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Chelsey Silveria
Perceived Stress Levels of
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Exercise

ABSTRACT

This study explored if the perceived stress levels of individuals was influenced by the activity they engaged in, yoga or other forms of exercise. Additionally, factors of practicing yoga or another form of exercise were examined to determine their influence on perceived stress such as length of time, frequency, form, and longevity of the activity. The sample was found using a nonprobability convenience sample in addition to snowball sampling. Participants consisted of 85 individuals (75% white), however only 50 participants qualified as well as completed all questions on the Perceived Stress Scale and thus were the only individuals considered. Participants completed the Perceived Stress Scale assessment in addition to several questions in regards to participants' yoga or other form of exercise habits such as duration, frequency, longevity, and form of preferred activity. Inferential statistics were utilized to compare the perceived stress scores of individuals who participated in yoga with individuals who engaged in other forms of exercise. This study found that individuals who practice yoga have significantly lower perceived stress levels than individuals who engage in other forms of exercise. Due to the limited sample size (N=50) there was no significant relationship found between perceived stress level and duration, longevity, frequency and form of activity.

**PERCEIVED STRESS LEVELS OF INDIVIDUALS WHO PRACTICE YOGA IN
COMPARISON TO INDIVIDUALS WHO PARTICIPATE IN OTHER FORMS OF
EXERCISE**

A project based upon an independent investigation
submitted in partial fulfillment of the requirements
for the degree of Master of Social Work

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2014

ACKNOWLEDGEMENTS

I would like to thank Nancy Sheridan Perry and Laura Calcaterra for their continued support and guidance. They both have allowed me to grow as an individual and explore my own life and the influence yoga has had on it. In addition, I wish to acknowledge Dr. Colette Duciaume-Wright for her investment and support as my thesis advisor. Lastly, I want to thank my family and friends for their understanding and encouragement.

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CHAPTER I

Introduction

Recently, within the last ten years, researchers have focused on the benefits of yoga in relation to physical well-being and psychological benefits. However, there is very little consistent research that compares yoga with other forms of exercise in regards to self-reported stress levels of individuals. Thus, this study will examine the level of reported stress that individuals indicate who practice yoga in comparison to individuals who participate in other forms of exercise. Yoga is defined as any method or discipline prescribed that includes a series of postures and breathing exercises practiced to achieve control of the body and mind, tranquility (Yoga, 2013). Exercise on the other hand is defined by planned bodily exertion, especially for the sake of training or improvement of health (Exercise, 2013).

Many studies have illustrated that yoga and exercise decrease stress levels (Vancomport et al., 2011). However, very few studies have identified the differences in stress level, if any, between individuals who practice yoga and individuals who perform other forms of aerobic exercise. This research is essential due to the increase of individuals who report experiencing high levels of stress (da Silva, Ravindran, & Ravindran, 2009). Currently, there is only a limited amount of literature that addresses the comparison of stress levels between individuals practicing yoga and individuals engaging other forms of exercise (Streeter et al., 2010). Within this literature there are several inconsistencies in regards to which method is more effective at decreasing mood symptomatology and stress levels (Kraemer & Marquez, 2009).

Much of current literature focuses on the impact exercise and yoga has on mood disorders, such as anxiety and depression (Netz & Lidor, 2003). The level of stress an individual reports after practicing yoga or another form of exercise has not explicitly been discussed. A self-report measure of stress has been used only in addition to other measures such as the Positive Affect and Negative Affect Schedule as well as a biological measure of stress in the current literature (West, Otte, Geher, Johnson, & Mohr, 2004). Stress can be defined as a state of mental or emotional strain or tension resulting from adverse or very demanding circumstances (Cohen, Kamarck, & Mermelstein, 1983). The level of stress an individual reports can greatly impact their physical, emotional, and social functioning. Due to the potential impairment of stress, identifying if practicing yoga decreases stress levels more so than other forms of exercise would be beneficial for individuals experiencing high volumes of stress.

In relation to the field of social work it would be valuable to illustrate what activity may be more useful in decreasing ones' level of stress. Due to the increase of stress present in our society, more clients that social workers interact with will most likely report stress level as a top concern. In addition, to offering therapeutic services as a social worker it would also be appropriate to recommend activities outside of therapy to reduce stress levels. Currently, some clinical social workers have begun to incorporate yoga, including pranayama (breathing), asana practice (physical practice), and meditation into therapeutic treatment among patients with a variety of symptoms (Strauss & Northcut, 2013).

Thus, in order to give patients the best quality of care, social workers need to provide information about activities that are proven to reduce stress most effectively. Therefore, this research will help inform social workers if yoga or other forms of exercise is more effective at reducing a client's stress. The research question that will be addressed is, do individuals who

practice yoga self report a different level of perceived stress than individuals who practice other forms of exercise? Additionally, do length of time, frequency, form, and longevity of practicing yoga or another form of exercise influence perceived stress levels?

The goal of this study is to continue to present research comparing yoga and other forms of exercise, due to the limited and inconsistent results of the current research. The author hopes this study will provide more data and information on this topic in order to help form more consistent and reliable findings in regards to the perceived stress levels of individuals who practice yoga compared to individuals who participate in other forms of exercise. Also, much of the research describes how mood and stress are influenced after one single session of either activity (West et al., 2004). This research will focus on the impact of yoga and other forms of exercise over a more extensive time period in order to demonstrate the constant stress levels of individuals who participate in either of the activities. This study will also solely measure the perceived stress of an individual instead of measuring anxiety, mood, and stress-hormones like much of the current literature (Streeter et al., 2010). Thus, this research will not only be limited to the clinical population, but will incorporate the larger population. The next chapter provides an overview of the literature that has examined yoga and other forms of exercise as well as perceived stress levels.

CHAPTER II

Literature Review

This literature review is comprised of five major sections bounded by this introduction and a final summary. It begins with the definitions of exercise and yoga with the use of literature. The review then presents information on a biological theory, which illustrates that exercise decreases stress. From there the review describes the practice of yoga and the results of decreased stress levels. Next the review presents literature on the comparison of perceived stress by an individuals report and biological indicators of stress such as cortisol level. The current research in regards to comparison studies between yoga and other forms of exercise will then be presented. Finally, this chapter will end with a summary of this chapter and a formal statement of purpose for this study.

Definitions of Yoga and Exercise

There are several different forms of yoga, and varied schools of practice. However, the standard components of yoga are based on the ancient teachings, which include specific postures (asanas), breathing exercises (pranayamas), and meditation (dhyana) (da Silva et al., 2009). Therefore, regardless of the specific school of practice an individual engages in, the basic characteristics of yoga practice is the same. The ancient teachings of yoga are acquired through Patanjali Maharishi who comprised the first and foremost scripture of yoga. He illustrated his thoughts in The Yoga Sutras. In the translated and commentary version by Sri Swami Satchidananda (2012), yoga is defined as “the extraordinary experience gained by controlling the

modifications of the mind itself called Yoga” (p.4). The definition above emphasizes the importance of the mind in yoga. Therefore, the practice of yoga includes physicalness, similar to exercise but also includes the value of the mind and the breath.

The practice of yoga is also defined in more broad terms such as the positions of yoga provide a low-intensity exercise that provides muscle strength, flexibility and body alignment (Kraemer & Marquez, 2009). For the purpose of this study the author will include the ideals of the ancient teachings of yoga in the definition. Yoga will be defined as any method or discipline prescribed that includes a series of postures and breathing exercises practiced to achieve control of the body and mind, tranquility (Yoga, 2013). Thus, any method or particular school of yoga should fall into this definition. Individuals who practice any form of yoga which focus on breathing, postures and meditation/mind will be appropriate to complete the study.

Exercise also consists of several forms. The literature has illustrated numerous definitions of exercise. Many of the definitions are similar, however the definitions vary slightly depending on the primary focus of exercise the author utilizes. Some research has clearly defined physical activity in contrast to the definition of exercise. In this research the phrase ‘other forms of exercise’ instead of ‘other physical activity’ because of the differences in definitions. An element of exercise includes that it is planned, structured, and includes repetitive bodily movement (Caspersen, Powell & Christenson, 1985). Another element of the definition of exercise includes that there is an objective to improve or maintain physical fitness components (Caspersen et al., 1985). Neither of the above listed elements are included in the physical activity definition. Utilizing the word exercise in this research instead of physical activity allows individuals who intentionally plan to move their bodies as well as have an intention to improve physical health to participate in this research. These exercise elements are also similar characteristics to individuals

who practice yoga, due to the fact that yoga can be defined as a form of exercise. Other elements included in the definition of exercise are, “ 1. Bodily movement via skeletal muscles, 2. Results in energy expenditure, 3. Energy expenditure (kilo-calories) varies continuously from low to high 4. Positively correlated with physical fitness” (Capersen et al., 1985, p. 127).

