare.

Assumptions of the Study

It was assumed that when contacted, aikido instructors would agree to allow their students to participate in the study. It is also assumed that when asked, individual aikido students would volunteer for participation in this study. This was a reasonable concern, since there was no tangible award offered for participation. It was believed, however, that aikido students would be eager to seek involvement with a scientific study of their art.

Another assumption of this study was that volunteers would provide honest answers to the questions presented in the assessment of perceived stress, anxiety and somatic symptoms. This was vital to achieve if an accurate assessment was to be made when interpreting the results of the study. It seems reasonable that honesty of response was enhanced by the anonymity of responses inherit in this research design.

Definition of Terms

Aikido

Literally translated as "harmony, energy, way". A Japanese art of self-defense employing locks and holds and utilizing the principle of nonresistance to cause an opponent's own momentum to work against him. The "Way of Harmony" is more than a martial art, but not a competitive sport; it is a spiritual discipline, but not a religion (Stevens, 1996).

Anxiety

An emotional state characterized by feelings of displeasure, angst, apprehension and dread (Spielberger, 1966).

Daily Spiritual Experiences

A person's perception of the transcendent(God, the divine) in daily life and his or her perception of his or her interaction with or involvement of the transcendent in life (Underwood, 2002).

General Systems Theory

Developed by Bertalanffy in response to a need for a common theory to guide research efforts in multiple disciplines. Focuses on the arrangement of and relationships between the parts which connect them into a whole. Contains general principles which can be applied to many disciplines (Bertalanffy, 1968).

Holism

The belief that a fundamental characteristic of existence is the development of wholes. The whole-making, or holistic tendency is seen at all stages of existence and is by no means confined to the biological domain (Smuts, 1926).

Holistic Health

Based on the concept of holism. A multi-dimensional phenomenon that includes not only physical, but also emotional, intellectual, occupational, social and spiritual components (Hawks, 1994).

Perceived Stress

The degree to which situations in one's life are appraised as stressful. The perception of stress involves an evaluation of events as threatening, and a lack of confidence in one's ability to cope (Cohen, 1983).

Somatic Symptoms

Physical, bodily complaints such as pain, numbness, dizziness, etc. (Tabers, 1989)

Somatization

The process of expressing a mental condition as a disturbed bodily function (Tabers, 1989)

Spirituality

Spirituality is concerned with the transcendent, addressing ultimate questions about life's meaning, with the assumption that there is more to life than what we see or fully understand. Spirituality can call us beyond self to concern and compassion for others (Underwood, 2002).

State Anxiety

A temporal cross-section in the emotional stream-of-life of a person, consisting of subjective feelings of tension, apprehension, nervousness, and worry, and activation or arousal of the autonomic nervous system. A transitory emotional state which fluctuates over time based on an individual's perception of threat (Spielberger, 1985).

Trait Anxiety

Relatively stable individual differences in anxiety-proneness. A personality trait indicating a predisposition to respond in a certain manner. Differences between individuals in the probability that anxiety states will be manifested under circumstances involving varying degrees of stress (Spielberger, 1985).

CHAPTER 2

REVIEW OF THE LITERATURE

Multiple data bases were utilized in performing a thorough search of the scientific literature. The concepts of stress, anxiety and somatic symptoms were widely reported in published articles. Indeed, the current and past research performed on human stress and its relationship to health is somewhat overwhelming. There was little difficulty in selecting and obtaining references to document the significance of this growing health problem. Published studies evaluating relationships between spirituality and other health variables were more difficult to attain. The search for empirical research documenting the relationship between aikido practice and mental health also proved more difficult. There seemed to be more reported research describing other martial arts such as taekwondo and tai chi. Nonetheless, many hours and literally thousands of citations were sorted through in an effort to identify evidence that aikido practice is associated with reduced stress and anxiety. Very few quantitative articles were identified in the area of aikido and mental health. At the same time, it was interesting to note the extent to which the psychological benefits of aikido were cited in non-scientific writings.

The literature search for the aikido/martial arts connection to health began with a MEDLINE search from the year 1966 to present. “Martial Arts” and “Aikido” were included as terms for both title and key word searches. These findings were then combined with results from searches using “stress”, “anxiety”, “somatic symptoms”, “physical symptoms”, and “spirituality”. This process was continued with multiple

databases. Additional databases searched included: the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Health & Psychosocial Instruments, Dissertation Abstracts Online, PsychINFO, Health and Wellness Resource Center, SPORTDiscus, Social Science Citation Index, ISI Web of Knowledge/Web of Science, SCI-Expanded, Social Science Citation Index (SSCI), Arts and Humanities Citation Index (A&HCI), Education Resources Information Center (ERIC), Health Reference Center-Academic, Elton B. Stephens Company (EBSCO) (Academic Search Elite, Bus Source Elite, Master File Premier, Health Source, Nursing/Acad Edition, American Humanities Index, Healthsource-Consumer Ed., MLA Directory of Periodicals, MLA International Bibliography, Newspaper Source, ATLA Serials, Prof Devel Collection, Commun. & Mass Media Complete, MAS-Ultra School Ed.), Lexis (Medical, Med Journals, News, Abstracts), PubMed, Sociological Abstracts, Television News Archive, and Expanded Academic ASAP. Each database was searched for the oldest dates available to present. In addition, the internet was searched using Google. The process involved scanning through over 400 results from this internet search alone.

This review of literature begins with an overview of the history of stress research followed by explanations of stress-related concepts such as perceived stress, anxiety, and somatic symptoms. The relationship between stress and physical illness is discussed, followed by research demonstrating various approaches to stress management. The theoretical justification for this study based on the concepts of holism and General Systems Theory is then reported. Next follows a discussion of spirituality as it relates to mental and physical health. Finally, research describing the relationship between martial arts practice and health is examined. The literature relating aikido practice in particular to

health is reported. The philosophical and educational foundations of aikido are explained, with special consideration given to the potential stress management and spiritual development characteristics of aikido.

Criteria Used for the Evaluation of Research

This review of the literature includes studies of varying degrees of scientific rigor. The following discussion includes an overview of criteria commonly used to evaluate the strength of research designs. Topics discussed include the major types of research design, the importance of sample selection, instrument reliability and validity, and threats to internal and external validity. A categorization system is described that will assist the reader in evaluating the scientific rigor of the studies reported in this review.

Major Types of Research

Research is generally divided into two major categories: experimental and non-experimental. During experimental research, the researcher is an active agent whereas in non-experimental research the researcher plays a more passive role. The purpose of scientific research is to understand the nature of relationships among variables with the exception of descriptive research. Experimental and quasi-experimental designs offer the best approaches to test hypotheses related to cause-and-effect relationships. Experimental studies must possess three qualities: manipulation of an independent variable and measurement of a dependent variable, random assignment to a group and the use of a control group.

First, the independent variable must be manipulated in some way. This may involve a treatment intervention such as the administration of an experimental medicine or exposure to a health education campaign. Subjects are randomly assigned to the group that will receive the experimental condition or a control group. Quasi-experimental studies also include manipulation of the independent variable however, these studies lack either a control group or randomization (Polit & Hungler, 1991).

Finally, non-experimental research does not manipulate the independent variable. Non-experimental research can be descriptive, which attempts to document aspects of a situation as it naturally occurs, or ex post facto. Ex post facto research is also commonly referred to as correlational research. Correlational research is very common in the health and social sciences. The researcher attempts to understand relationships among phenomena as they naturally occur without intervention (Polit & Hungler, 1991).

The Importance of Sample Selection

The rigor of research studies may be determined by several criteria including sample appropriateness and size. The sample must be drawn from the population of interest to the investigation. It is unreasonable to select high school student volunteers to participate in a study of the effectiveness of a meditation training program to reduce workplace stress. The sample must also be large enough to allow for sound statistical analysis. Therefore, it is imperative that a power analysis be performed to determine adequate sample size prior to the completion of a study. Psychometric properties of research instruments must be reported before true and valid inferences can be made from the research data (Windsor, 1994).

Instrument Reliability and Validity

The reliability of an instrument is the degree of consistency with which it measures the attribute of interest to the investigator. Less variation in an instrument yields higher reliability. The reliability of an instrument is related to both its consistency and stability. The internal consistency of a measurement scale is the degree to which all items in the scale are measuring the critical attribute and nothing else. An instrument is said to be internally consistent or homogeneous to the extent that its subparts are measuring the same characteristic. The stability of an instrument refers to the extent to which similar results are obtained with repeated measures of the instrument. This is commonly referred to as test-retest reliability (Polit & Hungler, 1991).

The validity of an instrument is the degree to which an instrument measures what it is supposed to be measuring. The validity of an instrument is extremely difficult to establish and solid evidence supporting the validity of most psychologically-oriented measures is rarely available. It is possible for an instrument to be reliable, yet not valid however it is not possible for an instrument to have adequate levels of validity if it is not reliable. The instrument cannot provide valid information regarding the characteristic of interest if its measurements are erratic, inconsistent and inaccurate (Polit & Hungler, 1991).

Threats to Internal and External Validity

Finally, one may evaluate the adequacy of a research design by assessing its internal and external validity. Internal validity is attained when the findings are shown to be a result of the effects of the independent variable and not related to extraneous

variables. Threats to the internal validity of a study include history, selection, maturation, testing and instrumentation, and mortality. History refers to the occurrence of external events that may affect the variables under study. The term selection refers to bias resulting from pretreatment differences between groups. Maturation refers to changes in the subjects that occur as a result of time rather than being related to the study intervention. Testing and instrumentation threats refer to the possibility that subjects may alter their perceptions as a result of the testing procedure. It is also important when using pretest/posttest designs that the instrument is exactly the same for both phases of the study. Mortality refers to loss of subjects from groups over time.

External validity is attained when the results of a study can be generalized to other populations outside of the research setting. Threats to the external validity of a study include the Hawthorne effect, novelty effects, history, experimenter effects and measurement effects. The Hawthorne effect refers to changes in the subjects due to an awareness of participation in a research study. Novelty effects occur when subjects change their behavior due to reactions to something new and exciting, such as introduction of an innovative new treatment. As with internal validity, historical effects may also affect the external validity of the study. Experimenter effects occur when the subjects are influenced by researcher characteristics such as mood states and overzealousness. Measurement effects occur when the data collection process changes the variables under consideration. Therefore, the findings of the study may not apply to another group of people who were not subjected to this process (Polit & Hungler, 1991).

Reviewing Professional Literature Using Criteria of Scientific Rigor

With consideration of the preceding discussion, an attempt was made to identify which studies were more rigorous and therefore merit more consideration. A list of five criteria was created based on the above discussion of research evaluation. Criteria are listed in Table 1. The first and second criteria relate to sampling issues, while the third and fourth relate to the reliability and validity of the measurement instruments used in each study. The fifth criteria relates to threats to internal and external validity. The investigator of this dissertation study applied five criteria to studies selected from professional literature regarding mental and spiritual health and martial arts.

Table 1

Criteria for Evaluating Research in Review of Literature

Criteria	Study Requirement
(1) Sample	The sample chosen must seem reasonable for use in answering the proposed research questions
(2) Sample Size	Must indicate that a power analysis was performed to determine sample size
(3) Reliability	Must use instruments with known internal consistency or test/retest reliability
(4) Validity	Must use instruments with known validity
(5) Threats to Internal/ External Validity	Must discuss threats to internal/external validity as they relate to study

As presented in Table 2, a categorization system was constructed to assist the reader in identifying more rigorous research studies. The research was divided into three

levels with Level I consisting of studies possessing the most rigorous research design. Level I included experimental and quasi-experimental studies that met *at least three of the five* criteria listed in Table 1. All studies included in the categorization were required to meet the first criteria for use of an appropriate sample. Level I studies included both experimental and quasi-experimental designs that utilized an appropriate sample of subjects drawn from the population of interest. In addition, Level I studies must have met *at least two of the other design criteria*: use of instrumentation with known reliability, use of instrumentation with known validity, performance of power analysis to determine sample size, discuss threats to internal/external validity.

Level II studies consisted of ex post facto/correlational studies meeting *at least three of the five criteria* listed in Table 1. Level III studies consisted of either experimental, quasi-experimental or non-experimental studies which met *at least two of the five criteria.*

Table 2

Categorization of Research in Review of Literature

	Level		
	I	II	III
Study Design	E or QE	EPF	E, QE or EPF
Total Criteria Met	3 of 5	3 of 5	2 of 5

Note. E = Experimental, QE = Quasi-experimental, EPF = Ex Post Facto/Correlational
All studies included in this categorization must meet criteria 1 in table 1.

For each section of the review of literature, a table is provided indicating those studies which met the criteria for classification as Level I, II or III. The investigator

applied these criteria to separate more from less rigorous studies in the professional literature. For example, a study listed as Level I may warrant greater consideration than one listed as Level III simply because it adhered to a higher standard of research methodology. The reader should be especially cautious in interpreting results from studies not included in this categorization.

The Concept of Stress

Stress is a growing cause for concern among individuals in industrialized nations. This is made evident by the frequent reports on stress in the media which have served to raise awareness of this growing problem. The cover of Time Magazine's June 1983 issue shows the face of a man in severe distress, with the title above him reading "Stress: Seeking Cures for Modern Anxieties". The feature story refers to stress as "The Epidemic of the Eighties" (Time, 1983). Unfortunately, there is no indication that our concern for stress in our society waned during the 1990's. A review of the literature from 1990 to 2000 using the Medline Database with psychological stress as a keyword revealed a total of 18,596 published research articles.

This proposed epidemic has given rise to organizations whose sole purpose is to help individuals fight back. The information that they provide offers some insight into the nature of the problem. One example is The American Institute of Stress (AIS). The AIS website states that it is "Dedicated to advancing our view of the role of stress in health and illness" (American Institute of Stress, 2004). It also reports that "stress research has increasingly confirmed the crucial role stress can play in causing and aggravating different disorders". According to AIS, job stress is by far the number one cause of stress

for adults, but adds "…stress levels have also escalated in children, teenagers, college students and the elderly for other reasons, including: increased crime, violence and other threats to personal safety; pernicious peer pressures that lead to substance abuse and other unhealthy life style habits; social isolation and loneliness; the erosion of family and religious values and ties; the loss of other strong sources of social support that are powerful stress busters." Modern stress is viewed as different from those stressors that man was exposed to during thousands of years of evolution. According to AIS, "Contemporary stress tends to be more pervasive, persistent and insidious because it stems primarily from psychological than physical threats." We are faced with traffic jams and interpersonal confrontations multiple times daily, resulting in repeated activation of our fight or flight response. This repeated activation of the fight or flight response, reports AIS, contributes to such maladies as hypertension, heart attack, stroke, diabetes, ulcers, and neck and back pain.

America is not the only industrialized country to recognize the growing influence of stress in our lives. The London-based International Stress Management Association (ISMA) states that it "…exists to promote sound knowledge and best practice in the prevention and reduction of human stress." (International Stress Management Association, 2004). According to ISMA, government statistics reveal that stress related sickness cost the country of England 13.5 million lost working days in 2001, at an estimated financial loss of 3.7 billion pounds. In its efforts to reduce stress in English citizens, the ISMA sponsors an annual "National Stress Awareness Day" every November. A review of the historical events in the formal scientific study of stress suggests that these public reactions may be justified.

Walter Cannon, a physiologist, was one of the first scientists to study the effects of stress on the body (Cannon, 1932). Cannon's view of stress was one of a disruption of the homeostasis, or balance, of the body's internal systems, leading to movement away from physiological equilibrium secondary to exposure to physical and/or psychological stimuli. Cannon described a physiological response to stress involving activation of the sympathetic nervous system. He referred to this as the "fight or flight syndrome". According to Cannon, stress activates the sympathetic branch of the autonomic nervous system leading to increased rate and strength of cardiac contraction, constriction of the blood vessels in the skin, a decrease in gastrointestinal activity, increased rate of respiration, stimulation of the sweat glands, and dilation of the pupils in the eyes..

Hans Selye was an endocrinologist who became known as the Father of modern stress research. In his book, The Stress of Life, published in 1936, Selye describes what he terms the General Adaptation Syndrome (GAS). In the body's attempt to defend itself against stressful agents, a series of three adaptive stages are put in motion. Stage 1 is referred to as Alarm Reaction, during which the sympathetic nervous system is activated and physiological arousal occurs. This prepares the body for the Resistance Stage. During this stage the body adapts to the stressor in an attempt to restore balance. In the event that the stressor is not removed, eventually the exhaustion stage is reached. The body's resources are limited and breakdown occurs. Selye reports that the exhaustion stage can potentially end in death of the organism.

Cannon and Selye have both been criticized for focusing primarily on the physical dimensions of stress and ignoring the psychological factors that are at play (Brannon & Feist, 1997). It has been argued that the uniquely human dimensions of perception and

interpretation of stressful experiences must be accounted for in any comprehensive study of stress. In contrast to Cannon and Selye, who frequently used animal models in their research, Lazarus focused on humans. Lazarus argued that the stress an individual experiences is based more on his/her feelings of threat, vulnerability, sense of harm, and ability to cope than the actual presence of the stressor. He defined stress as "…a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being." (Lazarus & Folkman, 1984, p.19).

Perceived Stress

Lazarus developed the Stress and Coping Paradigm which states simply that an event is only stressful if it is perceived as stressful by the individual (Lazarus & Folkman, 1984). According to Lazarus, it is the psychological appraisal of life events, not the events themselves, which determines whether or not an individual experiences stress. Lazarus describes the appraisal process as a two-part process: primary and secondary appraisal. Primary appraisal is the attempt to determine if the event has any affect on the well-being of the individual. Events can be labeled either irrelevant, relevant and positive, or relevant and negative. Irrelevant events are those determined to be insignificant and not worthy of further attention. A good example of this would be someone who is suddenly startled by a noise, then realizes that is it is only his pet cat playing behind the couch. The event is assessed as benign and no further cognitive attention is required. Events can be labeled relevant and positive, which would be those that have an influence on one's well-being, but in a positive way. A good example might

be the same pet cat playing behind the couch, yet this time the cat has been lost for weeks and has finally returned home, to the delight of its owner. Finally, relevant and negative events are those which are deemed significant to the individual's welfare and which are viewed as having harmful qualities. These are what are commonly referred to as "stressors", and include such life events as death of a spouse, marital divorce, loss of employment, and traffic jams.

According to Lazarus, there are at least three categories of negative appraisals or stressors: harm, threat and challenge. Harm is present when the individual has perceived that damage has already taken place. Threat involves the anticipation of future harm or injury, and challenge refers to situations that present the potential for growth or gain. When individuals appraise events as relevant and negative, or stressful, they will then naturally proceed to secondary appraisal, an assessment of one's ability to deal effectively with the situation.

Secondary appraisal asks the question, "Can I successfully cope with the stressful event that I am presently facing?". Coping has been defined as "…constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person." (Lazarus & Folkman, 1984, p. 141). In describing the coping process, Lazarus suggests that there are several resources which, when present, enhance our ability to cope with stress. These include such factors as health and energy, positive belief, problem-solving skills, social skills, and material resources. Our ability to cope with the stressful events of our lives determines whether or not we experience stress.

According to the stress and coping paradigm, psychological stress occurs when we believe that we are unable to effectively cope with the negative events in our lives. The process has been described well: "When confronting environmental demands, people evaluate whether the demands pose a potential threat and whether sufficient adaptive capacities are available to cope with them. If they find the environmental demands taxing or threatening, and at the same time view their coping resources as inadequate, they perceive themselves as under stress." (Cohen, Kessler & Gordon, 1997, p. 10). Cohen continues with an explanation of how the concept of perceived stress fits within the stress/health relationship. A heuristic model of the stress process is offered which attempts to illustrate how perceived stress might serve as a mediator through which stressful environmental events eventually affect health status. The model states simply that environmental demands (stressors) result in cognitive appraisal, which may lead to the perception of stress, which then leads to negative emotional responses. These negative emotions then are presumed to cause physiological and behavioral responses, which subsequently result in physical and psychiatric disease.

Anxiety

The concept of anxiety is closely related to our understanding of psychological stress. Anxiety is an emotional state that is believed to be influenced when an individual is exposed to stressful situations. Anxiety, an emotional state, differs significantly from the concept of "perceived stress", which is more a measurement of intellectual, cognitive thought processes related to one's exposure to stressful situations. Therefore, it is important to measure both concepts to gain a comprehensive view of the effects of stress

on individuals. The actual term "anxiety" has proven difficult to define. In attempts to describe its essential nature, scientists have used a variety of adjectives and definitions including: angst, apprehension, dread, and "character of unpleasure" (Spielberger, 1966, p. 9). May offers a lengthy definition stating that anxiety is:

> …the apprehension cued off by a threat to some value that the individual holds essential to his existence as a personality. The threat may be to physical life(a threat of death), or to psychological existence(the loss of freedom, meaninglessness). Or the threat may be to some other value which one identifies with one's existence(patriotism, the love of another person, "success", etc (May, 1979, p. 180).

Barlow states that the concept we refer to as anxiety would be better described as "anxious apprehension" (Barlow, 2002, p.64). His view of anxiety sees its essence as stemming from a concern for the uncontrollability of future threats and dangers. Anxiety is anticipatory, and future-oriented. It is concerned with our ability to cope with upcoming events. This distinguishes anxiety from the related emotions of fear and panic which are more of a response to a present harmful situation. Anxiety is "…characterized as a state of helplessness, because of a perceived inability to predict, control, or obtain desired results or outcomes in certain upcoming personally salient situations or contexts" (Barlow, 2002, p. 9). According to Barlow, during anxiety states there is a shift in attention to a self-focus or self-preoccupation. This emotional state, he believes, is linked to a strong physiological or somatic component which leads to a state of readiness to deal with the perceived threat. Chronic anxiety is seen as a persistent central nervous system tension and arousal leading to a state of perpetual readiness to confront danger.

Anxiety has been described as both a transitory emotional state and as a more enduring feature of the personality. The concept of state anxiety is an example of the former. State anxiety defined is "…a temporal cross-section in the emotional stream-of-life of a person, consisting of subjective feelings of tension, apprehension, nervousness, and worry, and activation or arousal of the autonomic nervous system" (Spielberger, 1985, p. 10). Spielberger believes that state anxiety fluctuates over time depending on a person's perception of dangerous or threatening situations in the environment. This view of anxiety as an emotional state proposes that the emotion can either be present or not at any given moment of time, and that it can vary in level of intensity. These emotional states, though transitory, may recur if stimulated by certain events and may even endure over a period of time if these events persist. Spielberger believes that "State anxiety may vary in intensity and fluctuate over time as a function of the amount of stress that impinges upon the person; but the individual's perception of threat may have greater impact on the level of state anxiety than the real danger associated with the situation (Spielberger, 1983).

Anxiety has also been described as a personality trait. Traits are predispositions to respond in a certain manner, or generalized action tendencies. They are personal dispositions, or the building blocks for personality. Personality traits account for the consistency in behavior seen in individuals (Allport, 1966). Trait anxiety is a concept that has been explored by researchers.

Trait-anxiety has been referred to as "relatively stable individual differences in anxiety-proneness, that is, to differences between people in the tendency to perceive stressful situations as dangerous or threatening and to respond to such situations with

elevations in the intensity of their state anxiety reactions" (Spielberger, 1983, p. 2). Trait anxiety is "…differences between individuals in the probability that anxiety states will be manifested under circumstances involving varying degrees of stress" (Spielberger, 1966, p. 15).

Spielberger believes that trait anxiety may affect the frequency and intensity of state anxiety, with those having more trait anxiety having a higher likelihood of experiencing state anxiety during future life events. Generally speaking, the higher the trait anxiety, the more intense the state anxiety reaction. Spielberger uses an interesting analogy to illustrate the relationship between state and trait anxiety. Anxiety, he states, can be compared to kinetic energy. When considering physical objects, the potential energy is the difference in kinetic energy associated with these objects. This potential energy is synonymous with trait anxiety on a psychological level. When this potential energy in physical objects is triggered and released by an appropriate force, kinetic energy is released. This release of kinetic energy in physical objects is equivalent to the expression of anxiety states in individuals.

Somatic Symptoms

Somatic, or physical symptoms account for over half of all medical outpatient visits or approximately 400 million clinic visits in the United States each year (Schappert, 1992). Studies have demonstrated that approximately one-third of somatic symptoms are medically unexplained (Kroenke & Mangelsdorff, 1989). The term somatization is generally used to describe clinical presentations where the presence of somatic symptoms cannot be explained by the presence of organic, objective diagnostic findings

(Gucht & Fischler, 2002). Somatization has generally been described in two different ways. According to Gucht & Fischler,

> It is interesting to note that it is exactly the relation between somatization, anxiety, and depression that is at the heart of the two distinct ways in which somatization has been conceptualized, namely as a somatic manifestation of psychological distress on the one hand, and as somatic distress or the experience of medically unexplained symptoms on the other hand (Gucht & Fischler, 2002, p. 2).

The idea that the manifestation of physical symptoms may be related to psychological dysfunction is not new. Lipowski has offered several definitions for somatization that relate the presence of physical symptoms to mental stress and anxiety. He states that somatization is "…the tendency to experience, conceptualize and/or communicate psychological states or contents as bodily sensations, functional changes or somatic metaphors" (Lipowski, 1968, p. 395). In later publications, this same author described somatization as "…a tendency to experience and communicate psychological distress in the form of somatic symptoms and to seek medical help for them" (Lipowski, 1987, p. 294). These descriptions seem to imply a causal relationship between psychological distress and the presence of somatic symptoms. In later years Lipowski softened his words to allow the interpretation of somatization as "the tendency to experience and communicate somatic distress and symptoms unaccounted for by pathological findings, to attribute them to physical illness, and to seek medical help for them." However, he follows this with the assertion that "it is usually assumed that this tendency (to somatize) becomes manifest in response to psychosocial stress" (Lipowski,

1988, p.1358). Thus, somatization can be viewed from two different perspectives. "Presenting Somatization" is that clinical scenario where the physical symptoms are considered to be predominantly a presentation of psychiatric disorder (i.e., anxiety or depression). Whereas, "Functional Somatization" is viewed simply as those clinical cases that have high levels of medically unexplained symptoms. In the latter definition, there is no implication that psychological processes are to blame (Gucht & Fischler, 2002).

Researchers have attempted to establish a link between somatic symptoms, stress and anxiety. In one study, 72 healthy college students completed several psychological inventories and reported illnesses over a period of two weeks (Waters, 1993). Physiological activation of the stress response was measured using the Autonomic Nervous System Response Inventory, and stress was assessed using the Daily Stress Inventory. Physical symptoms were measured using the Wahler Physical Symptoms Inventory. The authors concluded that autonomic nervous system response and daily stress were substantially related to the self-report of somatic complaints (statistics not available).

A more thorough study was conducted by Henningsen, Zimmermann and Sattel to assess the relationship between psychological and physical symptoms. Using a meta-analytical approach, 244 studies published between the years 1980 to 2001 were reviewed with a focus on identification of four functional somatic syndromes: irritable bowel syndrome, nonulcer dyspepsia, fibromyalgia, and chronic fatigue syndrome. Results of the study indicated that there was an association between the four somatic syndromes and both anxiety and depression. These relationships were of moderate magnitude and highly statistically significant (CI = .328, .720, $p<.0001$) when compared

with healthy persons and controls with medical disorders of known organic pathology (Henningsen, Zimmerman & Sattel, 2003).

In exploring the relationship between stress, anxiety and somatic symptoms, it is interesting to note that behavioral medicine interventions designed to reduce stress and anxiety have demonstrated reduced self-reports of physical symptoms. Nakao et al. administered a 10-week behavioral medicine intervention to 1312 outpatients with presenting physical symptoms. The intervention consisted of training in the relaxation response, cognitive restructuring, exercise and nutrition. The volunteers each completed multiple questionnaires pre and post-intervention, including the Medical Symptom Checklist, the Symptom Checklist 90 Revised, and the Stress Perception Scale. Post-intervention testing revealed significant reduction in medical symptoms, anxiety, psychological distress and stress perception (statistics unavailable). The authors conclude that behavioral medicine interventions are effective in reducing medical symptoms coinciding with improvement in anxiety (Nakao et al., 2001).

The previous discussion has indicated the importance of stress to modern society. The concept of stress was described, including a historical account of its development. Furthermore, the concepts of perceived stress and anxiety were discussed in detail. The terms somatic symptoms and somatization were defined and discussed as they relate to stress and anxiety. Very few research studies were mentioned in this section but those meeting the criteria discussed previously are listed in Table 3.

Table 3

Categorization of Research in Review of Literature – The Concept of Stress

Study	*Categorization	**Criteria Met
Somatization and symptom reduction through a behavioral medicine intervention in a mind/body medicine clinic (Nakao, et al, 2001)	Level III	Sample I/E Validity

The Relationship Between Stress and Physical Health

This section contains a discussion of the relationship between stress and physical health. The physiological response to stress is described in detail, providing a reasonable explanation for the connection between the mind and body. Research studies linking stress to physical health are discussed including illnesses involving impaired immune function, hypertension, headaches and insomnia.

