Stress on Well-Being

Jennifer Buer

American College of Healthcare Sciences

Cap 501 Graduate Capstone

Abstract

This paper is a comprehensive review of current research on the topic of stress; including an in-depth examination of the interaction of stress and disease and the physiological components of stress. It is reported that 70 to 85% of all diseases are stress related. The concept of fight or flight as it relates to our tendency in current society to respond with a non-adaptive fight or flight reaction to non-physical threats is addressed. A stress management program is discussed. Further, three complementary and alternative medicine (CAM) modalities are discussed and studies are provided to support inclusion of these interventions with stress reduction.

Methods

The academic paper was researched using Google Scholar, ProQuest (Library Information Network), MEDLINE, PubMed, and two primary books, "Why Zebras Don't Get Ulcers" and "Managing Stress: Principles and Strategies for Health and Well-being." Keywords/Boolean logic such as stress and disease, stress and CAM modalities, guided imagery for stress, autogenic training and stress, nutrition, stress and vitamins, brain and stress, exercise and stress, and immune system and stress were used. The intent of the chosen studies was to demonstrate the effectiveness of several CAM modalities and stress reduction. These particular studies were chosen because of their relevance, recency, and ease of implementing the reviewed modality. Further, these interventions were chosen as they can be implemented with little to no expense making them available across socio-economic groups. These studies attempt to tie in the physiological component of stress, although demonstrating additional research needs to be conducted in this area. Due to the extent of available CAM modalities used for stress reduction many inventions were not discussed but will be incorporated into the workshop based on population. The workshop will be comprised from the research in the academic paper and tailored to the specific population.

Stress on Well-being

According to Seaward (2012), stress is defined as "the experience of a perceived threat (real or imagined) to one's mental, physical, or spiritual well-being, resulting from a series of physiological responses and adaptations" (p. 3). Stressful life events include problems stemming from employment difficulties, interpersonal conflict, financial struggles, family discord, or medical illness (Overholser & Fisher, 2009). Physiologically speaking, stress is defined as the frequency of wear and tear on the body (Seaward, 2012). A short-term exposure to stress may be harmless to physical and mental health but chronic (a more severe level of stress) exposure to the same may lead to a prolonged state of distress that may increase vulnerability to stress-related diseases (Vandana, Saraswathy, Pillai, Ramaiyer, & Kumar, 2011). According to Sapolsky (2004), the body's physiological response mechanisms are superbly adapted for dealing with a short-term physical emergency, known as an acute physical crisis. "For the vast majority of beasts on this planet, stress is about a short-term crisis, after which it's either over with or you're over with" (Sapolsky, 2004). Today's culture generates many types of stressful thoughts, often long term, turning on the same physiological responses and potentially causing stress-related diseases to emerge.

In 1914, Walter Cannon coined the term *fight-or-flight response* (described as the dynamics involved in the body's physiological arousal to survive a threat) that gave understanding about how the body reacts to acute stress. He reported that the body prepares itself for one of two modes of immediate action: to fight and defend oneself from the threat, or to run and escape the danger (as cited in Seaward, 2012). Cannon's concluded that the fight response was triggered by anger or aggression and more than likely induced by fear (as cited in Seaward, 2012). This idea was developed during a time in which individuals faced threats of a physical

nature, those that jeopardized their survival. In today's culture, although threats to personal survival still exist, they are far less prevalent than those perceived by the mind and, more specifically the ego (Seaward). However, the body's preparation of movement and energy production to handle an attack, pursuit, or challenge is quite ineffective when dealing with events or situations that threaten the ego, such as being stuck in traffic or having to wait in a long grocery line, yet the body responds identically to all types of perceived threats (Seaward, 2012). Examples of the physiological reactions that the body goes through during a stressor are increased heart rate and blood pressure to get the muscles working, increased ventilation to supply working muscles with oxygen for energy metabolism, increased free fatty acid mobilization as an energy source for prolonged activity, and decreased gastric movement and abdominal blood flow to allow blood to go to working muscles (Seaward). These reactions would be vital if experiencing an acute stressor but they are actually damaging (throwing the body off from its natural way of functioning) when experiencing the daily stressors that are related to the mind/ego. Sapolsky (1998) stated, "It is suggested that, in effect, the fight-or flight response is an antiquated mechanism that has not kept evolutionary pace with the development of human mind" (as cited in Seaward, p. 7). The problem with stress in today's culture is that the stress response becomes activated in all types of threats (mental, emotional, and spiritual), not just physical intimidations (Seaward, 2012).

Not all stress is bad, in fact the body craves physiological arousal to ensure the optimal functioning of several organs, including the heart and musculoskeletal system (Seaward, 2012). This type of "good" stress is called *eustress* and happens in any situation or circumstance that a person finds motivating or inspiring (i.e. falling in love, meeting a movie star). It brings happiness and therefore is not seen as threatening. Additionally, *neustress* is described as any

kind of information or sensory stimulus that is perceived as unimportant or insignificant (Seaward, 2012). An example of this type of stress may be news of a world event that does not have a direct effect on the person. A third type of stress is called *distress*, and is considered "bad" stress. Distress is defined as interpreting an event (real or imagined) as unfavorable, negative, or threatening, which then promotes continued feelings of fear or anger; it is more commonly known simply as *stress* (Seaward). There are two type of distress: acute stress; which surfaces, is quite intense, and disappears quickly; and chronic stress, which may not appear quite so intense, yet seems to linger for prolonged periods of time (hours, days, weeks, or months) (Seaward, 2012). Acute stress is stress and the anticipation one feels when stopped by a police officer (bringing up the heart rate) until the officer issues only a warning. On the other hand, chronic stress can occur when roommates do not get along, or from the worry of paying a credit card monthly but the balance does not seem to go down. According to the American Institute of Stress (AIS), chronic stress is associated with disease because the body is perpetually aroused for danger (Seaward, 2012).

A concept called the Yerkes-Dodson principle explains the relationship between eustress, distress, and health. Figure 1 shows that when stress increases, performance or health decreases and there is a greater risk of disease and illness. The optimal stress level is the midpoint, prior to where eustress turns into distress. According to Seaward (2012), studies indicate that stress-related hormones in optimal doses actually improve physical performance and mental processing skills such as concentration, making people more alert. However, beyond that optimal level, all aspects of performance begin to decrease in efficiency. It's at this point, physiologically speaking, a person's health is at serious risk.