Another definition of physical exercise is described by Salmon (2001), “physical exercise implies a regular, structured, leisure-time pursuit” (p. 34). Similar to the definition above exercise includes the idea that it is a planned and structured event. This definition includes the phrase ‘regular’, which is not presented in the definition by Capersen et al. (1985), however in relation to this research participants who are eligible to participate in this study will need to be regularly exercising at least for the past month. Individuals in this research will need to engage in exercise at least twice a week for the past month. Thus, the term ‘regular’ is consistent with the use of the term exercise in this research.

Winter and Fowler (2009) presents the definition of exercise by The American College of Sports Medicine’s guidelines for terms and nomenclature. These guidelines define exercise by, “Any and all activity involving generation of force by the activated muscle(s) that results in disruption of a homeostatic state” (Winter & Fowler, 2009, p. 448). This definition focuses more on the biological component of exercise, specifically what is occurring inside the body when an individual is engaging in exercise. In this research the biological component of exercise is assumed when participants state that they engaging in exercising. Therefore, this is not a component of the definition the author will be focusing on in this research; however, it is an essential component to exercise and thus should be mentioned.

Winter and Fowler (2009) also clearly describe that exercise includes both movement represented activities such as walking, running and swimming as well as movement assisted by

machines or other devices such as biking and skiing. This is an important component to mention because in this survey the author asks individuals what form of ‘other exercise’ they engage in, the author has listed several activities including but not limited to swimming, running and biking. As illustrated, the author has acknowledged that exercise can both be movement with or without the use of a machine or a device. The definition that the author will use in this research is listed below. Exercise will be defined by planned bodily exertion, especially for the sake of training or improvement of health (Exercise, 2013). This definition includes elements of several of the definitions discussed above and includes individuals who engage in all forms of exercise including walking, running, swimming and biking.

Exercise Theory: Exercise Decreases Stress Level

The theoretical framework that is present in all of the research stems from the biological theory and operates under the assumption that yoga and exercise decrease stress levels. Specifically, this theoretical framework is based on the biological indicators of the reaction to stress. Physiological indicators of stress in the body include systolic blood pressure, diastolic blood pressure, heart rate and cortisol level in saliva or in urine (de Rooij, Schene, Phillips, & Roseboom, 2010). The biological theory has acknowledged the stress indicators in the body and from there have concluded that the use of exercise decreases or limits the stress reactions in the body.

Klaperski, Dawans, Heinrichs, & Fuchs (2013) states, “physical exercise is thought to act as a moderator of the stress-health relationship by reducing the detrimental effects of chronic stress (e.g., at the workplace) on physical and mental health, or in otherwords by “buffering” the negative health effects of stress” (p.266). The study by Klaperski et al. (2013) reinforces the theory that exercise influences stress mediators within individuals. This study found that

participants with more regular exercise practice showed alleviated cardiovascular stress reactions in psychosocial stress situations. The results of the study also found that individuals who were inactive, meaning they did not participate in exercise, had higher cortisol reactivity to stress compared to the more active individuals in this study. These findings illustrate how exercise decreases biological reactions to stress. Thus, because the stress reaction within the body was not as significant for individuals who are active and engage in exercise compared to individuals who are inactive, the biological theory that states exercise influences stress reactions within in the body is reinforced.

Similarly, Rimmele et al. (2007) found in his study of men that men who were elite sportsman and thus exercised on a frequent basis had significantly lower cortisol levels and heart rate responses to stress in comparison to men who were untrained and did not participate in exercise. Once again, the current literature recognizes the biological theory that individuals who participate in exercise exhibit lower and less significant biological reactions to stress than individuals who do not engage in activity. Another study by Rimmele et al. (2009) reinforces previous results that indicate lower reactivity in regards to heart rate and cortisol level when exposed to stress for individuals who exercise. This study also found that in comparison with individuals who do not exercise, individuals who exercise have lower cortisol levels, lower heart rate and lower state anxiety responses.

The biological theory specifically indicates that exercise influences biological responses to stress. This theory does not address self-report of stress such as mood, feeling state or perceived stress. Thus, the study presented by Rimmele et al. (2009) acknowledged a lower cortisol level, lower heart rate, and lower anxiety response for individuals who exercised, this theory supports the lower cortisol levels and lower heart rate of the individuals who engage in

exercise because cortisol and heart rate are biological indicators of stress within the body. However, the biological theory does not necessarily support the lower anxiety response because this response is based on self-report and perceived reaction to anxiety by the individual himself and not the biological markers within the body, which are measurable. The biological theory is the theory, which all the research on this topic is based.

Yoga Practice and Decreased Stress Level

The literature also describes that yoga in addition to exercise is an effective method of reducing stress, specifically biological symptoms of stress, as well as other psychological symptoms. In regards to biological indicators of stress, Yadav, Magan, Mehta, Sharma, & Mahapatra (2012) specifically measured cortisol levels, the hormone indicator of stress in a yoga intervention study. This research illustrated that the brief yoga-based lifestyle intervention decreased stress significantly as indicated by biochemical markers such as a reduction in plasma cortisol and increase in b-endorphin levels (Yadav et al., 2012). This study reinforces the biological theory that exercise and in this case yoga reduces the biological and physiological symptoms of stress.

In addition there has also been literature that illustrates the psychological benefits, including stress, of yoga. Some literature measures both self-report of stress as well as biological measures of stress. Yoshihara, Hiramoto, Sudo, & Kubo (2011) and Rocha et al. (2012) employed both self-report stress assessments and biological assessments in their studies. As Yoshihara et al. (2011) illustrates “Yoga has been reported to have various therapeutic effects. Studies have shown that the practice of yoga reduces perceived stress and negative feelings and improves mental and physical symptoms” (p.52). This demonstrates that there is evidence that

yoga has not only improved biological indicators of stress, but has also improved an individual's perceived stress level.

The literature has also illustrated that yoga is beneficial in regards to mental health. Mental health and stress are strongly correlated; many individuals with mental health symptoms also indicate high levels of stress. Therefore, the author has included some literature, which focuses on the benefits of yoga for individuals with anxiety or depression. Frequently, one of the assessments used in this research is the Perceived Stress Scale (Cohen et al., 1983) or some other similar form of the assessment, which measures stress. Hazlett-Stevens (2012) presents a case study of a 51-year-old man who was referred to mindfulness based stress reduction program. Mindfulness based stress reduction program teaches a series of mindfulness meditation and yoga practices, delivered in a group format during eight weekly sessions plus one full-day sessions. This case study illustrated that MSBR was effective at reducing severe levels of anxious arousal, generalized anxiety, worry, fear of negative evaluation, and depression, which this individual experienced at the beginning of treatment (Hazlett-Stevens, 2012). The literature has also measured the effectiveness of mindfulness-based stress reduction, which consists of mindfulness meditation and yoga practices, and has found that this intervention improves symptoms of depression and anxiety (Streeter, Gerbarg, Saper, Ciraulo, & Brown, 2012).

Khalsa, Shorter, Cope, Wyshak, & Sklar (2009) provides a study, which placed professional musicians in either a yoga lifestyle intervention group, a group practicing yoga and meditation and a control group, which consisted of no yoga. Individuals completed perceived stress scale assessment along with other mood assessments. The study found that yoga and meditation as well as yoga lifestyle intervention are beneficial at reducing stress levels as well as several other symptomology. These findings were continuous at the year follow-up as well. This

study found that yoga was beneficial at decreasing levels of stress. It also illustrates how effective the intervention of yoga was in regards to the continuing benefits the individuals experienced even a year after the study. This research allows me the opportunity to consider the long-term effectiveness of practicing yoga or participating in other forms of exercise in this research.