The Physiology of Stress

The physiology of the stress response has been described in detail (Cannon, 1932; Selye, 1956; Seaward, 1994). Three physiological systems are stated as being directly involved with the stress response: the nervous system, the endocrine system and the immune system.

The nervous system is comprised of two parts: the central nervous system and the peripheral nervous system. The central nervous system consists of the brain and spinal cord, whereas the peripheral nervous system includes the spinal nerves which extend into the trunk and extremities. The central nervous system houses higher cognitive functions

such as reasoning and problem solving, as well as the limbic system which includes the hypothalamus. The hypothalamus, which controls many bodily functions such as water balance, fat metabolism, and regulation of body temperature, also plays a key role in control of the emotions. The autonomic division of the peripheral nervous system is most involved in the stress response.

The autonomic nervous system is divided into the sympathetic and parasympathetic branches. These entities function similarly to the accelerator and brake of an automobile. The sympathetic branch acts to increase physiological activity in anticipation of the need to respond to a stressful stimuli. The parasympathetic branch acts to return the body to a resting state. When activated, the sympathetic branch causes the adrenal gland to release epinephrine (adrenaline) into the blood. This hormone activates the fight-or-flight response. The pupils dilate to allow better vision, the heart rate increases to improve blood flow to muscles, and the bronchioles of the lungs dilate to improve airflow. Historically, these responses enabled the body to meet the energy needs required to either fight or flee for survival in a physically hostile world.

The endocrine system consists of a series of glands located throughout the body which serve to regulate metabolic functions. This system works more slowly than the nervous system, but its effects are longer lasting. In the stress response, the hypothalamus stimulates the pituitary gland to release a chemical called adrenalcorticotrophic hormone (ACTH), which subsequently triggers the adrenal gland to release cortisol into the blood. The normal function of cortisol is to help mobilize energy stores in the body for use during stress. It raises the level of blood sugar and provides energy for cells. Cortisol also has an anti-inflammatory effect, providing the body with defense against swelling from

injuries that might be sustained during a fight or flight. Excessive cortisol in the blood may lead to excessive buildup of cholesterol and plaque formation in the arteries. The consequences may be hypertension and heart disease.

Another way the endocrine system influences the body during stress involves antidiruretic hormone (ADH). ADH functions normally to increase blood pressure by regulating blood volume. It functions to increase blood pressure to ensure active muscles receive oxygenated blood. The oversecretion of this hormone as a result of chronic stress results in persistent elevations in resting blood pressures, hypertension, and cardiovascular disease.

The immune system can also be affected by chronic stress. Excessive blood cortisol metabolizes (degrades) white blood cells. The number of white blood cells decreases, thus limiting the body's ability to fight off infection and disease. This mechanism may help explain why stress is associated with higher rates of infection.

Impaired Immune Function

Studies have attempted to link the stress process with impaired functioning of the immune system. One study measured Hepatitis B antibody status in 260 medical school undergraduates who had recently received a three-dose Hepatitis B vaccine. Subjects completed questionnaires measuring exposure to stressful life events in the past year. Results showed that participants with greater-than-average stress exposures had a greater than two-fold increased risk of having inadequate antibody titer. The authors concluded that the immune system is sensitive to variations in psychological factors (Burns, Carroll, Ring, Harrison & Drayson, 2002).

In a similar study, researchers monitored stress levels four times daily in a group of 83 healthy young adults for a period of 13 days prior to, during and after vaccination with the New Caledonia strain of influenza. Antibody titers for the vaccine were taken at baseline and at one and four months time. Statistical analysis revealed that higher levels of reported stress were associated with poorer antibody responses. The high stress group demonstrated significantly fewer antibodies at both 1 and 4 months than did the low stress group [$F(1, 29) = 5.20$, $p<.04$]. The authors state that this may be a possible mechanism through which stress increases vulnerability to infectious disease (Miller et al., 2004).

Along this line of thinking, the relationship between stress and susceptibility to the common cold has been explored. Researchers studied 276 healthy adults using the Bedford College Life Events and Difficulties Schedule (LEDS), and blood and urine samples (Cohen et al., 1998). Subjects were inoculated with the common cold virus and monitored for onset of the disease. The authors state that although severe acute stressful events were not associated with development of the common cold, severe chronic stressors were associated with increased risk of infection. The odds ratio reported was 2.2 (CI = 1.08, 4.34).

Asthma is an upper respiratory ailment of increasing importance in our society. Wright reports, “Environmental stressors may impact asthma morbidity through neuroimmunological mechanisms which are adversely impacted and/or buffered by social networks, social support, and psychological functioning” (Wright, Rodriguez & Cohen, 1998, p. 1072). In studying the role of acute and chronic stress in asthma attacks in children, one study included 90 child asthma patients who were attending local clinics

(Sandberg et al., 2000). Participants completed the interview-based Psychosocial Assessment of Childhood Experiences to assess the occurrence, nature and impact of life events and long-term psychosocial experiences. Asthma monitoring consisted of twice-daily parent-assisted peak-flow recordings of breathing. The results indicated that severely negative life events predicted asthma attacks, and that these events were associated with multiple chronic stressors. Odds ratios were reported as 2-98 and 95% confidence intervals of 1.20-7.38 ($p<.05$). The authors conclude that special consideration should be given to young asthma patients during times of high stress.

Others have attempted to demonstrate that stress can have an impact in auto-immune disorders, possibly through a mechanism involving disruption of the control of the inflammation response. A study of 50 health adults was conducted to determine the effect of stress on the immune system's capacity to respond to hormonal signals that terminate inflammation. The participants were divided into two groups with half being parents of children diagnosed with cancer. This group reported significantly higher levels of stress as would be expected using the Cohen's PSS. Using laboratory tests, the researchers demonstrated a diminished ability of the stressed groups' blood to suppress in vitro production of pro-inflammatory components [$F(1, 40) = 4.12$, $p<.05$]. The authors conclude that impairment of this hormonally driven system may explain how chronic stress may affect inflammatory disease (Miller, Cohen & Ritchey, 2002).

Perhaps one of the most well-known inflammatory diseases is Rheumatoid Arthritis (RA). Investigators have studied the relationship between RA disease activity and stress. Sixty-nine patients with RA volunteered for the study. During routine medical visits, participants completed questionnaires and blood tests. Stress was assessed using

the Life Experiences Survey, and the Weekly Stress Inventory. Level of inflammation was determined using the erythrocyte sedimentation rate, a laboratory measure of plasma protein levels. Statistical analysis of results indicated that minor stress was significantly correlated with level of inflammation ($r = .323$, $p<.01$). Interestingly, no association was found between major stress and RA disease status (Thomason, Brantley, Jones, Dyer & Morris, 1991).

Systemic Lupus Erythematosus is another common auto-immune disorder. In studying its relationship to stress, researchers surveyed 41 patients with the disease (Adams, Dammers, Saia, Brantley & Gaydos, 1994). The Life Experiences Survey, Daily Stress Inventory, and Symptom History and Daily Symptom Checklists were completed by each subject. It was concluded that the severity of stress as measured with the Daily Stress Inventory explained 29% of the variability in severity of joint pain which was significant [$F(2, 36) = 7.22$, $p<.001$].

Blood Pressure/Hypertension

Research has demonstrated a relationship between stress and blood pressure. In a study of the effects of workplace noise, a type of physical stress commonly found in industrial settings, investigators measured blood pressure over an eight month period in a sample of automobile engine assembly plant workers (N=374). The results of the study found that the use of hearing protection in high-noise areas was a significant predictor of both systolic and diastolic blood pressure. The use of hearing protection was associated with a reduced systolic blood pressure of 3.7mm Hg, and a reduced diastolic blood pressure of 2.9 mm Hg. The authors concluded that “More concerted efforts are needed to

promote workers' constant use of hearing protection devices to reduce noise-induced hearing loss and the possible effect on risk for cardiovascular disease" (Lusk, Hagerty, Gillespie & Caruso, 2002).

The psychosocial stress of work has also been studied in relationship to blood pressure. One study of 195 adult male workers found a significant relationship between job strain and ambulatory blood pressure. Workers repeatedly exposed to high job strain had ambulatory blood pressure measurements of 5-7 mmHg higher than those with low job strain which was a significant difference ($p<.001$). It was also found that change in job strain predicted change in ambulatory blood pressure over a three year period. The authors conclude that "These results provide new evidence supporting the hypothesis that job strain is an occupational risk factor in the etiology of essential hypertension" (Schnall, Schwartz, Landsbergis, Warren & Pickering, 1998, p. 697).

Another interesting study investigated the acute effects of psychosocial processes on ambulatory blood pressure. In a sample of 120 healthy adults, an automated blood pressure monitor took readings multiple times daily for a period of six days. After each blood pressure measurement, subjects were instructed to answer a series of questions using a hand-held computer. The questionnaire assessed such variables as emotional activation, social interactions and environmental stressors. In an analysis of task strain and cardiovascular activity, researchers found that situations that individuals rated as having more control showed lower levels of diastolic blood pressure ($b = -.39$, $t = -3.15$, $p<.01$) and lower heart rate ($b = -.25$, $t = -1.72$, $p<.10$). Both blood pressure and heart rate were elevated during times of emotional activation(high negative affect or high arousal).

The authors suggest that emotional activation may be the mechanism through which environmental events affect cardiovascular activity (Kamarck et al., 1998).

Headaches

Perhaps one of the most common medical maladies associated with stress is the common headache. Research supports this general belief. Findings from a nationwide survey of 1254 respondents, the Nuprin Pain Report, states that 39% of headache sufferers stated that stress was the single most important cause of their pain (Sternbach, 1986). In another study of 261 volunteers with headaches, daily hassles as measured by the Revised Hassles Scale were studied in relation to the intensity of headache pain (Fernandez & Sheffield, 1996). Daily hassles have been described as "…experiences and conditions of daily living that have appraised as salient and harmful or threatening to the endorser's well-being" (Lazarus & Folkman, 1984). Results indicated that daily hassles explained 6% of the variability in headache intensity which was statistically significant [$F(2, 258) = 7.73$, $p<.001$].

Insomnia

Another common assumption with the general public is that stress interferes with sleep. This commonly held belief also seems to have support from the literature. Researchers have reported a significant relationship between major stressful events and insomnia. In a study of insomniacs, it was found that insomnia sufferers reported more stressful life events during the year preceding the onset of insomnia compared to previous years and in relation to good sleepers (Healy et al., 1981). Another study collected data

from 67 men and women, with a mix of both good and bad sleepers. Participants completed both the Life Experience Scale, to measure life events and their perceived impact, and the Perceived Stress Scale, to measure the degree to which situations in one's life are appraised as stressful (Morin, Rodrigue & Ivers, 2003). Results indicated that although the number of stressful life events was similar in both good and bad sleepers, bad sleepers tended to rate the impact and intensity of these events as more stressful, used more emotion-oriented coping strategies, and reported higher perceived stress [$F(1, 64), = 15.67, p<.001$].

The previous narrative provided a description of the body's physiological response to stress. An overview of research studies linking stress to physical health was also included. Those studies which were believed to possess more rigorous research design are included in Table 4. The reader who is interested in further exploring the relationship between stress and health may want to focus on these studies.

Table 4

Categorization of Research in Review of Literature – Stress and Physical Health

Study	*Categorization	**Criteria Met
Psychological stress and antibody response to influenza vaccination: when is the critical period for stress, and how does it get inside the body (Miller, et al, 2004)	Level III	Sample I/E Validity
Role of stress, arousal, and coping skills in primary insomnia (Morin, 2003)	Level II	Sample Reliabity Validity I/E Validity
Chronic psychological stress and the regulation of pro-inflammatory cytokines: a gluco-corticoid-resistance model (Miller, et al, 2002)	Level II	Sample Reliability Validity
The role of acute and chronic stress in asthma attacks in children (Sandberg, et al, 2000)	Level II	Sample Reliability Validity
Types of stressors that increase susceptibility to the common cold in healthy adults (Cohen, et al, 1998)	Level II	Sample Reliability Validity
Effects of task strain, social conflict, and emotional activation on ambulatory cardiovascular activity: daily life consequences of recurring stress in a multiethnic adult sample (Kamarck, et al, 1998)	Level III	Sample I/E Validity
A longitudinal study of job strain and ambulatory blood pressure: results from a three-year follow-up (Schnall, et al, 1998)	Level II	Sample Reliability I/E Validity
Stress, depression, and anxiety predict average symptom severity and daily symptom fluctuation in systemic lupus erythematosus (Adams, et al, 1994)	Level III	Sample I/E Validity

Note. * See Table 2, ** See Table 1

Stress Management

Numerous methods have arisen to give humans ways to reduce the stress and anxiety in their lives. These can generally be viewed from two distinct perspectives: Macro and Micro. The Macro perspective forces us to look not so much at the individual perception of stress and anxiety, but rather at the causative agent, the stressor. This viewpoint suggests that individuals should not simply try to manage internal perceptions and emotions, but rather should attempt to eliminate the actual cause of stress. The environment in which individuals find themselves oftentimes serves as a source of stress. For example, if commuting to work for one hour in bumper to bumper rush hour traffic causes stress symptoms such as stomach ache and heart palpitations, perhaps one should try to find a better way to get to work. Maybe one could eliminate this stressor by carpooling with a friend, taking the bus, moving closer to work, changing one's work hours or perhaps even changing one's job. The macro perspective calls our attention to the abundant stressors in our modern, industrialized society: time pressures and work deadlines, unfair supervisors, workplace noise and other poor working conditions, long hours at work, job uncertainty, personal financial strain, threats of theft, assault, and terrorism, among others.

The social environment in which individuals find themselves can have a profound influence on levels of stress and anxiety. One's friends and family, the clubs and groups to which one belongs have the capacity to affect one's life in positive or negative ways. Generally speaking, social support is considered a positive factor in promoting health and well-being. Researchers have demonstrated a relationship between allostatic load, a measure of the cumulative physiological effects of stress (eg, heart rate, blood pressure),

and types of social relationships. In a study of older adults, it was shown that positive cumulative relationship experiences were associated with lower allostatic load for both men and women with an Odds Ratio reported of .25 (CI = .08, .75). Men who were more socially integrated and reported more frequent emotional support from others had lower allostatic load. The authors concluded that positive social experiences are associated with lower allostatic load (Seeman, Singer, Ryff, Love & Levy-Storms, 2002).

Clinical research has utilized the relationship between social relationships and stress in attempts to improve health outcomes. The Montreal Heart Attack Readjustment Trial (M-HART) attempted to examine relationships between reductions in psychological distress and long-term cardiac and psychological outcomes in post-myocardial infarction patients (Cossette, Frasure-Smith & Lesperance, 2001). In the study, 1376 post-MI patients were assigned to treatment or usual care groups. For the treatment group, patients were phoned one week after discharge and then once a month afterwards. A telephone interview using the General Health Questionaire (GHQ) was administered to assess for symptoms of depression, anxiety and social dysfunction. Patients found to have elevated scores on the GHQ were visited at home by a project nurse who developed an individual plan of care to reduce the patient's distress symptoms. The nurse onsite further assessed the patient's emotional condition and considered such social factors as the family's reaction to the patient's medical problem. After determining the source of stress, the nurse attempted to alleviate its affect on the patient using a combination of emotional support, cognitive restructuring, education and referral to other health providers. At one-year follow-up, the researchers concluded that reduction of psychological distress in patients was associated with reduced cardiac-related mortality and hospital readmissions.

Results indicated that 2% of patients who responded well to the intervention suffered death within 1 year due to cardiac causes compared to 5% for those who did not show reduction of anxiety with the intervention ($p<.05$). Of those subjects who responded well to the intervention, 20% were readmitted to the hospital within one year compared to 35% of those who did not respond well to the intervention ($p<.001$).

The Ischemic Heart Disease Life Stress Monitoring Program (IHDLSMP) offered similar methods and results (Frasure-Smith & Prince, 1985). A sample of 769 myocardial infarction patients were asked to complete the GHQ. Those with high scores were followed regularly by nursing staff to determine causes for distress. The patients reported concern for chest pain and discomfort, shortness of breath, fatigue, and generalized feelings of anxiety and depression. The nurses interventions included individually tailored teaching, support and consultation. The authors reported that "providing reassurance" was a major portion of the nurses role. They suggest that a major benefit may have been the actual telephone monitoring itself, since patients reported they liked being involved in a system that was concerned and contacted them regularly. Results of the program found that those in the intervention program had significantly fewer heart attack recurrences ($p = .0080$) over a 5 year period. The authors further suggested that the support offered through the program may have served to lower fear levels and reduce sympathetic tone.

As will be outlined, the micro perspective, or a focus on what the individual can do, offers a variety of individual techniques which research has demonstrated to be effective in reducing stress and anxiety. A variety of coping strategies have been suggested for the reduction of stress: cognitive restructuring, behavior modification,

journal writing, art therapy, humor therapy, creative problem solving, communication skills, time management, and hobbies (Seaward, 1994). In addition to coping strategies, methods have been developed to help individuals reduce the physiological response to stress. Several relaxation techniques have been described including: diaphragmatic breathing, meditation, hatha yoga, mental imagery, music therapy, massage therapy, tai chi chuan, progressive muscular relaxation, autogenic training, clinical biofeedback, and physical exercise (Seaward, 1994).

Several studies suggest that a general stress reduction program can have positive effects on mental health. One study of 35 senior nursing students in a private liberal arts college assessed state and trait anxiety levels prior to and after participation in a stress management program. The stress management program was divided into three phases: education, training and application, Six 50-minute sessions twice a week were attended for a period of three weeks. A control group met only for the initial education class. Stress management principles included cognitive restructuring and relaxation training such as breathing, imagery, galvanic skin resistance monitoring, and progressive muscle relaxation. Post-test analysis revealed that the intervention group showed significantly lower anxiety ($F = 14.76$, $p = .000$) than the control group (Johansson, 1991).

Another study of nursing students revealed similar results. A sample consisting of forty junior nursing students completed a 5-week stress management program consisting of cognitive modification techniques, breathing techniques, and biofeedback for self-relaxation. The sessions were held once weekly for 90 minutes each. The format included didactic instruction addressing stress and coping, physiological, psychological and cognitive perspectives, practice of relaxation training using electromyography, skin

temperature sensors, and galvanic skin resistance monitors. Breath training was a major component of the intervention. The authors found that state anxiety scores did not change for the control group, but dropped significantly for the experimental group [$F(2, 35) = 8.13$, $p<.000$]. No changes were found for trait anxiety with either group (Heaman, 1995).

A study of a work-place stress reduction program demonstrated significant reductions in stress as measured using the Recent Life Changes Questionnaire [$F(2,324) = 3.81$, $p = .023$], and anxiety [$F(2, 316) = 18.29$, $p<.001$] as measured using the STAI. In addition, the authors found that illness and healthcare utilization decreased over the one-year period. Five hundred workers participated in the project which used face-to-face, group interventions, and a self-help program where group members received interventions through the mail. All three groups showed improvements. Topics included personal wellness, instruction in stress and the stress response, and coping methods (Rahe et al., 2002).

Schiraldi and Brown describe a college course format that has been used to teach stress management at the University of Maryland for over ten years. The course meets twice weekly for a whole semester with each session lasting 90 minutes. It is a small group with no more than 14 students enrolled per class. The program includes the use of a Journal to help students explore their emotions. The emotion of anger is given special consideration, with emphasis on reducing feeling of hostility. The limitation of the cognitive process of worrying is also taught. A large portion of the class activities focuses on improving self-esteem, which the authors believe is vital to good mental health and management of stress. Self-esteem is viewed as dependent on three factors: development of a sense of unconditional worth, unconditional love, and the need for personal growth.

The authors state that attendance in this college course has reduced anxiety levels in past students, though no statistical data is provided (Schiraldi & Brown, 2001).

Participation in physical activity has been associated with reduced levels of stress, anxiety, and improved mental health. Results of a study of 10,063 women aged seventy to seventy-eight in Australia using cross-sectional methods suggests a relationship between physical activity and emotional well-being (Lee & Russell, 2003). Higher levels of physical activity were associated with higher scores on emotional well-being using the mental health subscales of the Medical Outcomes Study Short Form (SF-36).

Another study investigated the relationship between leisure time physical activity and perceived stress in a group of working adults (N=32,229). Subjects who expended more than 3.0Kcal/kg per day in physical activity during leisure time were .49 times less likely to have high levels of perceived stress as measured with the Strain Questionnaire (95% CI = 0.46, 0.5). It was reported that a large sample offered sufficient power to detect significant differences and provides a clear view of the relationship between physical activity and perceived stress. They suggest the need for increased awareness and education for promoting physical activity to reduce high rates of stress in a relatively sedentary workforce (Aldana, Sutton, Jacobson & Quirk, 1996).

A study of 135 college undergraduates attempted to determine if leisure time physical activity and aerobic fitness buffer against the negative effects of stress as manifested by physical and psychological symptoms. The subjects completed questionnaires including the General Health Questionnaire to assess psychological distress, the Profile of Mood States, the Weekly Stress Inventory, the Life Experiences Survey, the Modified Wahler Physical Symptoms Inventory, and the Physical Activity

Questionnaire. Aerobic capacity was assessed using VO2 Max using the Bruce protocol. Results suggest that there is a buffering effect for leisure physical activity against the physical symptoms and anxiety associated with minor stress. There was no effect for aerobic fitness (Carmack, Boudreaux, Amaral-Melendez, Brantley & Moor, 1999).

Meditation is becoming popular as a stress management tool in Western countries. Multiple research reports indicate it is effective for reduction of stress and anxiety. In one study of twenty-eight volunteers participating in an eight-week stress reduction program based on training in mindfulness meditation, reductions in overall psychological symptomatology were found. The experimental group demonstrated a 60% reduction in anxiety as measured with the Sharpiro Control Inventory compared with only a 10% reduction for controls [$F(2, 16) = 7.30$, $p<.02$]. The author concludes:

> …based on the theory that it is our cognitive-emotional interpretation or appraisal of life events that gives rise to the stress we experience in life, the techniques of mindfulness meditation, with their emphasis on developing detached observation and awareness of the contents of consciousness, may represent a powerful cognitive-behavioral coping strategy for transforming the ways in which we respond to life events since we must first become aware of the nature and existence of these maladaptive cognitive appraisals before we can effectively alter them (Astin, 1997, p. 105).

Meditation has been applied to the treatment of stress in cancer patients. In a study of ninety adult patients assigned to treatment and wait-list control groups, mindfulness meditation was performed in a group setting once per week for one and a half hours for seven weeks. Post intervention assessment included use of the Profile of

Mood States and the Symptoms of Stress Inventory. Scores indicated that the treatment group had a 65% reduction in total mood disturbance and a 31% reduction in the symptoms of stress (Speca, Carlson, Goodey & Marueen, 2000).

Meditation-based stress reduction programs have been shown to be effective in the treatment of clinically diagnosed anxiety disorders. In one study, twenty-two patients diagnosed with either generalized anxiety disorder or panic disorder according to DSM-III-R criteria were referred for participation in a stress-reduction and relaxation program. Subjects completed the Symptom Checklist 90 Revised (SCL-90-R) and the Medical Symptom Checklist prior, during and after intervention including a three-month follow-up period. Significant reductions in anxiety and depression were noted for 20 of the 22 subjects, and these changes were maintained during follow-up assessments (statistics unavailable). The authors concluded that group mindfulness meditation training is effective for reducing symptoms of anxiety and panic (Kabat-Zinn et al., 1992).

Meditation-based stress reduction programs have been shown to improve health-related quality of life. In one study, 136 volunteers participated in an 8-week mindfulness-based stress reduction program consisting of the practice of a minimum of 20 minutes meditation daily. Pre and post assessment consisted of the Short-Form Health Survey (SF-36), the Medical Symptom Checklist (MSCL), and Symptom Checklist-90 Revised (SCL-90-R). Results indicated improved health-related quality-of-life ($p<.01$), a 28% reduction in physical symptoms, a 38% reduction in psychological distress, a 44% reduction of anxiety and a 34% reduction of depression. The authors conclude that mindfulness meditation can improve functional status and well-being, and reduce

physical symptoms and psychological distress (Reibel, Greeson, Brainard & Rosenzweig, 2001).

The previous narrative discussed the concept of stress management. An overview of research studies linking stress management to health outcomes was also included. This section provided support for the use of stress management interventions in reducing stress and stress-related disease. Those studies which were believed to possess more rigorous research design are listed in Table 5. The reader who is interested in further exploring the relationship between stress management and health may want to focus on these studies.

Table 5

Categorization of Research in Review of Literature – Stress Management

Study	*Categorization	**Criteria Met
Effects of physical activity on emotional Well-being among older Australian women (Lee, et al, 2003)	Level II	Sample Reliability Validity
A novel stress and coping workplace program reduces illness and healthcare utilization (Rahe, et al, 2002)	Level I	Sample Reliability I/E Validity
Clinical implications of a reduction in psychological distress on cardiac prognosis in patients participating in a psychosocial intervention program (Cossette, et al, 2001)	Level I	Sample Reliability Power
Aerobic fitness and leisure physical activity as moderators of the stress-illness relation (Carmack, et al, 1999)	Level III	Sample Reliability
Stress reduction through mindfulness meditation (Astin, 1997)	Level II	Sample Reliability I/E Validity
Relationships between leisure time physical activity and perceived stress (Aldana, et al, 1996)	Level II	Sample Reliability Validity Power
The quieting response: a modality for reduction of psychophysiologic stress in nursing students (Heaman, 1995)	Level I	Sample Reliability Validity
Effectiveness of a stress management program in reducing anxiety and depression in nursing students (Johansson, 1991)	Level I	Sample Reliability Validity I/E Validity
Long-term follow-up of the ischemic heart disease life stress monitoring program (Frasure-Smith, et al, 1989)	Level I	Sample Reliability Power I/E Validity

Note. * See Table 2, ** See Table 1

Theoretical Foundation for the Study

This dissertation study was guided by the fundamental principles of holism. General Systems Theory (GST) also provided a theoretical background to justify the research questions. This section includes a description of the basic concepts of holism and General Systems Theory, and a discussion of how they may be applied to health.

Holism

The term holism did not originate until 1926, although holistic concepts have been a part of the lives of native peoples for thousands of years. Jan Smuts, a former South African Prime Minister and philosopher, first coined the term in his book entitled *Holism and Evolution*. In this seminal work, Smuts describes his conception of holism:

> The creation of wholes, and ever more highly organized wholes, and of wholeness generally as characteristic of existence, is an inherent character of the universe... The whole-making, holistic tendency, or Holism, operating in and through particular wholes to the particular wholes, is seen at all stages of existence, and is by no means confined to the biological domain to which science has hitherto restricted it (Smuts, 1926, p. 185).

Through writing Smuts explained that it is not possible to reach the whole from the parts, because the sum of the parts only provides a partial explanation. The world is no longer viewed as a machine, but rather as an organic unity or web of relations. This "Wholeness" has been described as "… the fundamental character of every personality and of every form and structure in the universe. We live in a world and in a universe where everything, as every life and person, always forms a whole. It is a universe of

whole-making, nothing is half-finished, and if it is, it is abnormal and contrary to the purpose of nature as well of all existence" (Beukes, 1989, p. 114).

Smuts believed his idea of holism could be applied to an understanding of the human personality. According to Smuts, the ideal personality is able to:

> Learn to be yourself with perfect honesty, integrity and sincerety; let universal Holism realize its highest in you as a free whole of Personality; and all the rest will be added unto you – peace, joy, blessedness, happiness, goodness and all the other prizes of life. Nay more: the great evils of life – pain, suffering and sorrow – will only in the end serve to accelerate the holistic progress of the Personality, will be assimilated and transformed in the spiritual alchemy of the Personality and will feed the flame of the pure and free soul (Smuts, 1926, p. 314-316).

Smuts believed that holism applies "… to the creations of the human spirit in all its greatest and most significant activities" (Visser, 1995, p.3).

Smuts refutes the idea that holism is an assumption which has only philosophical or metaphysical value but no scientific importance. A limited, one-sided attempt to describe reality strictly by an analysis of the details composing its parts is incomplete. Acccording to Smuts, a full and complete account of an object in nature must also include a description of the whole. The anatomy and physiology of a plant do not sufficiently describe the plant. A full description must include detailed mechanisms and functions in addition to an account of the structure or organization as a whole. Science tends to take a narrow view by confining itself to details (Smuts, 1926).

Although Smuts is given credit for originating the term holism, the concept which he described is easily recognizable in earlier civilizations. Native Americans in particular tended to embrace holistic beliefs. Cherokee tribesmen believed that all things were connected, all things had life, and all things were worthy of respect and reverence. The importance of "relation" as a way of existing in the world was emphasized. This power of relation was symbolized by the Circle of Life, consisting of spirit, nature, body and mind. These were called the "Four Winds of Life". This circle described the inter-relationship of all living beings and the natural growth of life itself. Harmony and balance between these different parts were seen as key to survival (Garrett, 1998).

General Systems Theory

The following narrative will introduce General Systems Theory (GST). The historical background and development of GST will be described. Applications of GST will be explored, with particular emphasis on health-related topics.

