7-2020

Effectiveness of Ashtanga and Vinyasa Yoga: Combating Anxiety, Depression, Stress and Sleep Quality.

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Effectiveness of Ashtanga and Vinyasa Yoga:
Combating Anxiety, Depression, Stress and Sleep Quality.

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Community Health Promotion

by

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July 2020
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Abstract

Purpose: The lack of rigor in yoga research methodology hinders the understanding of yoga components and best practices. This study implements two yoga interventions with recommended adequate structure, one more physically demanding (Ashtanga Vinyasa) and a less physically demanding (slow flow vinyasa). The instructor, who is also the lead researcher, developed a slow flow vinyasa sequence and modified the set sequence of Ashtanga Vinyasa for beginners. Both yoga interventions cover domains suggested by Sherman (2012) for meticulous methods in yoga research.

Methods: This study implements two styles of yoga with university students over the course of eight weeks, meeting twice a week. The courses in this study are academic electives offered through the university, the treatment group consisted of four individual classes. The control group consisted of other elective classes that did not include yoga, such as women's health and resilience & thriving. Effects were measured over time within groups and between groups through pre and post assessments for sleep, stress, anxiety, and depression. Sleep is measured in two ways, sleep quality and amount of sleep. This study also implements a newly developed assessment for yoga intervention fidelity, The Essential Properties of Yoga Questionnaire (EPYQ).

Using Sherman's (2012) domains, the yoga interventions are articulated and implemented with intention to meet the medical standard of study replicability. Sherman's domains are the followings: style of yoga, dose and delivery of yoga, home practice, yoga intervention components, deep relaxation, asana, pranayama, specific class sequences, dealing with modifications, selection of instructors, and intervention fidelity. The instructor completed the EPYQ after each class to evaluate intervention fidelity.

Results: The yoga groups significantly improved at post in amount of reported sleep (p = .035), stress (p = .015), and anxiety (p = .049). Significant differences were found between the two yoga styles at post assessment in amount of reported sleep (p <.001) and stress (p = .042). Depression was not found significant on any analysis.

Yoga groups showed positive improvements over the course of the intervention in amount of sleep (p <.001), stress (p <.001), and anxiety (p = .014). There were no significant differences between the two styles of yoga, Ashtanga and slow flow vinyasa, in this study. As expected, data analysis from the EPYQ showed a difference between the two styles only in the domains of breathwork and physicality.

Conclusions: The high standards for yoga interventions serve as a major step towards the integration of yoga and modern medicine. Much is still unknown about the different yoga intervention components and their effects. This study can be template for researchers and instructors to replicate and adjust appropriately to strengthen the methods of yoga interventions in research and practice.

Keywords: yoga, university students, best practices, programing, sleep, health behavior

Acknowledgments

I would like to give my sincere appreciation to the professors, staff, and peers who attributed to this endeavor through guidance, advocacy, and sharing resources. To my advisor and committee chair, Professor Bart Hammig, who was available when needed to offer instruction and guidance. Without his grace and accountability, this project would not have been realized.

I truly appreciate each individual perspective given by my committee members, Professor Dean Gorman, Professor Timothy Eichler, and Ed Mink. The genuine interest, receptibility, and consistence presence enriched and refined this work.

An additional recognition to Ed Mink, who believed in me, giving the opportunity to work in the field of health and wellness and develop skills and understanding that were foundational to the development of the interventions in this study. The experience furthered into a platform for me to conduct the interventions mentioned in this study.

Throughout this project I consulted informally with colleagues, Brook Bouza, Hannah Coffman, Asher Morgan, Susan Rausch, Emery Gower, and Aaron Myers. Each one of these people gave me guidance that helped me navigate this process in various ways ranging from sorting thoughts to technical components.

The influence of each person mentioned is invaluable to this work and the professional development of me as a writer, educator, and researcher.

Dedication

This work is possible because of the patience, acceptance and support from different people. My parents have been my biggest supporters and it's hard to think where I would be without their generosity and encouragement. Mark Cain, Louise Ellis, and Kristen Albertson have influenced my life as a yogi through being a teacher and providing community.

I have been blessed with many friends, who have been there through the good and bad times. CJ has surpassed expectations of a supporter with his patience and willingness to help with day-to-day duties, giving me more time to focus on this work.

This work is dedicated to all the close friends, family and teachers who have influenced my interests and motivated this work.

Table of Contents

List of Tables

Epigraph

Yoga, an ancient but perfect science, deals with the evolution of humanity. This evolution includes all aspects of one's being, from bodily health to self-realization. Yoga means union – the union of body with consciousness and consciousness with the soul. Yoga cultivates the ways of maintaining a balanced attitude in day to day life and endows skill in the performance of one's actions.

– B.K.S. Iyengar

Chapter 1: Introduction

Mental health disorders are a growing concern in the United States. The effects of depression and anxiety pose an entangled problem in higher education. An annual student experience survey conducted by the University Partnership Program (UPP) found twenty-two percent of undergraduate students claimed living independently caused a substantial amount of stress (Wakeford, 2017). Anxiety, depression, and suicide among college students have reached alarmingly high rates with no indication of decreasing (Beiter, et al., 2014;2015; Sutton, 2012). Stress is a risk factor in mental and physical illness, academic performance, college attrition, unhealthy relationship behaviors, and heavy episodic drinking (American College Health Association [AHCA], 2014; Chen, Xiang et al., 2017; Hartley, 2012; Iarovici, 2014; Lewondowski et al., 2014; Mackay & Pakenham, 2011; Stallman & Hurst, 2016).