Current research suggests that yoga is effective at reducing reported stress as well as an effective treatment for mood disorders, specifically anxiety and depression as stated above. Research has illustrated that yoga is comparable to medication for individuals with depressive disorders and the combination of yoga and medication is superior to medication alone for anxiety disorders (da Silva et al., 2009). da Silva et al. (2009) also illustrated that there were significant reductions of plasma cortisol levels in depressed patients after participating in three weeks of yoga. It may then be assumed that because the cortisol level decreased the individuals stress level also decreased. West et al. (2004) also examined cortisol levels of individuals who participated in Hatha yoga and determined that individuals who participated in the yoga class had lower cortisol levels than individuals who participated in other groups.

Khalsa et al. (2009) measured the influence of yoga on young professional musicians that experience high levels of stress, performance anxiety, and debilitating performance-related musculoskeletal disorders. The study randomized the musicians in to a yoga lifestyle intervention group or to a group practicing yoga and meditation as well as a control. The results of the study indicated that individuals in either of the yoga groups experienced less general anxiety/tension, depression and anger at the end of the program and at a one-year follow-up continued to experience less anxiety than compared to the control group. Another study also illustrated that a comprehensive yoga program significantly reduced self-reported symptoms of depression. This

study measured participant's mood prior to and after a LifeForce yoga training, specifically designed to address mood. Individuals indicated decreased symptoms of depression and better mood two months after intervention (Bennett, Weintraub, & Khalsa, 2008).

This literature illustrates that yoga benefits mental health as well as reduced stress benefits. This research will only focus on stress levels of individuals; due to the fact that the author wants to incorporate the general population and not limit the sample to individuals who experience depression or anxiety.

Perceived Stress Level Compared to Biological Stress Level

Some literature presented has measured both perceived stress level and biological stress levels, while other studies have focused either on perceived stress level or biological stress level. As illustrated above, the biological theory is the underlying ideology that practicing yoga or any form of exercise decreases stress level. This theory is based on the actual biology of individuals. Specifically, the measurement of hormones and stress indicators in the body such as the hormone cortisol, heart rate and blood pressure are used to determine the level of stress an individual is experiencing. Doyle et al. (1996) states, "cortisol levels in spot-urine samples are generally considered indicative of state adrenal activity" (p. 44). Perceived stress on the other hand is the interpretation of the level of stress the individual is experiencing. This measurement of stress is based solely on self-report. Individuals who report stress levels are unaware of their biological functioning and instead base their report on their experience and knowledge of the word stress.

As acknowledged in the biological theory, exercise decreases stress levels on the biological level and thus is assumed it also lowers stress on the psychological level. However, some literature has found significant differences in the biological stress level and the stress level reported by the individual. In this research the author is interested in how individuals feel in

regards to stress level and experienced stress. The importance of this study is not placed on the biological level but instead on the individuals feeling of experienced level of stress.

de Rooij et al. (2010) completed a study, which included a large number of individuals who filled out the Hospital Anxiety and Depression scale. The study found that systolic blood pressure, diastolic blood pressure, heart rate and cortisol reactivity as a result of psychological stress were lower for individuals with mild to severe depression and anxiety than individuals without a diagnosis of anxiety or depression. However, perceived stress was higher for individuals with anxiety and depression than those without. Overall blood pressure, heart rate, and cortisol stress levels decreased and perceived scores significantly increased for individuals with greater depression and anxiety symptomology. de Rooij et al. (2010) study illustrates that the biological stress response did not correspond to how individuals perceived their stress level in the moment. This conclusion illustrates why the author has chosen to focus on how individuals perceive their level of stress rather than the actual biological response.

Another study illustrates the same dissimilarity between physiological response and psychological response to stress. Individuals in the Klaperski et al. (2013) study participated in different levels of physical activity. Results from the study demonstrated that physiological reaction to stress, specifically heart rate and salivary cortisol, were less reactive in the individuals who participate in more exercise. However, reported mood and stress level was more significantly impacted by stress for individuals who participated in more exercise than individuals who did not. This study only further illustrates the discrepancy that can occur between the biological indicators of stress and the perception of stress the individual is experiencing. However, some studies have illustrated that stress hormones correlate with perceived stress. Doyle et al. (1996) study illustrated that urinary cortisol concentration was

found to correlate with MAO-A inhibitory activity and with the elevation in perceived stress of participants.

West et al. (2004) found that individuals perceived stress was not always directly related to their cortisol level. West et al. (2004) completed a comparison study where they compared individuals who participated in Hatha yoga and individuals who participated in African Dance. The study used the Perceived Stress Scale (Cohen et al., 1983) to measure the individuals self-reported stress level, a positive affect and negative affect schedule was used to measure affect and the participant's salivary cortisol was measured. West et al. (2004) found that individuals in both the Hatha yoga group and the African Dance group experienced a reduction in perceived stress as well as negative affect. However, individuals who participated in African dance had increased levels of cortisol and individuals who participated in yoga had decreased levels of cortisol after a class.

This research illustrates that exercise does not necessarily reduce cortisol levels even though the corresponding perceived stress level may have decreased. This finding is unique from the biological theory and the assumption that individuals who participate in yoga and exercise experience decreased stress levels and therefore, decreased cortisol levels. This research indicates that even though both activities produce positive psychological effects the activities may be different in terms of physiological stress processes.

These findings may align with the authors hypothesis due to the fact that individuals that practice yoga over an extended period of time, unlike the one session measured in this study, may process stress differently on a biological level than individuals whom participated in other forms of exercise, including dance. Thus, the differences in long term physiological stress processing could possibly impact the level of perceived stress an individual experiences.

Current Comparison Studies of Yoga and Exercise

Some of the literature has compared yoga with other forms of exercise. However, much of the research is related to depressive and anxiety symptomatology and does not solely measure levels of stress. The study by West et al. (2004) compared individuals who practiced yoga with individuals who participated in a dance class. Streeter et al. (2010) compared individuals who participated in yoga to individual who participated in metabolically matched walking intervention for an extended period of twelve weeks. The yoga group reported greater improvement in mood and greater decrease in anxiety than the walking group. This study also measured GABA levels and found that improved mood was positively correlated with decreased anxiety and thalamic GABA (Streeter et al., 2010).

Kraemer and Marquez (2009) also noted the differences between individuals who participated in yoga and individuals who walked. The participants were age 50 and older and research found that individuals who participate in yoga had higher levels of depression and lower levels of quality of life in comparison with the walking group. This study also indicates that change in heart rate indicated no change in individual's mood or state of anxiety in regards to the pre and post sessions (Kraemer & Marquez, 2009). The research hypothesizes individuals who suffer from greater levels of depression and lower qualities of life seek out practicing yoga to cope with their experiences.

This is an important component to consider for this research. Due to the fact this research is a comparison study and not a randomized experimental design, it is necessary to question the influence of an individuals choice to choose practicing yoga verse participating in other forms of exercise. Another component of this study is long-term effects of yoga or walking was not taken into account. This study as well as the other literature mentioned demonstrates that there are

inconsistencies in the research in this area.

Netz and Lidor (2003) found that individuals who participated in Feldenkrais, swimming and yoga but not aerobic dance and computer classes had an improved mood. This study found that mindful low-exertion activities, including yoga and Feldenkrais as well as some aerobic activities, specifically swimming, improved mood in one single session. This study illustrates that not all forms of exercise are proven to enhance mood and potential level of perceived stress. Thus, it is important that in this study the author asks individuals who perform other forms of exercise what type of exercise they are participating in. Thus, this research can potentially demonstrate if certain forms of exercise are more likely to impact an individual's level of perceived stress than others. Also from this study it is important to be aware of the fact that certain exercises may compare with individuals who practice yoga in regards to perceived stress. Meaning the results may indicate that there is no difference in perceived stress between individuals who practice yoga and individuals who perform certain types of exercise.

Rocha et al. (2012) completed a study, which compared healthy men before and after a six-month intervention of either yoga practice or exercise. Individuals in the yoga group had improved scores on memory tests, lower salivary cortisol, and improvements on their reported levels of stress, anxiety, and depression inventories. This study illustrates the holistic component that exercise and yoga can have on an individual. This study measured several components from cognition to perceived stress to biological reactions as well as other mental health symptomology. It is important for the author to remember the complexities of humans and not quickly jump to assumptions within the research. The author will only be measuring one component of an individual's experience, which is the individuals' perceived stress level. However, many other factors may be apparent that are also important in this research that the

author will be unable to acknowledge.