A system has been defined as "…a set of objects or entities that interrelate with one another to form a whole" (Littlejohn, 1983, p. 29). Systems can be either closed or open. A closed system has no exchange with its environment while an open system exchanges matter and energy with its environment (Littlejohn, 1983). A complex system has been defined as being "… made up of a large number of parts that have many interactions" (Simon, 1996). The behavior of a system is considered to be dependent on the behavior and interrelations of all its parts. Complex systems are composed of heterogeneous interdependent units which exhibit emergent properties. These interdependent units are considered to directly influence each other (Bar-Yam, 1997).

Austrian-born biologist Ludwig von Bertalanffy first introduced GST with his 1968 book of the same name (Bertalanffy, 1968). General Systems Theory focuses on the arrangement of and relationships between the parts which connect them into a whole. It's development was partly a reaction to the extensive use of reductionism in science. Bertalanffy believed there was a need for a common theory to guide research efforts in multiple disciples. He believed that general principles could be discovered which would apply to many disciplines. General Systems Theory laws apply to any system, irrespective of the particular properties of the system or the elements involved.

Bertalanffy believed that all living things were part of an open system. Open systems exchange matter and energy with the environment and are oriented toward growth and development. This is contrasted with closed systems which do not exchange energy with the environment and eventually die (e.g., metal eventually rusts). Bertalanffy believed that the opens systems of life were constantly evolving toward higher levels of organization. His view of mankind was optimistic in that he conceived of man as progressively improving himself through interactions with his environment. Thus, man is affected by his environment, but man's actions also may result in changes to the environment (Bertalanffy, 1968).

General Systems Theory has been applied to several areas of research. Fisher described the application of GST to the understanding of small group communication (Fisher, 1980). As an example of how the whole is greater than the sum of the parts, Fisher stated that under normal circumstances, the majority of the time a group of five people will generate more and better solutions to a problem than those provided by five

people working separately in seclusion. The whole (i.e., the groups' solutions) is greater than the sum of the parts (i.e., the individuals' solutions).

The field of biology has also embraced GST. Kitano provided the example of cataloging individual components of the genes and proteins in an organism. The individual parts alone cannot fully explain the complexity of the organism, no more than the separate parts of a jet engine can explain the engineering marvel that allows the airplane to fly. According to Kitano, it is possible to draw an exhaustive diagram of gene-regulatory networks and their biochemical interactions, but such diagrams provide limited knowledge of how changes to one part of a system may affect other parts. To understand how a particular system functions, it is important to first examine how the individual components dynamically interact during operation (Kitano, 2002).

General Systems Theory has also been applied to an understanding of the causes of child abuse (Mapp, 2006). According to Mapp, child abuse explanations were traditionally focused on intra-psychic issues of the abuser with the implication that these perpetrators must be psychologically disturbed or criminally inclined. The application of GST allows for a more comprehensive view at different system levels. From this perspective, child mistreatment can be viewed as a combination of individual, family, community and cultural forces. These combination of forces might include such variables as clinical depression of the mother, communications within the family, social support from community, and levels of violence in the neighborhood. This approach emphasizes the need to intervene on multiple systemic levels at once for maximum effectiveness of interventions.

Application of Holism and General Systems Theory to Health

The idea of holism has been applied by western man to the concept of health recently; however this concept is not new. It is interesting to attempt understanding of this through the words of a health promotion expert who also is a Native American. Begay wrote in the American Journal of Public Health:

> Before Western medical practice and research began to involve what was considered to be an unnatural curiosity about the human body, medicine was intricately involved with a person's spirit or soul… As an American Indian, I am aware of an entirely different tradition of healing that never split from the spirit world. There is no difference, for example, between Navajo religion and Navajo medicine. American Indian medicine consists of spoken prayers, songs that are prayers, rituals, and instruments of prayer. Even herbal medicine comes with prayers for a person's spirit. It is interesting to me that modern providers have recently "discovered" holistic medicine. It is something like the way Columbus "discovered" America. Suddenly our spiritual practices exist, though they have been practical for centuries (Begay, 2003, p. 363).

In trying to learn minute details about reality, modern man has neatly sorted every aspect of life into separate compartments. In doing so he has made great discoveries in science. The human genome project is a great example of this mode of thinking. Scientists of the twenty-first century thrive on dissecting matter into its smallest parts in order to better understand physiological mechanisms. This approach, however, requires that we restrict our field of vision to a very narrow focus. In doing so we may have

inadvertently lost sight of our peripheral vision. In writing about the subject of health and Native American women, Napoli reports that "Embracing the significance of the connection between body, mind, and spirit, and land is of paramount importance when we attempt to address health issues with Native women." And, "The belief that humans and all other living things are connected and affect each other in health and illness is an integral component of Native people's belief and values… We cannot separate ourselves into parts; we are part of a whole and, from a health perspective, need to be treated as a whole person" (Napoli, 2002, p. 1573-1575). If these words prove true, then it is potentially a great loss for modern man to solely study the individual parts of human nature and not embrace the whole.

The call for holism has not been unheard. According to Engebretson, the nursing profession has incorporated the concept of holistic health into its practices for years. She reports that although the scientific method and germ theory have served the medical community well for many years, "…additional concepts of health and illness are necessary to better explain the complexity of health and illness" (Engebretson, 2003, p. 205). She reports that the American Holistic Nurses Association and American Holistic Medical Association have been in existence for more than 20 years. According to this author, the concept of spirituality is incorporated into many nursing theories and is identified in the Nursing Diagnosis Inventory and Nursing Interventions Classification. According to Engebretson, "The holistic approach involves understanding the interrelationships of the biological, psychological, sociocultural, and spiritual dimensions of the person who is interacting with internal and external components of the

environment… a holistic perspective is vital. Privileging one perspective above all the others can result in major loss" (Engebretson, 2003, p. 224).

Engel has written about the need for a new medical model (Engel, 1977). Engel states that medicine is in crisis due to its adherence to a model of disease no longer adequate for the scientific tasks or social responsibilities which are needed. The current medical model is described as a focus on somatic parameters and a neglect of psychosocial issues. The medical model leaves no room for social, psychological and behavioral dimensions of illness. The body is viewed as a machine, and disease is a consequence of breakdown of the machine. The physician's role is simply to repair the machine. Engel called for a change in philosophy to one which would maintain the advantages of the biomedical model while at the same time allowing for inclusion of psychosocial considerations. Engel proposes that GST as developed by Bertalannfy may have application for the new medical model. The idea that change in one level of an organization can affect change in others may help to resolve the holistic-reductionist dichotomy and improve communication. "For medicine, systems theory provides a conceptual approach suitable not only for the proposed biopsychosocial concept of disease but also for studying disease and medical care as interrelated processes" (Engel, 1977, p. 134).

Other individuals in the medical community also have become aware of the limitations of the current medical model and are participating in dialogue and debate about the future of medicine. Carlson stated this concern clearly:

> Reductionist thinking in any area results in compartmentalizing human experience into those aspects or parts which are amenable to detailed

> analysis or intervention. This is one of the root premises underlying prevailing medical practice. And, although it has its uses, it is a profoundly limited view of human beings. Holistic thinking, as an epistemological notion, requires that human beings be perceived as whole persons made up of physiological, emotional, intellectual and spiritual dimensions that dynamically interact, and that any approach to improving health of human beings, either individually or in groups, requires placing them in a larger and richer context than does traditional medicine (Carlson, 1979).

Descartes helped to establish the primacy of logical, rational thought. He viewed the body as a mechanical system much like a clock. A sick man is compared to an ill clock and a healthy man to a well-made clock. The dualism proposed by Descartes separated the mind from the body in two distinct categories. This viewpoint has resulted in the meaning of illness being defined in terms such as physical symptoms due to invading bacteria or viruses and various other laboratory findings. According to Pietroni, this mode of thinking is no longer sufficient to explain the phenomena that present themselves to physicians in the clinical setting (Pietroni, 1987).

Perhaps in response to these comments, the medical establishment has made some strides in recent years to incorporate holistic principles into patient care. In 2002 EURACT, the European Academy of Teachers of General Practice, incorporated holistic modeling as one of its six core competencies for the general practice/family doctor. The competencies include an expectation that physicians must manage an array of health problems across physical, psychological, social, cultural and existential dimensions. The

implication for patient care is that multiple variables affects health. Physicians must understand and honor the whole person, in each of his/her parts (Freeman, 2005).

The concepts of GST also have been applied to population health and epidemiology. Roux described a model in which social and biological factors are tightly entwined in systems (Roux, 2007). Social factors are capable of actually modifying both functional and structural aspects of biology as seen through this model. As an example, Roux cited a study in which it was demonstrated that social experience modifies neuronal response to serotonin in crayfish (Yeh, 1996). Roux described the model as one in which every element in a sequence dynamically influences related elements and is, in turn, influenced by these same elements. An initial change can reverberate through the system.

Roux gives an example of the application of this model to a major public health topic, obesity. Obesity is commonly measured using data from individuals to obtain an obesity rate. This is typically determined using body mass index, which is a height-weight ratio. Application of social cognitive theory constructs to the problem of obesity however, indicates that it is caused by multiple factors (Glanz, Lewis, & Rimer, 1997). Environment, or factors external to the person may influence an individual's inclination towards obesity. These factors would include the properties of the population as a whole (i.e., advertising and availability of unhealthy foods, methods of transportation, etc). The social cognitive theory construct of observational learning suggests that individuals may learn eating and exercise behaviors from others. Application of GST to this topic implies that the prevalence of obesity in the population is a function of the system as a whole. A model designed to understand obesity and direct interventions would therefore incorporate all factors which create the system. A systems approach begins by stating the

components of the obesity system, including biological, behavioral, and social characteristics of individuals in addition to system-wide features such as the mass production and marketing of foods, the organization of transportation and social norms regarding body size and image.

Other researchers have also offered support for the application of GST to public health. Ness has argued that systems models should be developed because they provide richness in describing the real world where current models are limited (Ness, 2007). Systems models can incorporate broad influences on disease, from molecular biology to social systems and can describe the interplay between those influences. Ness states that "We believe that by adding dynamic systems modeling to the chronic disease epidemiology tool box, we will improve our capability to predict etiologic agents and the effects of interventions, define characteristics of individuals at risk, and identify what key data are missing from our understanding of health and disease" (Ness, 2007, p. 7).

The field of health education/health promotion has also embraced the idea of holistic health. Hawks has reported, "The health education field has undergone a transformation during the past 50 years, from an almost exclusive emphasis on the importance of physical health to a more balanced perspective that now promotes the achievement of "wellness" through the pursuit of holistic health. Toward that end, the concept of health is now generally defined as a holistic, multi-dimensional phenomenon that includes not only physical, but also emotional, intellectual, occupational, social and spiritual components" (Hawks, 1994, p. 3).

Hawks offers a model of spirituality and holistic health based on Maslow's hierarchy of needs (i.e., food and shelter, safety and security, love and acceptance, self-

esteem, and self-actualization). He suggests that just as Maslow promotes a hierarchical model, there may exist a loose hierarchy within the dimensions of holistic health. He states that physical and intellectual health may be necessary to develop high levels of wellness in the social, spiritual and emotional dimensions. However, Hawks makes the point that "The process is not strictly unidirectional, however, as wellness in these higher dimensions, in turn, enhances physical and intellectual health" (Hawks, 1994, p. 7). According to this model of holistic health, spirituality is a major component. It serves as the path to emotional development and self-actualization. "Without spiritual health, the highest levels of human development cannot be achieved" (Hawks, 1994, p.7).

Holism and GST are two closely related paradigms which allow for a more integrated and complete view of health than is commonly utilized. Each viewpoint suggests that health is more than just physical, but also includes the social, intellectual, emotional and spiritual components. If health of the individual is seen as a system, then GST suggests that the various components of health interact and affect each other in a process which results in the health of the whole person. This theory provides justification for our hypothesis that spirituality will be related to both mental and physical health.

Spirituality

This section defines the concept of spirituality. Spirituality and spiritual practices are discussed as they relate to health. The relationship between spirituality, physical health and mental health is discussed. An overview of research linking spirituality to health is provided.

The concepts of religion and spirituality are frequently considered synonymous by lay persons although in reality they have separate meanings. In a health-related scientific study using spirituality as a variable it is important to clarify this distinction. The following statements are commonly used to make clear the differences between the two.

> Religiousness has specific behavioral, social, doctrinal, and denominational characteristics because it involves a system of worship and doctrine that is shared within a group. Spirituality is concerned with the transcendent, addressing ultimate questions about life's meaning, with the assumption that there is more to life than what we see or fully understand. Spirituality can call us beyond self to concern and compassion for others. While religions aim to foster and nourish the spiritual life-it is possible to adopt the outward forms of religious worship and doctrine without having a strong relationship to the transcendent (Fetzer, 1999, p.2).

While religion is a system of beliefs concerning man's relationship to the divine and consisting of methods of worship, sacred texts, and usually administrative and physical structures to promote its practice, spirituality is simply a belief in a personal communion with what is holy through prayerful meditation and conscious living (Sigmund, 2002). Spirituality has also been described as "…one's ability to keep centered no matter how severe one's life circumstances…an ever increasing search for a commitment to a life purpose…Spirituality comprises the values by and through which construe our worldview…spirituality determines, guides and controls each and every

decision, action, interaction and reaction we make or refuse to make. It is a disposition to achieve a deeper, fuller, and better life" (Doswell, Kouyate, & Taylor, 2003, p. 196). The daily experience of spirituality has been reported to consist of the following: a feeling of "connection" to either god or some greater whole, frequent interaction with the transcendent, perceived divine love, inspiration or discernment, the experience of transcending the difficulties of life, a sense of wholeness and internal integration, feelings of awe, unconditional love and compassion, mercy and spiritual longing (Underwood & Teresi, 2002).

Spiritual health is included as one of the dimensions of health in the holistic health model. Though sometimes difficult to define, Hawks offers one definition. Spiritual health is "A high level of faith, hope, and commitment in relation to a well-defined worldview or belief system that provides a sense of meaning and purpose to existence in general, and that offers an ethical path to personal fulfillment which includes connectedness with self, others, and a higher power or larger reality" (Hawks, 1994, p. 9).

Spiritual Practices

Underlying the reality of spiritual practices is the basic belief that spirituality can be developed in individuals. These activities are believed to influence the components of spirituality mentioned previously such as sense of inner peace, love, and the transcendence of life's problems. The purpose of these practices is "to lead the practitioner to long term spiritual transformation toward an enhanced awareness of spirit, and a corresponding diminishment of identification with the mental and physical aspects of life" (Luskin, 2004, p. S-15). These practices may include such activities as formal

religion, meditation, health education and cognitive-behavioral therapy. There is some published research in support of the premise that levels of spiritual health can be improved with active intervention.

In a study of 181 women with breast cancer, spiritual well-being was shown to improve after a 12-week program in two groups, one that received group support and another which received meditation, affirmation, imagery and ritual training (Targ & Levine, 2002). Similarly, another published study also demonstrated enhancement of spiritual well-being. Twelve students aged 18-22 years underwent 8 weeks of Jungian-oriented group dreamwork for a total of 4 sessions. The sessions consisted of relaxation, statement of dream content, amplification, interpretation and validation (Dahlenburg, Christensen, & Moore, 1996). Yet another study reports improvement of spiritual well-being through active intervention strategies. Fifty-nine undergraduate students participated in two 4-session, 6-hour cognitive-behavioral stress management workshops. One group received standard cognitive-behavioral techniques while another received the same techniques plus added suggestions and illustrations on how to incorporate spirituality into the stress management process. Only this latter group showed greater improvement in spiritual well-being than a no-intervention control group (Nohr, 2001).

Spirituality and Mental Health

Several psychological constructs have been associated with spiritual health. In a study of 77 pastors, higher levels of spiritual functioning were correlated with lower perceived stress levels (Dodd, 2003). High levels of spiritual well-being have also been associated with lower levels of neuroticism, higher extraversion, higher agreeableness,

and higher conscientiousness in a study of 319 undergraduate students (Ramanaiah, Rielage, & Sharpe, 2001).

Perhaps the most studied relationship between spirituality and mental health involves the concept of anxiety. Davis & Kurpius studied religiosity, spirituality and anxiety in 45 at-risk male and female high school students (Davis & Kurpius, 2003). Instruments included the STAI and the Spiritual Well-Being Scale (SWBS). The SWBS consists of 20 items responded to on a 7-point Likert-type scale. Ten of these items measure religious well-being (RWB), which is concerned about one's sense of well-being in relation to God. Another 10 items measure existential well-being (EWB), which refers to a sense of life purpose and life satisfaction with no reference to anything specifically religious. Results indicated that higher EWB was associated with lower trait anxiety in male subjects ($r = -.48$, $p<.05$) and female subjects ($r = -.39$, $p<.05$). Higher RWB was associated with lower trait anxiety only in males ($r = -.56$, $p<.01$). The authors also performed backward regression to determine if EWB and RWB predicted trait anxiety. Only EWB predicted trait anxiety ($b = -.51$, $p<.01$), with EWB accounting for 27% of the variance in trait anxiety. It is interesting to note that a similar study reported an absence of significant relationship of religiosity with death anxiety, yet did find a negative relationship between spirituality and death anxiety (Rasmussen & Johnson, 1994).

Another study attempted to test the theoretical assumption that highly spiritual persons have lower anxiety (Kaczorowski, 1989). To assess the premise that highly spiritual persons with life-threatening illness show lower anxiety, Kaczorowski studied 114 adult cancer patients. Patients were asked to complete the SWBS and the STAI. Results indicated a consistent inverse relationship between SWB total scores and

combined state and trait anxiety scores regardless of the influences of gender, age, marital status, diagnosis, or length of time since diagnosis. Pearson correlations ranged from -.29 to -.59 with significance levels ranging from .05 to .001. A very interesting finding of this study involved the results of surveys completed by 12 nuns who were included in the sample. For these individuals, the relationship between spiritual well-being and anxiety was very high ($r = -.86$, $p<.001$).

Other authors have used this same SWBS in a British study of anxiety and depression in patients with advanced cancer (McCoubrie & Davies, 2005). Anxiety and depression were measured using the Hospital Anxiety and Depression Scale. Eighty-five hospice patients volunteered to complete the survey. Results indicated no significant relationship between the religious portion (RWB) of the SWBS, but a significant negative correlation was reported for EWB and anxiety ($r = -.534$, $p\leq.001$). Overall SWB score was also significant ($r = -.281$, $p=.009$). Similarly, RWB was not significantly related to depression, but EWB was significantly negatively correlated with depression ($r = -.611$, $p\leq.001$). The authors conclude that patients with high levels of existential/spiritual well-being are less likely to be anxious or depressed. They suggest that by helping patients to address existential issues may lead to improvement in spiritual well-being and, consequently, psychological health.

An Australian study reports the relationship between anxiety and spirituality in patients with gynecological cancer (Boscaglia, Clark, Jobling, & Quinn, 2005). One hundred female patients were recruited from outpatient clinics, with age ranging 20 to 70. Anxiety was assessed using the STAI and spirituality using the Spiritual Involvement and Beliefs Scale-Revised. This scale measures 22 items related to rituals and belief in a

higher power, internalized beliefs and spiritual growth, meditation and existential beliefs, humility, and daily application of spiritual principles. Positive and negative spiritual coping were measured using the Brief RECOPE, consisting of 14 items. Positive spiritual coping is characterized by a secure relationship with God, a sense of meaning in life, and spiritual connectedness with others. Conversely, negative spiritual coping is related to a less secure relationship with God, a tenuous and ominous view of the world, and a religious struggle in the search for significance.

Sequential regression was performed in 3 steps to determine if spirituality (step 2) and positive and negative religious coping (step 3) explained variability in anxiety after controlling for illness and demographic variables. Results indicated that after the first 3 steps, R was not significantly different from zero ($p>.10$). Change statistics indicated that addition of positive and negative spiritual coping (step 3) did result in significant improvement of the regression model ($R^2=.12$, $F(2,90)=4.33$, $p<.05$). Negative spiritual coping was the only significant predictor of anxiety ($\beta= -.25$, $p<.05$). The authors concluded that more negative spiritual coping was associated with higher levels of anxiety.

A Canadian study attempted to determine relationships between spiritual coping and life stress in a sample of 101 adult survivors of childhood sexual abuse (Gall, 2006). Spiritual coping was measured using 8 of the 21 subscales available in RECOPE, a multidimensional measure of spiritual coping methods. This instrument measured such concepts as Active Surrender, or the handing over of control to God; Passive Deferral, of the passive waiting for God to control the situation; Pleading, or asking for a miracle or divine intervention; and Self-Directed efforts to use individual initiative with no help

from God. Anxiety was measured using 3 items from the Profile of Mood States (POMS): tense, nervous, anxious. Results of hierarchical regression indicated that the combination of demographics, abuse descriptors, cognitive appraisal, social support and spiritual coping significantly predicted anxious mood [$F(15,60)=3.31$, $p<.000$]. Spiritual factors explained an additional 18% of the variance in anxious mood.

The role of daily spirituality was studied in relationship to pain, and positive and negative mood in subjects suffering from rheumatoid arthritis (Keefe, 2001). Thirty-five subjects volunteered to complete a daily journal for 30 consecutive days. Measures included the short form of the Religious/Spiritual Coping Scale of the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS) which included 3 parts: positive religious/spiritual coping, negative religious/spiritual coping, and perceived salience of religion in coping. The researchers also asked basic questions related to religious/spiritual coping efficacy. Daily mood was measured using 18 adjectives from the Profile of Mood States (POMS). Daily negative mood was calculated by summing the responses to nine adjectives describing depression, anxiety and hostility. Daily positive mood was calculated by summing responses to nine adjectives describing elation, composure and agreeableness. Basic questions related to daily levels of social support were also included in the assessment.

Finally, daily spiritual experience was measured using the 6-item short form of the Daily Spiritual Experiences Scale. This brief version of the DSES includes the following items: Felt God's presence, Found strength and comfort in my religion, Felt deep inner peace or harmony, Desired to be closer to, or in union with, God, Felt God's

love for me, Directly or through others, and Felt spiritually touched by the beauty of creation. The items were summed to create a summary score.

The authors performed statistical analysis to determine relationships between daily spiritual experience and other study variables. Standardized maximum likelihood estimates for within-person relations between daily spiritual experience and daily joint pain, positive mood and negative mood were reported. Daily spiritual experience was inversely related to negative mood ($b = -.34$, $t = -3.42$, $p<.05$) and positively related to positive mood ($b = .41$, $t = 6.15$, $p<.001$). Religious/spiritual coping efficacy was found to be inversely related to joint pain ($b = -.15$, $t = -2.95$, $p<.01$) and negative mood ($b = -.20$, $t = -3.07$, $p<.01$). Daily spiritual experience was found to be positively related to positive religious/spiritual coping ($r = .41$, $p<.001$), salience of religion for coping($r = .40$, $p<.001$), and religious/spiritual coping efficacy ($r =.35$, $p<.01$). The authors report that individuals with frequent daily spiritual experiences had higher levels of daily positive mood, lower levels of daily negative mood and higher levels of each of the social support domains. However, they conclude that although it is possible that high levels of daily spiritual experiences may lead to improved mood, it is also possible that improved mood contributes to higher levels of daily spiritual experience.

Other researchers have explored the relationship between DSE and mental health. A study was conducted of 122 patients suffering from chronic musculoskeletal pain at a large Midwest University Medical Center (Rippentrop, et al, 2004). Subjects completed paper and pencil surveys while in the waiting room for a regularly scheduled physician visit. DSE was measured using the brief, 6-item DSES. Religion/Spirituality was also measured using the Brief Multidimensional Measure of Religion/Spirituality (BMMRS).

Measures of forgiveness, negative religious coping, religious support, and spiritual/religiousness intensity were assessed. Health status was measured using the SF-36, one of the most widely used health status inventories. The SF-36 measures 8 health concepts including physical functioning, role limitations due to physical health, bodily pain, general health, social functioning, role limitations due to emotional problems, and mental health. For this study, the 8 health areas were reduced to two components: Physical Component Summary (PCS) and Mental Component Summary (MCS). Higher values reflect better physical and mental health. A positive relationship was reported between DSE and the mental health measure MCS ($r = .27$, $p<.10$). Age was also positively associated with DSE ($r = .29$, $p<.10$).

Hierarchical multiple regression was performed to determine if mental health status could be predicted from demographic variables, pain variables and religion/spirituality. Variables were entered in 3 steps. Addition of religion/spiritual variables in step 3 added an additional 12% of the variance in mental health which was a significant gain ($R^2 = .12$, $p = .032$) and the religious/spiritual variables added significantly to the prediction of mental health above and beyond that accounted for by demographics and pain ($F = 2.47$, $p = .032$). None of the religious/spiritual variables, including DSE, could independently predict variance in mental health, and the authors suggest problems of collinearity may partially explain this finding.

Koenig George, Titus and Meador studied religion, spirituality and health in 838 medically ill hospitalized older patients (Koenig, George, Titus, & Meador, 2004). Daily spiritual experiences were measured using the 16-item DSES. Depression was measured using the 11-item Brief depression Scale. Results of this study indicated that DSE was

related to depressive symptoms ($r = -.12$, $p<.001$). Depressive symptoms were found to be significantly less common in those with more DSE.

In addition, a study of female subjects was conducted at a major medical center in Chicago as part of the Study of Women Across the Nation (SWAN), a multi-site, multi-ethnic and multi-factorial study of midlife (Underwood & Teresi, 2002). The authors administered the 16-item DSES to a total of 233 volunteers. Other variables measured included quality of life measured using the Short Form-36, anxiety measured with the STAI, depression measured with the Center for Epidemiologic Studies-Depression F, perceived stress using the Cohen's PSS, hostility using the Cook Medley Hostility Scale, and optimism using the Scheirer Optimism Scale. Significant correlations of the Daily Spiritual Experiences Scale with various psychosocial variables were found including: quality of life ($r = -.240$, $p<.01$), anxiety ($r = -.394$, $p<.01$), depression ($r = -.220$, $p<.01$), perceived stress ($r = -.197$, $p<.01$), hostility ($r = -.157$, $p<.05$), and optimism ($r = +.352$, $p<.01$). The DSES was scored positively for this analysis, meaning that more DSE was associated with less anxiety, less depression, less perceived stress, less hostility and greater optimism.

Spirituality and Physical Health

Spirituality has been linked to various physical health parameters. Several studies have linked quality of life with spiritual health. Cotton, Levine, Fitzpatrick, Dold & Targ studied spirituality and quality of life in 142 women with breast cancer (Cotton, Levine, Fitzpatrick, Dold & Targ, 1999). The study questionnaire included the Functional Assessment of Chronic Illness Therapy-Breast which included quality of life measures

and a 12-item Spiritual Well-Being Scale (SPWB) which focused on existential aspects of spirituality and faith with 2 subscales: meaning/peace and faith. Also included was the Principles of Living Survey (PLS) which is a 16-item measure of religious and spiritual beliefs with lower scores meaning more spirituality. Results indicated a positive correlation between spiritual well-being and quality of life ($r = .48$, $p<.001$), indicating more spiritual well-being was associated with more quality of life. Spirituality as measured with the PLS was also significantly correlated with quality of life ($r = -.19$, $p<.05$), indicating more spirituality was associated with higher quality of life. However, after controlling for demographic variables, health status and personality constructs, hierarchical regression revealed no significant improvement in the prediction of quality of life, whereas spiritual well-being explained a significant amount of additional variance in quality of life (R^2 change .03, $p<.05$). Spiritual well-being contributed significantly to the model ($\beta = .29$, $p<.05$).

It is interesting to note that other researchers reported no relationship between quality of life and spiritual well-being. In a sample of 18 women with gynecologic cancer, spiritual well-being was measuring using the SWBS and quality of life using the Functional Living Index-Cancer (FLIC). Unfortunately, the authors neglect to report the statistical method used to determine this result (Gioiella, Berkman & Robinson, 1998).

Another study of 216 inpatients and outpatients at the University of Michigan Medical Center examined this same relationship using the SWBS and the Functional Assessment of Cancer Therapy-SP. By analyzing results of scores on the SWBS, the researchers categorized subjects into three groups: religious, existential and non-spiritual. The authors report that the “non-spiritual” group demonstrated poorer quality of life,

poorer health and less vitality (Riley, Perna & Tate, 1998). Specifics of statistical analysis were not reported.

Interestingly, other researchers have reported different results regarding the relationship between spirituality and quality of life. For example, Tate & Forchheimer report a study of 208 out-patients with multiple diagnoses. Quality of life was measured with the Functional Living Index-Cancer (FLIC), and spirituality using the Functional Assessment of Cancer Therapy-Spiritual (FACT-SP). After controlling for demographic variables, spirituality was not a significant predictor of quality of life as determined using sequential regression analysis (Tate & Forchheimer, 2002).