Recognizing the difficulties experienced by students at the University of Arkansas, the Department of Health, Human Performance and Recreation offers one-credit hour elective courses in Wellness, Assertiveness Training and Yoga. Whether or not participation in yoga classes can be empirically demonstrated to improve self-reported physical and mental well-being is the focus of this study. The principal investigator has been teaching yoga classes at the University of Arkansas for six semesters and is intent on discovering whether quantitative protocols can be developed to measure the effects of two different types of classes: gentle and advanced yoga. It is expected that the conclusions of this study will have broad implications for the general population regarding the ability of yoga in minimizing stress.

Purpose

This study draws heavily on the work of Karen Sherman (2012), who described the seven domains that need to be guidelines for random controlled yoga interventions. Sherman (2012)

described the following domains that need to be addressed in yoga research: style of yoga, dose, components, specific class sequences, instructors, modifications, intervention fidelity over time, and facilitation of home practice. The purpose of the proposed study is to compare effects in two different yoga styles while developing replicable methodology aligned with Sherman's proposed domains. The underlying goal for covering Sherman's domains is to have enough rigor so that the yoga interventions may be replicated by other researchers and/or yoga instructors. The research questions are the following:

1. Can a beginner's slow flow vinyasa yoga intervention be created and implemented that meets Sherman's criteria to be standardized and replicable?
2. Can a beginner's Ashtanga Vinyasa yoga intervention be created and implemented that meets Sherman's criteria to be standardized and replicable?
3. Are there changes in reported sleep quality, amount of sleep, perceived stress, symptoms of anxiety and depression over time in participants participating in two 50-minute weekly yoga classes for eight weeks?
4. Are there differences between effects from Ashtanga Vinyasa and slow flow vinyasa in reported sleep quality, amount of sleep, perceived stress and symptoms of anxiety and depression in healthy college students after an 8-week intervention?

Chapter 2: Literature Review

The Problem

Depression is the leading source of disability, with over 350 million adults suffering worldwide (World Health Organization [WHO], 2018; Pascoe & Bauer, 2015; Shyn & Hamilton, 2010). Psychological strain heightens in people affected with depression, resulting in high comorbidity with conditions such as addictions (Lai et al., 2015), increased inflammation (Silverman & Sternberg, 2012), and neurogenerative diseases (Herbert & Lucassen, 2016; Riccelli, et al., 2016; Cramer, Anheyer et al., 2017). The strongest predictor of depression is anxiety (Pascoe & Bauer, 2015; Mathew et al., 2011). Although there are differences between anxiety and depression, the overlapping symptomology, aetiology, and neurobiology proposes a continuum for the disorders (Pasco & Bauer, 2015; Davidson, 2003; Neale & Kendler, 1995; Ionescu et al., 2013).

The transitional time of college potentially heightens intervention impact; this influential time can be used to promote positive coping skills, decreasing the chances of developing a mental illness. Prevention and treatment strategies are imperative, regardless of college attendance because three quarters of mental illnesses surface by age 24 (Knowlden et al., 2016). Stress and sleep are environmental factors known to induce physiological and psychological symptoms associated with depression and anxiety (Iwata et al., 2012; 2013; Tsuno et al., 2005; Breslau et al., 1996). These environmental factors are common struggles of college students (Cohen & Janiki-Deverts, 2012). According to the UPP annual survey, 87% of university students found it difficult to cope with social and academic aspects of university life (Wakeford, 2017), and reported low sleep quality (Regenstein et al., 2008; 2010), especially in women (Lund et al., 2010).

Psychotherapy, pharmacological, or a combination of both are the standard treatments for depression (Leichsenring et al., 2016), but these therapies have low success rates (Pigott et al., 2010; Mathew & Charney, 2009) and 40% of patients do not experience significant relief in symptomology (Papakostas & Fava, 2007). Some studies suggest that yoga interventions are equally effective to pharmaceuticals in stress reduction, depression and anxiety treatment (Dayalan et al., 2012; Chen, Berger et al., 2012; Cramer et al., 2013), warned that the medicalization of yoga faces shortcomings (Patwardhan, 2017a; 2016; Sherman, 2012). Research and policy of yoga limit the ability to bring yoga into medical practice (Patwardhan, 2017a; 2016).

Yoga Research

A search in the PubMed database for "yoga" and "interventions" resulted in 2,767 articles assessing the effects of yoga in a variety of health conditions ranging from cardiovascular disease (Chu et al., 2016; Innes et al., 2005) to lymphoma (Kaur et al., 2018). A more complete list of conditions positively affected by yoga can be seen on Table 1. For this study, majority of the information on yoga research is from systematic reviews and meta-analysis on yoga in healthcare and yoga's effects on depression, anxiety, stress, and sleep. Although research is extensive, lack of rigor stunts the medicalization of yoga (Uebelacker & Broughton, 2016; Sherman, 2012; Patwardhan, 2016; 2017a; 2017b; Smith et al., 2019; Elwy et al., 2014; Pascoe & Bauer, 2015). Reviews find that majority of yoga articles do not mention the style (Cramer et al., 2013; Elwy et al., 2014; Cramer et al., 2013; Cramer et al., 2017; Pascoe & Buer, 2015; Pascoe et al., 2017; Wang et al., 2019), or other crucial information, such as dosage and context, is inconsistent in research (Sherman, 2012; Patwardhan, 2017a; 2017b; Uebelacker &

Broughton, 2016). Incorporating yoga into medical treatments and preventative programs requires concrete methodologies of yoga interventions that are replicable.