Summary

This chapter included information on the biological theory specifically that exercise and yoga decrease biological stress indicators. Also mentioned was the current literature on yoga in relation to stress as well as other mental health symptomologies. A comparison of biological stress indicators and individuals perceived stress level was addressed. Lastly, the chapter reviewed literature, which has compared yoga with other forms of exercise and the corresponding stress levels.

The literature illustrates that there are very few studies that have measured the differences between individuals who participate in yoga to individuals who participate in other forms of exercise. Much of the literature that is available consists of samples that are homogeneous. The literature also does not consist of samples that include great variation between participants but instead are created with individuals who vary slightly if not at all in age, educational level, sex, and SES. Also, much of the research describes how mood and stress are influenced after one single session (West et al., 2004). This research will focus on the impact of yoga practice and exercise during a longer time frame. Individuals will need to be participating in yoga or another form of exercise for at least a month and be involved in at least two sessions a week.

The literature also suggests that there are some inconsistencies in regards to the comparison of individuals who practice yoga and individuals who participate in other forms of exercise. Some literature indicated that individuals who practice yoga experienced higher levels of depression and lower levels of quality of life in comparison to individuals who walked (Kraemer & Marquez, 2009). Other literature has found that individuals who practiced yoga experienced reduced stress, depression, and anxiety in comparison to individuals who

participated in aerobic exercise (Rocha et al., 2012). While other literature showed that there was no significant difference in anxiety and mood between individuals who participated in one single aerobic exercise session verse one yoga session (Vancampfort et al., 2011). Thus, this research will provide further information in regards to the inconsistencies presented in the current literature.

The author will also solely measure the perceived stress of an individual in this research instead of measuring anxiety, mood, and stress hormones like much of the current literature. This is due to the fact that the author does not want to limit the sample to exclusively the clinical population, but instead wants to incorporate a larger population. Therefore, the author will only use the Perceived Stress Scale (Cohen et al., 1983) as a measurement for this research. The author will not measure hormone levels because hormone levels do not necessarily indicate the perceived stress an individual may experience (West et al., 2004).

The relevance of this study is related to the increasing number of individuals who frequently experience and are affected by stress. It is crucial for clinical social workers to have a greater understanding of the different self-care options available to the public. It is also essential to identify the activity that is most effective at reducing the level of stress experienced by an individual in the general population as well as with individuals with clinical disorders, such as mood disorders. Assuming this research illustrates that individuals who practice yoga report lower levels of stress than individuals who participate in other activities, social workers as well as other health professionals can encourage individuals to engage in stress reducing behaviors, specifically encouraging the practice of yoga over other forms of exercise. Since the literature has illustrated yoga decreases stress (Rocha et al., 2012) it is essential that health providers,

including social workers discuss this as another treatment option with patients along with appropriate medications or therapy.

CHAPTER III

Methodology

The purpose of this research is to gain more knowledge related to effective methods of reducing an individuals' self-reported stress level. Specifically, the study question is: *Do individuals who practice yoga have different levels of perceived stress than individuals who participate in other forms of exercise?* Other forms of exercise will include any form of exercise other than yoga that is planned, structured and intended to improve or maintain physical fitness (Exercise, 2013). The current literature focuses primarily on the symptoms of mood disorders such as anxiety and depression and the influence yoga and exercise has on this symptomology. Also, there is not an abundant amount of literature that includes comparison studies of yoga and other forms of exercise and the differences in reported stress between the two groups. To the authors knowledge there are few studies, which document the perceived stress level of individuals who practice yoga and other forms of exercise over an extended time frame. The current study tested and examined the hypothesis and additional exploratory questions listed below.

Hypothesis and Exploratory Questions:

1. Individuals who practice yoga will report a significantly lower level of perceived stress levels than individuals who perform other forms of exercise.
2. Does the length of time, frequency, form and longevity of practicing yoga or another form of exercise influence perceived stress levels?

Research Type, Method, and Design

This study is quantitative, cross-sectional, comparison, and exploratory in nature. The cross-sectional comparison design was used in order to measure the differences, if any, between the two groups. The quantitative measurement was also utilized, similar to other research in this area, because of the relative effectiveness this method accounts for when answering the research question. A quantitative measurement is also an efficient tool in order to retrieve a greater sample. Limitations to this design include, but are not limited to, the lack of personal narratives or verbal experiences of the population, which can be helpful in interpreting results.

Individuals whom practice yoga as well as individuals who participate in other forms of exercise completed the Perceived Stress Scale (Cohen et al., 1983), this can be found in Appendix B, as well as some questions in regards to their yoga or other form of exercise habits such as duration, frequency and longevity of preferred activity (see Appendix C). This study compared the self-reported stress level between the two groups of individuals. The Perceived Stress Scale is a survey that measures the degree to which situations in ones' life are appraised as stressful. The questions within the survey are designed to measure how unpredictable, uncontrollable and overloaded individuals find their lives to be. The survey also formulates numerous questions about the current stress that the individual is experiencing. The questions on the survey inquire about a participants thoughts and feelings during the last month (Cohen et al., 1983). The additional questions that were asked of individuals who participate in yoga or another form of exercise included how long they have engaged in the activity, how often they participate in the activity, the amount of time they practice the activity, and the type of yoga they participate in or the type of the other form of exercise they participate in. The survey also asked individuals their gender, race, and age.

Characteristics of Participants

The author relied on a nonprobability convenience sample. In addition to the convenience sample the author also utilized snowball sampling. The author encouraged individuals who received the survey through the convince sample to send the study to other potential participants. All the participants' were 18 years of age and either practiced yoga twice or more a week; or engaged in any other form of exercise twice or more a week. The length of yoga practice or exercise the participants engaged in was at least in a 45-minute interval. The participants have also practiced yoga or performed other exercises for at least the past month. Individuals who did not participate in yoga and other forms of exercise were excluded from this study as well as individuals who practiced both yoga and other forms of exercise due to validity of the study.

47 females and 9 males participated in the study with a complete sample size of N=56. However, only 50 participants completed the entire Perceived Stress Scale, while 6 participants had missing information on one or more of the 10-questions listed on the scale. Thus, when comparing the perceived stress level of individuals who practiced yoga and individuals who engaged in other forms of exercise only the 50 participants scores who completed all questions on the Perceived Stress Scale were considered. In regards to ages of participants, the sample consisted of a diverse group with 32.1% of individuals between ages 25-31 (n=18). 21.4% of individuals were between the ages of 18-24, 10.7% of individuals were between the ages 32-38, 8.9% of individuals were between the age 39-45, 12.5% of individuals were between the ages 46-52, 8.9% of individuals were between the ages 53-59, and 3.6% of individuals were between ages 60-66.

75% individuals in the sample identified themselves as “White”. Two participants identified as “Asian”, one participant identified as “Filipino”, four participants identified themselves as “Hispanic”, one participant identified as “Indian (Asian)”, one identified as “Mexican-American”, one participant identified as “Middle Eastern”, three participants identified as “Mix” and one participant identified as “Human”. Thus, the majority of individuals within this study identified as white as well as female.

Sample Recruitment

The author utilized a convenience sample due to the fact the author is a certified yoga instructor at Big Yoga studio in Houston, TX, thus the researcher had several contacts with the owners and individuals at the Big Yoga studio. In the fall, the author spoke with Laura Calcaterra and Nancy Sheridan Perry the owners of Big Yoga. Both individuals agreed to post the link to the survey in their newsletter and encouraged members of the Big Yoga community to participate. As a former resident of Half Moon Bay, CA the author has maintained several contacts in this community. Thus, the author sent the survey to various community members involved in fitness organizations within the area.

After obtaining permission from the Human Subjects Review Board at Smith School for Social Work the author began to recruit individuals for the study by sending out the survey to the Big Yoga owner Nancy Sheridan as well as community members in Half Moon Bay, CA connected to fitness organizations in the area. The author also encouraged individuals to send the survey to other individuals that would be appropriate participants to complete the survey.

Ethics and Safeguards

Risk of participation. There were no reasonable foreseeable (or expected) risks for participants in the study.

Benefits of participation. Participants possibly gained a greater understanding of their stress level due to participation in the study. Individuals within the study may not have frequently focused on their emotions therefore, this study allowed participants to dedicate some time to examine how they have been feeling and how the environment has impacted them specifically in the last month. This survey created the ability to bring an element of self-awareness to participants.