Researchers have attempted to study the relationship of spirituality with other physical health outcomes. Newlin, Melkus, Chyun & Jefferson studied 22 black females with diabetes. They report significant inverse correlations of diastolic blood pressure with both total spiritual well-being ($r = -.51$, $p = .02$), and religious well-being ($r = -.55$, $p = .01$). The authors suggest that holistic care, addressing the spiritual and emotional dimensions of health may help lead to improved blood pressure levels in black women with type 2 diabetes (Newlin, Melkus, Chyun & Jefferson, 2003).

Other research efforts have explored the relationship between spirituality and healthcare utilization. Koenig, George, Titus & Meador studied 2477 patients at least 50 years of age during hospitalization (Koenig, George, Titus & Meador, 2004). The primary outcome variables were number of acute care hospital days during a 21 month observation period, number of times hospitalized, and number of days spent in a nursing home or rehabilitation setting (long-term care). Spirituality was measured using the 16-item DSES. The results of the study demonstrated only weak relationships between

spirituality and acute care hospitalization, whereas robust and persistent effects were seen for long-term care among both African Americans and women. After controlling for demographics and baseline use of long-term care services, DSE was a significant predictor of long-term care ($\beta = -.19$, $p<.001$). The authors conclude that more DSE was associated with shorter long-term care stay.

The relationship between spirituality and physical symptoms has received some limited attention in health-related research. In one study of 117 African-American men and women diagnosed with HIV/AIDS, the existential well-being subscale of the SWBS was found to be inversely related to HIV symptoms ($r = -.33$, $p <.001$) as measured with the HIV Symptom Checklist (Coleman, 2003). The authors conclude that interventions for people with life-threatening illnesses like HIV need to address the importance of finding meaning and purpose in both health and illness states.

In related research, investigators studied a community sample of 80 adults, measuring a variety of health-related variables (Lawler & Younger, 2002). Significant correlations were found between the EWB subscale of the SWBS and physical symptoms ($r = -.32$, $p<.001$), and use of common medications ($r = -.35$, $p<.001$). Physical symptoms were assessed using the Cohen-Hoberman Inventory of Physical Symptoms which measures 40 common physical ailments that often bring patients into the healthcare system. In addition, regression analysis revealed higher levels of EWB were predictive of fewer illness symptoms ($R^2 = .191$, $p<.0001$) and lower use of medications ($R^2 = .159$, $p<.05$). It is interesting to note that a measure of spiritual experiences which was also included in the study, the Stanford Spiritual Experiences Scale, showed no statistically significant relationship with either physical symptoms or medication usage.

Underwood reports results of the administration of the DSES to 233 women as part of SWAN (Study of Women Across the Nation). Daily spiritual experience was significantly positively correlated with quality of life ($r = +.240$, $p<.01$), yet no statistically significant relationship was found with either sleep problems or physical ailments (Underwood & Teresi, 2002).

In a study of 828 medically ill hospitalized older patients, researchers found no significant relationships between DSE and physical health. Daily spiritual experiences were measured using the 16-item DSES. Self-report of physical functioning was measured using the Duke Activity Status Index. Patients also self-rated physical health by answering the question: "How would you rate your overall physical health?". Responses ranged from very poor (1) to excellent (6). Observer rated health status was measured using the American Society of Anesthesiologists Severity of Illness Scale, the Cumulative Illness Rating Scale and the Charlson Comorbidity Index (Koenig et al., 2004).

As mentioned previously, Keefe measured spiritual health in a total of 35 rheumatoid arthritis patients (Keefe, 2001). Daily spiritual experience was measured using the 6-item short form of the DSES. Daily joint pain was assessed using the Rapid Assessment of Disease Activity in Rheumatology (RADAR). Standardized maximum likelihood estimates for within-person relations between daily spiritual experience and daily joint pain were reported. Daily spiritual experience was not significantly related to joint pain.

A study was conducted of 122 patients suffering from chronic musculoskeletal pain at a large Midwest University Medical Center (Rippentrop, 2004). Subjects

completed paper and pencil surveys while in the waiting room for a regularly scheduled physician visit. DSE was measured using the brief, 6-item DSES. Religion/Spirituality was also measured using the Brief Multidimensional Measure of Religion/Spirituality (BMMRS). Measures of forgiveness, negative religious coping, religious support, and spiritual/religiousness intensity were assessed. Health status was measured using the SF-36, one of the most widely used health status inventories. The SF-36 measures 8 health concepts including physical functioning, role limitations due to physical health, bodily pain, general health, social functioning, role limitations due to emotional problems, and mental health. For this study, the 8 health areas were reduced to two components: Physical Component Summary (PCS) and Mental Component Summary (MCS). Higher values reflect better physical and mental health. Pain intensity was measured using the McGill Pain Questionnaire (MPQ).

The results of this study found no significant relationship between DSE and physical health as measured with the PCS, nor was there a significant relationship between DSE and pain as measured on the MPQ. Hierarchical multiple regression was performed to determine if physical health status could be predicted from demographic variables, pain variables and religion/spirituality. Variables were entered in 3 steps. Addition of private religious practice in step 3, the only religious/spiritual variable significantly correlated with physical health, added an additional 3% of the variance in physical health which was a significant gain (R^2 Change= .03, p = .01). Private religious practice (β= -.20, p = .03) was significantly related to physical health status. This proved to be an interesting finding, since it suggests that the more personal prayer, meditation or bible reading reported by subjects, the worse their physical health. Hierarchical

regression demonstrated that religious/spiritual variables were not able to add significantly to the prediction of pain intensity as measured with the MPQ beyond the variance explained by demographics and health status.

The previous discussion in this section defined spirituality and spiritual practices. A review of the literature relating spirituality to health outcomes was provided. The research discussed in this section demonstrated both support for and against a relationship between spirituality and health. Table 6 lists those studies which were believed to possess more rigorous research design. The reader who is interested in further exploring the topic of spirituality and health may want to focus on these studies.

Table 6

Categorization of Research in Review of Literature – Spirituality

Study	*Categorization	**Criteria Met
Spirituality and coping with life stress among adult survivors of childhood sexual abuse (Gall, 2004)	Level II	Sample Reliability Validity I/E Validity
The contribution of spirituality and spiritual coping to anxiety and depression in women with a recent diagnosis of gynecological cancer (Boscaglia et al, 2005)	Level II	Sample Reliability Validity
Is there a correlation between spirituality and anxiety and depression in patients with advanced cancer (McCoubrie et al, 2005)	Level II	Sample Reliability Validity
Religion, spirituality, and health in medically ill hospitalized older patients (Koenig, et al, 2004)	Level II	Sample Reliability Validity I/E Validity
The relationship between religion/ spirituality and physical health, mental health, and pain in a chronic pain population (Rippentrop et al, 2004)	Level II	Sample Reliability Validity I/E Validity
Spirituality and sexual orientation: relationship to mental well-being and functional health status (Coleman, 2003)	Level II	Sample Validity I/E Validity
Meaning, purpose, and religiosity in at-risk youth: the relationship between anxiety and spirituality (Davis, et al, 2003)	Level II	Sample Reliability Validity
Religion, spirituality, and health service use By older hospitalized patients (Koenig, et al, 2003)	Level II	Sample Reliability Validity
The relationship between spirituality and health outcomes in black women with type 2 diabetes (Newlin, et al, 2003)	Level III	Sample I/E Validity

Note. * See Table 2, ** See Table 1

Table 6

Categorization of Research in Review of Literature – Spirituality (Continued)

Study	*Categorization	**Criteria Met
Quality of life, life satisfaction and spirituality (Tate, et al, 2003)	Level II	Sample Reliability Validity
The daily spiritual experience scale: development, theoretical description, reliability exploratory factor analysis and preliminary construct validity using health-related research (Underwood, et al, 2002)	Level III	Sample I/E Validity
Living with rheumatoid arthritis: the role of daily spirituality and daily religious and spiritual coping (Keefe et al, 2001)	Level II	Sample Reliability Validity
Exploring the relationships among spiritual well-being, quality of life, and psychological adjustment in women with breast cancer (Cotton, et al, 1999)	Level II	Sample Reliability Validity I/E Validity
Spirituality and quality of life in gynecologic oncology patients (Gioiella et al, 1998)	Level II	Sample Reliability Validity
Spiritual patients have a better quality of life than those who aren't (Riley, et al, 1998)	Level II	Sample Reliability Validity
Spiritual well-being and anxiety in adults diagnosed with cancer (Kaczorowski, 1989)	Level II	Sample Reliability Validity

Note. * See Table 2, ** See Table 1

Martial Arts and Mental Health

This section includes an introduction to the martial arts as they are practiced today. Research is provided linking martial arts to mental health. Although a range of psychological constructs are discussed, the primary focus of this narrative is stress and anxiety. The martial arts of taekwondo, karate, judo and tai chi are discussed as they relate to the research literature.

Practice of the martial arts has increased dramatically in recent years in the United States. Martial arts schools are noticeably visible across small towns and large cities, from community dojos to after-school care programs. Historically, the martial arts were created for purposes of self-defense as a means of survival for primitive peoples. In addition to the always-present need for self-defense, today's individuals are seeking martial arts training for other reasons as well. Long purported to have health promoting qualities, the martial arts attract individuals who wish to improve physical health parameters such as flexibility, strength, endurance, coordination and balance. Mental health improvements are also commonly believed to be associated with martial arts practice. Self-control, self-esteem, self-concept, anger and aggression are considered important psychological concepts affected by the practice of martial arts. In today's modern society, individuals are much more likely to "self-destruct" through participation in poor health behaviors than to actually require the use of self-defense skills against an assailant. The following literature review suggests that martial arts training has been shown to be positively related to various health parameters, and therefore should not be overlooked as a possible avenue for health promotion and primary prevention.

Taekwondo, Karate, and Judo

The idea that participation in the martial arts may enhance mental health is not new. A study was conducted of 30 adult taekwondo practitioners divided into two groups of 15 subjects based on years of experience, with the inexperienced group having less than 1.5 years experience. The more experienced group demonstrated statistically significant lower scores on measurement of anxiety ($t = 1.90$, $p<.05$) and higher on measurement of personal independence ($t = -2.42$, $p<.05$) as assessed using the 16 Personality Factor Questionnaire (Kurian, 1993). A study of young taekwondo practitioners also found significant differences between advanced students and beginners in several psychological concepts (Kurian, 1994). Kurian administered the Children's Personality Questionnaire to a group of young taekwondo practitioners and found that attainment of higher belt rank is associated with more demanding, enthusiastic and optimistic, self-reliant, and socially perceptive personality traits ($p<.05$). Other research has demonstrated that a single bout of dynamic taekwondo exercise can affect psychological status (Toskovic, 2001). The Profile of Mood States inventory was completed prior to and immediately after a 75 minute exercise session in a group of 20 college-aged students and controls. Whereas control group scores actually increased for negative mood states, the taekwondo group reported significant improvement for tension [$F(1, 36) = 22.20$, $p<.001$], depression [$F(1, 36) = 21.56$, $p<.001$], anger [$F(1, 36) = 8.13$, $p=.007$], fatigue [$F(1, 36) = 12.45$, $p=.001$], confusion [$F(1, 36) = 18.97$, $p<.001$], vigor [$F(1, 36) = 26.8$, $p<.001$], and total mood disturbance [$F(1, 36) = 37.39$, $p<.001$]. The author concludes that participants in taekwondo training experience immediate beneficial alterations of mood.

Another psychological concept that appears related to martial arts practice is aggressiveness. Although past stereotypical viewpoints would have us believe that the martial arts are associated with the macho, hypercompetitive, ego-driven male image of the warrior, current research is suggesting that the "kill or be killed" image of the past may have been replaced with more positive attitudes. In a study of 68 youth taekwondo students, researchers concluded that a significant inverse relationship exists [$F(4, 68) = 4.43$, $p<.01$] between the childrens' taekwondo rank and aggression as measured with the parent-scored Revised Child Behavior Profile/Child Behavior Checklist. The authors conclude that increased proficiency in taekwondo results in a generalized lessening of aggressive behavior (Skelton, Glynn & Berta, 1991). In a similar study, 51 Judo students ranging in age from 11 to 63, with 0-36 years experience, were assessed for aggressiveness/aggressive fantasy using the Rosenzweig Picture Frustration Test (Lamarre & Nosanchuk, 1999). Belt rank significantly predicted aggression ($R^2 = .20$, $p<.01$, $B = -2.32$, $p<.01$).

Self-concept is another psychological construct that has received attention in the martial arts literature. In a study of college-aged female students, a trial of 8-weeks taekwondo training was compared with general health classes. Fifty-one women enrolled in taekwondo training, and 49 in general health courses. The taekwondo group scored significantly higher ($p<.05$) on 5 of the 9 subscale scores and on total self-concept than students from education. These higher scores indicate a more positive self-concept rating on the Tennessee Self-concept Scale (Finkenberg, 1990). Qualititative research involving 30 female karate practitioners indicates similar positive findings. After conducting in-depth interviews, the author concludes that "Women's self-concept appeared to be

profoundly altered when physically empowering activities such as the martial arts were practiced…" and "Healing from incest, rape, and other forms of violence is facilitated by martial arts/self-defense training in ways that are qualitatively different from traditional psychological therapy, suggesting that approaches that empower women physically, as well as mentally and spiritually, may be more effective in producing personal and social change than cognitive strategies alone" (Guthrie, 1996, p. 107). In related research, Prince administered the Tennessee Self-concept Scale to students from 5 different martial arts schools. He reported a statistically significant difference (statistics not reported) between beginning level students and scores from intermediate and advanced students. "…the implication is that martial arts training can positively affect an individual's self-concept" (Prince, 1996).

Tai Chi Chuan

Tai Chi Chuan (TCC), which means "boxing of the highest ultimate", is a martial art developed in 17th century China. According to Sieh, TCC is close in theory and application to Aikido (Sieh, 1995). TCC is deeply rooted in the philosophy of Taoism, which focuses on mind tranquility with a goal to achieve longevity by meditation and lifestyle modification. The practice of TCC has been associated positively with several health parameters including cardio-respiratory function, strength, flexibility, balance, motor control, peripheral circulation, blood lipid profile, thyroid and immune function, self-reported physical function, and psychosocial function. Research has demonstrated its application for health promotion in reducing coronary artery disease, hypertension, falls, arthropathy, and neurological diseases (Lan, Lai & Chen, 2002).

Researchers have attempted to associate practice of TCC with mental health parameters. One study (Jin, 1992) exposed 48 TCC practitioners to laboratory controlled stressors (mental arithmetic, stressful film, etc). Following exposure to these stressful experiences, the TCC practitioners were divided into four treatment groups (tai chi, brisk walking, meditation, and reading). Measurements were taken before and after each intervention for salivary cortisol levels, mood (POMS) and anxiety (STAI). After all treatments, salivary cortisol levels dropped significantly [$F(1, 88) = 65.42$, $p<.001$], and mood states improved also across all 4 groups [$F(6, 83) = 78.00$, $p<.001$]. The tai chi group appeared to be superior to neutral reading in the reduction of state anxiety [$F(1, 87) = 10$, $p<.005$].

Another study exposed 66 TCC practitioners to a single 60 minute tai chi session with two 3-minute breaks. Participants completed pre/post testing for salivary cortisol, mood (POMS) and anxiety (STAI). Results indicated that salivary cortisol levels decreased markedly immediately after the practice of tai chi and were still low after 1 hour ($p<.001$). The same result was noted for total mood ($p<.001$). Immediately after the tai chi session, state anxiety was significantly lower than pretest scores [$F(1, 60) = 47.58$, $p<.001$]. The researchers did not repeat the anxiety measurement at 1-hour post intervention (Jin, 1989).

The effects of TCC practice over time have also been studied (Tsai et al., 2003). During one investigation, 76 health subjects with high-normal or stage I hypertension underwent a 12-week TCC exercise program. Subjects practiced three times per week and each session consisted of a 10 minute warm-up, 30 minutes of TCC, and a 10 minute cool-down period. The group showed a significant decrease in systolic blood pressure of

15.6mm Hg (<.001), and diastolic blood pressure drop of 8.8mm Hg (p<.05). Mean trait anxiety scores as measured with the STAI dropped from 42.8 to 32.8 (p<.01) and state-anxiety decreased from 41.2 to 30.6 (p<.01).

In a similar study, 33 community-dwelling subjects diagnosed with lower extremity osteoarthritis (mean age 68) and no previous TCC training participated in two 1-hour TCC classes per week for 12 weeks. The Arthritis Impact Measurement Scale II(AIMSII) was used as a multidimensional questionnaire to measure various aspects of health and quality of life. Tension and mood scales measured psychological factors such as enjoyment, nervousness, relaxing without difficulty, and feeling down in the dumps. Compared to baseline measures, participants showed improvement in self-efficacy for arthritis symptoms (p=.001), total arthritis self-efficacy (p=.004, level of tension (p=.000), and satisfaction with general health status (p=.000). No significant changes were noted in a no-treatment control group (Hartman, Manos, Winter, Hartman & Smith, 2000).

Another interesting study describes the self-reported benefits of TCC practice by older women. After three months of regular TCC practice, participants completed a questionnaire. In response to an open-ended question: “Do you feel that you benefited from the tai chi exercise program?”, 88% reported various benefits. The most frequent benefit cited was better postural control. Eleven percent of participants reported feeling more relaxed and better able to sleep at night. Other reported benefits were reduced pain and improved control over chronic diseases such as hypertension and diabetes (Taggart, 2001).

This section has discussed the practice of martial arts in modern times. An overview was provided of research studies linking various mental health variables to the practice of taekwondo, karate, judo and tai chi. It was demonstrated that the practice of these martial arts has been associated with more positive self-concept, lower levels of aggression, more enthusiasm, less depression, less anger, and less anxiety. Table 7 lists those studies which were believed to possess more rigorous research design. The reader who is interested in further exploring the topic of martial arts and mental health may want to focus on these studies.

Table 7

Categorization of Research in Review of Literature – Martial Arts

Study	*Categorization	**Criteria Met
The beneficial effects of tai chi chuan on blood pressure and lipid profile and anxiety status in a randomized controlled trial (Tsai, et al, 2003)	Level I	Sample Reliability Validity I/E Validity
Self-reported benefits of tai chi practice by older women (Taggart, 2001)	Level I	Sample Reliability Validity
Alterations in selected measures of mood mood with a single bout of dynamic taekwondo exercise in college-age students (Toskovic, 2001)	Level II	Sample Reliability Validity
Effects of tai chi training on function and quality of life indicators in older adults with osteoarthritis (Hartman, et al, 2000)	Level I	Sample Reliability Validity
Efficacy of tai chi, brisk walking, meditation and neutral reading in reducing mental and emotional stress (Jin, 1992)	Level I	Sample Reliability Validity I/E Validity
Aggressive behavior as a function of taekwondo ranking (Skelton, et al, 1991)	Level III	Sample Reliability
Effect of participation in taekwondo on college women's self-concept (Finkenberg, 1990)	Level II	Sample Reliability Validity
Changes in heart rate, noradrenaline, cortisol and mood during tai chi (Jin, 1989)	Level I	Sample Reliability Validity I/E Validity

Note. * See Table 2, ** See Table 1

Aikido

This section introduces the martial art aikido. The origins, philosophical ideals and training methods of aikido are described. An overview of mental health research involving aikido is provided. The stress management properties of aikido training are discussed in detail.

Aikido is a relatively new Japanese martial art, formally developed in post-war Japan by Morihei Ueshiba. Ueshiba was a deeply spiritual man who, although at one time the leading martial arts instructor for Japans' military elite, became disillusioned by the arrogance of political leaders and the destructiveness of war. Having personally fought in the Russo-Japanese War, Ueshiba experienced the horrors of war up close and personal and soon thereafter relinquished his very promising military career. Considered by many to be "…the greatest of martial artists" (Stevens, 1999, p. VII), Ueshiba spent most of his adult life developing a martial art that would be to serve and protect, rather than destroy.

When martial arts were finally permitted to resume in post-war Japan by US Occupying Forces, aikido spread across the globe as a new way to promote peace and harmony among all peoples. Aikido is utilized by the Tokyo riot police, the Royal Canadian Mounted Police and police officers worldwide for physical self-defense purposes. However, despite its popularity for physical self-defense, the primary reason to participate in aikido is to make oneself a better person, mentally, physically and spiritually, and to promote peace and harmony in the world. Aikidoists are regularly taught to master themselves rather than others. Aikido, which is translated literally as "Way of Harmony", teaches nonviolence and peaceful resolution to crisis situations. In aikido practice "…there are no contests or organized competitions… the goal is to subdue

one's base nature and triumph over one's weaknesses or fears rather than to defeat an opponent in some trivial game" (Stevens, 1996, p 27).

Differing from many other martial arts which focus mostly on an array of kicks and punches, aikido is comprised of a complex set of joint-locking pins and throws that are designed to be totally defensive in nature and are applied only in response to an attack. Aikido teaches one to protect oneself, but it is unique in the martial arts in that it also teaches that one must also protect the attacker. To harm another person is to go against the ideals of aikido, and therefore a high level of skill is required to "neutralize" an attack without harming the attacker. Aikido is generally considered to be one of the most difficult of all the martial arts to learn. Since timing, coordination and balance are the key ingredients for success in aikido, physical strength is not considered important. In his book, Dynamic Aikido, Shioda reports:

> When performed correctly aikido technique requires no undue effort. Furthermore, no aikido technique requires abnormal physical power; anyone who can lift approximately sixteen pounds has sufficient strength-and if at any time a great deal of power is required to execute a technique, it is safe to conclude that the execution is bad. Thus, since aikido can be practiced as energetically or gently as desired, it can be enjoyed by people of all ages and both sexes (Shioda, 1968, p. 17-18).

Aikido – Relationship to Mental Health

Research efforts specifically addressing aikido and mental health are limited. This is probably due to the popularity of other more "external" martial arts such as karate and

taekwondo that emphasize kicking and punching, and are more visible in the media. Korean Taekwondo is the most popular martial art in America (Sieh, 1995), and has attracted more attention from investigators. However, some attempt has been made to assess the relationship between mental health and the practice of aikido. A review of the literature will demonstrate, however, that some of the research methodology used has significant limitations.

A few studies have attempted to assess the effects of brief aikido training on psychological concepts. One study exposed 21 youths to 2 ½ weeks of aikido training, with 21 other students in a control/waiting group. Intensive 45-minute training sessions were provided daily. No significant difference was found between the groups for measurement of self-control using the Teacher's Self-control Rating Scale or for aggressive behavior using a 12-item rating scale which was not named in the study (Delva-Tauilili, 1995). The authors admit the limitation of this study is the very brief nature of the training.

Another study compared brief aikido training with karate, and golf-training in university students (Foster, 1997). Sixty-nine beginning students underwent aikido training for 10 weeks. Pre-test/post-test measures of self-esteem, anxiety and anger expression were assessed using the Self-esteem Scale, the State-Trait Anxiety Inventory, and the Anger Expression Scale from the State-Trait Anger Expression Inventory. No significant changes were noted for the aikido group or golf group, whereas the karate group showed significant decrease in trait anxiety ($t = 2.69$, $p<.05$). The authors conclude that subjects should be observed for a period of several years to assess changes in test scores. Other research with aikido does suggest the potential of positive psychological

benefit. In a study of 48 aikido students, Hannon investigated the relationship between time spent in active aikido practice and self-actualization as measured with the Personal Orientation Dimensions instrument. Time spent in aikido was positively related to self-actualization ($p<.05$) and the authors suggest that the active practice of aikido may contribute to self-actualization over time (Hannon, 1999).

Researchers have demonstrated that aikido training is effective for reducing disruptive and assaultive behaviors among severely emotionally disturbed adolescents (Edelman, 1994). Fifteen middle and high school students with severe emotional disturbances who attended an alternative educational setting were trained for 12 weeks in aikido. The training focused on peaceful conflict resolution, nonviolent self-defense, confrontation management, and relaxation training. Improved behaviors observed by teachers and parents included reduced violent behavior, enhanced respect for authority and peers, and improved feelings of confidence and self-worth. During the intervention period, an average of 14.33 of the 15 students refrained from disruptive classroom behavior, 14.83 refrained from verbally abusive behaviors, 15 refrained from physically assaultive behaviors, and 10 of the 15 exhibited a reduction in school-wide disciplinary referrals for violent behavior. The goals for the program were all met with regards to these measurements. The authors concluded that aikido training can be implemented with a minimum of scheduling disruptions and financial expenditure.

A qualitative study of psychotherapists who study aikido suggests that aikido may have potential applications in mental health counseling. Thematic analysis of interviews outlines major themes in aikido practice that have psychological parallels. The mind-body unification of aikido was described as being physically and psychologically healing.

The “centering” in aikido was reported to be similar to being present in therapy, and aikido as spiritual practice was seen as being similar to psychotherapy since both were viewed as stemming from the same source-“love” (Faggianelli, 1996). In an open-interview format, Ingalls investigated the adolescent experience of aikido (Ingalls, 2003). Several themes emerged: the benefit of being a part of a community, impact of aikido on interactions and relationships with others (using the entering, blending and resolution of aikido within emotional as well as physical relationships, relating to other people better, anger and aggression reduction, and protection/self-defense), the Self(developing more specific attributes such as love, peace, confidence, discipline, and relaxation/calm). The findings of these qualitative studies would seem to suggest that aikido practice may possess some stress management characteristics.

In a discussion of martial arts and psychological health, Fuller uses aikido as an example and explains possible mechanisms whereby its practice may affect health. Firstly, aikido is practiced in a group format and is a “gentle regime of interactive exercises geared (like yoga) to flexibility rather than strength or stamina. Since it exploits naturally occurring capabilities it offers an immediate sense of empowerment to novices, which may be valuable when trying to engage depressed or passive clients and improve their self-esteem.” The author states that aikido may have application to stress management and inoculation: “…the non-verbal stress inoculation principles evident in the warp and weft of aikido practice. These aim to teach mental calmness, physical relaxation, absorption of antagonistic force, adaptation to sudden obstacles, timing of effective reaction to stressors and one-at-a-time problem-solving strategies. Certain aikido exercises not only provide memorable physical analogies for everyday conflicts

and problems, but may be introduced in a graduated manner so that students are able to cope with ever-increasing degrees of personal threat and adversity" (Fuller, 1988, p. 325). It seems plausible from a stress management perspective that if aikido actually improves one's ability to cope with personal threat and adversity, "perceived stress" may be reduced, since it is partially a function of one's ability to cope with the stress of life.

Despite the limited empirical research supporting the use of aikido for stress management purposes, there seems to be a general belief in certain segments of society that aikido practice is indeed associated with reduced stress. Anecdotal claims of the health benefits of aikido are abundant. A visit to the University of Chicago Aikido Club website (www.aikido.uchicago.edu) finds a section titled "What It's Good For". Included in this section is "Mental Relaxation". The text reads,

> …when one learns to relax the body, there is a corresponding relaxation of mental tension which allows the mind to be properly centered or focused…One becomes less reactive to those everyday irritations which interfere with efficiency and enjoyment…Aikido teaches you ways to keep otherwise stressful stimuli from getting you agitated in the first place.

Along these same lines, the health education company, healthAtoz (www.healthatoz.com) suggests alternative treatments for the treatment of anxiety. It is reported that "Yoga, aikido, tai chi, and dance therapy help patients work with the physical, as well as the emotional, tensions that either promote anxiety or are created by the anxiety." An article published in an online magazine states that yoga, tai chi and aikido help individuals become more centered, allowing relaxation and the release of stress. The article reports that "If done regularly, they allow the body to confront and deal

with everyday stresses from a different perspective." In specifically describing aikido the article states that aikido forces individuals to face death and walk through the fear of death in order to create a more purposeful life. "Aikido assists in relaxing the body through the quieting of the mind." The author suggests that the discipline of aikido training helps one to combat the daily stresses of life (Kineavy, 1997).

The Jewish online magazine Tikkun published an article on the psychological and spiritual benefits of aikido (Kohn, 2001). The author writes from the enlightened perspective of a rabbi who also possesses a black belt in aikido. He reports that "an aikido practitioner responds to conflict with equanimity and calm repose…paving the way towards reconciliation and peace." Aikido practice is viewed for its real purpose, to "strengthen the quality of your life". In regards to stress management, the author makes some interesting comments:

> If you always escape from stress, you cannot develop a strong and noble spirit. As you refine your reaction to stress and pressure on the mat, you refine your reaction to the stresses of life in your relationships with others. On the mat you cannot escape the attacks of your partner. You must learn to face them with confidence and control. Through this training you will find the strength and confidence to control the conflict that you face every day.

The Stress Management Properties of Aikido

Aikido as a martial art is typically practiced in a group setting. The Dojo, or school, may be a separate, freestanding facility with its own unique identify, or it may simply be a borrowed room in someone else's business or home. Whatever the venue, one thing is certain; if aikido is practiced, there is generally at least a small group of people gathered together for this sole purpose.