Rigor and practicability in yoga research is difficult due to multiple styles, components, and even definitions of yoga. Yoga is a Sanskrit word that often is translated as “union” (Turlington, 2005; Stern, 2020; Swenson, 1999), but yoga’s less literal meanings are to yoke or harness (Turlington, 2005), concentration or relation (Stern, 2020), a path (Jois, 2002; Stern, 2020). In the Yoga Sutras, the foundation of yoga theory and practice (Satchidananda, 2010), Patanjali defines yoga as “the restraint of the modifications of the mind-stuff" (p. 3); a modern translation of this sutra is “uniting of consciousness in the heart” (Devi, 2007, p.12). A range of techniques, philosophies, and practices dating back thousands of years in India are considered yoga. Yoga was, and still is by some, used as an umbrella term equivalent to “mind-body connection” or “spiritual.” In recent years, researchers define yoga as a mind-body practice composed of physical postures (asana), breathing techniques, and meditation (Patwardhan, 2017b; Cramer, et al., 2013).

A bibliography of random control trials (RCTs) analyzed more than 40 different yoga styles, but almost half of the RCTs did not define the style of yoga (Cramer et al., 2013). Hatha yoga is the style predominantly studied in research. The Harvard Medical School defines Hatha yoga as a general term indicating physical postures and describes up to 15 different styles of yoga (Stanten et al., 2016). The lack of a clear definition of yoga impedes an understanding of intervention methodologies, and key components of yoga interventions are missing in the literature (Smith et al., 2018). Although Cramer et al., (2013) claimed yoga as an intervention is unlikely to be standardized, Sherman (2012) explains eight domains for robust protocol in yoga

treatments that are generally recognized as critical for rigorous studies but are not commonly seen in current yoga research. Sherman's domains were critical in formulating this research.

Sherman's Intervention Domains

Style of Yoga

Most modern yoga is a physical practice in the form of postures (asana) and breathing techniques (pranayama). Syncing breath and movement results in a rhythmic dance (Swenson, 1999). A serpentine flow is developed by linking asanas, this rhythmic dance is termed vinyasa (Swenson, 1999). Vinyasa yoga stems from Ashtanga, emphasizing flow, but without the structured sequencing, resulting in variation among teachers. Vinyasa classes range from vigorous to gentle, depending on the teacher and age and ability of the yoga practitioners (Emerson & Hopper, 2011), but the physically demanding structured practice of Ashtanga Vinyasa is considered the grandfather of modern yoga (Singleton, 2010).

Maintenance of a steady synchronized rhythm of breath facilitating a flow of yoga postures is the most important aspect of vinyasa yoga (Turlington, 2002). Strom (2010) compares movement in vinyasa to waltz dancing with a partner, but in vinyasa, the two dancers are a person's breath and movement. The breath is leading the movement just as one of the dancers in the waltz leads. It is claimed that vinyasa flow produces an internal heat, but further describing this process is beyond the scope of this study. Vinyasa is commonly used to refer to three specific postures linked together in a specific order, Chaturanga Dandasana, Urdhva Mukha Svanasana (upward facing dog), and Adho Mukha Svanasana (downward facing dog). These three postures synched together are in all styles and lineages of vinyasa yoga but is arguably most prominent in Ashtanga yoga.

The decision to evaluate the two different styles of flow yoga, Ashtanga and Vinyasa, was rooted in the emphasis on movement and breathing due to the positive effects on targeted symptomology and physical activity (Nosrat et al., 2016; Strohle, 2009; Wennman et al., 2014; Carek et al., 2011; Chen, Xiang et al., 2017). American College Health Association (2013) found that only 19% of all college students engage in enough physical activity to meet national guidelines. Although specific components of classes are undefined, vinyasa and Ashtanga yoga are commonly used in studies that evaluate the effects on stress (Gaskins et al., 2014; Uebelacker, Tremont, Epstein-Lubow et al., 2010; Javnbakht et al., 2009; Jarry et al., 2017).

Ashtanga yoga is a holistic practice with emphasis on all eight of Patanjali's limbs (Swenson, 1999). The physical aspect of Ashtanga is a vigorous asana practice consisting of six progressive flow sequences emphasizing a specific breathing technique, ujjayi (Maehle, 2008). Ujjayi breathing is used in a vast range of vinyasa yoga classes (Telles et al., 2016; Brown & Gerbarg, 2005), but this technique was not taught in the slow flow vinyasa class in this study. This breathing technique is discussed further in the components of yoga domain.

Dose and Delivery of Yoga

In the present study, yoga treatments will consist of two weekly classes lasting 50-minutes each. The intervention will last eight weeks, but the first meeting will include reviewing study and class criteria and a short yogic breathing and mindfulness session, leaving a total of 15 yoga classes lasting 50-minutes. The participants enrolled in a one-credit academic class labeled "Yoga I."

A systematic review of yoga intervention components and study quality found that the most common yoga sessions in research were 60 minutes (24%); out of the 465 articles evaluated for this review, only six had 50-minute interventions (Elwy et al., 2014). Gaskins et al., (2014)

found significant effects on stress and mood in healthy college students from two weekly classes, each lasting an hour, in an eight-week intervention of yoga. A Delphi study on yoga for reducing depression and anxiety concluded at least fifteen minutes for any benefit and 30 to 40 minutes for maximum benefit (de Manincor et al., 2015).

A similar study focusing on yoga for musculoskeletal conditions found that eight-week interventions with at least eight total hours of instructor-led yoga as a minimum recommendation (Ward et al., 2014). Yang (2007) reviewed yoga studies evaluating common physical health benefits (overweight, high cholesterol, etc.) and found that many studies consisted of 2 to 3 sessions per week for 8 to 12 weeks. A meta-regression analysis on yoga interventions for adjuvant therapy for breast cancer found improvements of fatigue, anxiety, and depression with interventions ranging in time spans from 5 to 16 weeks (Carayol et al., 2014). Another review finds that yoga interventions range in frequencies of one single session to six sessions per week and intervention durations lasting from 1 session to 2 years (Elwy et al., 2014).