Precautions taken to safeguard information and identifiable information. Approval from the Smith College Human Subjects Review Board was attained prior to starting data collections. The participants received a link to the anonymous survey either through email or the Big Yoga newsletter. Individuals were notified that the study was anonymous and that no information in regards to identify was being collected. Participants were also informed that participation was optional and they could exit the survey at anytime, however once they submitted the survey they were unable to withdraw from the study. The participants were then asked to click “I agree to participate in the study” in order to access the survey. Next, individuals were asked to read the consent in order to participate in the survey. By clicking on the “I agree” button, participants acknowledged that they had decided to volunteer as a research participant for this study. The study then appeared if the consent was signed. Individuals were then asked a series of questions which included the researcher generated questions as well as the Perceived Stress Scale.

Human Subjects Review Board and confidentiality. The Human Subjects Review Board (HSRB) at Smith College, Northampton, MA approved the study after ensuring that the study met institutional and Federal standards for protection of human subjects. The study was

anonymous. No identifying information of the participants was recorded. The survey was submitted electronically and no IP addresses were linked to responses of the survey.

Sample Bias

This sample did not consist of individuals who do not engage in either yoga or other forms of exercise. The sample bias that occurred in this sample is related to the fact that the author retrieved the sample from individuals who practice yoga or exercise in a facility. Many individuals practice yoga or perform daily exercise at home or in a different environment. Individuals who participate in yoga or exercise in a studio may enjoy working out with other individuals and may have significantly different stress levels than individuals who practice yoga and exercise in isolation. Therefore, this sample only included individuals who are interested in exercising or practicing yoga in a group setting and did not include individuals who prefer to practice yoga or exercise individually. The sample is also biased due to the fact that both facilities the author recruited the participants from are fairly expensive to practice yoga or exercise in. However, due to utilizing the snowball technique not all participants within the sample were derived from these facilities. In reporting results of the study, the author is aware that the socioeconomic status of an individual can greatly impact an individual's self-reported stress. The sample also may be biased by the several personal connections the author has within the sample framework and thus respondents may have felt pressured to respond in a certain way.

Demographic Considerations

In reviewing the existent literature it was apparent that most samples used were homogenous. Also, much of the research did not include demographic information in regards to the sample used in the study. Therefore, it was important that the demographics of the sample were included in the study as well as creating a diverse sample. Netz & Lidor (2003) used a

limited sample, which included females who were general curriculum and physical education teachers who had voluntarily enrolled in a 1-year enrichment program at s College of Physical Education and Sport Sciences. Several of the specific demographics of the sample were not described; therefore, no information on race or SES was given. Yoshihara et al. (2011) study also included an only female sample. Once again, the study did not describe the diversity of the sample and thus could not be easily generalizable. The demographics of the participants are listed within the findings chapter of this paper. The study gathered information in relation to the participant's age, racial identification and gender identification. Therefore, demographic information is included when interpreting data. This sample is also not homogenous. There are participants of different genders and a variety of ages as well as various racial identifications.

Measures

The author collected quantitative data in regards to the participants perceived stress level as well as the participants' current pattern of exercise or yoga practice. The Perceived Stress Scale was utilized due to it unique questions in regards to stress as well as the variety of questions. The questions describe components of stress that can impact an individual's life. The Perceived Stress Scale adequately addresses the encompassing components of stress. The survey itself consists of close-ended, short item questions. It was self-administered by participants, with clear directions located at the top of the survey. The responses were recorded on the survey through SurveyMonkey software and returned to the author. The results were scored once all participants completed the survey.

The validity of the Perceived Stress Scale was illustrated in a study conducted by Sheldon Cohen, Tom Kamarck, Robin Mermelstein called the Global Measure of Perceived Stress (1983). The study found the following

The PSS Showed adequate reliability and, as predicted, was correlated with life-event scores, depressive and physical symptomatology, utilization of health services, social anxiety, and smoking reduction maintenance. In all comparisons, the PSS was a better predictor of the outcome in question than were life-event scores. When compared to a depressive symptomatology scale, the PSS was found to measure a different and independently predictive construct (p.385)

This research also illustrated the concurrent and predictive validities of the assessment by disbursing it among several different samples. The study also demonstrated the internal and test-retest reliabilities of the scale (Cohen et al., 1983). As stated in the research, the Perceived Stress Scale provides different information than a depressive symptomatology scale, which is the scale used in many of the comparison studies in the current literature.

Data Analysis

The author completed data analysis with statistical consultation from a faculty member of Smith College for Social Work. Statistical analysis was performed to test the differences between individuals who practice yoga and individuals who perform other forms of exercise and their corresponding perceived stress level. The use of inferential statistics was utilized in regards to the responses received from the Perceived Stress Scale. The total scores of how often certain feelings or thoughts are occurring for participants within the past month from the Perceived Stress Scale assessment were calculated. The author grouped the scores appropriately and then compared the yoga group and exercise group to one another. A t-test was then employed to measure the difference between the perceived level of stress for individuals who practice yoga and individuals who perform other forms of exercise. The use of inferential statistics allowed the author to make statements about the larger population from the specific statistics gained from my sample.

Limitations

The study did not identify other factors and components that may cause stress such as biopsychosocial factors. Thus, upon examining the results the author took into account the several other variables that were not addressed or measured in the study. The validity of the study was lowered due to this; however, the large sample size the author accrued limited the validity issues within the sample.

Another validity concern within the study was the author's failure to address diversity within the sample and thus the author's ability to apply the results to the entire population. The author used a convenience and snowball sample from a small regional area as well as a major city. However, the author retrieved the sample from within only a couple organizations. Thus, it was difficult to recruit a sample that represents the diversity of the general population, which in turn made the study less valid. The sample as well only represented individuals who can afford to attend a yoga studio or a fitness studio. Thus, the sample did not include individuals of low socioeconomic status.

CHAPTER IV

Findings

This study was a comparison study using a quantitative method design. The purpose of this study was to identify the more effective method of reducing an individuals' self-reported stress level. Specifically of interest, was individuals practicing yoga in comparison with individuals engaging in other forms of exercise.

There were a total of 85 people who accessed the survey. Five of the participants were removed because they left the consent blank. 24 participants were removed because they were disqualified based on their response to question three, which asked if the individual participated in yoga at least twice a week or another form of exercise twice a week or both. Individuals who answered "both" were disqualified and not allowed to complete the rest of the survey. The resulting sample size was 56. An additional six participants had missing information on one or more of the 10-questions listed on the Perceived Stress Scale. Thus, when comparing the perceived stress level of individuals who practiced yoga and individuals who engaged in other forms of exercise only the 50 participants scores who completed all questions on the Perceived Stress Scale were considered. Thus, the sample size was N=50 when comparing the perceived stress of individuals who practice yoga in comparison with individuals who engage in other forms of exercise.

Table 1

Demographic Characteristics of the Participants, (N=56)

	Frequency	Percent
Gender		
Female	47	83.9 %
Male	9	16.1 %
Age in years		
Age 18-24	12	21.4 %
Age 25-31	18	32.2 %
Age 32-38	6	10.7 %
Age 39-45	5	8.9 %
Age 46-52	7	12.5 %
Age 53-59	5	10.7 %
Age 60-66	2	3.6 %
Race/Ethnicity (self-identification)		
White	42	75 %
Asian	2	3.6 %
Filipino	1	1.8 %
Hispanic	4	7.1 %
Human	1	1.8 %
Indian (Asian)	1	1.8 %
Mexican-American	1	1.8 %
Middle Eastern	1	1.8 %
Mix	3	5.4 %

Almost one-third of the participants were between the ages 25-31 (n=18). 75% of participants identified as white and 83.9% identified as female. Therefore, even though the sample consisted primarily of white females the demographics of the participants were included as illustrated above, unlike the Netz & Lidor (2003), which did not identify the race or ethnicity of participants within their study. Also, the sample had more diversity in relation to gender than both the Netz & Lidor (2003) and Yoshihara et al. (2011) even though it was a predominantly female sample. This sample also consisted of a more diverse group of participants in relation to

age ranging from age 18 to 64 unlike the Kraemer & Marquez study (2009), which included participants only over age 50.