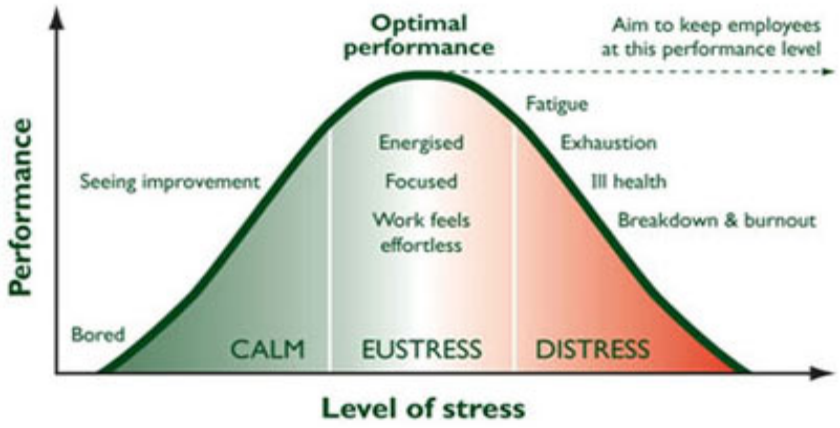

Figure 1: The Yerkes-Dodson Human Performance and Stress Curve. Adapted from http://www.bing.com/images/search?q=dodson+yerkes+curve&view

This idea can get complex when considering that people have different optimal levels. Therefore, the focus of any stress-management approach should include: (a) identifying where this optimal level of stress is for a person so that it can be used to his or her advantage rather than it becoming a detriment to the person's health status, and (b) reduce physical arousal levels so that the person can stay out of the danger zone caused by too much stress (Seaward, 2012). The goal for any person to have his or her body return to homeostasis, a physiological state of complete calmness or rest, once the threat/stressor is gone.

Stress management strategies can be classified according to a biopsychosocial framework whereby a multidisciplinary team works together to provide different options that follow their theoretical views (Overhosler & Fisher, 2009). Often, symptoms of emotional distress are labeled in terms of major depressive disorder or generalized anxiety disorder and treated with medications to reduce the client's negative emotional responses. According to the National Center for Health Statistics (NCHS; as cited in Wehrwein, 2011), the rate of antidepressant use in the United States among teens and adults (people ages 12 and older) increased by almost 400% between 1988 and 1994 and 2005 and 2008. Moreover, the federal government's health statisticians figure that about 1 in every 10 Americans takes an antidepressant (as cited in

Wehrwein, 2011). Although medication may be an effective treatment when someone is going through a severe depression that inhibits daily functioning, it is important to see that the majority of emotional reactions (the stress component) may be normal, natural and even adaptive. These types of reactions toward stressors, such as divorce, job loss, or bereavement, can guide the individual to seek social support or make changes to his or her lifestyle.

Research has shown that the influence of stress weakens the body's physiological system, thereby rapidly advancing the disease process (Seaward, 2012). Vandana et al. (2011) found that stress and other emotional responses affect the body's ability to remain healthy or to fight disease. They wrote, "Stress and emotion appear to have important consequences for the beginning or progression of cancer, HIV, cardiovascular disease, and other illnesses through nervous, endocrine, and immune systems" (Vandana et al., 2011). Seward (2012) reported that some health experts estimate that 70 to 85% of all diseases and illnesses are stress-related. According to Seaward, the leading causes of death are dominated by what are referred to as *"lifestyle diseases*," those diseases whose pathology develops over a period of several years, perhaps even decades. Whereas infectious diseases are treatable by medication, lifestyle diseases are, for the most part, preventable or correctable by altering the habits and behaviors that contribute to their etiology (Seaward, 2012).

A *stressor* is defined as situation, circumstance, or any stimulus that is viewed as a threat (Seaward, 2012). This means what constitutes a stressor can be almost limitless, especially when considering the variation between people. According to Seaward (2012), a large amount of research has been done to determine the nature of stressors, and they are divided into three groups: bioecological, social, and psychointrapersonal.

Bioecological influences can trigger people's stress response in various ways, some outside of their awareness. External influences; such as sunlight, gravitational pull, solar flares, and electromagnetic fields; affect people's biological rhythms in three areas affected are: (a) circadian rhythms, fluctuations in physiological functions over the course of a 24-hour period (e.g., body temperature); (b) ultradian rhythms, fluctuations that occur over less than a 24-hour period (such as stomach contractions and cell divisions); and (c) infradian rhythms, changes that occur in periods longer than 24 hours (e.g., the menses) (Seaward, 2012). The natural occurrences of the earth's orbit and axis rotation (giving the earth periods of light, darkness, and seasons) influences the biological changes. Further, synthetic food additives fall into this category because they trigger the release of various stress hormones throughout the body (Seaward, 2012).

Psychointrapersonal influences are the perceptions of stimuli that are created through a person's own mental processes (perceptions and interpretations). Stressors such as thoughts, values, beliefs, attitudes, opinions, and perceptions that people use to defend their identity or ego fit in this category (Seaward, 2012). The stress response is activated when any of these areas are violated, challenged, or changed, due to the ego feeling threatened. Psychointrapersonal influences make up the highest percentage of stressors and it is imperative to interrupt the stress response in the mind before it creates a rush of stress hormones into the body to cause potential damage (Seaward, 2012).

Social influences that can cause stress involve situations in which people struggle to cope with their given environment, such as crowded urban/city areas, long lines at the grocery store, and traffic jams, wherever their personal space is invaded (Seaward, 2012). Seaward (2012) explained that the cause of this particular social influence may be intuitive in nature, considering

that the desire for personal space appears to be universal in the animal kingdom (including humans). Additionally, financial insecurity, relocating, technological advances, violation of human rights, and low socioeconomic status fall into this group, as does major life changes (Seaward, 2012).