The intention for this study is to examine the degree yoga can work in healthy college students and the decision for vinyasa yoga classes is because of the prevalence of this style in the yoga studios and gyms. In the community settings, classes are often 60 minutes in length. 60-minute classes would be preferred for this study, but the dose is pre-determined through the academic scheduling for the University offering the class for academic credit to students. The pre-determined dosage surpasses the average requirement for maximum benefits and thus is adequate for this study (de Manincor et al., 2015).

Home Practice

Home practice is one of Sherman's domains (2012) and is considered an aspect of dose in protocols for yoga interventions for depression (Uebelacker, Tremont, Gillette et al., 2017), low

back pain (Saper et al., 2014), and smoking cessation (Bock et al., 2018). However, "home practice" has yet to be explicitly defined (Uebelacker, Feltus et al., 2019), and the connections between amount of prescribed practice, the degree to compliance, and clinical outcome are undistinguishable (Greenberg et al., 2018) Recommending home practice spikes controversy in the profession as some professionals believe a home practice is essential to a long-term independent practice, and others claim potential safety issues without proper supervision, especially for beginners and vulnerable populations (Ward et al., 2014). Parsons et al. (2017) note that a home practice may pose a burden on participants and could lead to less compliance and more participants and clients dropping out of research and clinical treatments.

Even without a concrete definition and controversy, literature indicating home practice is important for yoga benefits continues to grow (Saper et al., 2014; Uebelacker, Anheyer et al., 2017; Brock et al., 2018). In the United States, 89.5% of people who practiced yoga did so outside of class (Ross et al., 2014) and 61% reported practicing yoga at home on a regular basis (Ayala et al., 2018).

This study does not include home practice in the intervention dosage. Participants are asked to continue their routines per-usual outside of the interventions for the study. Students reported any additional yoga classes and amount of exercise in questionnaires.

Yoga Intervention Components

There are eight limbs associated with a holistic yoga practice (Swenson, 1999; Maehle, 2008; Stone, 2008). This comprehensive foundation, presented in Patanjali's Yoga Sutras, includes ethical principles and self-observances (Satchidananda, 2010). This intervention does not formally include all eight limbs, but almost all eight limbs are embedded in the four components emphasized in this intervention, postures (asana), breathing practices (pranayama),

deep relaxation, and meditation (Stanten et al., 2016). These four components are expected to be the foundation of yoga's broad range of benefits (de Manicor et al., 2015).

Mindfulness. Mindfulness is repeatedly regarded as the "active ingredient" in yoga (Brisbon & Lowery, 2011; Knight et al., 2014; Salmon et al., 2009; Butterfield et al., 2017), and is essential for deducing both depression and anxiety (de Manicor et al., 2015). Mindfulness is a form of meditation, intentionally focusing and observing the present moment without judgement or reactivity (Hart, 1987; Kabat-Zinn, 2003; Berkovich-Ohana et al., 2011;2012; Falsafi, 2016). Mindfulness requires objective engagement in all five senses (Kabat-Zinn, 2005). There are different techniques used when attention becomes consumed with forms of thought; the simplest is to stop the thinking and re-direct to feeling and experiencing the present moment (Gunaratana, 2011). Immersion in the present moment is the essence of mind-body practices, such as yoga and tai chi, and are often termed mindful movements or "mindfulness in motion" (Salmon et al., 2009; Crane et al., 2017).

Extensive research on mindfulness techniques and practices show positive effects in multiple aspects of mood (Uebelacker & Broughton, 2016; Hofmann et al., 2010), stress (Khoury et al., 2015), depression (Falsafi, 2016; Jain et al., 2007; Preddy et al., 2013) and anxiety in college students (Bamer & Schneider, 2016; Bamber & Morpeth, 2019). Mindfulness is a bottom-up approach, suggesting that relaxing the body, such as tense muscles, can ease mental stress and anxiety as well (Stanten et al., 2016). Greeson (2009) suggests mindfulness precedes "important shifts in cognition, emotion, biology, and behavior that may work synergistically to improve health" (p.15). It should be noted, neuroscience of mindfulness techniques and key ingredients is just beginning (Tang & Posner, 2013).

In this study, the instructor prompted students to notice and/or observe their mental and physical states throughout each class. Common suggestions by the instructor included “be kind to yourself” (non-judgment) and “notice where your attention goes as you would notice a cloud passing” (objectivity). The intervention took place in a room without mirrors, subtracting a potential distraction and music was used to drown out potential background noises.

Deep relaxation. Mindfulness and other forms of meditation are frequently simplified or even equated to relaxation and the elimination of stress or relaxation (Brazier, 2016), but deep relaxation is often described as biproducts of a physical yoga practice and mindfulness meditations (Davis & Thompson, 2015; Seema et al., 2019). Relaxation techniques are embedded throughout many yoga classes with verbal prompts, and the final pose at the end of yoga classes, savasana – also written as shavasana- is often considered the component of deep relaxation and essential to the yoga practice (Swenson, 1999; Maehle, 2008). *The Hatha Yoga Pradipika*, an ancient text foundation to Hatha Yoga practices and philosophy (Michelis, 2004), describes savasana as “lying down on the ground, like a corpse” (Muktibodhananda, 2013, p. 37). It is claimed that savasana “gives rest to the mind” (Muktibodhananda, 2013, p. 37)

Savasana, also known as corpse pose, is the time to “take rest” at the end of every asana practice (Swenson, 1999; Maehle, 2008). This is more than the lack of movement in the body, but an act of surrender by the practitioner (Stephens, 2012). The cessation of activity, both physical and mental, in savasana is believed to give rise to “the calming, centering, and soothing effect of yoga practice” (Maehle, 2008, p. 129). It is customary that all yoga asana classes end with 5-10 minutes of savasana, an asana for opening and “integration following the practice” (Stephens, 2012, p. 425). Research on the effects of this specific posture was not found in preparation for this intervention

In this intervention, the instructor consistently cued students to take full breaths and relax muscles, especially muscles in the face and shoulders. During savasana, the instructor asked students to "let go of effort" in different ways while spraying an essential oil blend in the room. Every class consisted of at least five minutes of the final resting pose; the longest savasana recorded in this intervention was eight minutes.