Frequency, Duration and Longevity Characteristics

The frequency, duration, and longevity of yoga or another form of exercise were all measured unlike several of the prior studies. Yoshihara et al. (2011) utilized the longevity characteristic by comparing individuals who practiced yoga for at least the last two years with individuals who had never practiced yoga. Kramer & Marquez (2009) and Netz & Lidor (2003) conducted an assessment after only a single session of yoga or exercise and thus only included the class time duration characteristic. Both Kramer & Marquez (2009) and Netz & Lidor (2003) indicated that a limitation of the study was that it was conducted over one single session and did not include the frequency of participation in yoga or another form of exercise as well as the longevity characteristics. Thus, the frequency, duration and longevity were measured in this study to reduce such limitations as well as improve reliability of the measure perceived stress level.

Table 2

Frequency, Duration, and Longevity Characteristics, (N=56)

	Frequency	Percent
Frequency Characteristics		
2x a week	4	7.1
3x a week	11	19.6
4x a week	17	30.4
5x a week	11	19.6
6 or 7x a week	13	23.2
Duration Characteristics		
45 minutes	7	12.5
45-75 minutes	30	53.6
75-90 minutes	15	26.8
90-120 minutes	4	7.1
Longevity Characteristics		
Less than 6 months	4	7.1
1 year	4	7.1
2-3 years	13	23.2
4-6 years	15	26.8
7+ years	18	32.1
No response	2	3.6

30.4% of individuals practiced yoga or participated in another form of exercise 4 times a week. Khalsa et al. (2009) had individuals participate in yoga 3 times per week for both of the yoga intervention groups, including the yoga lifestyle group. This sample however, illustrates that several individuals within the sample choose to engage in yoga or exercise 4 times a week or more. In addition, 23.2% of participants engaged in yoga or other form of exercise 6-7 times per week. Thus, 73.2% of individuals within this sample engage in exercise or perform yoga 4 or more times a week, which is a greater frequency than much of the literature presented (Rocha et al., 2012). Therefore, this sample demonstrates that the frequency in which an individual

engages in yoga or another form of exercise is greater than most of the previous studies and thus may indicate different levels of perceived stress than acknowledged in other studies.

53.6% of participants engaged in their activity between 45 minutes and 75 minutes. West et al. (2004) utilized a two-hour class period in their study, which is very different class time duration from the majority of this sample. Most of these participants did not engage in exercise or yoga for such an extended period of time as the individuals in the West et al. (2004) study.

Over half of the sample has practiced yoga or engaged in another form of exercise for four or more years. Thus, the perceived stress levels of these individuals may have been impacted by the significant amount of time that they have spent engaging in yoga or other forms of exercise. In comparison West et al. (2004) measured the perceived stress level of individuals who participated in one 90-minute class session of an African dance class, Hatha yoga, or biology lecture which is only a single session measurement verses a measurement after years of practice.

Yoga and Exercise Characteristics

Most of the literature had participants engage in either a specific form of yoga or a specific form of exercise like Netz & Lidor (2003) who utilized a single session of either yoga, dance aerobics, Feldenkrais (awareness through movement), swimming or a computer class. It was necessary to ask individuals which form of yoga or exercise that they participated in, in order to measure any differences if any in perceived stress level of individuals who engage in different forms. Other studies such as Yadav et al. (2012) had participants immersed in a yoga-based lifestyle intervention where all participants engaged in the same form of yoga and thus did not include different forms of yoga that may influence the perceived stress level of an individual.

Thus, this study measured the exploratory question does the form of yoga or exercise influence the perceived stress level of an individual.

Table 3

Forms of Yoga and Other Exercise, (N=56)

	Frequency	Percent
<hr/>		
Types of yoga		
Hatha yoga	1	1.9
Vinyasa yoga	25	44.6
Bikram yoga	1	1.8
Other form of yoga	4	7.1
Other exercise	22	39.3
No response	3	5.4
<hr/>		
Types of exercise		
Running	11	19.6
Biking/Spinning	4	7.1
Weightlifting	2	3.6
Other form of exercise	15	26.8
Yoga	23	41.1
No response	1	1.8
<hr/>		

In relation to the types of exercise individuals within the other form of exercise group, several individuals (26.8%) indicated ‘other exercise’ in which participants wrote in the form of exercise that they engaged in. Individuals list of other forms of exercise included “Barre”, “baseball, weight lifting, and running”, “circuit training”, “combination of cardio and weights”, “Elliptical”, “fast walking”, “biking, running, weight lifting circuits”, “Pilates”, “running, boot camp workouts, weight lifting”, “running, swimming, weight lifting, biking”, “strength/cardio exercise classes”, “walking, stretching, light weight lifting”, “walking”, “water aerobics and walking”, and “cardio dance class”. These responses illustrate that individuals engage in a variety of different forms of exercise as well as multiple forms of exercise. Due to the small

sample size and the variety of responses listed for the forms of exercise performed by individuals there is no significant data in regards to the exploratory question, does the type or form of exercise influence perceived stress level. This is illustrated more clearly in the results section of this chapter.

44.6% of individuals who practiced in yoga in this study performed Vinyasa yoga, which is a different form of yoga than the individuals in the West et al. (2004) study who participated in Hatha yoga. The majority of the individuals who practiced yoga in this sample and indicated that they practiced Vinyasa yoga could be attributed to where the author retrieved the sample. The yoga studio, Big Yoga, discussed more thoroughly in the methodologies section is the location in which much of the sample was recruited and this yoga studio is a Vinyasa studio. The other forms of yoga that were indicated by the four individuals were: “Baptiste” “baptiste power flow”, “lyengar”, “Pilates”. Similar to the forms of exercise, the sample size of the individuals who practiced yoga was too small to determine any significance in the type of yoga and the potential differences in perceived stress level. Once again, illustrated more clearly in the results section below.

Results

A two-tailed t-test was used to explore any possible differences between the perceived stress level of individuals who practice yoga and the individuals who participate in other forms of activities and a significant difference was found. Individuals who practice yoga ($M=10.7971$) had a significantly lower ($p=.033$, two-tailed) perceived stress level than individuals who engaged in other forms of exercise ($M=14.5000$) with a t value of -2.189 .

Table 4

Comparison of the Different Groups PSS Score

	N	M	T	df	P
Yoga	24	10.7917	-2.189	48	.033
Other form of Exercise	26	14.5000			

Individuals who practiced yoga had a lower mean perceived stress level score (M=10.7917) than individuals who engaged in another form of exercise (M=14.5000). The significance of this t-test was .033, which indicates that the difference in mean perceived stress level scores is significant between individuals who practice yoga and individuals who perform other forms of exercise. Also, a cronbachs alpha was run to test of internal reliability of the Perceived Stress Scale. This sample had strong internal reliability, alpha=.81, N=50, N of items=10.

A spearman’s rank correlation coefficient was used to determine if there was a relationship between frequency, longevity, or length of time of either yoga or another form of exercise and perceived stress level scores. No significant correlation was found between frequency of yoga or another form of exercise and perceived stress level. There was also no significant correlation found between longevity and length of time of either activity and perceived stress levels. As illustrated in Table 5:

Table 5

Correlation between Perceived Stress Score and Frequency, Longevity, and Length of Time

		frequency	length of time	longevity	PSS score
frequency	Spearman's rho*	1.000	.262	.094	-.221
length of time		.262	1.000	-.051	-.073
longevity		.094	-.051	1.000	-.116
PSS score		-.221	-.073	-.116	1.000

There was no significant correlation between perceived stress scores and how often the individual performed yoga or other form of exercise weekly, or how long the individual engaged in the activity daily, or how long the individual had been participating in the activity.

In addition, a one-way anova test was used to determine if there was a difference in the perceived stress scores by frequency, longevity, or length of time. As illustrated below, no significant differences were found.

Table 6

Potential Difference in Perceived Stress Score by Frequency of Activity

	N	M			
2x a week	4	15.0000			
3x a week	11	14.3636			
4x a week	15	13.4000			
5x a week	8	9.5000			
6 or 7x a week	12	11.7500			
	Sum of Squares	df	Mean Square	F	P
Between Groups	151.685	4	37.921	.982	.427
Within Groups	1738.395	45	38.631		

There was no significant difference in relation to frequency of activity within a week and perceived stress level score as indicated by the significance of the one-way anova test ($p=.427$). Thus, this study did not find differences in perceived stress score of individuals who engaged in either yoga or another form of exercise anywhere from two times a week to seven times a week.