Holmes and Rahe (as cited in Seaward, 2012) made significant advancements in understanding the relationship between stress and disease through life changes by conducting a survey of thousands of people to determine what events in their lives caused the most stress. They created a list of circumstances that represented typical life stressors, or events that required adaptation or readjustment to a situation (as cited in Seaward). Holmes and Rahe gave the events numeric value (called Life-Change Units [LCU]) based on their degree of disruption of a person's life and readjustment following the event, and put together a system to weigh each event according to its stress potential. The results generated an inventory called the Social Readjustment Rating Scale (SRRS), which ranked 43 life events from most stressful to least stressful, as shown in figure 2.

Life Event	Value
Death of Spouse	100
Divorce	73
Marital separation	65
Jail term	63
Death of close family member	63
Personal injury or illness	53
Marriage	50
Fired at work	47
Marital reconciliation	45
Retirement	45
Change in health of family member	44
Pregnancy	40
Sex difficulties	39

Gain of new family member	39
Business readjustment	39
Change in financial state	38
Death of close friend	37
Change to a different line of work	36
Change in number of arguments with spouse	35
Home Mortgage over $100,000*	31
Foreclosure or mortgage or loan	30
Change in responsibilities at work	29
Son or daughter leaving home	29
Trouble with in-laws	29
Outstanding personal achievement	28
Spouse begins or stops work	26
Begin or end school	26
Change in living conditions	25
Revision of personal habits	24
Trouble with boss	23
Change in work hours or conditions	20
Change in residence	20
Change in schools	20
Change in recreation	19
Change in church activities	19
Change in social activities	18
Mortgage or loan of less than $100,000*	17
Change in sleeping habits	16
Change in number of family get-togethers	15
Change in eating habits	15
Single person living alone	**
Other- describe	**
Total:	

Figure 2: Holmes-Rahe Life Stress Scale. Adapted from The social readjustment rating scale, Holmes, T. H. and Rahe, R. H. 1967, *Journal of Psychosomatic research*, 11(2), 213-21.

Holmes and Rahe (as cited in Seaward, 2012) took the inventory a step further and gave it to several physicians and then compared their results with major health changes reported by

the physicians. The results showed a significant correlation between life-event scores and personal health histories, with an LCU score of 150 being the point of separation between the exposure to major life stressors and health-related problems (as cited in Seaward). Upon further analysis, they created categories based on LCU scores: 150 – 199 points suggested a mild life crisis, 200 – 299 points suggested a moderate life crisis, and any score over 300 points indicated a major life crisis (as cited in Seaward, 2012).

According to Lazarus (as cited in Seaward, 2012), the accumulation of acute stressors or daily life hassles, such as texting on the phone, or locking keys in the car, is just as likely to adversely affect a person's health as the death of a spouse is (Seaward, 2012). These daily life hassles are often based on unmet expectations that trigger an anger response of some type, whereas stressors of a chronic nature more often appear to have a greater association with fear and anxiety (as cited in Seaward, 2012). Overall, if people repeatedly turn on the stress-response (whether acute, chronic, and/or daily life hassles), or they cannot turn off the stress-response at the end of a stressful event, the stress-response can eventually become damaging (Sapolsky, 2004). The constant increase in stress levels puts people at risk of getting diseases, or if they have a disease, stress increases the risk of the disease overwhelming their defenses (Sapolsky). According to Sapolsky (2004), "a large percentage of what we think of when we talk about stress-related diseases are disorders of excessive stress-responses" (p. 16).

According to Selye (as cited in Seaward, 2012), an endocrinologist who was a leading researcher on the topic of stress, the exposure of repeated stress causes several physiological adaptations that in some cases are subtle and often go unnoticed until permanent damage has occurred. He referred to the collective stress-induced changes as the general adaptation

syndrome (GAS), a process in which the body tries to accommodate stress by adapting to it (as cited in Seaward, 2012). Selye's research identified three stages of the GAS:

> Stage one: Alarm reaction. The alarm reaction describes original flight-or-fight responses. In this stage several body systems are activated, primarily the nervous system and the endocrine system, followed by the cardiovascular, pulmonary, and musculoskeletal system. Like a smoke detector alarm buzzing late at night, all senses are put on alert until the danger is over.
>
> Stage two: Stage of resistance. In the resistance stage, the body tries to revert to a state of physiological calmness, or homeostasis, by resisting the alarm. Because the perception of a threat still exists, however, complete homeostasis is never reached. Instead, the body stays activated or aroused, usually at a lesser intensity that during the alarm stage but enough to cause a higher metabolic rate in some organ tissue. One or more organs may in effect be working overtime and, as a result, enter the third and final stage.
>
> Stage three: Stage of exhaustion. Exhaustion occurs when one (or more) of the organs targeted by specific metabolic processes can no longer meet the demands placed upon it and fails to function properly. This can result in death to the organ and, depending on which organ becomes dysfunctional (e.g., the heart), possibly the death of the organism as a whole. (as cited in Seaward, 2012, p. 14)

His research outlined the parameters of the physiological dangers of stress and opened the doors to understanding the strong relationship between stress and disease and the mind-body spirit equation (as cited in Seaward, 2012).

Stress has a major impact on brain functioning. According to McEwen (2007), the brain is the key organ of the response to stress because it determines what is threatening and, therefore,

potentially stressful, as well as the physiological and behavioral responses that can be either adaptive or damaging. Stress involves two-way communication between the brain and the nervous system, endocrine system, and immune system, all triggered by perceived threats (Seaward, 2012). The nervous system is divided into three principle anatomic units: the central nervous system (CNS) (consisting of the brain and spinal cord), the peripheral nervous system (PNS) (consisting of 31 pairs of spinal nerves and 12 pairs of cranial nerves), and the autonomic nervous system (ANS) (consisting of the sympathetic and parasympathetic branches), all three working together as a whole (Copstead & Banasik, 2013). According to Sapolsky (2004), the autonomic nervous system has everything to do with our responses to stress.