Asana. Asana is one of the eight limbs of practice according to yoga philosophy (Turlington, 2002; Maehle, 2008; Stone, 2008; Stern, 2019). Asana is a Sanskrit word, literally translated as "seat" or "to sit" (Turlington, 2005; Stern, 2020; Stone, 2008). This term references the physical postures in a yoga practice, and commonly translated as "posture" (Khalsa et al., 2016; Swenson, 1999; Saraswati, 1999; Weintraub, 2004). Asanas are intended to "prepare the body and mind for pranayama and meditation" (Saraswati, 1999, p. 5) through purifying the body (Maehle, 2008). The asanas are necessary as the body is considered the manifestation of the mind (Stern, 2020) and constructs of the past are stored in the body (Maehle, 2008). Once comfort and ease are achieved in asana, one's true self is experienced (Devi, 2007). Asana is often described as steady and comfortable (Satchidananda, 2010), and some lineages consider asana is practiced incorrectly if that physical discomfort is felt.

The described interventions for this intervention mostly consist of asana. There is a wide range of yoga poses in terms of difficulty and require capabilities, such as flexibility and strength. This intervention controls for potential varying effects of different postures by keeping consistency throughout the intervention and between the two different styles implemented.

Pranayama. Pranayama is one of the eight limbs in yoga philosophy and the most frequent emphasis used in hatha yoga research supplementary to asana (Elwy et al., 2014). This Sanskrit term is an umbrella term for breathwork or breathing exercises (Feuerstein, 1998). The

term prana denotes the omnipresent force of life that vitalizes all things (Telles et al., 2016; Stone 2008; Devi, 2007; Satchidananda, 2010; Yogani, 2006; Swenson, 1999), but prana is most often interpreted as the breath (Maehle, 2006; Telles et al., 2016; Stern, 2020) and illustrated as an internal energy flow (Stone, 2008). Yama translates to as restraint or extension (Strom, 2010). Pranayama is a vehicle for extending prana through breath control. It is argued that without focused breath there is no yoga (Weintraub, 2004; Telles et al., 2016) as the breath is what unites the mind and body (Stone, 2008).

There are a numerous variety of pranayama practices (Jois, 2010); many are done while sitting and stable (Strom, 2010). Ujjayi is a pranayama technique based off vinyasa yoga (Stone, 2008; Schmalzl et al., 2018; Maehle, 2008) and is routinely emphasized in hatha yoga research (Brown & Gerbarg, 2005). Ujjayi breath means victorious breath (Maehle, 2008; Brown & Gerbarg, 2005; Turlington, 2002; Birch, 1995) and is characterized by a soft audible sound that has coined the technique additional names such as Darth Vader and ocean breath (Swenson, 1999; Brown & Gerbarg, 2005b).

The audible sound of ujjayi breathing is a soft restriction of the glottis, which is the upper opening of the larynx. This restriction on the back of the throat partially closes the epiglottis, which works as a lid on the throat that closes when drinking and opens when breathing (Maehle, 2008). The audibility of ujjayi breathing is from the chest, not the vocal cords as the nostrils are used for this breathing technique (Maehle, 2008). A wave motion occurs in the diaphragm as the ribs expand and contract freely throughout the breath cycle (Brown & Gerbarg, 2005). One of the most important features of this pranayama is maintaining a slow and rhythmic breath while progressing to deeper breaths to increase vitality (Maehle, 2006). Each inhale and exhale are encouraged to be of equal length.

The simplest advantage of ujjayi breathing is a point of focused attention (Swenson, 1999; Telles et al., 2016; Brown & Gerbarg, 2005a, 2005b; Cowen & Adams, 2005), serving as a mantra for concentration (Swenson, 1999). The autonomic nervous system is affected in multiple ways by slow, rhythmic ujjayi breaths via vagal somatosensory afferents (Telles et al., 2016; Brown & Gerbarg, 2005a; 2005b).

An increase of airway resistance from the laryngeal muscles contracting stimulates somatosensory vagal afferents to the brain and aids in developing lung capacity with elongated inspiratory and expiratory phases (Brown & Gerbarg, 2005). Slow and rhythmic breathing normalizes baroreflex sensitivity (Brown & Gerbarg, 2005) and is thought to promote parasympathetic dominance (Telles et al., 2016). The restriction in ujjayi is expected to build an internal heat that aids in an internal cleansing while regulating the central nervous system, thus promoting an inner cleanse for the practitioner (Maehle, 2006; Swenson, 1999).

Both classes focused on breath as often as asana with consistent prompts to employ deep, slow, rhythmic breathing, while synching the breath and the movement. The only difference was the instructions of ujjayi pranayama in the Ashtanga group. The ujjayi breathing technique was taught without movement the first class first class and prompts for using the ujjayi technique were continued through the asana intervention. Ujjayi is more common in physically demanding yoga classes and the choice to not incorporate in the slow flow sequence was to maintain the integrity of a softer and slower vinyasa class for comparison.