Table 7

Potential Difference in Perceived Stress Score by Longevity of Activity

	N	M			
Less than 6 months	3	20.0000			
1 year	3	14.6667			
2-3 years	12	11.6667			
4-6 years	13	13.0000			
7 or more years	18	12.1667			
	Sum of Squares	df	Mean Square	F	P
Between Groups	188.656	4	47.164	1.278	.293
Within Groups	1623.833	44	36.905		

There was no significant difference in regards to how long an individual has been performing an activity and perceived stress level score as indicated by the significance of the one-way anova test, which was .293. Thus, this study did not find differences in perceived stress score of individuals who participated in either yoga or another form of exercise for 2 months or up to 7 or more years; unlike the Yoshihara et al. (2011) study, which indicated that the long-term yoga group had lower scores of self-rated anxiety, anger and fatigue than the control group.

Table 8

Potential Difference in Perceived Stress Score by Length of Time of the Activity

	N	M			
45 minutes	7	15.4286			
45-75 minutes	27	12.1481			
75-90 minutes	12	12.6667			
90-120 minutes	4	12.0000			
	Sum of Squares	df	Mean Square	F	P
Between Groups	62.292	3	20.764	.523	.669
Within Groups	1827.788	46	39.735		

There was no significant difference in regards to the length of time of the activity daily and perceived stress level score as indicated by the significance of the one-way anova test, which was .669. Thus, this study did not find differences in perceived stress score of individuals who engaged in either yoga or another form of exercise for 45 minutes or 120 minutes.

In order to determine if form/type of yoga influenced perceived stress level a t-test was utilized. Due to the small sample size, the 'Hatha' yoga and 'Bikram' yoga categories were combined with the 'Other forms of yoga' category due to the fact they each contained only one person. A t-test was used to determine if there was a difference in perceived stress by the two types of yoga categories, Vinyasa yoga and other forms of yoga category. No significant difference was found.

Table 9

Comparison of Vinyasa Yoga with Other Forms of Yoga

	N	M	F	P
Other forms of yoga	6	11.6667	.480	.495
Vinyasa	20	11.2000		

Individuals who perform other forms of yoga have a similar perceived stress score (M=11.6667) with individuals who participate in Vinyasa yoga (M=11.2000). The significance of this t-test was .480, which indicates that the difference in mean perceived stress level scores is not significant between individuals who practice other forms yoga and individuals who practice Vinyasa yoga.

A one-way anova test was completed to determine if the form of exercise influenced the perceived stress level of individuals. As illustrated in Table 10, no significant difference was found.

Table 10

Comparison of Different Forms of Exercise

	N	M			
Other form of exercise	14	14.2857			
Running	10	14.3000			
Biking/Spinning	4	15.0000			
Weight lifting	2	10.5000			
	Sum of Squares	df	Mean Square	F	P
Between Groups	30.010	3	10.003	.242	.866
Within Groups	1075.457	26	41.364		

There was no significant difference in regards to the form of exercise an individual participates in and the perceived stress level score of the individual as indicated by the significance of the one-way anova test (p=.866). Thus, this study did not find differences in perceived stress of individuals who participate in running, biking/spinning, swimming, and other forms of exercise.

Summary

In short, individuals who practice yoga had a significantly lower perceived stress level than individuals who engaged in other forms of exercise. In relation to the exploratory questions about length of time, frequency, form, and longevity of practicing yoga or another form of exercise influencing perceived stress levels there were no significant differences found. This data result could be attributed to the small sample size and even smaller categories in relation to length of time, frequency, form, and longevity of both the activity groups within the study.

CHAPTER V

Discussion

Perceived Stress Levels of Individuals who Perform Yoga and Other Forms of Exercise

The present study compared the self-reported perceived stress levels of individuals who practice yoga and individuals who participate in other forms of exercise. This study found that individuals who practice yoga had a significantly lower perceived stress level than individuals who engaged in other forms of exercise, which confirmed the hypothesis. This finding aligned with the previous literature that determined that yoga was more effective at decreasing negative mood than other forms of exercise (Rocha et al., 2012). However, this study's findings were incongruent with the Kraemer and Marquez (2009) study, which found that individuals who participate in yoga had higher levels of depression and lower levels of quality of life in comparison with the walking group. The difference in findings could be attributed to the different scales utilized in each study. The present study only used the Perceived Stress Scale (Cohen et al., 1983) to measure individuals self-reported stress levels, unlike most of the previous research, which administered several scales to determine mood and stress (Streeter et al., 2010). Thus, the present study focuses solely on the individuals perceived stress and to this author's knowledge is the only study of its kind. More research using the Perceived Stress Scale solely to measure stress levels of individuals who practice yoga and individuals who perform other forms of exercise is needed.

The present study also measured if length of time, frequency, longevity, and type of activity influenced an individual's perceived stress level. This study found no significant differences in perceived stress level of individuals and each of the following variables: length of time of activity, frequency of activity, longevity of activity, and type of activity. This finding was surprising based on several studies presented in the literature thus far. In relation to longevity of the activity and the influence it has on perceived stress, the researcher hypothesized that the amount of time an individual had engaged in an activity would influence the perceived stress of the individual based on findings from Yoshihara et al. (2011), which found that individuals who practiced yoga for the last two years had lower self-reported levels of anxiety, anger and fatigue than individuals who recently started practicing. The present study had a limited sample size that may have influenced any potential findings in relation to longevity of the activity and perceived stress levels. More research using a larger sample size would be beneficial to determine if longevity of an activity influences perceived stress. Additionally, the difference could be related to where the sample was recruited.

In relation to the other exploratory question, does form of exercise or yoga influence perceived stress this study determined that the type of exercise or yoga does not determine stress level. Netz and Lidor (2003) demonstrated that mindful low-exertion activities, including yoga and Feldenkrais as well as some aerobic activities, specifically swimming, improved mood in one single session, however not all forms of exercise did. Thus, because this current study did not determine if certain types of exercise or yoga influence perceived stress level more research on this would be needed. The limited sample size and large variety of different exercises and types of yoga performed impacted the potential correlation of perceived stress and type of activity.

In relation to the frequency variable and length of time of the activity variable, more research will be needed with a larger sample size in order to determine if either variable influence perceived stress level.

Limitations and Strengths of the Study

Limitations. There are limitations to this study, which include a small sample size. The final sample size (N=50) included only the participants who completed the entire survey, answering all of the perceived stress score questions. A larger sample size would have been more appropriate in order to generalize the study's findings. Also, the limited sample size influenced the results in relation to the exploratory questions addressing if frequency, length of time, longevity, and form of activity influenced perceived stress. The sub categories of each of these variables were fairly small due to the limited small size, which clearly influenced the results of the study. A larger sample perhaps would have yielded more accurate and clear results in relation to these variables and the potential influence they have on perceived stress level.

Another limitation of this study was the lack of diversity in relation to the gender and race of participants. Much of the previous literature consisted of homogenous samples (Rocha et al., 2012). The author's goal was to include a more diverse sample in order to ensure generalizability. However, due to the limited sample size as well as using a convenience and snowball sampling technique to retrieve participants, the sample was not as diverse as the author would have liked. 83.9% of the sample identified as female and 75% of the sample identified as white. Thus, individuals of color and men were underrepresented in the sample; therefore the findings from this study cannot be generalized to the larger population. Further research using a more diverse sample is needed.

Limitations of the study also include that there was no control for other factors that may influence perceived stress level of the individuals within the study. The only variable measured was the activity the individual participated in and several other variables relating to the activity. Thus, all other biopsychosocial factors were not controlled or measured in this study. These factors can greatly impact an individual's perceived stress level, but were not accounted for in this study. In addition, an experimental design including randomization was not used. Therefore, personality characteristics that cause individuals to choose to practice yoga over participating in other forms of exercise was also unaccounted for in this study.

The instrument used to measure perceived stress was the Perceived Stress Scale, the scale asks individuals to measure how unpredictable, uncontrollable, and overloaded individuals find their lives to be, including the amount of stress an individual is experiencing within the last month. Lack of memory or the current mood of the individual while taking the survey could have impaired how the participants answered questions about their life and stress level within the last month. Due to the self-report nature of this study, participants may have exaggerated results or individuals may have answered questions in a manner in which they believed to be favorable. Other limitations when utilizing a self-report assessment includes relying on the honesty of participants, the ability for the participants to be introspective, as well as the ability for participants to understand the questions asked within the survey.