The "ai" in Aikido means to bring together, unification, or harmony. The practice of aikido brings people from different backgrounds together, sometimes in close embrace. The very nature of martial arts study requires intimate physical contact, and aikido in particular places emphasis on this "blending" with one's opponent. Practitioners of aikido, referred to as aikidoka, frequently hold each other in physical embrace, arms remaining almost always in close contact with one's partner. Aikido is not practiced solo, but requires at least one other person. It is generally practiced in pairs, with members of the dojo taking turns and changing partners frequently so that everyone gets to know everyone. This method of practice brings individuals together for what turns out to be group physical activity. Typical attendance is twice per week for either one or two hour sessions. Aikido practice thus becomes somewhat of a social gathering, and friendships are often made with complete strangers. Social support is given and received from the group, as would be expected from any group activity that meets regularly and focuses on self-development. This social support may offer one explanation for the stress management properties of aikido.

Rothman reports that aikido practitioners are seeking a state of "connectedness" with their fellow students. This immediate physical proximity is described as the central

element in “the constitution of social solidarity among its practitioners” (Rothman, 2000, p. 655). The author reports that these experiences of social connection are then deliberately applied to interpersonal relationships outside of aikido training. It is interesting to note research has demonstrated that leisure-generated social support serves to buffer the effects of stressful life events. Park demonstrated that the social support attained from participation in taekwondo training was associated with reduced mental illness in subjects reporting high rates of stressful life events (Park, 1996). It seems plausible that the social interaction that is part of aikido training may have similar effects.

Aikido practice involves significant physical activity. Although great amounts of strength are not required, there is almost constant movement of the extremities. Some movements are very slow and deliberate, whereas other forms of practice may require sudden bursts of speed. There is usually a warm-up session consisting of basic stretches prior to beginning formal aikido training. With the exception of a few very brief breaks, during which the participants kneel to observe a demonstration from the teacher, there is near continuous physical movement. The intensity of physical training varies greatly from person to person. Beginners may move very slow initially in order to learn the correct forms for the techniques, while advanced students may sometimes practice at lightning fast speeds in order to simulate actual self-defense situations. Aikido may also be adapted for the older participant or for someone with disabilities. Each individual has the freedom to practice at his or her level of comfort. Thus, while aikido practice involves near continuous motion of the human body for time periods ranging from one to two hours, the intensity of this physical exertion will vary substantially from person to person.

The physical exercise received during aikido training may explain some of its stress reducing qualities.

There is meditation incorporated into the practice of aikido. Some of the pre-aikido warm-up activities frequently involve meditation. One exercise in particular involves clasping the hands together in front of the waist and shaking them together rhythmically as one concentrates on the breath. In aikido terminology, this is misogi, or purification. According to Stevens, "Misogi is the process of driving off wickedness, purging the body of defilements, and polishing the spirit. As the layers of foulness and corruption are worn away, our immaculate inner light shines brighter and brighter" (Stevens, 1985, p. 23). The actual practice of aikido techniques can be considered a type of meditation with movement similar to that associated with the practice of tai chi chuan. If practiced with the proper frame of mind, the rhythmic movements of aikido can produce a near trance-like state. Despite the visible dynamic movement of the body, the mind can become still and calm. This stillness of the mind may help reduce anxiety and stressful thoughts.

It may seem somewhat paradoxical, yet the practice of aikido involves relaxation of the muscles and nerves of the body. In fact, good aikido technique is dependent upon relaxation. It is generally agreed upon in aikido that if someone is tensing up and straining with the muscles to perform a technique, there is poor execution. One of the major figures in the historical spread of aikido across the globe, Koichi Tohei, spoke about the importance of relaxation in his classic 1966 aikido text "Aikido in Daily Life". Tohei states:

> Why do people feel that it is impossible to relax when something big is happening? First of all, this notion arises from the illusion that when one is relaxed he is weak. The fact is that if you relax properly you are very strong, as you will see from the examples we shall mention later. We relax at important, trying times because relaxing makes us strong" (Tohei, 1966, p. 62). And… "We must be able to instantaneously move with great speed even though, to outward appearances, we remain perfectly calm. We are able to move most rapidly and violently when we are most calm… Maintaining a profound calm within even the most violent action is also essential. Like the sea whose lower depths are always peaceful whatever tempest furrows its surface and like the eye of the typhoon around which the violent winds howl, we must always retain our own calm. Strength of action is born from inner calm. For this reason, if we have that calm, regardless of how rapidly we act, we will not upset our breathing… When you have achieved this state you will be able to handle whatever complexities the world may offer with equanimity and accuracy" (Tohei, 1966, p. 168-169).

This focus on the development of mental calmness and relaxation during the stress of physical self-defense may carry over to other aspects of the aikido practitioner's life, helping to improve emotional regulation and inhibiting high states of arousal.

The nature of aikido training requires deep mental focus and concentration. It is next to impossible to perform the techniques of aikido properly while distracted by other thoughts. One must be totally absorbed in the process, or else the likelihood of injury either to oneself or one's partner becomes a very real possibility. The level of attention

required is so great that one must either consciously or unconsciously decide to continue with class or step off the mat. This total absorption in an activity of physical, mental and spiritual self-development has an immediate calming effect.

It is probable that aikido may function as a type of stress inoculation training. Beginning students begin at relatively slow pace and the expectations are generally somewhat low in terms of both performance and conduct during class. However, even at the lowest ranks aikidoka must regularly test for a higher belt rank, and this process can be quite stressful. During the belt testing procedure, the aikidoka must perform his/her techniques alone with a partner while the entire class and teacher observe. It can be something akin to public speaking, and "stage fright" is a common occurrence. With each passing test and more experience, the testing procedure becomes more rigorous and the technical requirements more demanding.

This gradual exposure to progressively more difficult circumstances is purposefully ingrained into the training process. During testing procedures, the teacher sometimes intentionally attempts to "rattle your nerves" and may occasionally seem unduly demanding. The aikidoka realizes a new level of confidence, however, with each subsequent test. It is not only possible, but probable that this exposure to gradually increasing stress associated with the belt testing in aikido improves one's ability to tolerate stress. A suitable explanation could be that individuals develop a higher threshold for perceived stress through the exposure to higher and higher levels of stress on a gradual basis. Perhaps what originally was perceived as stressful is now appraised as benign. Another explanation may be that one's assessment of his or her coping abilities has risen to new levels. As proficiency in physical self-defense skills develops it seems

probable that self-efficacy, self-esteem, and self-confidence may also be enhanced. It is possible that these positive shifts in mental health may affect an individual's resiliency to stressful life events.

It is possible that aikido training improves one's ability to deal with interpersonal conflict, which is a common cause of stress in our society. The physical movements of aikido can be compared to the movements of our thoughts and actions. For this purpose, Miller-Lane integrated the teachings of aikido into the development of a high-school civic education course designed to teach critical skills for democratic citizenship (Miller-Lane, 2001). As an example, the "grounding" of the body in physical movements is compared with "being clear in your point of view in a discussion". "Connection" meant either physical touch with the hands or on a psychological level "listening to different points of view" while communicating with others. The physical aspect of "blending" or joining with one's opponent is compared to "looking for areas of common ground in a discussion". "Resolution" was described as the physical throw or pin. In relation to social skills, the resolution means making a compromise, coming to a decision, or respectfully agreeing to disagree.

Finally, aikido is ultimately a spiritual discipline. It is a method of self-development which calls upon the individual to master his or her own inner demons. Aikido, the "Art of Peace", has application for personal self-development. The calmness of mind which aikido promotes yields clarity of vision and self-understanding. As the saying goes, "troubled people cause trouble for others." Individuals who are brave enough to wrestle with their own inner demons often find inner peace. They no longer need to cause trouble for either themselves or others. In the words of O Sensei, "The

penetrating brilliance of swords wielded by followers of the way, strikes at the evil enemy lurking within their own souls and bodies" (Ueshiba, 1992, p. 34). The Art of Peace is "…a fight to the finish, the slaying of evil desires and all falsehood within" (Ueshiba, 1992, p. 35). Despite aikido's very obvious roots in the way of the warrior, Ueshiba intended his art to be much more than a sophisticated system of self-defense. Immediately after his own personal enlightenment, Ueshiba stated, "…the way of a warrior is to manifest Divine love, a spirit that embraces and nurtures all things"(Ueshiba, 1992, p. 6-7). "The art of peace can be summed up like this: True victory is self-victory; let that day arrive quickly" (Ueshiba, 1992, p. 109).

This section provided an introduction to the martial art aikido. The origin, philosophy and training methods of aikido were discussed. Stress management characteristics of aikido were described in detail. Research involving aikido and various psychological constructs was presented. The practice of aikido has been studied in relationship to self-concept, self-esteem, anger expression, self-actualization, anxiety, and disruptive/assaultive behaviors. This overview indicates the limited amount of published research available on this topic. Much of the research is qualitative in nature. Furthermore, the discussion indicates significant limitations in the research methodologies used in the few quantitative studies available. Small sample size was common in all studies, and length of aikido training was relatively short when used as an independent variable in experimental/quasi-experimental studies. Table 8 lists those studies which were believed to possess more rigorous research design. The reader who is interested in further exploring the topic of aikido and mental health may want to focus on these studies.

Table 8

Categorization of Research in Review of Literature – Aikido

Study	*Categorization	**Criteria Met
Brief aikido training versus karate and golf training and university students scores on self-esteem, anxiety and expression of anger (Foster, 1997)	Level I	Sample Reliability Validity
Does brief aikido training reduce aggression in youth? (Delva-Tauilili, 1995)	Level I	Sample Reliability Validity

Note. * See Table 2, ** See Table 1

CHAPTER 3

METHODOLOGY

This chapter presents the methodology used to conduct this study. A description of the sample, hypotheses, design, instrumentation, protection of human subjects, pilot study, data collection procedure and data analysis is presented.

Setting

Surveys were sent to 26 aikido schools (dojos) across the United States and were completed onsite per research protocol under the supervision of the head instructor. Individual dojos may be free-standing facilities with their own identity, or for smaller schools they may consist of only a limited amount of gym space which is rented strictly for the duration of each weekly classes. Aikido classes are typically held in self-contained areas that are relatively quiet so that distractions do not occur. These are general characteristics, however, and no data was collected to assess specific traits of the individual schools.

Hypotheses

The research hypotheses for this study are listed below. Each was tested at the .05 level of significance in order to protect against Type I error.

1) After controlling for demographic variables, daily spiritual experience

will explain variability in perceived stress, anxiety, and somatic symptoms. Higher levels of daily spiritual experience will be associated with lower levels of perceived stress, anxiety and somatic symptoms.

2) After controlling for demographic variables, aikido experience level as measured by belt rank will explain variability in perceived stress, anxiety, somatic symptoms and daily spiritual experiences. Higher levels of aikido experience will be associated with lower levels of perceived stress, anxiety, somatic symptoms and higher levels of daily spiritual experience.

Sample

The subjects for this study consisted of men and women attending a total of 26 aikido schools across the continental United States. The head instructor of each school introduced the study to his/her students. Each subject volunteered of his/her own free will with no coercion or incentive provided to participate in this study. The sample, therefore, is a representation of those volunteers only and not the entire membership of each school.

The general rule of thumb for calculating sample size with multiple regression is N greater than or equal to 104 + m where m = # independent variables (Tabachnick, 2001, p. 117). In our case, seven independent variables were included (age, sex, race, marital status, years of education, gross family income, and aikido belt rank). Therefore, 104 + 7 = 111, but we needed to add another 30 for cross validation which adds to 141. We originally proposed a minimum of N=150 subjects to provide sufficient power to the analysis of this data.

Exclusionary criteria are required in this study in order to perform a more realistic and valid assessment of the research hypotheses. For the purpose of all hypothesis testing, only those subjects with age at least 21 years were included in the data analysis.

This is deemed necessary since below this age neurological maturation and development is not complete. Although children and adolescents are susceptible to stress and anxiety, it is perhaps not realistic to expect that these individuals will be equally susceptible to the physical symptoms often associated with stress.

Current mental illness was also controlled for in this study. It is possible if not probable that a limited number of aikido students may suffer from such common maladies as clinical depression or generalized anxiety disorder. Biochemical/physiological changes in these individuals may affect mood states. Allowing these individuals to participate could have influenced stress and anxiety scores through mechanisms which have little to do with normal psychological processes. Any subjects indicating a current psychiatric diagnosis were excluded from all hypothesis testing.

The effects of training in other martial arts were controlled for in this study as well. It is not unusual for some highly motivated individuals to seek training and even mastery in more than one martial style. Aikido students may also participate in tai chi, chi kung, and yoga. Although these disciplines are not typically practiced for enhancement of martial skills, they nonetheless possess content and training methods of eastern origin which share similarities with aikido. Subjects who indicated current involvement in these practices or previous attainment of the black belt level in another martial art were excluded from the sample for testing of hypothesis II.

Design

This study utilized a cross-sectional survey research design. The survey was administered a single time to aikido students in multiple locations across the continental

United States. The ability to collect data at a single point in time was convenient and offered a means for obtaining an overview of holistic health variables in this population. However, the researcher acknowledges the limitations of this type research and recognizes that other designs involving control groups and/or longitudinal data collection provide greater potential for making scientific inferences based on the results.

Instrumentation

Patient Health Questionnaire-15

The Patient Health Questionnaire-15 (PHQ-15) as developed by Kurt Kroenke MD is a brief measure of the severity of somatic symptoms. The instrument is a 15-item self-administered questionnaire designed to monitor somatic symptom severity in both clinical practice and research. The PHQ-15 is an adaptation from the PRIME-MD, a clinical instrument used to help physicians diagnose mental health problems. The PHQ-15 is available free from the test developer.

The PHQ-15 questionnaire asks respondents “During the past 4 weeks, how much have you been bothered by any of the following problems?” A checklist of 15 common physical symptoms follows. Physical symptoms included are such common maladies as “stomach pain”, “back pain”, and “headaches”. The respondent is required to rate the severity of the symptoms by selecting one of three categories: “Not bothered at all”, “Bothered a little”, and “Bothered a lot”. Scores for the PHQ-15 range from 0 to 2 for each item. Thus, total scores can range from 0 to 30.

The test-retest reliability of this instrument has not yet been assessed, however, the validity of the PHQ-15 has been reported in the literature. In a study of 6,000 adult patients seen in primary care clinics, the instrument was compared to measures for functional status, self-reported sick days, healthcare utilization and symptom-related difficulty (Kroenke et al., 2002).

Statistical analysis revealed that as symptoms increased as reported on the PHQ-15, functional status decreased ($p<.001$) as measured with the SF-20. Self-reported sick days increased in a stepwise manner. For example, subjects reporting minimal PHQ-15 scores (1-4) also reported a mean of 1.4 for the number of days in the last 3 months that symptoms interfered with usual activities. As PHQ-15 scores increased to low (5-9), the mean number of sick days increased to 4.7. This trend continued for medium (10-14) and high (15-30) PHQ-15 scores with increasing sick days of 8.7 and 18.2 respectfully, indicating a positive relationship between PHQ-15 scores and number of self-reported sick days. Significance testing was not performed on this data.

Healthcare utilization also increased in a stepwise manner with increasing PHQ-15 scores. As PHQ-15 scores increased, self-reported number of physician visits in the last 3 months increased. Mean physician visits increased stepwise from .8, 1.4, 1.9, and 2.9 for minimal, low, medium and high PHQ-15 scores respectfully. Significance testing was not performed on this data.

Symptom-related difficulty was also demonstrated to be related to PHQ-15 scores. Subjects were asked a single question: “How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?” Possible responses included “not difficult at all”, “somewhat difficult”, “very difficult”,

and “extremely difficult”. Scores ranged from 1 to 4. Results indicated a stepwise increase of scores (1.4, 7.8, 17.3, and 28.0) for minimal, low, medium and high PHQ-15.

Perceived Stress Scale

The Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring the perception of stress. The PSS is “…designed to measure the degree to which situations in one’s life are appraised as stressful” (Cohen et al., 1983, p. 385). The instrument is used to determine how unpredictable, uncontrollable, and overloaded individuals assess their lives. The PSS is designed to be used with subjects who are at least of a junior high school level of education. The questions contained in the test are straightforward and easy to understand and require simple responses. The questions are of a very general nature and thus are applicable to a wide-variety of population types. The PSS asks individuals how often they have felt a certain way during the last month. Each item is scored on a scale from 0 to 4, thus on the 10-item version used in this study, total scores can range from 0 to 40. The positively stated items are reverse scored. The PSS is available free to the public and no permission is required for research purposes.

The original PSS consisted of 14 items. This version has been tested for both reliability and validity. Cohen, the test developer, administered the instrument to three different groups including two groups of college students (n=332 & n=114), and one group of adults (n=64) involved in a community smoking-cessation program. Assessment of internal consistency demonstrated that Cronbach alpha coefficients for each group were .84, .85 and .86 respectfully. The Pearson’s r reliability coefficient for test-retest

after a period of two days was .85, yet dropped to .55 for test-retest over a period of six weeks. In using the PSS to predict health outcomes, it was found that the best predictions occurred within a one-to two-month period. The instrument is therefore considered more of an assessment of a transitory state which can vary over time. Cohen reports, "After all, perceived levels of stress should be influenced by daily hassles, major events, and changes in the availability of coping resources, all of which are quite variable over a short period"(Cohen et al., 1983, p. 393).

The validity of the PSS has also been addressed. In the same sample mentioned above, Cohen demonstrated significant correlations of the PSS with measures of life-event scores as measured using the College Student Life-Event Scale ($r = .20$ to $.39$, $p<.05$), depressive symptomatology using the Center for Epidemiologic Studies Depression Scale ($r = .65$ to $.76$, $p<.05$), physical symptomatology using the Cohen-Hoberman Inventory of Physical Symptoms ($r = .52$ to $.70$, $p<.001$), utilization of health services as measured using self-report ($r = .20$, $p<.001$), social anxiety as measured using the Social Avoidance and Distress Scale ($r = .37$ to $.48$, $p<.001$), and smoking-reduction maintenance as measured by self-report ($r = .31$, $p<.001$).

A 10-item version of the PSS was developed by essentially eliminating four items from the original version. According to Cohen, the PSS-10 "allows the assessment of perceived stress without any loss of psychometric quality (actually a slight gain) over the longer PSS-14" (Cohen, 1988, p. 34). The test developer reports that higher scores on the PSS-10 are associated with shorter periods of sleep, smoking of cigarettes, decreased frequency but increased quantity of alcohol consumption, less frequent physical exercise,

and increased frequency and variety of illicit drug use (Cohen, 1988). The PSS-10 is currently the most commonly used version of the test.

State/Trait Anxiety Inventory

The State-Trait Anxiety Inventory (STAI) is a commonly used instrument for measuring anxiety in adults. The STAI differentiates between the temporary condition of "state anxiety" and the more general and long-lasting quality of "trait anxiety". The instrument is divided into two separate parts: state anxiety and trait anxiety. Each segment consists of 20 questions pertaining to feelings of apprehension, tension, nervousness, and worry. The STAI is available from the publisher for a small fee ($120 for the first 150 uses, then $.75 for each additional copy.) Payment was made and permission received for use of the STAI in this study (see Appendix A).

For the State Anxiety Inventory (SAI), 20 separate feelings or emotions are listed. Examples include "I feel calm" and "I am tense". The respondent must rate the severity of these feelings on a 4-point scale: "Not at all", "Somewhat", "Moderately so", and "Very much so". The respondent is asked to "…indicate how you feel right now, that is, at this moment." The Trait Anxiety Inventory (TAI) consists of 20 brief statements of feelings and personality traits. Examples include "I feel pleasant", "I feel nervous and restless", and "I am calm, cool, and collected". Respondents are asked to "…indicate how you generally feel." There is no time frame suggested. Each item is rated for frequency of occurrence on a 4-point scale: "Almost never", "Sometimes", "Often", and "Almost always". Scoring for both the SAI and the TAI ranges from 20 to 80, since each of the 20 items can receive a score from 1 to 4. The positively stated items are reverse scored.

Test-retest reliability has been reported for the STAI. Spielberger administered the STAI to 6,000 high school and college students. Reliability coefficients for the TAI ranged from .71 for males and .75 for females for a 30-day timeframe. Correlations dropped to .68 for males and .65 for females at 60 days. State Anxiety Inventory testing revealed correlations of .62 for males, and .34 for females after 30 days, and .51 and .36 after 60 days (Spielberger, 1983). State anxiety is generally considered more unstable with fluctuations coinciding with life events and the passage of time, while trait anxiety is believed to be more stable over time. This data supports these assumptions. Assessment of internal consistency demonstrated Cronbach's alphas of .86 to .95 for the SAI and .89 to .91 for the TAI.

The STAI has been shown to be a valid assessment of anxiety. The STAI has been correlated with other anxiety scales, with measures of personality and adjustment, measures of academic aptitude and achievements, and stress. For example, correlations between the TAI and other anxiety scales ranged from .52 to .80 when compared to scores on the IPAT Anxiety Scale ($r = .75$ to .77, $p<.05$), the Taylor Manifest Anxiety Scale ($r = .79$ to .83, $p<.05$) and the Affect Adjective Checklist ($r = .52$ to .58, $p<.05$) in three separate groups ($n = 126$, 80 & 66). In addition, a study of 162 undergraduates demonstrated that STAI scores of those individuals diagnosed with emotional problems were significantly higher ($p<.05$) than those suffering from educational-vocational problems (Spielberg, 1983).

Only the TAI was used in this study. The SAI was omitted since the investigator was primarily interested in studying the more permanent characteristics of the personality as they related to both aikido practice and health. An additional consideration was the

time required to complete the survey. The SAI was included in the original pilot study but it was believed that the survey was too long in length and therefore only the TAI was retained.

Daily Spiritual Experiences Scale

The National Institute on Aging and the Fetzer Institute arranged for a meeting in March of 1995 for the purpose of discussing methods for measurement of spirituality/religion in health studies. This meeting spawned a working group which identified "daily spiritual experience" as one component of religiousness and spirituality needing further study. Underwood subsequently developed the DSES after holding in-depth focus groups and reviewing the relevant literature. According to Underwood, "the scale is "…intended to measure a person's perception of the transcendent in daily life and his or her perception of his or her interaction with or involvement of the transcendent in life. The items attempt to measure experience rather than particular beliefs or behaviors; therefore, they are intended to transcend the boundaries of any particular religion" (Underwood & Teresi, 2002, p. 23). The DSE attempts to measure the inner dimension, substantive feeling and thoughts that describe the interface of faith with daily life. It is a measure of the day-to-day, practical experiences of the ordinary person. The test developers propose that "It appeared that here might lie some of the proximal connections of spirituality with health." (Underwood & Teresi, 2002, p. 23).

The DSES consists of 16 items which are scored using a Likert-scale. For the first 14 questions, the individual is asked to rate the frequency he or she has experienced the stated item. For example, item #1 states "I feel God's presence". The individual is asked to respond by selecting one of the following: 1) Many times a day, 2) Every day, 3) Most

days, 4) Some days, 5) Once in a while, 6) Never or almost never. The DSES individual items address a variety of concepts related to spirituality including: a "connection" to either God or some greater whole, frequent interaction with the transcendent, perceived divine love, inspiration or discernment, the experience of transcending the difficulties of life, a sense of wholeness and internal integration, feelings of awe, unconditional love and compassion, mercy and spiritual longing.

Test-retest reliability was assessed for a short 6-item version of the DSES in a group of 47 treatment-seeking substance abusers. The DSES was administered then repeated after 2 days. Good reliability was demonstrated (Pearson test-retest correlation =.85, intraclass correlation coefficient = .73). Cronbach's alpha estimate for internal consistency was .88 for test and .92 for retest. (Underwood & Teresi, 2002). Reliability of the 16-item version has not been reported.

Preliminary construct validity of the DSES has been reported in the literature. The authors found that African American women tended to have more daily spiritual experiences than whites and this finding is consistent with other research which has demonstrated high levels of religiousness in this group (Underwood & Teresi, 2002). Individuals who reported having "no religion" had less spiritual experiences than those stating they were either catholic or protestant.

Protection of Human Subjects

The Institutional Review Board (IRB) of the University of Alabama at Birmingham (UAB) granted approval for this research project (see Appendix B). Given the low risk of harm to subjects participating in this project it was granted expedited

review. Project revision/amendment approval was attained following a change of research protocol (see Appendix C). For the protection of subject confidentiality, no personal identifying information of any kind was recorded. Each subject was given a written introduction to the study explaining its purpose, the strictly voluntary nature of the study, and the complete anonymity of responses to all survey items (see Appendix D). The contact information for both the primary investigator and the UAB IRB office were provided to allow subjects to express any concerns or ask further questions about the study.

Pilot Study

A brief pilot study was completed to determine the effectiveness of the data collection procedure and to test the feasibility of using the research instrument in this population. Questionnaires were administered to volunteers at an aikido dojo in Birmingham, Alabama during a regularly scheduled class on August 20th, 2005. Permission was given by the head instructor of this school. Twenty-five subjects participated.

The results of pilot testing revealed that aikido students were eager to participate in this research project and made favorable comments regarding the survey. Missing data was minimal. Internal consistency scores were all above .7 except for the PHQ-15 scale which was .487 (Table 9). There were some simple editing changes that needed to be made to the survey questions related to aikido experience level to improve comprehension. Thirty-seven percent of the blackbelts did not indicate blackbelt level and this was deemed a product of survey design. Due to the time needed to complete the

survey (22 minutes), it was deemed necessary to omit the 20-item SAI from the instrument.

Table 9

Internal Consistency for Major Measurement Scales(N=25)

Scale	Cronbach's Alpha
Patient Health Questionnaire-15	.487
Perceived Stress Scale	.791
Trait Anxiety Inventory	.932
Daily Spiritual Experiences Scale	.915

Data Collection Procedure

Following approval from the UAB IRB, the investigator began the collection procedure (see Appendix E). Seventy-nine aikido schools across the continental United States were identified using Google internet searches. Schools with email contact available were sent an introductory email (see Appendix F) explaining the purpose of the study and asking for participation. Schools which replied and agreed to participate were then asked how many students were potentially available to volunteer, and each was asked for correct mailing address. Upon receipt of this information, the appropriate number of surveys were sent via U.S. mail within 1 week. Each survey was placed in a sealable envelope, and pencils and return packaging were provided. The surveys were mailed to the head instructor of each school with specific instructions (Appendix G) on how to administer the survey and complete the process. The complete survey included questions concerning demographic information, exclusionary criteria, aikido experience, and the four major scales (Appendix H).

Upon receipt of all completed surveys in the mail, the primary investigator submitted all forms to the UAB Center for Educational Accountability to be electronically scanned and placed in data files. These data files were then imported into the Statistical Package for the Social Sciences 11.0 (SPSS) for data analysis.

Data Analysis

Prior to formal data analysis, a new database was created by eliminating those subjects who indicated they were either less than 21 years of age and/or had a current psychiatric diagnosis. Two of the measurement scales required recoding of item scores. Both the PSS and the TAI required reverse coding of all positively stated items. This was performed using SPSS. After this procedure was performed, descriptive statistics were run on the entire dataset for each of the major variables. Means and standard deviations were performed on all interval data, and frequencies were run on categorical data. Comparison of means was performed using t-tests to determine if scores for the aikido group differed significantly from norms for the PSS, TAI and DSES.

This data was used to test hypothesis 1 which involves the examination of relationships between spirituality and health. Initially, correlations were run using the Pearson R Correlation Coefficient to determine relationships between sum scores for spirituality, anxiety, perceived stress and physical symptoms. Later, spirituality sum scores (DSESSUM) were correlated with individual items from each of the other scales using the Spearman's Rho Correlation Coefficient.

To formally test hypothesis I, hierarchical (sequential) regression was performed. The following variables were initially coded as categorical: marital status, race, and gross

family income. In order to include categorical variables in the regression, they had to be recoded into indicator variables. Two indicator variables were created for marital status: Single and Divorced/Widowed. One indicator variable was created for race: NonWhite. Three indicator variables were created for Gross Family Income: LowIncome, MediumIncome, and HighIncome. In order to test for prediction, all demographic variables were entered in block 1 as follows: Gender, Education, Age, Single, Divorced/Widow, NonWhite, LowIncome, MediumIncome, HighIncome. Then, all demographic variables plus DSESSUM were added in block 2. Three separate regressions were run to determine if variability in DSESSUM explains variability in PHQ-15SUM, PSSSUM and TAISUM.

The same database used to test hypothesis I was then altered to remove those subjects who indicated that they currently practice other eastern arts or have earned a black belt in another martial art in the past. Correlations were run using the Spearman's Rho Correlation Coefficient to determine relationships between aikido belt rank and sum scores for physical symptoms, perceived stress, anxiety and spirituality. Later, belt rank also was correlated with individual items from each of the major scales: PHQ-15, PSS, TAI, and DSES.

To formally test hypothesis II, hierarchical (sequential) regression was performed. All demographic variables were entered in block 1, followed by all demographic variables plus belt rank in block 2. Four separate regressions were run to determine if belt rank in aikido explains variability in PHQ-15SUM, PSSSUM, TAISUM, and DSESSUM.

Summary

This chapter included a description of the setting, hypotheses, sample, design, and instrumentation. Information on the reliability and validity of the research instruments was also presented. The process for protection of human subjects was outlined. Results of the pilot study were presented. The data collection procedure and data analysis used in this study were described in detail.