The sympathetic nervous system, originating in the brain, sends sympathetic projections that exit the spine and branch out to nearly every organ, every blood vessel, and every sweat gland in our body (Sapolsky, 2004). This area is associated with energy expenditure. For example, if someone is scared and activate those projections, their hair stands on end; gooseflesh results when the parts of the body are activated where those muscles exit but lacks hair attached to them (Sapolsky, 2004). The sympathetic nervous system is activated during emergencies, or what is perceived as an emergency, helping to mediate alertness, arousal, activation, and mobilization (Sapolsky, 2004). It's the archetypal system that is turned on at times when life gets exciting or alarming, such as during stress (Sapolsky, 2004). The nerve endings of this system release adrenaline and noradrenaline, known as epinephrine and norepinephrine. The epinephrine is released as a result of the actions of the sympathetic nerve endings in the adrenal glands (located right above the kidneys); norepinephrine is released by all the other sympathetic nerve endings throughout the body (Sapolsky, 2004). The effects of epinephrine and norepinephrine are very short, lasting only seconds (Seaward, 2012).

The parasympathetic drive is responsible for energy conservation and relaxation, during which time the body cells are allowed to regenerate (Seaward, 2012). According to Seaward (2012), the parasympathetic nervous system is dominated by the tenth cranial, which in turn is influenced by the brain stem. When activated, the parasympathetic nervous system releases acetylcholine (Ach), a neurological agent that decreases metabolic activity and returns the body to homeostasis by reducing heart rate, ventilation, blood pressure, muscle tension, and several other functions. Consequently, the autonomic system works in opposition: sympathetic and parasympathetic projections from the brain course their way out to a certain organ where, when activated, they bring about opposite results (i.e. sympathetic speeds up the heart and parasympathetic slows it down) (Sapolsky, 2004).

The endocrine systems a network of four components: glands, hormones, circulation, and target organs (Seaward, 2012). Endocrine glands make and release hormones (biochemical substance) that are seen as “chemical messengers” made up of protein compounds that are programmed to attach to specific cell receptor sites to alter (increase or decrease) cell metabolism (Seaward, 2012). Hormones are transported through the bloodstream from the glands that produced them and travel to the target organs they are called upon to influence (Seaward, 2012). The glands most closely involved with the stress response are the pituitary, thyroid, and adrenal glands (Seaward, 2012). However, the gland that has the most direct impact on the stress response is the adrenal gland (known as the stress gland) (Seaward, 2012).

The adrenal gland has two distinct parts, each of which produce hormones with very different functions (Seaward, 2012). The exterior of the adrenal gland is called the adrenal cortex, and it makes and releases hormones called corticosteroids (Seaward, 2012). There are two types of corticosteroids: glucocorticoids and mineralocorticoids. Glucocorticoids include

cortisol and cortisone and its function is to help generate glucose as an energy source for both the central nervous system (brain) and skeletal muscles during physical exercise (Seaward, 2012). Cortisol is also involved in the process of lipolysis, or the mobilization and breakdown of fats (fatty acids) for energy. According to Seaward (2012), recent clinical studies have linked increased levels of cortisol with suppression of the immune system. It is reported that cortisol metabolizes white blood cells, and as the number of white blood cells decreases, the efficiency of the immune system decreases, setting the stage for illness and disease (Seaward, 2012). Moreover, increased cortisol can direct excess amount of cholesterol into the blood, thereby adding to associated artery plaque buildup and leading to hypertension and coronary heart disease (Seaward, 2012). As noted above, the increased secretions of cortisol in the blood act to ensure adequate supplies of blood glucose for energy metabolism (Seaward, 2012). However, when increasingly high levels of cortisol are observed because of chronic stress, this hormone compromises the integrity of several physiological systems (Seaward, 2012).

The interior part of the adrenal gland is the adrenal medulla. This portion of the gland secretes catecholamines (epinephrine and norepinephrine), which act in a similar way as those secreted at the endings of sympathetic nerves (Seaward, 2012). The adrenal medulla releases 80 percent epinephrine and 20 percent norepinephrine (Seaward, 2012). When under the influence of stress, up to three hundred times the amount of epinephrine can be found in the blood compared to the amount in samples taken at rest (Seaward, 2012). The hormonal influences brought about by the adrenal medulla are called intermediate stress effects (Seaward, 2012). Unlike the release of these substances from sympathetic neural endings, the effects of catecholamine's from the adrenal medulla can last as long as two hours when high levels of secretions are circulating in the bloodstream (Seaward, 2012). These along with hormones

secreted from the adrenal gland become a “toxic chemical cocktail” if they persist in the body for prolonged periods of time without being flushed out primarily through exercise (Seaward, 2012).

The process of these various neural and hormonal pathways serves a very important purpose: physical survival (Seaward, 2012). Moreover, when these same pathways are employed continuously as a results of the influence of chronic stressors, the effects can be devastating to the body. In light of the fact that the body prepares physically for threats, whether they are physical, mental, or spiritual nature, repeated physical arousal suggests that the activation of the stress response is an obsolete mechanism for dealing with stressors that do not pertain to physical survival. The inability of the body to return to homeostasis can have significant effects on the cardiovascular system, and, research now indicates, the immune system (Seaward, 2012). For example, constant pressure and repeated wear and tear on the arteries and blood vessels can cause tissue damage to the inner linings of the organs.

The immune system is a collection of billions of cells that travel through the bloodstream. They move in and out of tissues and organs, defending the body against foreign bodies (antigens), such as bacteria, viruses and cancerous cells. The main types of immune cells are white blood cells. There are two types of white blood cells – lymphocytes and phagocytes. Lymphocytes include: (a) B cells- produce antibodies which are released into the fluid surrounding the body’s cells to destroy the invading viruses and bacteria and, (b) T cells - if the invader gets inside a cell, these (T cells) lock on to the infected cell, multiply and destroy it. When a person is stressed, the immune system’s ability to fight off antigens is reduced. That is why people are more susceptible to infections. The stress hormone corticosteroid can suppress the effectiveness of the immune system (e.g. lowers the number of lymphocytes). Stress can also

have an indirect effect on the immune system as a person may use unhealthy behavioral coping strategies to reduce their stress, such as drinking and smoking.