Specific Class Sequences. Both class sequences (Ashtanga and Vinyasa) were intended for beginners. The level of cardiovascular exercise varies in the two chosen yoga styles. The Ashtanga sequence represents a power flow, more physically demanding with more standing postures. Additionally, the Ashtanga class is taught a specific breathing technique (pranayama),

Ujjayi, to incorporate into the practice. The Vinyasa class is a gentle, slow flow with no pranayama technique. Both classes emphasize following the breath with movement, a practice that is considered by many the heart of yoga (Stanten, et al., 2016).

Ashtanga first (primary) series in this intervention is adjusted for beginners. David Swenson (1999) developed a 45-minute Ashtanga sequence evaluated for the study, but his sequence is intended for regular practitioners, containing asanas difficult for beginners. Traditionally, beginners do a fraction of the set sequence and the teacher gives the student more poses as student abilities develop, thus a practice could take months before lasting 50-minutes. This is an uncommon method in the West where students of all capabilities attend a class that generally lasts an hour. The shortened and modified sequence in this intervention has minor modifications from that were developed by the world-renowned teacher, Eddie Stern (Jeter et al., 2015).

The Ashtanga class begins standing, with sun salutations as a warm-up. Sun-salutations are the best-known yoga flow (Stanton et al., 2016) consisting of two short sequences moving with each breath except for five breaths in downward facing dog. Sun-salutations allow practitioners to find their breathing rhythm and set the pace for the rest of the sequence (Swenson, 1999). A series of standing asanas follows sun salutations, each asana is held for five seconds and both the left and right sides of the pose are completed before moving to the next asana. After standing postures, a few forward folds, backbends are followed by savasana. Asana sequences are listed in Appendix A (Ashtanga) and Appendix B (slow flow vinyasa). For a more detailed description of sequences, Appendix C (Ashtanga) and Appendix D (slow flow vinyasa) show sequences with instructor prompts.

The vinyasa class sequence "slow flow," is a gentle sequence, beginning with a seated posture (sukhasana) focusing on breath with small movements, such as neck rolls, and building to bigger movements, such as standing poses. The vinyasa class begins with small movements, such as neck rolls, and builds intensity to standing postures, ends with seated postures. Figure 1 shows the class structure of both yoga sequences used in this study.

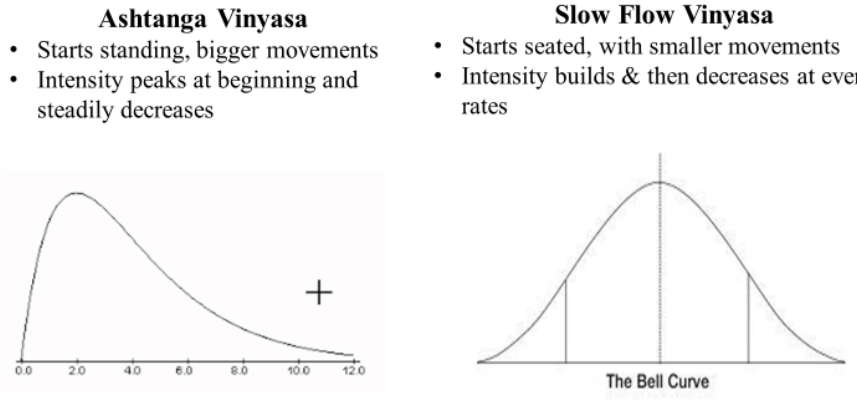

Figure 1. *Ashtanga and Slow Flow Yoga Class Structure*.

Dealing with Modifications. Modifications are subjective by nature and potentially the most difficult aspect of yoga asana practice to standardize. Generally, yoga teacher training includes learning modifications. This study utilizes healthy college students, diminishing demand for modifications. In this intervention, verbal instructions for asanas convey students to move slowly and halt once they feel the sensation of a stretch. Students were given individualized instruction when deemed appropriate. In this study, modifications were accounted for after each class and reviewed in the results section of this paper and in sequence outlines.

Selection of Instructors. Systematic reviews of the literature find more than half of studies do not provide any information on instructors for yoga interventions (Cramer, Lauche, Langhorst, & Dobos, 2013; Elwy et al., 2014). Yoga is not a licensed profession (Sherman,

2012). A small portion of studies describe the yoga teacher as “certified”, “trained”, or “experienced” in yoga, but do not include any further information on the teacher’s training or experience (Elwy et al., 2014). Yoga Alliance (YA) is a national registry for yoga teachers but is often criticized for its for lack of governance (Stephens, 2017). YA registration requires completion of a 200-hour training from an approved school and teachers with higher level of certification (mostly 500-hour certifications, but experienced 200-hour teachers are allowed as well).

Yoga Alliance [YA] does not oversee schools and there is no verification of competence for yoga teachers (Stephens, 2017), leaving standards for yoga instructors in research and medicine problematic. In addition to problems in implementation to oversight of yoga schools, YA has opposed efforts to standardize yoga teacher competence (Stephens, 2017). There is a standard outline of how many hours are spent on subject matter in 200-hour yoga teacher trainings. For example, twenty hours must be dedicated to anatomy and physiology in YA certified programs (Yoga Alliance, 2019).

Resistance to standards in yoga trainings and teachers is rooted in earlier points on defining yoga and related terms. Due to the multiple components of yoga, it can be argued that there is not an ideal standard for all teachers. Specific certifications in styles or lineages of yoga have rigorous trainings. Iyengar yoga certifications has rigorous standards with multiple levels accompanied by exams to ensure educational standards. A study conducted by Streeter et al., (2017) required Iyengar level II certification, at least two years of practice and five of teaching experience. Teachers in this study also participated in manual development and attended staff meetings to insure intervention protocol fidelity.