CHAPTER 4

RESULTS

The purpose of this study was to examine relationships between physical, mental and spiritual health. An additional purpose was to determine if the practice of aikido is associated with measurable levels of somatic symptoms, perceived stress, anxiety and spirituality. This chapter presents a description of the sample and findings related to the research questions.

Description of the Sample

A total of 278 subjects participated in the study. The subjects came from 26 separate aikido schools in a total of 13 states across the continental United States. Age ranged from 21 to 73 with a mean of 37. Reported years of education ranged from 6 to 27 with a mean of 16.

Of the total sample, 217 reported their gender as male (78%) and 60 as female (22%). An assessment of marital status revealed that the majority of subjects were married (46%), with single being a close second (44%). Marital status data are displayed in Table 10.

The major portion of subjects reported their race as white (69%). See Table 11 for a complete description.

Gross family income was measured in approximately $10,000 increments with 10 levels ranging from $19,999 or less to $100,000 or more. All 10 levels were present in

the total sample with the $100,000 or more level having the highest percentage of subjects (21%). Gross family income is summarized in Table 12.

Table 10

Marital Status of Study Participants (n=278)

Marital Status	n	%
Married	127	46
Single	123	44
Divorced	26	9.4
Widowed	2	.7

Table 11

Race of Study Participants (n=278)

Race	n	%
White	193	69
African American	7	2.5
Hispanic	23	8.3
Asian	32	11.5
Native American	0	0
Other	10	3.6
Missing Data	14	4.7

Comparison of Aikido Sample with General Population

Normative data is available for the PSS, TAI and DSES from testing of healthy populations. The scores from the aikido sample were compared to these values to determine if aikido practitioners differ significantly from the general population for perceived stress, anxiety and spirituality.

Table 12

Gross Family Income of Study Participants (n=278)

Income Range	n	%
$19,999 or less	34	12.2
$20,000 to 29,999	28	10.1
$30,000 or 39,999	30	10.8
$40,000 to 49,999	33	11.9
$50,000 to 59,999	18	6.5
$60,000 to 69,999	20	7.2
$70,000 to 79,999	18	6.5
$80,000 to 89,999	18	6.5
$90,000 to 99,999	16	5.8
$100,000 or more	56	20.1
Missing Data	7	2.5

Comparison with Perceived Stress Normative Data

Data analysis was performed for the purpose of comparing the aikido sample with data available from a healthy population for perceived stress. Standard t-tests were performed for both male and female groups. No statistically significant difference was found between the means on the PSS for males. However, a statistically significant difference did exist for females on scores for the PSS ($p<.05$). These results are summarized in Table 13. We are able to conclude that male aikido students do not differ significantly in perceived stress from the general population, whereas, female aikido students do have significantly less perceived stress than the general population.

Table 13

Perceived Stress in Aikido Students(n=138, males; 42 females) and General Population(n=926, males; 1406, females)

	Aikido Students		General Population			
Variable	M	SD	M	SD	t	p
PSSSUM						
Male	11.21	6.2	12.1	5.9	1.96	ns
Female	11.62	5.8	13.7	6.6	2.02	<.05

Comparison with Trait Anxiety Normative Data

Data analysis was performed for the purpose of comparing the aikido sample with data available from a healthy population for trait anxiety. Standard t-tests were performed for both male and female groups. No statistically significant differences were found between the means on the TAI for males or females. These results are summarized in Table 14. We are able to conclude that male and female aikido students do not differ significantly in trait anxiety from the general population.

Comparison with Daily Spiritual Experiences Normative Data

Data analysis was performed for the purpose of comparing the aikido sample with data available from a healthy population for spirituality. Standard t-tests were performed for a combined male and female group. A statistically significant difference was noted between the means on the DSES for the aikido group and normal population. These results are summarized in Table 15. We are able to conclude that a combined male and female group of aikido students does differ significantly in spirituality from the general

population. In this sample, aikido students actually presented with less daily spiritual experiences than the general population.

Table 14

Trait Anxiety in Aikido Students(n=138, males; 40 females) and General Population(n=1387, males; 451, females)

	Aikido Students		General Population			
Variable	M	SD	M	SD	t	p
PSSSUM						
Male	33.91	8.72	34.89	9.19	1.20	ns
Female	33.55	9.60	34.79	9.22	0.78	ns

Table 15

Daily Spiritual Experiences in Aikido Students(n=176) and General Population(n=122)

	Aikido Students		General Population			
	M	SD	M	SD	t	p
DSESSUM	57	19.85	47	13.81	4.83	<.05

Note. A lower score on DSESSUM corresponds to a higher level of spirituality

Instrument Reliability

Twenty subjects agreed to participate in a test-retest survey to determine reliability of the instrument. The questionnaire was administered to 20 students from a

single martial arts school in Mobile, Alabama, and then repeated in exactly 14 days. Data analysis included Pearson Correlations to assess test-retest reliability of each instrument. Results are as follows: PHQ-15 (r=.942), PSS (r=.740), TAI (r=.740) and DSES (r=.862). The test-retest reliability of the PHQ-15 had not been previously reported in the literature, however, the results of this study indicate that its scores do remain stable over a short period of time (r=.942). The results for the PSS, TAI and DSES are similar to those reported in previous publications. Test/retest analysis suggests that the reliability of these instruments when administered to martial arts students closely resembles the published reports of reliability testing for other populations.

Findings Related to the Research Questions

Research Question 1

The first research question asked does daily spiritual experience explain variability in perceived stress, anxiety and somatic symptoms after controlling for the effects of demographic variables. There was one research hypothesis posed for Research Question 1 and it was tested using Statistical Package for Social Sciences (Version 15.0).

Testing of Research Hypothesis

The first research hypothesis of our study states: After controlling for demographic variables, daily spiritual experience will explain variability in perceived stress, anxiety, and somatic symptoms. Higher levels of daily spiritual experience will be associated with lower levels of perceived stress, anxiety and somatic symptoms. Twenty-two subjects below the age of 21 were eliminated from the analysis of this data. Also,

eleven subjects were excluded after having reported a current psychiatric diagnosis. These exclusions resulted in a sample size of N=278. Positively stated items from scales of the PSS and TAI were reverse-coded as required per instrument scoring protocol. Sum scores were produced for PHQ-15, PSS, TAI, and DSES.

Correlations Between Spirituality and Physical Symptoms, Perceived Stress, and Anxiety. Basic correlations were run to determine relationships between DSES and dependent variables. These results are reported in Table 16. There was a significant

Table 16

Correlations Between Spirituality and Dependent Variables(N=278)

Scale	1	2	3	4
DSESSUM	1.0	-.065	.030	.131*
PHQSUM	-.065	1.0	.335**	.388**
PSSSUM	.030	.335**	1.0	.718**
TAISUM	.131*	.388**	.718**	1.0

Note. A Correlation of .50 is large, .30 is medium, and .10 is small (Cohen, 1988)
* p<.05. ** p<.01

correlation noted between DSES and TAI Summary Scores (r=.131, p=.035). DSES was not associated with PHQ-15 or PSS Summary Scores. Though not directly related to the research hypothesis, other significant relationships were found. PHQSUM demonstrated a significant positive relationship with PSSSUM (r=.335, p=.000) and with TAISUM (r=.388, p=.000). PSSSUM demonstrated a significant positive relationship with TAISUM (r=.718, p=.000).

In an attempt to further explore possible relationships between spirituality and somatic symptoms, perceived stress and anxiety, DSES Summary Scores were correlated with individual items from each of the scales (i.e., PHQ-15, PSS, and TAI) using the Spearman's rho correlation coefficient. As shown in table 17, results indicated that DSESSUM was significantly correlated with one item on the PHQ-15, item 15 (sp rho=.126, p=.040). This indicated that less DSE was associated with more trouble

Table 17

Significant Correlations Between Spirituality(DSESSUM) and Individual Scale Items for Dependent Variables(N=278)

Scale	Item #	Item Description	Spearman's rho
PHQ-15			
	15	Trouble Sleeping	.126*
TAI			
	1	I feel pleasant	.205*
	2	I feel nervous and restless	.164*
	3	I feel satisfied with myself	.124*
	4	I wish I could be as happy as others seem to be	.155*
	10	I am happy	.148*
	16	I am content	.132*
	19	I am a steady person	.141*

Note. Higher DSESSUM score means less spirituality, Positively stated items on the TAI were reverse coded, * p<.05

sleeping. No significant correlations were observed between DSES and individual items on the PSS. There were significant correlations between DSESSUM and 7 items on the TAI: item 1 (sp rho=.205, p=.001), item 2 (sp rho=.164, p=.007), item 3 (sp rho=.124, p=.043), item 4 (sp rho=.155, p=.011), item 10 (sp rho=.148, p=.015), item 16 (sp rho=.132, p=.030), and item 19 (sp rho=.141, p=.020). This indicated that less DSE was

associated with fewer feelings of pleasantness, more nervousness and restlessness, less satisfaction with oneself, more wishing to be as happy as others seem to be, less happiness, less contentment, and fewer feelings of steadiness.

The Prediction of Physical Symptoms from Spirituality. To test hypothesis #1, hierarchical (sequential) multiple regression was performed to determine the degree Physical Symptoms could be predicted from Spirituality after controlling for demographic variables. Based on the nature of the positively skewed distribution of the Physical Symptom measurement (PHQSUM), square root transformation was performed in order to meet the assumptions of the regression. No transformation was performed on spirituality scores. In order to allow for cross-validation of the generated prediction equation, a random sample of 30 subjects was excluded for the generation of the prediction equation. This cross-validation sample was used to test the generalizability of the equation to an independent sample.

Table 18 summarizes regression statistics for this prediction. After accounting for sample size, the linear combination of demographic predictors accounted for 4.0% of the variance in the outcome variable, which was significantly different from zero (F=2.070, p=.033). After addition of spirituality in block 2, the regression accounted for 3.5% of the variance in the outcome variable, which was not significantly different from zero (F=1.856, p=.053). Of the independent variables, only two variables had slopes that were significantly different from zero: Gender (p=.004), and Race (p=.040). The standard error of estimate of .87 suggests that the prediction equation will be off on average about .9 points above and below per prediction. Collinearity did not appear to be a problem as

Table 18

Hierarchical (Sequential) Regression for Prediction of Physical Symptoms from Spirituality

	B (SE)	β	t	Adj R^2	Adj R^2 Δ
Step 1				.040*	
Gender	.401 (.136)	.192	2.954*		
Education	.022 (.020)	.077	1.117		
Age	.004 (.006)	.054	.676		
Single	-.018 (.142)	-.010	-.129		
Divorced/Widow	-.241 (.200)	-.085	-1.208		
NonWhite	-.276 (.133)	-.135	-2.078*		
LowIncome	.025 (.173)	.012	.143		
MediumIncome	.056 (.175)	.029	.322		
HighIncome	-.030 (.193)	-.015	-.157		
Step 2				.035	-.005
Gender	.401 (.136)	.192	2.946*		
Education	.022 (.020)	.077	1.118		
Age	.004 (.006)	.054	.673		
Single	-.019 (.143)	-.011	-.136		
Divorced/Widow	-.242 (.200)	-.085	-1.207		
NonWhite	-.275 (.133)	-.135	-2.062*		
LowIncome	.026 (.174)	.013	.149		
MediumIncome	.057 (.176)	.029	.325		
HighIncome	-.032 (.194)	-.016	-.164		
DSESSUM	.000 (.003)	.006	.099		

Note. * $p < .05$.

Tolerance levels were .45 to .97 and VIF were all below 5. Residual Statistics revealed all Standardized Residuals below 3. The resulting regression equation is provided below.

PHQSUMSQRT = .799 + .401 * Gender + .022 * Education +
.004 * Age - .019 * Single - .242 * DivWidow - .275 * RaceOther + .026 *
LoInc + .057 * MedInc - .032 * HiInc + .000 * DSESSUM .

This tells us, for example, that for each one unit increase in Education, there is an .022 increase in the dependent variable (PHQSUMSQRT). The Y-intercept value of .799 tells us the value of PHQSUMSQRT when other variables are equal to zero.

For the purpose of testing the validity of the regression equation, the equation was applied to the independent, random sample of 30 cases to generate a predicted outcome variable. This predicted variable was tested against the actual outcome variable for the independent sample using a paired t-test. Results of t-test show that predicted and actual means are not significantly different (mean difference = .03, t = -.236, p = .815), therefore we fail to reject the null hypothesis and accept that the two groups are likely to be from the same population. The regression equation is a reliable predictor for PHQSUMSQRT in an independent sample and is therefore generalizable to other samples.

In summary, research results do not support our hypothesis that daily spiritual experience will explain variability in somatic symptoms. Higher levels of daily spiritual experience are not associated with lower levels of somatic symptoms.

The Prediction of Perceived Stress from Spirituality. To test hypothesis 1, hierarchical (sequential) multiple regression was performed to determine the degree Perceived Stress could be predicted from Spirituality after controlling for demographic

variables. Based on the nature of the positively skewed distribution of the Perceived Stress measurement (PSSSUM), square root transformation was performed in order to meet the assumptions of the regression. No transformation was performed on spirituality scores. In order to allow for cross-validation of the generated prediction equation, a random sample of 30 subjects was excluded for the generation of the prediction equation. This cross-validation sample was used to test the generalizability of the equation to an independent sample.

Table 19 summarizes regression statistics for this prediction. After accounting for sample size, the linear combination of demographic predictors accounted for -2.0% of the variance in the outcome variable, which was not significantly different from zero (F=.480, p=.887). After addition of spirituality in block 2 the regression accounted for -2.4% of the variance in the outcome variable, which was not significantly different from zero (F=.448, p=.921). None of the independent variables had slopes that were significantly different from zero ($p<.05$). The standard error of estimate of .94 suggests that the prediction equation will be off on average about .9 points above and below per prediction. Collinearity did not appear to be a problem as Tolerance levels were .44 to .97 and VIF were all below 5. Residual Statistics revealed all Standardized Residuals below 3 with the exception of one case. The resulting regression equation is provided below.

PSSSUMSQRT = 3.55 + .159 * Gender - .001 * Education -
.007 * Age - .133 * Single - .100 * DivWidow - .029 * RaceOther - .167 * LoInc - .177
* MedInc - .043 * HiInc - .001 * DSESSUM .

This tells us, for example, that for each one unit increase in DSESSUM, there is an .001 increase in the dependent variable (PSSSUMSQRT). The Y-intercept value of 3.55 tells us the value of PSSSUMSQRT when other variables are equal to zero.

Table 19

Hierarchical (Sequential) Regression for Prediction of Perceived Stress from Spirituality

	B (SE)	β	t	Adj R^2	Adj R^2 Δ
Step 1				-.020	
Gender	.160 (.147)	.073	1.086		
Education	-.001 (.022)	- .002	-.035		
Age	-.007 (.007)	-.084	-.996		
Single	-.137 (.153)	-.074	-.898		
Divorced/Widow	-.103 (.224)	-.034	-.458		
NonWhite	-.025 (.144)	-.011	-.170		
LowIncome	-.161 (.189)	-.074	-.850		
MediumIncome	-.173 (.190)	-.084	-.911		
HighIncome	-.048 (.211)	-.023	-.228		
Step 2				-.024	-.004
Gender	.159 (.147)	.073	1.079		
Education	-.001 (.022)	- .004	-.051		
Age	-.007 (.007)	-.084	-.993		
Single	-.133 (.154)	-.071	-.864		
Divorced/Widow	-.100 (.225)	-.033	-.446		
NonWhite	-.029 (.145)	-.014	-.200		
LowIncome	-.167 (.190)	-.077	-.878		
MediumIncome	-.177 (.191)	-.086	-.925		
HighIncome	-.043 (.211)	-.020	-.202		
DSESSUM	.001 (.003)	-.028	-.417		

Note. * $p < .05$.

For the purpose of testing the validity of the regression equation, the equation was applied to the independent, random sample of 30 cases to generate a predicted outcome variable. This predicted variable was tested against the actual outcome variable for the independent sample using a paired t-test. Results of t-test show that predicted and actual means are not significantly different (mean difference = .11, t = -.611, p = .546), therefore we fail to reject the null hypothesis and accept that the two groups are likely to be from the same population. The regression equation is a reliable predictor for PSSSUMSQRT in an independent sample and is therefore generalizable to other samples.

In summary, research results do not support our hypothesis that daily spiritual experience will explain variability in perceived stress. Higher levels of daily spiritual experience are not associated with lower levels of perceived stress.

The Prediction of Anxiety from Spirituality. To test hypothesis 1, hierarchical (sequential) multiple regression was performed to determine the degree Trait Anxiety could be predicted from Spirituality after controlling for demographic variables. Based on the nature of the positively skewed distribution of the anxiety measurement (TAISUM), logarithmic transformation was performed in order to meet the assumptions of the regression. No transformation was performed on spirituality scores. In order to allow for cross-validation of the generated prediction equation, a random sample of 30 subjects was excluded for the generation of the prediction equation. This cross-validation sample was used to test the generalizability of the equation to an independent sample.

Table 20 summarizes regression statistics for this prediction. After accounting for sample size, the linear combination of demographic predictors accounted for -1.1% of the

variance in the outcome variable, which was not significantly different from zero (F=.724, p=.687). After addition of spirituality in block 2 the regression accounted for -0.5% of the variance in the outcome variable, which was not significantly different from zero (F=.877, p=.555). None of the independent variables had slopes that were significantly different from zero ($p<.05$). The standard error of estimate of .11 suggests that the prediction equation will be off on average about .1 points above and below per prediction. Collinearity did not appear to be a problem as Tolerance levels were .45 to .98 and VIF were all below 5. Residual Statistics revealed all Standardized Residuals below 3. The resulting regression equation is provided below.

TAISUMLOG = 1.505 - .008 * Gender + .002 * Education -
.001 * Age + .012 * Single - .009 * DivWidow - .003 * RaceOther - .001 *
LoInc + .001 * MedInc - .005 * HiInc + .001 * DSESSUM .

This tells us, for example, that for each one unit increase in DSESSUM, there is an .001 increase in the dependent variable (TAISUMLOG). The Y-intercept value of 1.505 tells us the value of TAISUMLOG when other variables are equal to zero.

For the purpose of testing the validity of the regression equation, the equation was applied to the independent, random sample of 30 cases to generate a predicted outcome variable. This predicted variable was tested against the actual outcome variable for the independent sample using a paired t-test. Results of t-test show that predicted and actual means are significantly different (mean difference = .07, t = -3.993, p = .000), therefore we fail to reject the null hypothesis and accept that the two groups are likely to be from the same population. The regression equation is not a reliable predictor for TAISUMLOG in an independent sample and therefore is not generalizable to other samples.

Table 20

Hierarchical (Sequential) Regression for Prediction of Trait Anxiety from Spirituality

	B (SE)	β	t	Adj R^2	Adj R^2 Δ
Step 1				-.011	
Gender	-.009 (.018)	-.033	-.497		
Education	.001 (.003)	.035	.500		
Age	-.001 (.001)	-.120	-1.434		
Single	.014 (.018)	.063	.765		
Divorced/Widow	-.009 (.026)	-.023	-.324		
NonWhite	-.004 (.017)	-.017	-.256		
LowIncome	-.004 (.022)	-.014	-.161		
MediumIncome	-.000 (.023)	-.001	-.015		
HighIncome	-.003 (.025)	-.011	-.115		
Step 2				-.005	.006
Gender	-.008 (.018)	-.032	-.482		
Education	.002 (.003)	.042	.595		
Age	-.001 (.001)	-.121	-1.459		
Single	.012 (.018)	.054	.648		
Divorced/Widow	-.009 (.026)	-.024	-.341		
NonWhite	-.003 (.017)	-.011	-.159		
LowIncome	-.001 (.022)	-.004	-.047		
MediumIncome	.001 (.023)	.003	.038		
HighIncome	-.005 (.025)	-.022	-.218		
DSESSUM	.001 (.000)	.101	1.491		

Note. * $p < .05$.

In summary, research results do not support our hypothesis that daily spiritual experience will explain variability in trait anxiety. Higher levels of daily spiritual experience are not associated with lower levels of trait anxiety.

Research Question 2

The second research question asked does the practice of aikido as measured by experience level explain variability in perceived stress, anxiety, somatic symptoms and daily spiritual experiences after controlling for the effects of demographic variables. There was one research hypothesis posed for Research Question 2 and it was tested using Statistical Package for Social Sciences (Version 15.0).

Testing of Research Hypothesis

We posed the following hypothesis regarding the relationship of aikido practice to holistic health: After controlling for demographic variables, aikido experience level as measured by belt rank will explain variability in perceived stress, anxiety, somatic symptoms and daily spiritual experiences. Higher levels of aikido experience will be associated with lower levels of perceived stress, anxiety, somatic symptoms and higher levels of daily spiritual experience. Subjects below the age of 21 were eliminated from the analysis of this data. Also, subjects were excluded if they answered yes to any of the following questions:

1) Do you have a current psychiatric diagnosis
2) Do you currently receive formal instruction in other martial arts in addition to aikido?

3) Do you currently receive formal instruction in meditation, tai chi, yoga or other bodywork systems?
4) Have you received a black belt in a different martial art than aikido?

These exclusions resulted in a sample size of N=183. Positively stated items from scales of the PSS and TAI were reverse-coded as required per instrument scoring protocol. Sum scores were produced for PHQ-15, PSS, TAI, and DSES.

Correlations Between Aikido Experience and Physical Symptoms, Perceived Stress, Anxiety and Spirituality. Basic correlations were run to determine relationships between Aikido Experience and dependent variables using spearman's rho correlation coefficient. These results are reported in Table 21. There were no statistically significant correlations ($p<.05$) for Belt Rank and the 4 dependent variables (i.e., PHQSUM, PSSSUM, TAISUM, and DSESSUM).

Table 21

Correlations Between Aikido Experience(Belt Rank) and Physical Symptoms, Perceived Stress, Anxiety and Spirituality(N=183)

	PHQSUM	PSSSUM	TAISUM	DSESSUM
Belt Rank	.100	-.012	-.111	.044

Belt Rank in aikido was correlated with the individual items of each scale using spearman's rho correlation coefficient to further explore the relationship between Aikido Experience and somatic symptoms, perceived stress, anxiety and spirituality. As shown in Table 22, for the PHQ-15, Belt Rank was significantly correlated with item 2 (sp

rho=.191, p=.010) and item 3 (sp rho=.224, p=.002). Belt Rank was not significantly correlated (p<.05) with individual PSS items. On the TAI, Belt Rank significantly correlated with only item 19 (sp rho= -.199, p=.007). Belt Rank in Aikido was not significantly correlated (p<.05) with DSES individual items.

Table 22

Significant Correlations Between Aikido Experience (Belt Rank) and Individual Scale Items for Dependent Variables (N=183)

Scale	Item #	Item Description	Spearman's rho
PHQ-15			
	2	Back Pain	.191*
	3	Pain in arms, legs or joints	.224*
TAI			
	19	I am a steady person	-.199*

Note. * p<.05

The Prediction of Physical Symptoms from Aikido Experience. To test hypothesis 2, hierarchical (sequential) multiple regression was performed to determine the degree Physical Symptoms could be predicted from Aikido Experience (Belt Rank) after controlling for demographic variables. Based on the nature of the positively skewed distribution of the Physical Symptom measurement (PHQSUM), square root transformation was performed in order to meet the assumptions of the regression. In order to allow for cross-validation of the generated prediction equation, a random sample of 30 subjects was excluded for the generation of the prediction equation. This cross-validation sample was used to test the generalizability of the equation to an independent sample.

Table 23 summarizes regression statistics for this prediction. After accounting for sample size, the linear combination of demographic predictors accounted for 5.3% of the variance in the outcome variable, which was not significantly different from zero (F=1.935, p=.052). After addition of Belt Rank in block 2 the regression accounted for 5.5% of the variance in the outcome variable, which was not significantly different from zero (F=1.867, p=.055). Of the independent variables, only Gender (p=.002) had a slope significantly different from zero. The standard error of estimate of .84 suggests that the prediction equation will be off on average about .9 points above and below per prediction. Collinearity did not appear to be a problem as Tolerance levels were .45 to .96 and VIF were all below 5. Residual Statistics revealed all Standardized Residuals below 3. The resulting regression equation is provided below.

PHQSUMSQRT = 1.221 + .527 * Gender - .005 * Education +
.003 * Age - .190 * Single - .246 * DivWid - .244 * RaceOther - .159 *
LoInc - .283 * MedInc - .399 * HiInc + .133 * BeltRank .

This tells us, for example, that for each one unit increase in Belt Rank, there is an .133 increase in the dependent variable (PHQSUMSQRT). The Y-intercept value of 1.221 tells us the value of PHQSUMSQRT when other variables are equal to zero.

For the purpose of testing the validity of the regression equation, the equation was applied to the independent, random sample of 30 cases to generate a predicted outcome variable. This predicted variable was tested against the actual outcome variable for the independent sample using a paired t-test. Results of t-test show that predicted and actual means are not significantly different (mean difference = .06, t = -.366, p = .717), therefore we fail to reject the null hypothesis and accept that the two groups are likely to be from the same population. The regression equation is a reliable predictor for

Table 23

Hierarchical (Sequential) Regression for Prediction of Physical Symptoms from Aikido Belt Rank

	B (SE)	β	t	Adj R^2	Adj R^2 Δ
Step 1				.053	
Gender	.532 (.168)	.259	3.162*		
Education	-.001 (.028)	-.004	-.048		
Age	.007 (.008)	.097	.938		
Single	-.071 (.190)	-.099	-.900		
Divorced/Widow	-.223 (.277)	-.070	-.804		
NonWhite	-.262 (.160)	-.132	-1.638		
LowIncome	-.187 (.212)	-.090	-.881		
MediumIncome	-.302 (.221)	-.154	-1.365		
HighIncome	-.394 (.232)	-.201	-1.698		
Step 2				.055	.002
Gender	.527 (.168)	.257	3.138*		
Education	-.005 (.028)	-.014	-.169		
Age	.003 (.009)	.041	.355		
Single	-.190 (.191)	-.110	-.995		
Divorced/Widow	-.246 (.277)	-.077	-.888		
NonWhite	-.244 (.160)	-.124	-1.522		
LowIncome	-.159 (.213)	-.077	-.747		
MediumIncome	-.283 (.222)	-.145	-1.278		
HighIncome	-.399 (.232)	-.204	-1.722		
Belt Rank	.133 (.120)	.106	1.108		

Note. * $p < .05$.

PHQSUMSQRT in an independent sample and is therefore generalizable to other samples.

In summary, the regression analysis does not support our hypothesis that aikido experience as measured by belt rank will explain variability in somatic symptoms. Higher levels of belt rank are not associated with lower levels of somatic symptoms.

The Prediction of Perceived Stress from Aikido Experience. To test hypothesis 2, sequential multiple regression was performed to determine the degree Perceived Stress could be predicted from Aikido Experience (Belt Rank) after controlling for demographic variables. Based on the nature of the positively skewed distribution of the Perceived Stress measurement (PSSSUM), square root transformation was performed in order to meet the assumptions of the regression. In order to allow for cross-validation of the generated prediction equation, a random sample of 30 subjects was excluded for the generation of the prediction equation. This cross-validation sample was used to test the generalizability of the equation to an independent sample.

Table 24 summarizes regression statistics for this prediction. After accounting for sample size, the linear combination of demographic predictors accounted for 0.8% of the variance in the outcome variable which, was not significantly different from zero ($F=.872$, $p=.552$). After addition of Belt Rank in block 2 the regression accounted for 0.7% of the variance in the outcome variable, which was not significantly different from zero ($F=.891$, $p=.544$). None of the independent variables had slopes that were significantly different from zero ($p<.05$). The standard error of estimate of .99 suggests

Table 24

Hierarchical (Sequential) Regression for Prediction of Perceived Stress from Aikido Belt Rank

	B (SE)	β	t	Adj R^2	Adj R^2 Δ
Step 1				-.008	
Gender	.032 (.198)	.014	.161		
Education	.038 (.033)	.102	1.176		
Age	-.009 (.009)	-.103	-.962		
Single	.019 (.222)	.010	.086		
Divorced/Widow	.045 (.325)	.012	.138		
NonWhite	-.134 (.188)	-.060	-.716		
LowIncome	-.462 (.251)	-.196	-1.838		
MediumIncome	-.242 (.259)	-.109	-.935		
HighIncome	-.341 (.274)	-.153	-1.243		
Step 2				-.007	.001
Gender	.027 (.198)	.012	.137		
Education	.035 (.033)	.093	1.063		
Age	-.013 (.010)	-.157	-1.315		
Single	-.002 (.223)	-.001	-.010		
Divorced/Widow	.019 (.326)	.005	.058		
NonWhite	-.115 (.189)	-.051	-.609		
LowIncome	-.433 (.253)	-.184	-1.714		
MediumIncome	-.225 (.259)	-.102	-.866		
HighIncome	-.348 (.274)	-.156	-1.271		
Belt Rank	.144 (.141)	.102	1.026		

Note. * $p < .05$.

that the prediction equation will be off on average about .9 points above and below per prediction. Collinearity did not appear to be a problem as Tolerance levels were .45 to .97 and VIF were all below 5. Residual Statistics revealed all Standardized Residuals below 3. The resulting regression equation is provided below.