According to Pelletier (1988) (as cited in Seaward, 2012), psychoneuroimmunology (PNI) is "the study of the intricate interaction of consciousness (psycho), brain and central nervous system (neuro), and the body's defense against external infection and internal abnormal cell division (immunology) (p. 64). The idea of viewing these systems as one network, verses independently, is a newly evolved concept that speaks to the idea of "mind-body-spirit healing" (Seaward, 2012). The Borysenko Model (one theoretical model among others trying to explain the relationship between stress and disease) is currently recognized as the most accurate description of the immune system (Seaward, 2012). Myrin Borysenko (1987) defined both a dichotomy of stress-induced dysregulation and a matrix describing the "immune balance" regarding four classifications of disease (as cited in Seaward, 2012). His model separated disease and illness into either autonomic dysregulation (overresponsive autonomic nervous system) or immune dysregulation (Seaward, 2012). Borysenko proposed that when the autonomic nervous system releases a large amount of stress hormones (epinephrine, norepinephrine, cortisol, and aldosterone), several physiological consequences can occur (as cited in Seaward, 2012). According to Seaward (2012), current research on the relationship between the stress response and immune function is now considered conclusive by researchers at the Institute for Behavioral Medicine at Ohio State University: "Stress increases neuroendocrine hormones, which suppress immune function" (p. 66). Moreover, chronic stress has a direct link to a marked decrease in T-cells, reducing their ability to locate and destroy mutant cells (as cited in Seaward, 2012). The effects of acute and chronic stress on B-cells are still under investigation but are thought to be similar to those on T-cells (Seaward, 2012).

As the mind-body connection is more closely looked at in relation to the stress response, it becomes clear that the mind is very complex and not just a by-product of neurochemical interactions (Seaward, 2012). The mind is accountable for the interactions of a person's thoughts, emotions, behaviors, and personality traits; and understanding it from a psychological point is important for emotional well-being (Seaward, 2012). Sigmund Freud is known for establishing the ground work for understanding human behavior, specifically the abstract concepts of emotional thought process and the theories of personality (as cited in Seaward, 2012). He perceived that people operate from an instinctual nature, referring to the *id* when looking at a person's biological and physiological impulses (as cited in Seaward, 2012). Freud coined the term*, instinctual tension*, referring to the tension between the mind's impulses and the body's responses, suggesting that stress is humanly inherent (as cited in Seaward, 2012). Freud developed a metaphor comparing the mind's innermost thoughts, memories, and feelings (things that make up a person's identity), to an egg (as cited is Seaward, 2012). He proposed that the egg represents the human psyche, fragile, delicate and protected by a sturdy yet vulnerable shell (Seaward, 2012). Freud viewed the ego as a place that sought out pleasure and avoided pain, being primarily responsible for controlling the flood of impulses from the id (as cited in Seaward, 2012). Understanding that stress is aroused simultaneously by internal impulses and perceived outside stimulation (threats) means that the protection of identity (ego) is critical to survival, setting off a person's defense system (Seaward, 2012). Freud believed that a person's defense mechanisms are a group of coping strategies to deal with stress (as cited in Seaward, 2012). Freud laid out the following defense mechanisms as the most commonly used among people in the defense of stress-produced anxiety: (a) denial- when a person is confronted with a perceived threat, he or she will deny association or involvement with any aspect of the situation,

(b) repression- involuntary removal of thoughts, memories, or feelings from the conscious mind (e.g., memories of unpleasant events, child abuse), (c) projection- a process in which an individual defends the ego by attributing unacceptable feelings, impulses, and behaviors to other people, things (e.g., golf club), or conditions (e.g., weather), (d) rationalization- a filter lens that makes emotional pain more acceptable. A manipulation of the truth, (e) displacement- transferring emotional pain and its related behavior from an unacceptable object (e.g., an authority figure) to a nonthreatening object (usually children and pets), (f) humor- the release of sexually repressed thoughts through laughter, decreasing pain and increasing pleasure (as cited in Seaward, 2012). Although these defense mechanisms can be a way to protect an individual, they can inhibit emotional growth and self-awareness (Seaward, 2012). As cited in Seaward (2012), "each time this "space" grows, therein lies an opportunity to expand one's capabilities and enhance one's human potential. It may not seem that stress always involves the ego, but in truth, it really does. Our ego is *our identity,* and whether it is fear or anger that triggers the stress response, things that cause stress typically attack the integrity of our identity and perceptions of self-worth" (p. 100). There are other well-known theorists that have tried to explain the psychological aspects of stress, addressing different strategies that the mind creates to cope with stress (Seaward, 2012). Regardless of the different ways the mind copes with stress, the idea of moving from a place of defensive thoughts and actions toward more positive coping styles based on the strength of a person's inner resources is thought to be the most effective strategy to deal with stress (Seaward, 2012).

When the stress response in minor, people do not notice any symptoms but the greater the stimulation, the more symptoms a person will notice (Micozzi, 2011). Significant life events (as referenced in figure 2) can quickly overload our ability to cope (Micozzi, 2011). According to

Micozzi (2011), "decades of research has linked stress, either directly or indirectly, to coronary heart disease, cancer, strokes, lung ailments, accidental injuries, cirrhosis of the liver, immune system deficiencies, and suicide" (p. 115). People who manage stress show signs of being more resilient, experience fewer symptoms, and experience an improved quality of life (as cited in Micozzi, 2011). Putting together a stress-management program that can utilize a person's inner resources (e.g., intuition, creativity, willpower, faith, humor, love, courage, self-reliance, and optimism) coupled with a person's desire for growth and maturation, is a very individual undertaking (Seaward, 2012). "No one relaxation technique works for everyone" (Seaward, 2012, p. 541). According to Seward (2012), the following are helpful toward creating the best personal stress-management program:

1. *Make a habit of spending some quality time each day to get to know yourself.* Take perhaps a half hour every day for self-exploration, whether in the form of journal writing, art therapy, music therapy, exercise, or something else. Be selfish. Believe that you deserve this time, and you will find it takes priority in your life. Time management is one of the major cornerstones of a successful stress-management program; allocate time for this self-development. Keep in mind that there is a fixed amount of time in a day and that there is a fixed amount of time in a day and that when a new activity is planned, an old one must be edited out of the daily agenda. Survey your daily routine to note where you can squeeze in a block of time for this purpose. If half an hour seems too long, start with five minutes and build from there. And remember that the occasion when you feel you do not have time for self-exploration is when you need it most.
2. *Make a habit of reading your emotional barometer.* Recognize the times when you feel angry, frustrated, anxious, and guilty. When you catch yourself feeling a certain emotion,

ask yourself, What triggered this response? Why did this emotion surface? What is the most appropriate action or behavior to resolve the feeling? Emotional well-being is the ability to feel and express the full range of emotions, but it means being able to control these emotions. Make sure you fill this quota.