The International Association of Yoga Therapists has extensive standards for accredited yoga therapists, ranging from a defined scope of practice (International Association of Yoga Therapists [IAYT], 2016b), to educational standards (IAYT, 2017), to an ethical code (IAYT, 2016a). Yoga therapy is grounded in the practices and principles of the ancient tradition of yoga (Sullivan et al., 2017) and is considered a sister science of Ayurveda (IAYT, 2016b). When yoga is being used as a part of treatment for a mental and/or physical condition, yoga therapy is recommended (de Manincor et al., 2001; Mohan & Mohan, 2004). Gary Kraftsow (2014) explains a yoga class as instructional and yoga therapy as educational. 200-hour teacher training in Vinyasa yoga.

Sherman (2012) lists five factors for selecting instructors, these factors are the following:

- Minimum level of training and experience
- Selection of instructors after having observed them teaching
- Train them on the protocol (detailed with practice teaching)
- Additional qualifications
- Personal yoga practice that includes all elements of the yoga protocol.

Selecting an instructor widely depends on the population of interest, styles of yoga, and protocol of yoga intervention. Yoga instructors and/or yoga therapists with related and adequate training and experience to the intervention and desired outcomes is imperative for yoga intervention appropriateness and fidelity. The current study is not measuring effects in people with ailments, leaving an experienced 200-hour yoga teacher acceptable for this study. The yoga instructor is the lead researcher and developer of intervention protocol. The instructor being the lead instructor is not common, but does occur at times (Cowen & Adams, 2004). All of

Sherman's factors to consider except the observe teaching is met in this study. The qualifications of the instructor are the following:

- 35-hour teacher training in Ashtanga yoga
- 35-hour teacher training in yoga for addictions and trauma
- 7-years of experience in teaching and practicing Ashtanga yoga
- Student of Ashtanga practitioners trained by the founder of Ashtanga, Pattabhi Jois
- 5-years of experience teaching victims of trauma in a therapeutic setting
- Master's degree in Clinical Mental Health Counseling

Intervention Fidelity. Gearing et al., (2011) conducted a comprehensive review of meta-analysis articles focusing on intervention fidelity. This extensive work consists of twenty-four reviews states research interventions must have the following four required components: design, training, monitoring of intervention delivery, and intervention receipt. The current study covers almost all factors listed in review, but one element in monitoring of intervention delivery, intervention receipt. Intervention receipt focuses on "whether the participants received the treatment" (Gearing et al., 2011, p. 83). Daily sign-in and attendance documentations strengthens this element. However, it is recommended that monitoring of intervention delivery consists of at least two raters (Gearing et al., 2011) and this study only has one.

Intervention fidelity could be strengthened or weakened in this study because the yoga instructor is also the researcher. In addition to fully understanding the research questions and implementation, the instructor has years of experience teaching in this setting with this population and created the slow flow sequence and the modifications for the Ashtanga. This level of engagement and ownership could make it less likely that the instructor deviates from the

described intervention. The instructor being the researcher may also be a problem due to the possibility of bias in desire to maintain consistency for the sake of the study.

After each session, the instructor completed 62 Likert-scale items derived from the Essential Properties of Yoga Questionnaire (EPYQ), shown in Appendix E (Park et al., 2018). Deviations from the created sequence were recorded as well. The deviations in this study included skipping postures and holding postures for longer/shorter than the standard five-breaths. The EPYQ was designed for observers to complete during/after watching a yoga intervention and has fourteen different components (Park et al., 2018). Components of interest and number of items on assessment are shown in Table 2. It is impractical to expect all fourteen components to be addressed (Park et al., 2018), and different yoga styles/lineages vary on the focus and inclusion of components (Park et al., 2018). The five components of focus in this study are the following: acceptance/compassion, breathwork, physicality, body awareness, and mindfulness meditation.

Chapter 3: Methods

This study assessed undergraduate students enrolled in a one-hour elective eight-week course. Classes began the third week in August, (26th, 2019) and continued until the middle of the semester (October 16, 2019). The treatment group consisted of four academic Yoga I classes; two classes were assigned to each style of yoga. Two classes met on Monday/Wednesday and two on Tuesday/Thursday. Class times were consistent, one started at 1:00 p.m. and the other at 2:00 p.m. The Monday and Wednesday classes were the Ashtanga group; the Tuesday and Thursday classes were the slow flow yoga group. The researcher explained the components of the study and alternative route option in the first scheduled class meeting. The pre-assessment was sent electronically to consenting students after the first meeting. Students were given the option to complete surveys in hard-copy form, but all chose online format.

The control group consisted of students enrolled in one-credit hour courses offered through the same department as the Yoga I classes. The control classes consisted of the following: women's health, resilience and thriving, university perspectives and mindfulness. University Perspectives (UP) consisted of only freshman and was assessed for differences with other control groups. In areas of significant difference between the UP are discussed in the results. The mindfulness class was assessed independently throughout the study since mindfulness is major component of the yoga interventions.

Sampling Procedures

All participants in this study consist of undergraduate students at the University of Arkansas. The elective academic classes in this study were not promoted nor are they required to obtain a degree. Enrollment to the course was open to all undergraduate students until the capacity was met. Classes were catalogued with the academic department for Health, Human

Performance and Recreation department, but students from all departments enroll. Reasons to enroll in the classes are assessed in the demographics. There were no exclusion criteria, but extensive demographic factors were accounted for in analysis.

Data Collection

Treatment Group

Assessments were administered through Qualtrics and sent to students via email. to all groups the first week of school (pre) and during the eighth week of school (post). Only the treatment groups were given a full week to complete each assessment. Participants who did not complete an assessment in the given time and/or missed more than two yoga classes over the course of the intervention were removed from the study.