PSSSUMSQRT = 3.092 + .027 * Gender + .035 * Education -
.013 * Age - .002 * Single + .019 * DivWid - .115 * RaceOther - .433 *
LoInc - .225 * MedInc - .348 * HiInc + .144 * BeltRank .

This tells us, for example, that for each one unit increase in Belt Rank, there is an .144 increase in the dependent variable (PSSSUMSQRT). The Y-intercept value of 3.092 tells us the value of PSSSUMSQRT when other variables are equal to zero.

For the purpose of testing the validity of the regression equation, the equation was applied to the independent, random sample of 30 cases to generate a predicted outcome variable. This predicted variable was tested against the actual outcome variable for the independent sample using a paired t-test. Results of t-test show that predicted and actual means are not significantly different (mean difference = 0, t = -.010, p = .992), therefore we fail to reject the null hypothesis and accept that the two groups are likely to be from the same population. The regression equation is a reliable predictor for PSSSUMSQRT in an independent sample and is therefore generalizable to other samples.

In summary, the regression analysis does not support our hypothesis that aikido experience as measured by belt rank will explain variability in perceived stress. Higher levels of belt rank are not associated with lower levels of perceived stress.

The Prediction of Anxiety from Aikido Experience. To test hypothesis 2, hierarchical (sequential) multiple regression was performed to determine the degree Trait

Anxiety could be predicted from Aikido Experience (Belt Rank) after controlling for demographic variables. Based on the nature of the positively skewed distribution of the anxiety measurement (TAISUM), logarithmic transformation was performed in order to meet the assumptions of the regression. No transformation was performed on spirituality scores. In order to allow for cross-validation of the generated prediction equation, a random sample of 30 subjects was excluded for the generation of the prediction equation. This cross-validation sample was used to test the generalizability of the equation to an independent sample.

Table 25 summarizes regression statistics for this prediction. After accounting for sample size, the linear combination of demographic predictors accounted for 1.4% of the variance in the outcome variable, which was not significantly different from zero ($F=1.226$, $p=.284$). After addition of spirituality in block 2 the regression accounted for 0.8% of the variance in the outcome variable, which was not significantly different from zero ($F=1.125$, $p=.348$). None of the independent variables had slopes that were significantly different from zero ($p<.05$). The standard error of estimate of .11 suggests that the prediction equation will be off on average about .1 points above and below per prediction. Collinearity did not appear to be a problem as Tolerance levels were .45 to .96 and VIF were all below 5. Residual Statistics revealed all Standardized Residuals below 3. The resulting regression equation is provided below.

TAISUMLOG = 1.510 + .000 * Gender + .004 * Education -
.001 * Age + .029 * Single + .038 * DivWid - .011 * RaceOther - .039 *
LoInc - .010 * MedInc - .024 * HiInc - .008 * BeltRank .

Table 25

Hierarchical (Sequential) Regression for Prediction of Trait Anxiety from Aikido Belt Rank

	B (SE)	β	t	Adj R^2	Adj R^2 Δ
Step 1				.014	
Gender	-6.53E-005 (.023)	.000	-.003		
Education	.004 (.004)	.091	1.045		
Age	-.001 (.001)	-.134	-1.249		
Single	.028 (.025)	.124	1.100		
Divorced/Widow	.036 (.038)	.085	.956		
NonWhite	-.010 (.021)	-.039	-.466		
LowIncome	-.038 (.028)	-.139	-1.329		
MediumIncome	-.009 (.029)	-.034	-.296		
HighIncome	-.025 (.030)	-.099	-.816		
Step 2				.008	-.006
Gender	.000 (.023)	.001	.011		
Education	.004 (.004)	.095	1.090		
Age	-.001 (.001)	-.107	-.900		
Single	.029 (.025)	.130	1.141		
Divorced/Widow	.038 (.038)	.089	.994		
NonWhite	-.011 (.021)	-.043	-.516		
LowIncome	-.039 (.029)	-.145	-1.377		
MediumIncome	-.010 (.029)	-.038	-.331		
HighIncome	-.024 (.031)	-.097	-.797		
Belt Rank	-.008 (.016)	-.052	-.527		

Note. * $p < .05$.

This indicates, for example, that for each one unit increase in Belt Rank, there is an .008 increase in the dependent variable (TAISUMLOG). The Y-intercept value of 1.510 tells us the value of TAISUMLOG when other variables are equal to zero.

For the purpose of testing the validity of the regression equation, the equation was applied to the independent, random sample of 30 cases to generate a predicted outcome variable. This predicted variable was tested against the actual outcome variable for the independent sample using a paired t-test. Results of t-test show that predicted and actual means are not significantly different (mean difference = .02, t = -1.088, p = .285), therefore we fail to reject the null hypothesis and accept that the two groups are likely to be from the same population. The regression equation is a reliable predictor for TAISUMLOG in an independent sample and is therefore generalizable to other samples.

In summary, the regression analysis does not support our hypothesis that aikido experience as measured by belt rank will explain variability in trait anxiety. Higher levels of belt rank are not associated with lower levels of trait anxiety.

The Prediction of Spirituality from Aikido Experience. To test hypothesis 2, hierarchical (sequential) multiple regression was performed to determine the degree Daily Spiritual Experiences (DSES) could be predicted from Aikido Experience (Belt Rank) after controlling for demographic variables. No transformation was necessary for the dependent variable DSES. In order to allow for cross-validation of the generated prediction equation, a random sample of 30 subjects was excluded for the generation of the prediction equation. This cross-validation sample was used to test the generalizability of the equation to an independent sample.

Table 26 summarizes regression statistics for this prediction. After accounting for sample size, the linear combination of demographic predictors accounted for 4.6% of the variance in the outcome variable which was not significantly different from zero (F=1.783, p=.077). After addition of Belt Rank in block 2 the regression accounted for 4.4% of the variance in the outcome variable which was not significantly different from zero (F=.1.674, p=..093). Only one of the independent variables, Hi Income, had a slope that was significantly different from zero (p=.012). The standard error of estimate of 19 suggests that the prediction equation will be off on average about 19 points above and below per prediction. Collinearity did not appear to be a problem as Tolerance levels were .45 to .95 and VIF were all below 5. Residual Statistics revealed all Standardized Residuals below 3. The resulting regression equation is provided below.

DSES = 69.318 - 2.369 * Gender - .834 * Education - .202 *
Age + 5.423 * Single + 10.452 * DivWid + 1.910 * RaceOther - 2.680 * LoInc
+ 4.358 * MedInc + 13.657 * HiInc + 2.305 * BeltRank .

This indicates, for example, that for each one unit increase in Belt Rank, there is an 2.305 increase in the dependent variable (DSES). The Y-intercept value of 69.318 tells us the value of DSES when other variables are equal to zero.

For the purpose of testing the validity of the regression equation, the equation was applied to the independent, random sample of 30 cases to generate a predicted outcome variable. This predicted variable was tested against the actual outcome variable for the independent sample using a paired t-test. Results of t-test show that predicted and actual means are significantly different (mean difference = 8.75, t = -2.153, p = .040), therefore we accept the null hypothesis and accept that the two groups are likely to be from

Table 26

Hierarchical (Sequential) Regression for Prediction of Spirituality from Aikido Belt Rank

	B (SE)	β	t	Adj R^2	Adj R^2 Δ
Step 1				.046	
Gender	-2.307 (3.815)	-.051	-.605		
Education	-.776 (.651)	-.102	-1.191		
Age	-.128 (.175)	-.077	-.735		
Single	5.831 (4.381)	.150	1.331		
Divorced/Widow	10.893 (6.238)	.154	1.746		
NonWhite	1.603 (3.685)	.036	.435		
LowIncome	-3.106 (4.869)	-.067	-.638		
MediumIncome	4.129 (4.976)	.096	.830		
HighIncome	13.867 (5.349)	.313	2.592*		
Step 2				.044	-.002
Gender	-2.369 (3.819)	-.052	-.620		
Education	-.834 (.655)	-.110	-1.273		
Age	-.202 (.195)	-.122	-1.036		
Single	5.423 (4.411)	.140	1.229		
Divorced/Widow	10.452 (6.266)	.148	1.668		
NonWhite	1.910 (3.706)	.043	.515		
LowIncome	-2.680 (4.899)	-.058	-.547		
MediumIncome	4.358 (4.989)	.101	.874		
HighIncome	13.657 (5.360)	.309	2.548*		
Belt Rank	2.305 (2.709)	.084	.851		

Note. * $p < .05$.

different populations. The regression equation is not a reliable predictor for DSESSUM in an independent sample and therefore is not generalizable to other samples.

In summary, the regression analysis does not support our hypothesis that aikido experience as measured by belt rank will explain variability in daily spiritual experiences. Higher levels of belt rank are not associated with higher levels of daily spiritual experiences.

Summary

Statistical analyses were performed to test the following hypothesis: After controlling for demographic variables, daily spiritual experience will explain variability in perceived stress, anxiety, and somatic symptoms. Higher levels of daily spiritual experiences will be associated with lower levels of perceived stress, anxiety and somatic symptoms. Correlations between spirituality (DSES) and dependent variables revealed no significant correlations. However, correlations between DSES and the individual items from the other scales did reveal some small, significant correlations. The DSES was significantly correlated with item 15 on the PHQ-15, indicating less DSE was associated with more trouble sleeping. Also, the DSES was significantly correlated with items 1, 2, 3, 4, 10, 16, and 19 on the TAI, indicating that less DSE was associated with fewer feelings of pleasantness, more nervousness and restlessness, less satisfaction with oneself, greater wish to be as happy as others seem to be, less happiness, less contentment, and fewer feelings of steadiness. Regression analysis indicated that DSES did not significantly predict PHQ-15, PSS, or TAI.

Statistical analyses were also performed to test the following hypothesis: After controlling for demographic variables, aikido experience level as measured by belt rank will explain variability in perceived stress, anxiety, somatic symptoms and daily spiritual experiences. Higher levels of aikido experience will be associated with lower levels of perceived stress, anxiety, somatic symptoms and higher levels of daily spiritual experience. Correlations between aikido experience (belt rank) and dependent variables revealed no statistically significant correlations. However, correlations between belt rank and the individual items from the other scales did reveal some small, significant correlations. Aikido belt rank was statistically significantly correlated with PHQ-15 items 2 and 3, indicating that more experience in aikido is associated with more back pain and more pain in the arms, legs and joints. Aikido belt rank was also significantly correlated with TAI item 19, indicating that more experience in aikido was associated with more feelings of steadiness. Regression analysis indicated that Aikido belt rank did not significantly predict PHQ-15, PSS, TAI or DSES.

Additional analysis consisted of a comparison between scores on the major health scales between the aikido group and normative data available for the PSS, TAI and DSES. Results indicated that female aikido students have significantly less perceived stress than the general population. An unexpected finding was that a combined male/female sample of aikido students presented with significantly less daily spiritual experiences than the general population.

CHAPTER 5

DISCUSSION

This chapter presents a summary of the study, summary of the findings, and discussion of the findings in relationship to the research questions, prior research and theoretical framework. Conclusions, implications, and recommendations were drawn from the findings of this study.

Summary of the Study

This study reported the outcome of a survey of holistic health in practitioners of the martial art aikido. The purpose of this study was to examine relationships between physical, mental and spiritual health. An additional purpose was to determine if the practice of aikido is associated with measurable levels of somatic symptoms, perceived stress, anxiety and spirituality. The geographical area for this study included aikido schools in states in all regions of the United States in order to make the study generalizable to all aikido students in this country.

The concepts of holism and general systems theory suggest that individual parts interact to make a whole. Application of these ideas to health implies that the physical, mental and spiritual aspects of our being interact and influence each other in a multidirectional manner (Hawks, 1994). Based on these concepts, the following hypothesis was established: After controlling for demographic variables, daily spiritual experience will explain variability in perceived stress, anxiety, and somatic symptoms.

Higher levels of daily spiritual experience will be associated with lower levels of perceived stress, anxiety and somatic symptoms.

Research has linked martial arts practice to levels of mental and physical health. The spiritual health of martial artists has not been reported in the research literature. Aikido is unique among the martial arts in that its primary goal is to promote spiritual development. Surprisingly, aikido has received little attention with regards to health-related research. Based on this understanding, the following hypothesis was established: After controlling for demographic variables, aikido experience level as measured by belt rank will explain variability in perceived stress, anxiety, somatic symptoms and daily spiritual experiences. Higher levels of aikido experience will be associated with lower levels of perceived stress, anxiety, somatic symptoms and higher levels of daily spiritual experience.

The research design for this study was cross-sectional in nature. A sample of aikido schools across the United States were identified via internet search. The head instructor of each school was contacted by email to request participation in this study. Those agreeing to participate were mailed a set of questionnaires with return package and paid postage included. Each questionnaire asked basic demographic information including gender, marital status, race, gross family income, years of education, and age. Also, each questionnaire asked if the respondent currently had a diagnosis of psychiatric illness in order to control for this variable. Additional questions were asked about other martial arts experience. The major portion of the questionnaire included standardized scales designed to measure somatic symptoms (PHQ-15), perceived stress (PSS), trait anxiety (TAI), and spirituality (DSES).

Summary of the Findings

A total of 79 aikido schools across all regions of the United States were contacted via email and requested to participate in this study. Of those contacted, 29 schools agreed to participate. Surveys were mailed to all 29 schools within a week after each agreed to participate. Completed surveys were received from 26 of those schools. Participating schools were from 13 states across the country however, over half of these were located in the Southeastern United States (62%). A total of 278 subjects participated in this study.

For the purpose of determining relationships between physical, mental and spiritual health, statistical analysis was performed to test the following hypothesis: After controlling for demographic variables, daily spiritual experience will explain variability in perceived stress, anxiety, and somatic symptoms. Higher levels of daily spiritual experiences will be associated with lower levels of perceived stress, anxiety and somatic symptoms. Correlations between spirituality (DSESSUM) and dependent variables (PHQ-15SUM, PSSSUM, TAISUM) revealed a significant correlation with trait anxiety ($r=.131$, $p=.035$). Since higher scores on the DSESSUM mean lower levels of spirituality, this finding indicated that more daily spiritual experiences were associated with less trait anxiety. Correlations between DSESSUM and the individual items from the other scales did reveal some small, significant correlations. The DSESSUM was significantly correlated with item 15 on the PHQ-15, meaning that more daily spiritual experiences were associated with less trouble sleeping. The DSESSUM was also significantly correlated with items 1, 2, 3, 4, 10, 16, and 19 on the TAI. This meant that more daily spiritual experience was associated with feeling pleasant, having less nervousness and

restlessness, more satisfaction with self, less wishing to be as happy as others, more happiness, less discontentment and more steadiness.

Regression analysis indicated that DSESSUM did not significantly predict PHQ-15SUM, PSSSUM, or TAISUM. After controlling for sample size and demographic variables, spirituality accounted for 3.5%, 2.4%, and 0% of the variance of each variable respectively. None of the regressions were statistically significant ($p<.05$). The research hypothesis for research question I was not supported.

For the purpose of testing the relationship between aikido experience level and health, statistical analyses were performed to test the following hypothesis: After controlling for demographic variables, aikido experience level as measured by belt rank will explain variability in perceived stress, anxiety, somatic symptoms and daily spiritual experiences. Higher levels of aikido experience will be associated with lower levels of perceived stress, anxiety, somatic symptoms and higher levels of daily spiritual experience. Correlations between aikido experience (belt rank) and dependent variables revealed no statistically significant correlations. However, correlations between belt rank and the individual items from the other scales did reveal some small, significant correlations. Aikido belt rank was significantly correlated with PHQ-15 items 2 and 3. This indicated that higher belt rank in aikido corresponded to more back pain and more pain in the arms, legs and joints. Aikido belt rank was also significantly correlated with TAI item 19. This finding suggested that higher aikido belt rank was associated with more steadiness.

Regression analysis indicated that Aikido belt rank does not significantly predict PHQ-15SUM, PSSSUM, TAISUM or DSESSUM. After controlling for sample size and

demographic variables, Aikido belt rank accounted for 5.5%, 0.7%, 0.8% and 4.4% of the variance of each, respectively. None of the regressions were statistically significant ($p<.05$). The research hypothesis for research question II was not supported.

Additional analysis consisted of a comparison between scores on the major health scales between the aikido group and normative data available for the PSS, TAI and DSES. Results indicated that female aikido students had significantly less perceived stress than the general population. An unexpected finding was that a combined male/female sample of aikido students presented with significantly less daily spiritual experiences than the general population.

Discussion of the Findings

Relationships of Findings to Prior Research

A review of the scientific literature indicated a need for further research into the area of holistic health. Multiple studies were found relating various measures of spirituality to both mental and physical health, however the results were mixed. Only a few studies were identified which studied the relationship between DSE and mental and physical health. The DSES is a relatively new method for measuring spirituality in health-related studies and it was believed that the need for further inquiry was justified using this instrument. Review of the literature indicated that little research has been done to study holistic health in martial artists. There were no published studies found which reported spiritual health in martial artists. While some of the more popular martial arts such as taekwondo, karate and tai chi have received some attention with regards to the study of anxiety, there was very limited research published for aikido. There were no

published studies of perceived stress, and no publications reporting stress-related somatic symptoms in martial artists.

Research Question 1

The results of the current study found that the DSE as measured using the DSES was significantly associated with TAISUM ($r = .131$, $p = .035$). More DSE was associated with less trait anxiety. Of the individual TAI items, it was found that more DSE was associated with more pleasantness, less nervousness and restlessness, more satisfaction with self, less wishing to be as happy as others, more happiness, more contentment, and more steadiness. The DSES was not significantly associated with PSSSUM or any individual items on the PSS ($p>.05$). The DSES also was not significantly associated with PHQSUM ($p>.05$). The DSES was significantly associated with 1 item from the PHQ-15 with more DSE being associated with less trouble sleeping ($r = .126$, $p<.05$). The DSES did not significantly predict TAISUM, PSSSUM or PHQSUM using hierarchical regression after controlling for demographic variables.

The finding that higher levels of spirituality correlated with lower anxiety is not surprising. Other authors have reported similar findings using instruments besides the DSES for the measurement of spirituality in multiple populations (Davis & Kurpius, 2003; Kaczorowski, 1989; McCoubrie & Davies, 2005). Similarly, Rippentrop et al. (2004) found that more DSE as measured on the DSES was associated with better overall scores on the Mental Component Summary of the SF-36 which included measures of emotional problems and mental health. Also in accord with the findings of this study are

the results reported by Underwood & Teresi (2002), who reported more DSE as measured using the DSES was associated with less trait anxiety as measured using the TAI.

The finding that DSE did not predict trait anxiety is not surprising as other researchers have reported mixed results with the prediction of anxiety from various spirituality measures. Boscaglia, Clark, Jobling & Quinn (2005) reported that a battery of tests designed to measure spirituality and positive and negative religious coping failed to significantly predict total anxiety scores as measured with the STAI using sequential regression. In a related study, Rippentrop et al. (2004) attempted sequential regression to determine if mental health status could be predicted from demographics, pain variables and religion/spirituality. The addition of religion/spirituality variables in step 3 of the regression added an additional 12% of the variance in mental health which was a significant gain however, none of the religious/spiritual variables, including the DSES, independently predicted mental health.

Davis & Kurpius (2003) did demonstrate that scores on the Spiritual Well-Being Scale (SWBS) significantly predicted trait anxiety as measured on the TAI. Lower trait anxiety was associated with more existential well-being (EWB) with EWB accounting for 27% of the variance in trait anxiety. Likewise, Gall (2006) reported that spiritual coping as measured using RECOPE accounted for 18% of the variance in anxious mood as measured using the Profile of Mood States after accounting for demographic and psychosocial variables.

Although DSES did not predict trait anxiety in the current study, the results of this analysis should be considered tentative. Given that this study and others have reported an

association between spirituality and anxiety, research is needed in other populations to help further explain this complicated relationship.

Only 2 studies were identified linking spirituality and perceived stress. Dodd (2003) reported that higher levels of spiritual functioning were correlated with lower perceived stress levels. Unfortunately, neither the instruments used in that study nor the statistics were available for this review. Underwood and Teresi (2002) have reported a small yet significant relationship between the DSES and the PSS ($r = -.197$, $p<.01$) with more DSES associated with less perceived stress. No studies were found which attempted the prediction of perceived stress from spirituality. From the findings of our study and the few studies available in the literature it can be tentatively concluded that if a relationship does exists between perceived stress and spirituality it is most likely small. However, given the extremely limited number of studies addressing this relationship, further research is needed.

The finding of the current study that DSES is not related to a total summary score of physical symptoms is not surprising given the results of previous published research in this area. Although various measures of spirituality have been shown to be related to several physical health outcomes such as health-related quality of life (Cotton, Levine, Fitzpatrick, Dold & Targ, 1999; Riley, Perna & Tate, 1998), and long-term care utilization (Koenig, George, Titus & Meador, 2004), few studies have linked spirituality and physical symptoms. Coleman (2003) demonstrated that more existential well-being as measured using the Spiritual Well-Being Scale was associated with fewer HIV symptoms in a study of subjects with HIV/AIDS. Similarly, Lawler and Younger (2002) reported that more EWB was associated with fewer physical symptoms as measured

using the Cohen-Hoberman Inventory of Physical Symptoms. However, spiritual experiences as measured using the Stanford Spiritual Experiences Scale showed no statistically significant relationship to physical symptoms.

Likewise, Underwood and Teresi (2002) reported no significant relationship between DSE as measured using the DSES and either physical ailments or sleep problems (instruments unknown). In related research, Keefe (2001) reported that DSE as measured using the DSES was not significantly related to joint pain in rheumatoid arthritis patients as measured using the Rapid Assessment of Disease Activity in Rheumatology (RADAR). Rippentrop (2004) also has reported no significant relationship between DSE as measured with the DSES and pain using the McGill Pain Questionnaire (MPQ) in a population of chronic pain patients.

The finding of the current study that DSES did not predict physical symptoms using hierarchical regression is similar to the results of Rippentropp (2004) who reported that religious/spiritual variables, including the DSES, did not add significantly to the prediction of pain intensity as measured using the MPQ beyond that explained by demographics and health status in a population of chronic pain patients. It is interesting to note, however, that Lawler and Younger (2002) found that existential well-being as measured by the Spiritual Well-Being Scale was predictive of fewer illness symptoms in a community sample of healthy adults explaining 19% of the variance.

It was a premise of this study that more DSE would be associated with lower scores on the PHQ-15 since it was a measure of the physical symptoms commonly associated with stress and anxiety which were, in turn, believed to be related to spirituality. However, the findings of the current study indicated that the PHQ-15's

relationship to spirituality was similar to other measures of physical symptoms. Although DSE was not associated with total sum scores for the PHQ-15, it is interesting to note that more DSE was associated with less trouble sleeping. This differs from the finding of Underwood and Teresi (2002). Although this relationship was small, it does warrant further investigation in other populations. An interesting application of this finding might be to study the effects of spiritual training using various spiritual practices for the treatment of insomnia.

Research Question 2

The results of the current study found that experience level in aikido as measured using belt rank was not associated with total summary scores for the instruments measuring somatic symptoms (PHQ-15), perceived stress (PSS), trait anxiety (TAI) or DSE (DSES). Belt rank in aikido was associated with 2 individual items on the PHQ-15. More experience in aikido was associated with more pain in the back, arms, legs and joints. Belt rank in aikido was associated with 1 item on the TAI, meaning more experience in aikido was associated with more feelings of steadiness. Experience level in aikido did not predict somatic symptoms, perceived stress, trait anxiety or DSE using hierarchical regression after controlling for demographic variables.

The finding that aikido experience level was not associated with total summary scores for a measurement of the physical symptoms commonly associated with stress and anxiety is new to the scientific literature. There were no previous studies published which studied this relationship in martial artists. The result is not surprising however, given the

concurrent findings that aikido experience level also was not associated with either perceived stress or anxiety total sum scores.

The relationship of aikido experience level to pain in the back, arms, legs and joints is not surprising. Given the very physical nature of aikido training, the risk of injury to the musculoskeletal system is relatively high. It is interesting to note that researchers have demonstrated that aikido has a relatively high rate of injury compared to other martial arts. A retrospective study over a period of one year was conducted which compared the occurrence of injuries across five styles of martial arts (Zetaruk, Violan, Zurakowski, & Micheli, 2005). It was found that during this time period 51% of aikido students reported an injury compared with 59% in taekwondo, 38% in kungfu, 30% in karate and 14% in tai chi. Aikido students were most likely to have sustained a major injury (28%) which required at least seven days off from training. Aikido students were second most likely to have sustained multiple injuries (32%). Another interesting finding of this study was that martial artists with at least three years of experience were at twice the risk of injury.

Previous research thus supports our finding that aikido students with more experience have higher levels of musculoskeletal pain. Although it is possible if not probable that the higher levels of back, arm, leg and joint pain reported in this study by more experienced aikido practitioners were associated with previous injuries sustained during aikido practice, the methodology of this study does not permit the determination of this relationship. Further research is needed in this area.

The finding that aikido experience level is not related to perceived stress is new to the scientific literature. Perceived stress has not been studied in martial artists. However,

given the educational content of aikido training and its potential for stress management, this finding is surprising. Although no relationship was found in this cross-sectional study, further research is needed to study how perceived stress levels may vary over time during prolonged training in aikido. A comparison of perceived stress levels across different styles of martial arts is also needed. Given the finding of this study that female aikido students present with lower perceived stress than females from a normative group, further study is needed for comparison with females who do not practice martial arts.

The finding that aikido experience level was not related to total summary scores for trait anxiety differs from the finding of lower anxiety in experienced taekwondo practitioners with at least 1.5 years of experience compared with beginners (Kurian, 1993). One hypothesis of the current study was that more experienced aikido students would present with lower trait anxiety and this was based on the observations of other researchers who stated that aikido practice includes a training curriculum with the potential to enhance mental health and stress management (Hannon, 1999; Faggianelli, 1996; Fuller, 1988). It was also based on the findings of other research demonstrating a reduction in trait anxiety (Tsai, 2003) and levels of tension (Hartman et al., 2000) over time in practitioners of tai chi. The results of the current study do seem to be in accord with the findings of Foster (1997), who found no changes in trait anxiety in aikido students after 10 weeks of training whereas karate practitioners showed a significant decrease.

The results of the current study did demonstrate that more experience in aikido was associated with more feelings of steadiness. To be steady has been defined as firm in position, direct or sure in movement, unfaltering, showing little variation or fluctuation,

stable, not easily moved or upset, resolute, and constant in feeling, principle purpose or attachment. Antonyms given for the word steady include nervous and jumpy (Websters, 1981). Simple reasoning would suggest that an enhanced sense of steadiness may be related to one's ability to interact with the stressors of daily life. It seems plausible that one who is not easily moved or upset, and who shows little fluctuation in feelings may be better prepared to avoid the extremes of emotions that can result from exposure to life's tribulations. The concept of steadiness has not been studied specifically in martial artists. It would seem that further research is needed to determine both effects of training over time on steadiness and the application this feeling may have for stress management.

The finding of this study that aikido experience level was not associated with DSE is new to the scientific literature. Indeed, no published study in the peer-reviewed literature was found which reported spiritual health in martial artists. Based on the spiritual nature of aikido training, it was hypothesized that more experience in aikido would be associated with higher levels of DSE. However, quite the opposite was found. When compared to normative data, aikido students presented with less DSE. This finding has implications for the study of spirituality in martial artists. Perhaps DSE is not the best way to measure spiritual health in this group. Other measures of spirituality in addition to qualitative studies using in-depth interviews may prove enlightening. It is recommended that further study is needed to reveal the truth about this very complicated subject in martial arts populations.

The results of this study demonstrated that experience level in aikido did not predict somatic symptoms, perceived stress, anxiety or spirituality using hierarchical regression after controlling for demographic variables. Although belt rank in Judo has

been reported to predict levels of aggression explaining 20% of the variance (Lamarre & Nosanchuk, 1999), no other study was found which used regression for the prediction of the dependent variables used in this study. It may be that relationships which exist between martial arts practice and mental health are statistically small and do not lend themselves well to this approach.

Relevance of Findings to the Theoretical Framework

The concept of holism applied to health implies that the various components of health, including the physical, mental and spiritual, are related. Hawks (1994) has suggested that the components of health are interrelated and thus have the potential to affect each other. Previous research has demonstrated that spirituality is related to both physical and mental health (Dodd, 2003; Davis & Kurpius, 2003; Rasmussen & Johnson, 1994; Kaczorowski, 1989; McCoubrie & Davies, 2005; Boscaglia, Clark, Jobling & Quinn, 2005; Gall, 2006; Keefe, 2001; Rippentropp et al., 2004; Koenig, George, Titus & Meador, 2004; Underwood & Teresi, 2002; Cotton, Levine, Fitzpatrick, Dold, Targ, 1999; Riley, Perna & Tate, 1998; Newlin, Meklus, Chyun & Jefferson, 2003; Lawler & Younger, 2002). Based on this previous research it was believed that spirituality would be related to physical and mental health in martial artists, a population not very well represented in the health-related scientific literature.