3. *Practice the art of unconditional love.* Self-esteem is so critical to effective stress management that it should be given top priority in the design of your stress-management program. Focus on the positive attributes, not what you perceive to be your negative ones, and work to enhance these. Don't just think of yourself as a physical entity; appreciate your intellectual, emotional, and spiritual aspects as well. Self-esteem is the seed of unconditional love. To say hello, to smile, to share a song, to give positive feedback-these are all expressions of love. And when these behaviors are practiced, they seem to double our own sense of self-esteem and self-love.
4. *Nurture your creativity skills.* Creativity is second in importance only to self-esteem as a means to manage stress. Creativity plays a direct role in problem solving and an indirect role in distracting attention from stressful episodes during moments of "play." Don't let childhood memories suffocate your creative abilities.
5. *Balance all components of your well-being and take time to nurture them.* Stress is often expressed in terms of things being out of balance. In physiological terms, this is called lack of homeostasis. But our mental, emotional, and spiritual components can also lack homeostasis. Search out and practice ways to help you achieve mental homeostasis by learning how to either stimulate or desensitize your intellect, depending on its current state. Be attentive to your emotional states as they arise. Learn to express, not suppress, your emotions, but do it in a way that is both therapeutic and diplomatic. Take good care

of your body. Exercise it regularly. Feed it good nutrients, and get adequate amounts of sleep. Finally, give attention to your spirit by taking steps to enhance the maturation of your higher consciousness. Practice centering, emptying, grounding, and connecting on a regular basis. Search for and fulfill your purpose in life.

6. *Be like a child.* Children, like adults, experience acute stress, but they have not learned to be self-conscious about giggling or to suppress their tears. Before children are taught to conform to adult expectations, they are rich in curiosity, imagination, and creativity. These and other characteristics of young children can be relearned if we take the time to do so. (Seward, 2012, p. 542).

This stress-management program can be implemented slowly and best to begin when a person is at a calm state or experiencing minimal stress. Anyone can apply this tool to their life and more than likely relate to one or more sections. In addition to the stress-management program, there are hundreds of other positive coping strategies that can either be used alone or as a collective force to minimize/manage stress, based on a personal desire. The remainder of this paper will focus on three CAM modalities that have been identified as effective strategies to decrease stress and increase a person's overall health and well-being; exercise, guided imagery and autogenic training.

Exercise is great to minimize stress for many reasons (Sapolsky, 2004). First, it decreases a person's risk of numerous metabolic and cardiovascular diseases, and thus decreases the opportunity for stress to worsen those diseases (Sapolsky, 2004). Second, exercise makes people feel good. This may be because exercise causes secretion of beta-endorphin, improving the mood of just about any person (Sapolsky, 2004). Third, the stress-response is about preparing a person's body for a sudden explosion of muscular activity, and you actually reduce tension if you

turn on the stress-response for that specific reason (Sapolsky, 2004). Further, there's some evidence that exercise makes for a reduced stress-response to some psychological stressors (Sapolsky, 2004).

Results

According to Kettunen, Vuorimaa, and Vasankari (2014), several studies report a decrease is depressive symptoms when a person increases their exercise and if they enjoy it their stress and depressive symptoms decrease while raising their emotional well-being (Kettunen, 2014). A study was conducted to examine the effect of a 12-month exercise-training program with a moderate volume and low intensity on stress symptoms, mental resources and cardiorespiratory fitness of healthy, working adults (Kettunen, 2014). The study participants involved 371 employees, who were brought in from different small/medium size business in Southern Finland (Kettunen, 2014). The employees that were part of the inclusion criteria reported they did not take any permanent medications; aged 20-60 (mean age, women: 44 years, men: 42 years); and had no contraindications against walking exercise (Kettunen, 2014). The participants were divided into exercise and control groups, so that approximately 10% of the participants would be part of the control group (Kettunen, 2014). The number of participants involved in the measurements in exercise group was, at the base line, 338 participants; at 4-months, N = 276 (82%); at 8-months, N = 306 (91%); at 12-months, N = 306 (91%); and at 24-months, N = 178 (53%) (Kettunen, 2014). Participants in the measurements of the control group was: at the baseline, N= 33; at 4-months, N = 29 (88%); at 8-months, N = 27 (82%); at 12-months, N = 28 (85%); and at 24-months, N = 28 (85%) (Kettunen, 2014). The participants were supervised and exercised in a group 2 times a week and engaged in 3-5 unsupervised exercise sessions, per week (Kettunen, 2014). After a 12-month supervised exercise program, a 12-month

follow-up without exercise coaching was conducted. The control group had no supervised exercise or program, but both the intervention and the control group participated in all the measurements Kettunen, 2014). Their oxygen and heart rate levels were assessed throughout the study. Measurement tools implemented were the Life Style questionnaire (information on lifestyle habits and level of physical activity), Occupational Stress Questionnaire (OSQ) (assesses characteristics and stress factors of work and stress reactions), The Stress Symptom Index (SSI) (calculating stress level), and the mental resource index (MRI) (assessing mental resources through three distinct questions) (Kettunen, 2014). The participants recorded their amount and intensity of their workouts on a web-based, exercise diary (Kettunen, 2014). The results showed that the SSI decreased by 16% in the exercise group, but no change was observed in the control group (Kettunen, 2014). In the control group there was no positive change in SSI during the intervention or follow-up (Kettunen, 2014). Further, the MRI increased by 8% in the exercise group, and no significant changes happened in the control group (Kettunen, 2014). After the 24-month follow-up, MRI was still increased by 5% (Kettunen, 2014). The participant's cardiorespiratory fitness (CRF) improved by 7% in the exercise group, and no significant changes in the control group (Kettunen, 2014). The participant's in the exercise group improved their leisure time physical activity (LTPA) by 19.5% when assessing their web-based diaries and according to a self-reported questionnaire they increased their LTPA by 71% Kettunen, 2014).