The author also had no control as to when the individual completed the survey. Thus, the time of day in which the individual completed the survey, as well as individual's current mood, or if the individual had just completed their activity or not were not controlled variables and could have influenced how the individual responded to questions on the survey.

Strengths. Even though this study had limitations, it also had strengths. Most importantly this study found that individuals who practice yoga have significantly lower perceived stress levels than individuals who engage in other forms of exercise, thus contributing to the current conflicting research presented this far in relation to whether yoga or other forms of exercise are more effective at decreasing stress and negative mood. This study was also the first study, to the authors' knowledge, that solely utilized the self-reported perceived stress level to determine an individuals stress level instead of using additional measurements and inventories to measure stress and mood. In addition, this study acquired data about an individuals average feelings and thoughts of experienced stress throughout the entire month versus only asking questions about stress in the moment or over one day as much of the previous literature has done (West et al., 2004). This study also incorporated a more diverse sample than a majority of the current research (Rocha et al., 2012).

Implications for Social Work

This study has relevance for social work practice due to the relationship identified between perceived stress and yoga. There has been an increase in the number of individuals that report being effected by stress (da Silva et al., 2009). Therefore, it is crucial for clinical social workers to have a greater understanding of the different self-care options available to the public. It is also essential to identify the activity that is most effective at reducing the level of stress experienced by an individual in the general population as well as with individuals with clinical disorders, such as mood disorders. This study illustrates that individuals who practice yoga report lower levels of perceived stress than individuals who participate in other activities, thus social workers as well as other health professionals can encourage individuals to engage in stress reducing behaviors, specifically encouraging the practice of yoga over other forms of exercise.

Since the literature has illustrated yoga decreases stress (Rocha et al., 2012) it is essential that health providers, including social workers discuss this as another treatment option with patients along with appropriate medications or therapy.

In addition, it would be important for social workers to help client's access yoga at an affordable cost in order for individuals to be able to engage in the activity that is most effective at reducing perceived stress. Access, availability, and affordability of yoga for clients would be an essential goal for social workers in order for yoga to be a part of client's lives and potentially impact the level of perceived stress they experience.

Currently, some clinical social workers are integrating yoga into their clinical practice (Strauss & Northcut, 2013). Strauss and Northcut (2013) describe utilizing treatment sessions with a patient with a recent diagnosis of cancer as such, "each session was structured with 10 min of pranayams, 20 minutes of gentle asana practice, 10 min of meditation, and 10 min of processing thoughts and feeling states" (p. 4). This case study illustrates that the clinical social worker, "integrates her knowledge of clinical social work and the trauma associated with a cancer diagnosis and treatment, with her understanding of the benefits of yoga interventions to help this socially active 29 year old young woman navigate life with cancer" (Strauss & Northcut, 2013, p.1). As Strauss & Northcut (2013) portray, social workers and other health professionals are beginning to incorporate yoga into their therapeutic sessions with patients.

Recommendations for Future Research

As stated above, another study comparing the perceived stress scores of individuals who perform yoga or other forms of exercise, with a greater more diverse sample size would be needed in order to determine generalizability of the findings that individuals who practice yoga report significantly lower stress levels than individuals who engage in other forms of exercise.

Further, more research with a much greater sample size may allow researchers to find a correlation between the length of time of the activity, frequency of the activity, longevity of the activity, or form of the activity with perceived stress levels.

In addition 24 participants that accessed the survey were removed because they were disqualified based on the fact that they reported engaging in both yoga and other forms of exercise. Thus, the perceived stress scores of individuals that engage in both yoga and other forms of exercise were not noted in these findings. Additional research identifying and perceived stress score of not only individuals who participate in either yoga or another form of exercise and instead both would be necessary to determine the most effective form of activity or activities at reducing perceived stress of individuals. Lastly, more research focusing on the clinical population would be beneficial in order to determine if the benefit of yoga is also present with this unique sample.

Conclusion

There is not an abundance of literature that compares individuals who practice yoga with individuals who perform other forms of exercise. The research that is available consists of samples that have a lack of diversity as well as utilize various scales to measure mood and biological stress instead of simply self-reported stress. The current study contributes to the literature due to the fact that it explored self-reported stress of individuals who practice yoga and other forms of exercise as well as incorporated a more diverse sample. This research found that individuals who practice yoga have a significantly lower perceived stress score than individuals who perform other exercise, which contributes to the inconsistent literature, presented this far. These findings could be used to help social workers and mental health professionals to create a more appropriate and effective plan of care for patients who struggle with stress. Research on

how to successfully incorporate yoga into patients' mental health treatment would yield meaningful data.

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APPENDIX A

Smith College Human Subject's Committee Approval Letter



School for Social Work
Smith College
Northampton, Massachusetts 01063
T (413) 585-7950 F (413) 585-7994

December 11, 2013

Chelsey Silveria

Dear Chelsey,

You did a very nice job on your revisions. Your project is now approved by the Human Subjects Review Committee.

Please note the following requirements:

Consent Forms: All subjects should be given a copy of the consent form.

Maintaining Data: You must retain all data and other documents for at least three (3) years past completion of the research activity.

In addition, these requirements may also be applicable:

Amendments: If you wish to change any aspect of the study (such as design, procedures, consent forms or subject population), please submit these changes to the Committee.

Renewal: You are required to apply for renewal of approval every year for as long as the study is active.

Completion: You are required to notify the Chair of the Human Subjects Review Committee when your study is completed (data collection finished). This requirement is met by completion of the thesis project during the Third Summer.

Congratulations and our best wishes on your interesting study.

Sincerely,

A handwritten signature in black ink, appearing to read 'Elaine Kersten'.

Elaine Kersten, Ed.D.
Co-Chair, Human Subjects Review Committee

CC: Colette Duciaume-Wright, Research Advisor

APPENDIX B

Perceived Stress Scale

Perceived Stress Scale

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 by circling how often you felt or thought a certain way.

Name _____ Date _____
Age _____ Gender Identification _____

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?..... 0 1 2 3 4
2. In the last month, how often have you felt that you were unable to control the important things in your life? 0 1 2 3 4
3. In the last month, how often have you felt nervous and “stressed”? 0 1 2 3 4
4. In the last month, how often have you felt confident about your ability to handle your personal problems? 0 1 2 3 4
5. In the last month, how often have you felt that things were going your way?..... 0 1 2 3 4
6. In the last month, how often have you found that you could not cope with all the things that you had to do? 0 1 2 3 4
7. In the last month, how often have you been able to control irritations in your life?..... 0 1 2 3 4
8. In the last month, how often have you felt that you were on top of things?.. 0 1 2 3 4
9. In the last month, how often have you been angered because of things that were outside of your control?..... 0 1 2 3 4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? 0 1 2 3 4

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The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 386-396.

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APPENDIX C

The Researcher Generated Questions

1. Do you participate in yoga at least twice a week, or in another form of exercise at least twice a week or in both yoga and other forms of exercise?
 - Yoga
 - Other form of exercise
 - Both yoga and other forms of exercise
2. What is your age? (Must be 18 or older)
3. What is your gender identification?
4. What is your racial identification?
5. How often do you practice yoga or other forms of exercise a week?
 - 2x a week
 - 3x a week
 - 4x a week
 - 5x a week
 - 6 or 7x a week
6. How long to practice yoga or the other form of exercise each day?
 - 45 minutes
 - 45-75 minutes
 - 75-90 minutes
 - 90-120 minutes
7. How long have you practiced yoga or the other form of exercise?
 - Less than 6 months
 - 1 year
 - 2-3 years
 - 4-6 years
 - 7+ years
8. If you practice yoga, which form do you practice? (If you perform other forms of exercise please mark 'other exercise' option)
 - Hatha yoga
 - Vinyasa yoga
 - Bikram yoga
 - Other yoga (please indicate)
 - Other exercise
9. If you perform other forms of exercise, which type of exercise do you perform? (If you practice yoga please mark 'yoga' option)
 - Running
 - Biking/Spinning
 - Weight lifting
 - Other exercise (please indicate)
 - Yoga