The results of this study found that spirituality was related to trait anxiety, though the relationship was small. Individuals with more DSE tended to have less trait anxiety. Spirituality was not related to perceived stress or physical symptoms with the exception of trouble sleeping. The findings of this study suggest that, in this population of aikido

students, the relationships existing between spiritual health and physical and mental health as they pertain to stress are small and may not be easily detected. Although not included as a hypothesis of this study, it also was found that physical symptoms were significantly related to perceived stress ($r = .335$, $p = .000$) and trait anxiety ($r = .388$, $p = .000$). These findings, which demonstrate stronger correlations than those associated with spirituality, offer further support for the conceptual framework of this study.

Limitations of the Study

The most obvious limitation of this research design is that causation cannot be implied due to the cross-sectional, correlational nature of the study. In this study of holistic health in aikido students, we can only state that there are some associations between aikido experience level and mental and physical health. There is no solid proof that aikido practice itself causes changes in these variables. The current study simply offers to fill-in a small piece of the puzzle, not to complete the picture. This study is important however, since it may encourage further research to determine if a causative relationship does exist.

An additional limitation to this study is that although attempts were made to recruit volunteers from states in all regions of the United States in equal proportions, for some unknown reason aikido schools in the Southeast were much more likely to respond favorably when contacted. Therefore, the results of this study may not be generalizable to aikido students in all regions of the country.

Another limitation of this study is that the sample was restricted by age, health status and the practice of other eastern arts. We are not able to generalize the results of

this study to individuals under the age of twenty-one, to those who have current psychiatric diagnoses, or to those who currently practice other eastern arts or have a previous black belt in another martial art.

The conclusions of this study are further restricted by the inherent limitations involved with measurement of the complex psychological concepts of stress, anxiety and perceived stress. For example, it is possible that daily spiritual experience as measured using the DSES does not accurately measure spiritual health in individuals who practice eastern arts due to the scale's dependence on language possessing strong theistic connotations.

The PHQ-15 was used in this study to measure somatic symptoms. However, this measurement was designed for use primarily in clinical populations. Given the positively skewed distribution of responses found in this study, it seems reasonable to conclude that this instrument does not possess sufficient sensitivity for use with healthy populations. A more sensitive instrument may have provided more meaningful information from which to make inferences.

The conclusions of this study are further limited by the fact that it was not feasible to control for all potentially confounding variables related to stress and anxiety. For example, life events and daily hassles may affect perceived stress and anxiety levels. Disease processes such as arthritis affect physical symptoms. No attempt was made to control for current medical diagnoses. Measurement of these variables would have made the survey excessively time-consuming. There may also exist unknown variables which affect mental, physical and spiritual health.

Finally, limitations of this study were related to the eight common threats to the internal validity of behavioral research (Windsor, 1986). The following narrative addresses these as they related to the present study.

History - It is possible, although improbable that some national, state or local event could have occurred around the time of data collection which could have affected the results. For example, if there was a local crime spree, weather disaster, or terrorist threat in the area affecting the subjects near the time of data collection then is it is possible these events could have affected stress and anxiety levels. The author is, however, unaware of any such events.

Program Participation or Maturation - Since the data collection phase of this study occurred only during a single day for each subject no effect was anticipated.

Testing or Observation - During the test/retest reliability assessment portion of the study, pretest/posttest measures were taken over a 2-week period of time. The effect of the pretest may have had an effect on the posttest since it is possible that the act of testing may change opinions and attitudes. Individuals may have been sensitized to issues that they had not contemplated before the initial test. This “testing effect” could have been a threat to the internal validity of the study. This would have affected the reliability testing portion of the study only, however.

Instrumentation - No effects were anticipated.

Statistical Regression-Artifacts - No effects were anticipated

Selection - It is possible that during the data collection phase of this study that aikido students may have minimized their responses to questions about the severity and frequency of their stress experiences in an effort to positively influence the results.

Aikido students may have preconceived notions about the mental health benefits of their past-time and these biases may have come forth during testing. It is possible that individuals with certain pro-aikido attitudes may have been more likely to volunteer for the study. The present research design was unable to control for this possible scenario. This "bias effect" was a threat to the external validity of the study, therefore limiting the generalizability of the findings.

Experimental Mortality - Not applicable due to one-time data collection

Interactive Effects - It is possible that the above-mentioned effects could interact in some unknown way to affect results.

The Hawthorne effect also may have affected the results of this study. For example, simply the awareness of participation in a research study may have affected an individual's responses to questions. The mood of the test administrator may have affected the mood and perceived stress/anxiety levels of those participating in the study. These were threats to the external validity of this study.

Conclusions

The following conclusions were drawn from the findings of this study.

1) Daily Spiritual Experience as measured using the DSES did not explain variability in perceived stress, trait anxiety and somatic symptoms in practitioners of the martial art aikido after controlling for demographic variables.
2) Daily Spiritual Experience as measured using the DSES did show some small statistically significant relationship with Trait Anxiety as measured using a summary score for the TAI ($p<.05$).

3) More DSE was associated with more feelings of pleasantness, less nervousness and restlessness, more satisfaction with self, less wishing to be as happy as others, more happiness, less discontentment and more steadiness as measured with the TAI ($p<.05$).
4) Daily Spiritual Experience as measured using the DSES was not associated with PHQ-15 summary scores ($p>.05$).
5) More DSE was associated with less trouble sleeping as measured with the PHQ-15 ($p<.05$).
6) Daily Spiritual Experience as measured using the DSES was not associated with PSS summary scores or individual items($p>.05$).
7) Aikido Experience as measured using Belt Rank did not explain variability in somatic symptoms, perceived stress, trait anxiety and spirituality in practitioners of the martial art aikido after controlling for demographic variables.
8) Aikido Experience as measured using Belt Rank was not associated with Physical Symptom summary scores, Perceived Stress summary scores, Trait Anxiety summary scores or DSES summary scores ($p>.05$).
9) More Aikido Experience as measured using Belt Rank was associated with more back pain and more pain in the arms, legs and joints as measured using the PHQ-15 ($p<.05$).
10) More Aikido Experience as measured using Belt Rank was associated with more feelings of steadiness as measured using the TAI ($p<.05$).

11) Female aikido students had statistically significant lower scores for perceived stress as measured using the PSS than did females from a normal population ($p<.05$).
12) A combined male/female group of aikido students had statistically significant less DSE as measured using the DSES than did a normal group ($p<.05$).

Implications

The findings of this study have implications for health education/health promotion practice, education and research. Although the results of this research cannot be generalized to all aikido students in the United States as was intended, a contribution to the health education/health promotion knowledge base can be made.

Implications for Health Education/Health Promotion Practice

Given the associations between spirituality and anxiety reported in this study, it seems appropriate to recommend the incorporation of spiritual training into health promotion interventions which target stress and anxiety as proposed by Seaward (1994). Spiritual practices may help reduce stress and anxiety and provide an affective supplement to more traditional stress management programs. Basic spiritual practices such as meditation may improve awareness of the transcendent in daily life and can be practiced without threat to an individual's current religious or secular belief systems.

The current study found that more experience in aikido was associated with more self-perceived steadiness. Based on this finding the temptation is to recommend the incorporation of martial arts principles into stress management programs. However, given

the small significant correlation at the alpha .05 level, it is very possible that this finding is due to chance alone. More evidence is needed before making the assertion that aikido principles can be applied to stress management programs.

Implications for Health Education/Health Promotion Higher Education

The results of this research should encourage health education/health promotion programs to teach health from a holistic point of view. Specific teaching modules or even entire courses could be designed to address the theory of holism and the concept of spiritual health. Of special interest would be coursework which reviews the relevant scientific literature relating spirituality to mental and physical health. The various methods of measuring spirituality could also be presented. Seaward has provided a past example which others should be encouraged to follow. In his stress management textbook Seaward included an entire chapter dedicated to the application of spiritual practices to stress management (Seaward, 1994).

Implications for Health Education/Health Promotion Research

The results of this study indicate that relationships do exist between physical, mental and spiritual health. The theory of holism should be further investigated specifically as it relates to spirituality's relationship to physical and mental health. The use of DSE in health-related research is a relatively new concept. As measured using the DSES it offers a new and innovative way of measuring spirituality in both healthy and unhealthy populations. Much more research is needed to help explain how DSE may relate to stress, anxiety and physical health parameters such as somatic symptoms and

chronic disease status. The relationship between DSE and health behaviors is also an area which is in need of further study. Research into the application of spiritual principles to health promotion programs is needed.

Finally, there is relatively little published research linking martial arts practice and health. This study in particular indicated that martial arts schools in the Southeastern United States were much more likely to volunteer to participate. Further research needs to clarify the reason for this occurrence. A very surprising finding of this study was that students of aikido actually presented with less DSE than a normal population as determined using normative data available from the test developer. Future studies using a comparison group may be able to further test the validity of this finding. Studies should be designed to measure spiritual health in other martial arts disciplines to determine if this finding is unique to aikido or widespread across all martial arts. There may be better ways to measure spiritual health in martial artists besides DSE. In-depth interviews may provide one method of understanding this complex subject in martial arts populations.

Recommendations

Based on the findings, conclusions and implications of this study, the following recommendations are made:

1) Conduct a study using a variety of measures of spiritual health in aikido students to more fully explain this complicated subject in this population.
2) Conduct a study to determine if aikido students have a higher tendency toward atheistic and agnostic beliefs than the normal population which may explain their lower scores for DSE in this study.

3) Conduct a study to determine if the addition of spiritual practices and martial arts principles adds significantly to the effectiveness of current stress management programs.
4) Conduct a study to determine if a health education/health promotion intervention based on spiritual principles is effective in reducing insomnia.
5) Conduct a study to determine if the higher frequency of back pain and pain in the arms, legs and joints reported by aikido students in this study is related to injuries sustained while practicing aikido.
6) Conduct a study to compare physical, mental and spiritual health across different styles of martial arts.
7) Conduct a longitudinal study to determine changes over time for physical, mental and spiritual health as aikido students progress from beginner levels to advanced.
8) Conduct a study to further explore the concept of steadiness in martial arts populations.

Summary

The purpose of this study was to examine relationships between physical, mental and spiritual health and to determine if the practice of aikido was associated with perceived stress, anxiety, somatic symptoms and spirituality. The findings indicated that spirituality did not predict perceived stress, anxiety or somatic symptoms. More DSE was associated with less trait anxiety. More DSE was associated with more feelings of

pleasantness, less nervousness and restlessness, more satisfaction with self, less wishing to be as happy as others, more happiness, more contentment, and more feelings of steadiness. More DSE was also associated with less trouble sleeping. Experience level in aikido did not predict perceived stress, anxiety, somatic symptoms or spirituality. More experience in aikido was related to more back pain, more pain in the arms, legs and joints, and more feelings of steadiness. Female aikido students had less perceived stress when compared with normative data. A combined male and female group of Aikido students had less DSE when compared with normative data. The findings of this study have implications for health education/health promotion practice, education and research. Further research is needed to explore the application of holism and martial arts principles to the field of health education/health promotion.

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APPENDIX A

PERMISSION TO USE STAI

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APPENDIX B

UAB IRB APPROVAL FORM

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Institutional Review Board for Human Use

Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56 and ICH GCP Guidelines. The Assurance became effective on November 24, 2003 and the approval period is for three years. The Assurance number is FWA00005960.

Principal Investigator:	TAPLEY, HOWELL E
Co-Investigator(s):	
Protocol Number:	**X050713010**
Protocol Title:	*A Study of Perceived Stress, Anxiety, Somatic Symptoms and Spirituality in Practitioners of the Martial Art Aikido*

The IRB reviewed and approved the above named project on 07-22-05. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This Project will be subject to Annual continuing review as provided in that Assurance.

This project received EXPEDITED review.

IRB Approval Date: 7/22/05

Date IRB Approval Issued: 07-22-05

Marilyn Doss

Marilyn Doss, M.A.
Vice Chair of the Institutional Review
Board for Human Use (IRB)

Investigators please note:

The IRB approved consent form used in the study must contain the IRB approval date and expiration date.

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

470 Administration Building
701 20th Street South
205.934.3789
Fax 205.934.1301
irb@uab.edu

The University of
Alabama at Birmingham
Mailing Address:
AB 470
1530 3RD AVE S
BIRMINGHAM AL 35294-0104

APPENDIX C

UAB IRB PROJECT REVISION/AMENDMENT FORM

UAB Project Revision/Amendment Form irb

(Rev. 4/7/2004)

(PLEASE TYPE: In MS Word, highlight the shaded, underlined box and replace with your text; double-click checkboxes to check/uncheck.)

Link: Project Revision/Amendment Form

Federal regulations require IRB approval before implementing proposed changes.
Please complete this form and attach the changed research documents. Change means any change, in content or form, to the protocol, consent form, or any supportive materials (such as the Investigator's Brochure, questionnaires, surveys, advertisements, etc.)

Principal Investigator: *Howell E. Tapley* Date: *7-5-06*
Contact: *Howell Tapley* Phone #: *205-567-1902* Fax #: *2053874658* E-mail: *HowieTaply@aol.com*
Campus Address: *Human Studies, Department of Health Ed/Health Promotion*
Study/Protocol Title: *A Study of Perceived Stress, Anxiety, Somatic Symptoms and Spirituality in Practitioners of the Martial Art Aikido*
IRB Protocol #: *X0507130l0*

RECEIVED JUL 20 2006 OFFICE OF INSTITUTIONAL REVIEW BOARD

Current Status of Project: (check only one)

☒ Currently in Progress (# participants entered: *29*)
☐ Study has not yet begun (no participants entered)
☐ Closed to participant enrollment (remains active); # participants on therapy/intervention_____; # participants in long-term follow-up only_____

This submission changes the status of this study in the following manner: (check all that apply)

☒ Protocol Revision
☐ Protocol Amendment
☐ Study Closed to participant entry
☐ Study Terminated
☐ Revised Consent Form
☐ Addendum (new) consent form
☐ Enrollment temporarily suspended by sponsor
☐ Other, (specify) _____

1. Briefly describe, and explain the reason for, the revision or amendment. Include a copy of supportive documents with changes highlighted. Please highlight changes/revisions/additions to the consent form, protocol, research questionnaire, etc.
No changes in questionnaire or procedure for administering questionnaire with the exception that the surveys will be mailed to individual martial arts schools and the head instructor of each school will administer the survey, then mail surveys back to principal investigator. This change is needed since we are not going to be able to get a large enough sample size in the southeast and will have to include subjects across the country. It will not be feasible for the investigator to collect these in person due to high cost of gasoline, time, etc.

2. Does this revision/amendment revise or add a genetic or storage of samples component? ☐ Yes ☒ No
If yes, please see the Guidebook to assist you in revising or preparing your submission documents or call the IRB office at 4-3789.

3. Does the change affect subject participation (e.g. procedures, risks, costs, etc.)? ☐ Yes ☒ No

4. Does the change affect the consent document? ☐ Yes ☒ No
If yes, briefly discuss the changes. _____

Include the revised consent form with the changes highlighted.

Revised 04-07-04

Will any participants need to be reconsented as a result of the changes? ☐ Yes ☒ No
If yes, when will participants be reconsented?_____

Signature of Principal Investigator_____ Date 7/20/06

FOR IRB USE ONLY

DXA 7-22-05

APPROVED
7/24/06
MARILYN DOSS, M.A.
Vice Chair – IRB

Revised 04-07-04

APPENDIX D

WRITTEN INTRODUCTION TO STUDY

Introduction

You are being asked to participate in a research study as part of a doctoral dissertation in Health Promotion at the University of Alabama in Birmingham. The purpose of this research is to study stress, anxiety, physical symptoms and spirituality in students of aikido. You will be asked to complete a short questionnaire which takes approximately 15 to 20 minutes. No identifying information will be collected or reported. All responses will remain completely anonymous. Your involvement in this study is voluntary and there will be no consequences if you decide not to participate.

If you have questions about this research, feel free to contact Howie Tapley, MSPT, at (205) 567-1902. If you have questions regarding your rights as a research participant please contact Ms. Sheila Moore, Director of the Office of the UAB Institutional Review Board for Human Use at (205) 934-3789 or 1-800-822-8816 (press the option for an operator/attendant and ask for extension 4-3789). You may contact Ms. Moore between the hours of 8 a.m. and 5 p.m. Central Time, Monday through Friday.

Remove this page and keep for your records.

APPENDIX E

DATA COLLECTION PROCEDURE

Data Collection Procedure

I. Identify Aikido Schools in the United States using internet searches, yellow pages, etc.

II. Contact head instructor of each aikido school by phone or email, explain purpose of study and ask for participation

III. Mail package to head instructor including introductory letter, instructions for administration of survey, and individual questionnaires.

IV. The head instructor will administer survey following provided protocol

V. The head instructor will return surveys to primary investigator via US mail

VI. Scannable survey forms will be submitted to UAB Center for Educational Accountability to be scanned.

VII. Database will be provided to primary investigator for analysis.

APPENDIX F

INTRODUCTORY E-MAIL MESSAGE

Dear Sensei,

I am conducting a research study into the possible health benefits of aikido practice as part of my doctoral training in Health Education/Health Promotion. This study is supervised by a diverse group of senior faculty members at the University of Alabama in Birmingham, a world-famous medical center and one of the top research institutions in the country. I believe this research to be the largest single study of health in aikido practitioners ever performed, with the goal of multiple schools across the United States participating. The results of the study have the potential to raise public awareness of the health benefits of regular aikido training. Having practiced aikido personally for the last 6 years, I am excited about making a contribution back to the art.

I am writing today to ask permission to include your school in this landmark study. You will find participation to be easy and straightforward. If you are agreeable, I will mail you a package containing written surveys, pencils, and a pre-addressed/postage-paid return package. Simply request for volunteers to complete survey at a regularly scheduled class. The survey is brief and can be completed in 15 minutes. At the completion of the study I will forward you a summary of the results.

I hope you will agree to participate in this worthwhile project. We need as many volunteers as possible to make this study a success! Should you decide to participate, please include the preferred mailing address with your response, and an estimate of the number of students you currently enroll. Thanks for your time, and I look forward to hearing from you soon.

Sincerely,

Howie Tapley MSPT, OCS, PhD-ABD
Department of Health Education/Health Promotion
University of Alabama in Birmingham
(205) 567-1902

APPENDIX G

INSTRUCTIONS FOR ADMINISTRATION OF SURVEY

INSTRUCTIONS FOR ADMINISTRATION OF AIKIDO QUESTIONAIRE

Dear Instructor, Thank-you for agreeing to participate in my important study of aikido and holistic health. I know that your class time is important. Many thanks for your kind assistance.

You may select more than one class for students to complete the survey during the two-week period. Students should not complete the survey more than once.

Read the instructions aloud to students that are printed in **bold** test, below. Students are free to volunteer or decline to participate without negative consequence. Encourage students with questions about the purpose of the study, or uses of data, to contact me at Email HowieTaply@aol.com , or telephone (205) 567-1902.

1) At the beginning of class, read aloud the following:

Instructions

You are invited to participate in a doctoral dissertation research study supervised by faculty members at the University of Alabama at Birmingham. The purpose is to study mental, physical and spiritual health among students of aikido. If you agree to participate, please complete a short questionnaire which takes approximately 15 minutes.

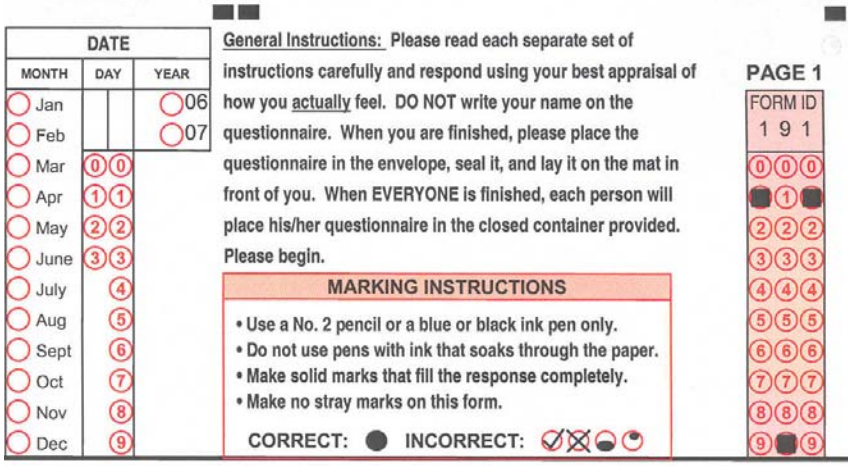
All responses are completely anonymous. Do not write your name on the questionnaire.

Do not leave items blank unless instructed to do so. Your involvement in this study is voluntary and there will be no effects on this class if you decide not to participate. Place the completed questionnaire in the return envelope, seal, and return to the instructor.

2) Hand out questionnaires, pencils and envelopes to all who agree to participate.
3) Observe students as they individually complete questionnaires. Please allow at least 15 minutes
4) Direct each student to seal his/her questionnaire in an envelope.
5) Ask students to place sealed envelopes in the return package.
6) Mail the return package containing all questionnaires completed during the two-week period using the label and postage provided.

APPENDIX H

SURVEY



DATE

MONTH	DAY	YEAR
◯ Jan		◯ 06
◯ Feb		◯ 07
◯ Mar	0 0	
◯ Apr	1 1	
◯ May	2 2	
◯ June	3 3	
◯ July	4	
◯ Aug	5	
◯ Sept	6	
◯ Oct	7	
◯ Nov	8	
◯ Dec	9	

General Instructions: Please read each separate set of instructions carefully and respond using your best appraisal of how you actually feel. DO NOT write your name on the questionnaire. When you are finished, please place the questionnaire in the envelope, seal it, and lay it on the mat in front of you. When EVERYONE is finished, each person will place his/her questionnaire in the closed container provided. Please begin.

MARKING INSTRUCTIONS

- Use a No. 2 pencil or a blue or black ink pen only.
- Do not use pens with ink that soaks through the paper.
- Make solid marks that fill the response completely.
- Make no stray marks on this form.

CORRECT: ● INCORRECT: ✓ ⊗ ◒ ◔

PAGE 1

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0 0 0
■ 1 ■
2 2 2
3 3 3
4 4 4
5 5 5
6 6 6
7 7 7
8 8 8
9 ■ 9

YOUR GENDER

◯ Male ◯ Female

YOUR MARITAL STATUS

◯ Married
◯ Single
◯ Divorced
◯ Widowed

YOUR RACE

◯ White
◯ African American
◯ Hispanic
◯ Asian
◯ Native American
◯ Other

YOUR GROSS FAMILY INCOME

◯ $19,999 or less
◯ $20,000-$29,999
◯ $30,000-$39,999
◯ $40,000-$49,999
◯ $50,000-$59,999
◯ $60,000-$69,999
◯ $70,000-$79,999
◯ $80,000-$89,999
◯ $90,000-$99,999
◯ $100,000 or more

Education Examples:
8th grade = 8 years
High School = 12 years
1 year of college = 13 years
Junior College = 14 years
Bachelor's Degree = 16 years

YOUR YEARS OF EDUCATION

0 0
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9

YOUR AGE IN YEARS

0 0
1 1
2 2
3 3
4 4
5 5
6 6
7 7
8 8
9 9

Do you have a current psychiatric diagnosis (for example, clinical depression, generalized anxiety disorder, bipolar disorder, schizophrenia, etc.)?

◯ Yes ◯ No

Please select the best description of your current aikido level of experience.

◯ **Beginner** (White Belt) I have NOT successfully tested for advancement in aikido.
◯ **Intermediate** (rankings up to 1st Kyu) I have successfully tested for rank advancement in aikido.
◯ **Advanced** (Black Belt).

Black Belt Level (If applicable):

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

Do you currently receive formal instruction in other martial arts in addition to aikido?

◯ Yes ◯ No

Do you currently receive formal instruction in meditation, tai chi, yoga, or other bodywork systems?

◯ Yes ◯ No

Have you received a black belt in a different martial art than aikido?

◯ Yes ◯ No

My primary motivation for studying aikido is:

◯ Self-defense
◯ Physical fitness/health
◯ Mental/spiritual development
◯ Other

PLEASE CONTINUE ON THE NEXT PAGE.

PAGE 2

During the past 4 weeks, how much have you been bothered by any of the following problems?	Not bothered at all	Bothered a little	Bothered a lot
a. Stomach pain	○	○	○
b. Back pain	○	○	○
c. Pain in your arms, legs, or joints (knees, hips, etc.)	○	○	○
d. Menstrual cramps or other problems with your periods *[Women only]*	○	○	○
e. Headaches	○	○	○
f. Chest pain	○	○	○
g. Dizziness	○	○	○
h. Fainting spells	○	○	○
i. Feeling your heart pound or race	○	○	○
j. Shortness of breath	○	○	○
k. Pain or problems during sexual intercourse	○	○	○
l. Constipation, loose bowels, or diarrhea	○	○	○
m. Nausea, gas, or indigestion	○	○	○
n. Feeling tired or having low energy	○	○	○
o. Trouble sleeping	○	○	○

The questions in this scale ask you about your feelings and thoughts *during the last month*. In each case, you will be asked to indicate *how often* you felt or thought a certain way. In the last month, how often have you . . .	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. been upset because of something that happened unexpectedly?	0	1	2	3	4
2. felt that you were unable to control the important things in your life?	0	1	2	3	4
3. felt nervous and "stressed"?	0	1	2	3	4
4. felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. felt that things were going your way?	0	1	2	3	4
6. found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. been able to control irritations in your life?	0	1	2	3	4
8. felt that you were on top of things?	0	1	2	3	4
9. been angered because of things that were outside of your control?	0	1	2	3	4
10. felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

PLEASE CONTINUE ON THE NEXT PAGE.

PAGE 3

A number of statements people have used to describe themselves are given below. Read each statement and select the appropriate value to describe how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer that seems to describe how you generally feel.

	Almost never	Sometimes	Often	Almost always
1. I feel pleasant.	①	②	③	④
2. I feel nervous and restless.	①	②	③	④
3. I feel satisfied with myself.	①	②	③	④
4. I wish I could be as happy as others seem to be.	①	②	③	④
5. I feel like a failure.	①	②	③	④
6. I feel rested.	①	②	③	④
7. I am "calm, cool, and collected."	①	②	③	④
8. I feel that difficulties are piling up so that I cannot overcome them.	①	②	③	④
9. I worry too much over something that really doesn't matter.	①	②	③	④
10. I am happy.	①	②	③	④
11. I have disturbing thoughts.	①	②	③	④
12. I lack self-confidence.	①	②	③	④
13. I feel secure.	①	②	③	④
14. I make decisions easily.	①	②	③	④
15. I feel inadequate.	①	②	③	④
16. I am content.	①	②	③	④
17. Some unimportant thought runs through my mind and bothers me.	①	②	③	④
18. I take disappointments so keenly that I can't put them out of my mind.	①	②	③	④
19. I am a steady person.	①	②	③	④
20. I get in a state of tension or turmoil as I think over my recent concerns and interests.	①	②	③	④

PLEASE CONTINUE ON THE NEXT PAGE.

PAGE 4

The list that follows includes items you may or may not experience. Please consider if and how often you have these experiences, and try to disregard whether you feel you should or should not have them. In addition, a number of items use the word 'God'. If this word is not a comfortable one, please substitute another idea that calls to mind the divine or holy for you. You may experience the following in your daily life. If so, how often?

	Many times a day	Every day	Most days	Some days	Once in a while	Never or almost never
1. I feel God's presence.	1	2	3	4	5	6
2. I experience a connection to all of life.	1	2	3	4	5	6
3. During worship, or at other times when connecting with God, I feel joy which lifts me out of my daily concerns.	1	2	3	4	5	6
4. I find strength in my religion or spirituality.	1	2	3	4	5	6
5. I find comfort in my religion or spirituality.	1	2	3	4	5	6
6. I find deep inner peace or harmony.	1	2	3	4	5	6
7. I ask for God's help in the midst of daily activities.	1	2	3	4	5	6
8. I feel guided by God in the midst of daily activities.	1	2	3	4	5	6
9. I feel God's love for me, directly.	1	2	3	4	5	6
10. I feel God's love for me, through others.	1	2	3	4	5	6
11. I am spiritually touched by the beauty of creation.	1	2	3	4	5	6
12. I feel thankful for my blessings.	1	2	3	4	5	6
13. I feel a selfless caring for others.	1	2	3	4	5	6
14. I accept others even when they do things I think are wrong.	1	2	3	4	5	6
15. I desire to be closer to God or in union with God.	1	2	3	4	5	6

	Not at all close	Somewhat close	Very close	As close as possible
16. In general, how close do you feel to God?	1	2	3	4

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THANK YOU FOR COMPLETING THIS QUESTIONNAIRE.