Discussion

The study showed a reduction in stress symptoms with the exercise group, along with an improvement in mental resources, leisure time physical activity and cardiorespiratory (Kettunen, 2014) during the 12-month intervention and the positive changes remained after the follow-up year (Kettunen, 2014). The participants who showed the most stress symptoms and least mental

resources in the beginning of the study showed the best improvements at the end of the study (Kettunen, 2014). The participants decrease in stress symptoms was associated with the improvement in measured CRF, but not with the increase in self-reported LTPA (Kettunen, 2014). This is an interesting piece of the data because LTPA (when self-reported) was the one measurement tool that increased the most (71%) over the duration of the exercise program. This may show that regardless of the quality and duration of physical activity, it's important for mental well-being that it improves an individual's fitness overall (Kettunen, 2014). As shown above, the drop-out rate was significantly higher during the 12-month follow-up portion of the program. Although during the 12-month follow-up period a positive relationship between exercise and reducing stress was founded, the findings where primary relevant during the time the participants were being held accountable by structured exercise sessions and coaches. This can be a concern for individuals that struggle to self-motivate and implement exercise into their weekly schedule. Further, it is important to take into account that certain individuals do not have the ability to engage in physical activity for immobile or health reasons.

Autogenic training (AT) is a type of relaxation training that has shown promise in assisting people with reducing their stress and thereby reduce the physical/psycho-social problems associated with high levels of stress. The autogenic technique applies what is called selected awareness (Seaward, 2012). "Selected awareness refers to the receptivity of the conscious mind to acknowledgment and receipt of specific thoughts or messages" (Seaward, 2012, p. 490). The idea behind selected awareness is that the suppression of the ego is removed and thoughts can move freely from the conscious to the unconscious (Seaward, 2012). AT can either be a training sequence of 3 months or the indirect approach that has been adapted from the 3 month training but a condensed version. The phases of these instructions are a feeling of

heaviness, a feeling of warmth, a calmness of the heart, a calmness of breathing, and even a coolness of the forehead (Seaward, 2012). Each phase should be held for one minute by repeating the instructions until the desired sensation is felt, taking approximately 15 minutes for the whole progression of phases (Seaward, 2012). An important part of the process is to remain in position and try to hold the feeling of relaxation into memory so it can be reflected upon during times of stress (Seaward, 2012). The process starts with a slow, deep breath and while feeling the sense of relaxation the person would exhale, this is done twice while making the breath even slower and deeper than the last (Seaward, 2012). Then, saying the following thoughts to him or herself:

Phase 1: Heaviness

- My arms and hands feel heavy.
- My legs and feet feel heavy.
- My arms and legs feel heavy.

Phase 2: Warmth

- My arms and hands feel warm.
- My legs and feet feel warm.
- My arms and legs feel warm.

Phase 3: Heart

- My heart is calm and relaxed.
- My heartbeat is slow and relaxed.

Phase 4: Breathing

- My breathing is slow and relaxed.
- My breathing is calm and comfortable.

Phase 5: Solar Plexus

- My stomach area is calm and relaxed

Phase 6: Forehead

- My forehead is cool.
- My forehead is calm and relaxed.
- My entire body is calm and relaxed. (Seaward, 2012, p. 493)

The idea is to become proficient in the technique, becoming relaxed immediately upon the suggestion of warmth and heaviness. This can be very useful in situations that trigger the stress response (Seaward, 2012). There is also an additional way to apply AT called direct approach. This approach is defined as not only suggesting the use of the words *warm* and *heavy* but also imagining the flow of blood to these body regions such as hands or feet (Seaward, 2012).

Results

In a study conducted by Lim and Kim (2014), the effects of autogenic training (AT) on stress-response were investigated using heart rate variability as a measure of stress of 40 nursing students in the clinical setting (Lim & Kim, 2014). Participants were assigned to one of two groups, the experimental group was comprised of 19 participants who underwent an 8-week AT program in which they were taught the phases of the relaxation responses (Lim & Kim, 2014). The other 21 were assigned to the control group and not provided any training (Lim & Kim, 2014). A questionnaire (stress response) and heart rate variability were implemented three times throughout the study to measure stress-response (before the program, at the end of the program, and 6 months after the end of the AT program) (Lim & Kim, 2014). The stress response is a 39-item scale that has seven subscales (aggression, somatization, anger, depression, fatigue, and frustration) that measures the physical and mental reactions caused by stress (Lim & Kim, 2014).

The study found a significant increase on the stress response in the control group at the end of the AT (increased by 14.70 points from 73.05 at the end) and at 6 months after AT by 20.99 points (Lim & Kim, 2014). In the experimental group no significant differences were observed between scores (Lim & Kim, 2014). No significant interaction was found for the objective measure of heart rate variability, all hypothesis were rejected (Lim & Kim, 2014).

The results did conclude that AT reduced stress response (Lim & Kim, 2014).

Discussion

Overall, the study is consistent with other research indicating that AT is an effective method for reducing perceived stress levels (psychological variables). However, the impact of AT on other physiological measures used to access stress need to be further investigated. For example, repeating the study using biological markers of stress such as blood corticotrophin releasing hormone (CRH) levels may produce a different outcome.

Mental imagery (also known as guided imagery), is a technique that uses the imagination to observe, in the first person, images created by the unconscious mind (Seaward, 2012). The images relate to three categories: (1) images that replicate peaceful scenes to promote relaxation, (2) images that substitute a less described behavior with a more healthy one, and (3)images that help to heal damaged body tissue (Seaward, 2012). Visualization is used side by side with mental imagery, but it can mean including additional aspects of mental imagery not directly linked to the relaxation effect (Seaward, 2012). This is because visualization is a conscious choice with specific instructions, and the term *imagery* is a spontaneous flow of thoughts coming from the unconscious mind (Seaward, 2012). Janoski and Kugler (1987) studied the effects of mental imagery as a relaxation technique on several biochemical reactions (as cited in Seaward, 2012). They measured the response of salivary immunoglobulin A (SigA), cortisol, and mood states

when under the effect of mental images specific to the heightening of the immune system (as cited in Seward, 2012). “The results supported the hypothesis that when cognition is directed toward the biochemical factors, there is a subsequent change in neuroimmunomodulation” (as cited in Seward, 2012, p. 412). According to Seward (2012), just as real or imaginary thoughts can trigger the stress response, relaxing thoughts can promote the relaxation response, making this the primary goal of metal imagery (Seaward, 2012).

Results

A study was conducted to evaluate the effectiveness of a guided imagery (GI) intervention for stress reduction in pregnant African American women beginning in the second trimester (Jallo, Ruiz, Elswick, & French, 2014). The study of 72 women used a randomized controlled experimental design with two groups conducted over a 12-week period (Jallo et al, 2014). The invention used during the study was a CD with four professionally recorded tracts designed and sequenced to influence study variables (Jallo et al., 2014). The CDs key components included relaxation, focused breathing, and a variety of multisensory images to promote reduction of stress and anxiety as well as to restore levels of energy (Jallo et al., 2014). The participants were asked to listen to the CD once a day in a specific order. The participants in both the GI group and controlled group completed measures and donated 5 cc of blood at baseline, 8 weeks and 12 weeks, along with completing a daily perceived stress scale (10-item, self-reported measure of global perceived stress that measures the way a person see’s their life as being stressful during the past month) (Jallo et al., 2014). The study found a significant reduction in perceived stress scores at 8 weeks but not at 12 weeks in the GI group compared to the controlled group (Jallo et at., 2014). No significant differences in the physiological measures were found between the groups.

Discussion

The final conclusion is that guided imagery is an effective tool to reduce perceived stressors among this specific population. Further research should be conducted to apply the findings to a broader population. As touched on in the review of the Lim & Kim study, other measures of physiological stress markers should be investigated.

Conclusion/Recommendations

As reported above a stressor is defined as a situation, circumstance, or any stimulus that is viewed as a threat. This means what constitutes a stressor can be almost limitless, especially when considering the variation between people. If people repeatedly turn on the stress-response (whether acute, chronic, and/or daily life hassles), or they cannot turn off the stress-response at the end of a stressful event, the stress-response can eventually become damaging. Therefore, compromising a person's immune system and overall well-being. The research looked at the effects stress has on the sympathetic and parasympathetic nervous system and how the endocrine system is linked hormonally to stress. Primarily looking at when increasingly high levels of cortisol are observed because of chronic stress, this hormone compromises the integrity of several physiological systems that in-turn can bring forth psychological concerns (e.g., depression, anxiety, sleep issues). Although continued research needs to be conducted on stress being a direct cause of illness and disease, the association between them is too significant to be considered a mere coincidence.

Regardless of the different ways the mind copes with stress, the idea of moving from a place of defensive thoughts and actions toward more positive coping styles is thought to be the most effective strategy to deal with stress. While current research shows a significant impact of various CAM modalities on participants perceived stress levels, 2 of the 3 studies reviewed

showed no significant change in the proposed physiological indicators of stress such as heart rate variability and stress hormones found in the blood. Further research should be done to determine which CAM interventions will have a measurable effect on multiple indicators of stress levels, including those of physiological nature. It is possible that these CAM modalities do impact physiological aspects of stress but need to be implemented and monitored over a longer period of time or using other valid measures of stress. As with many other types of research, demonstrating a positive impact on a larger more generalized population with effects that can be shown to be sustained over long periods of time can be helpful in gaining acceptance and utilization of CAM interventions as not just adjuncts to traditional medicine but as valid treatments in and of themselves.

References

Copstead, L. & Banasik, J. (2013). *Pathophysiology*, (5th edition). St. Louis, MI: Elsevier Inc.

Jallo, N., Ruiz, R., Elswick, R. & French, E. (2014). Guided imagery for stress and symptom management in pregnant African American women. *Evidence-Based Complementary and Alternative Medicine,* volume 2014. doi: http://dx.doi.org/10.1155/2014/840923.

Kettunen, O., Vuorimaa, T., & Vasankari, T. (2014). A 12-month exercise intervention decreased stress symptoms and increased mental resources among working adults-Results perceived after a 12-month follow up. *International Journal of occupational Medicine and Environment Health,* 28; (1): 157-168. doi: http://dx.doi.org/10.13075/ijomeh.1896.00263.

Lim, S. & Kim, C. (2014). Effects of autogenic training on stress response and heart rate variability in nursing students. *Korean Society of Nursing Science,* vol. 8, issue 3. doi: http://dx.doi.org/10.1016/j.anr.2014.06.003.

McEwen, B. (2007). Physiology and neurobiology of stress and adaptation: Central role of the brain. *Physiol Rev*, 87:873 - 904. doi: 10.1152/physrev.00041.2006.

Micozzi, M. (2011). Fundamentals of complementary and alternative medicine, (4th edition). St. Louis, Missouri: Elsevier Inc.

Overhosler, J. C., & Fisher, L. B. (2009). Contemporary perspectives on stress management: Medication, meditation or mitigation. Department of Psychology, Case Western Reserve University, 39: 147 - 155. doi: 10.1007/s10879-009-9114-8

Sapolsky, R. (2004). *Why zebras don't get ulcers*, (3rd edition). New York, NY: St. Martin's Griffin.

Seaward, B. (2012). Managing stress: Principles and strategies for health and well-being, (7th edition). Burlington, MA: Jones & Bartlett Learning, LLC.

Vandana, V., Sarawathy, L., Pillai, G., Ramaiyer, K. & Kuman, H. (2011). Meditation induces a positive response during stress events in young Indian adults. *International Journal of Yoga,* 4(2), 64 - 70. doi: 10.4103/0973-6131.85487

Wehrwein, P. (2011). Astounding increase of antidepressant use by Americans. [Web log post]. Harvard Health Publications. http://www.health.harvard.edu/blog/astounding-increase-in-antidepressant-use-by-americans-201110203624