Students opting or dropping out of study were not penalized in the course. The coursework was consistent with previous sessions of the same class. Weekly papers regarding yogic concepts (Appendix F) and a written final project (Appendix G) were requirements and were submitted online. Attendance was part of student grades regardless of whether students were included in the study.

Control Group

Control groups consisted of students from other one credit hour academic classes. The researcher visited the classes the first (pre-assessment) and last day (post-assessment) of the term. During both visits, students were informed of the study and voluntary participation was emphasized. Data was collected by hand during the visits to each class. There was no exclusion criteria and attendance were not accounted in control groups.

Coding. In attempts to maintain participant confidentiality, student names were replaced with numbers once data is recorded. Students in the treatment group started at one and counted consecutively, and control group was numbered the same way, starting at 100.

Population

The three main groups are the following: yoga, control, and mindfulness. There are two subgroups of yoga participants, Ashtanga and slow flow vinyasa. The UP group discussed previously was kept as a sub-group of control. Since mindfulness is a major component of yoga interventions a class covering mindfulness techniques is kept separately from the rest of the control group. Many demographic questions were obtained in this study, but the lack of diversity in groups impeded most demographic analysis. Table 2 shows group demographics and demographic questions are shown in Appendix H.

Treatment Groups. There were forty-eight participants in the yoga group. The majority were female (88%) and only three were non-Caucasian. Students were enrolled in 11-18 academic hours during the time of the study, 58% were enrolled in fifteen hours. The majority of students lived off campus (79%) and 40% had three roommates. More than half reported interest in the mental and physical benefits of yoga.

Thirty-three students in treatment group had previously done yoga, 58% of those students did not know the style of yoga they have done. None of the students claimed Hatha yoga, which is the style seen most often in yoga research. 58% of the students reported exercising on a regular basis, cardio and resistance were most common types of exercise. Almost half indicated a previous mental health diagnosis, Table 3 lists out the frequencies of diagnosis. Only four were freshman.

Ashtanga Vinyasa group had twenty-six participants, only two of these were males. The majority of the students were twenty years old (38.5%) and enrolled in fifteen academic hours (61.5%). There were two freshman, 11 sophomores, 10 juniors and 3 seniors in this group. 80.8% practiced yoga in the past. 53.8% reported exercising on a regular basis.

Slow Flow Vinyasa had twenty-two students, four of which were males. The majority of these students were nineteen years old (40.9%) and enrolled in fifteen academic hours (54.5%). There were two freshman, seven sophomores, six juniors and seven seniors. 54.5% had done yoga before and 63.6% reported exercising on a regular basis.

Control. There were forty-six participants in the control group. The control was congruous the treatment group in many ways, almost all female (83%), Caucasian (85%), and enrolled in fifteen academic hours (39%). Only 44% lived off campus and most claimed only one roommate (28%). There was more freshman in the control group (16 total) because a University Perspectives (UP) class participated in the study. This class was evaluated independently as well as with other classes in control. 70% of control had done yoga before, once again, nobody claimed experience in Hatha yoga. 67% of control reported exercising on a regular basis with cardio and resistance most common.

Mindfulness. There were 12 participants in the mindfulness group. All were Caucasian and 83% were women. Most students were enrolled in fifteen hours of academic credit (50%), 67% lived off campus, and 33% reported three roommates. 75% had experience in yoga and 58% exercised on a regular basis with cardio and resistance most common.

Instrumentation

Sleep

Sleep was included due to the high comorbidity of insomnia with anxiety, depression (Lohitashwa et al., 2015), and stress (Lund et al., 2010). The Pittsburg Sleep Quality Index (PSQI)measures the sleep disturbances and was used in this study to measure sleep quality. The PSQI is the most widely used sleep assessment in both non-clinical and research settings (Manzar et al., 2018). A meta-analysis of mind-body interventions effect on sleep found the PSQI used more than any other sleep assessment (Wang et al., 2019). The PSQI has internal consistency and a reliability of $\alpha = .83$ for its seven components (Smyth, 2008). Internal consistency of the PSQI is consistent across multiple languages for college students (Kim, 2017). The PSQI is shown in Appendix I.

Stress

The Perceived Stress Scale (PSS) is a common stress assessment (Lee, 2012) consisting of ten questions scored on a Likert scale. This assessment was designed to measure "the degree to which individuals appraise situations in their lives as stressful" (Cohen, Kamarck, & Mermelstein, 1983, p.77-79) by asking the degree to which people find life overloaded, unpredictable, and uncontrollable (Kopp et al., 2010). PSS shows high psychometric properties in English and nine other languages and college students are the most common cohort in PSS evaluations (Lee, 2012). Cohen, Kamarck, & Mermelstein (1983) show an internal consistency above the .70 cutoff in college student samples. In a more recent study with a large sample consisting of college students from the United States, Spanish adults, and Hungarian adults find a Cronbach's alpha ranged from $\alpha = .78$ to .85 (Kopp et al., 2010). The scoring of the PSS consists

of five ranges, from very low health concern to very high health concern. The Perceived Stress Scale is shown in Appendix J.

Depression

The Beck Depression Inventory - Second Edition (BDI-II) is considered one of the best measures of depressive symptoms (Joiner et al., 2005) and is the most widely used instruments for evaluating depressive symptomology (Whisman et al., 2000). Most recent assessments of internal consistency of the BDI-II with college students show high internal consistency with Cronbach $\alpha = 0.90$ (Storch et al., 2004) Regression analysis show BDI-II has high internal consistencies across different races (Sashidharan et al., 2012; Whisman, et al., 2013).

This instrument consists of 21 self-evaluated items on a 4-point Likert scale assess negative attitudes towards self, performance impairment, and somatic disturbance (Beck, 1961; Beck, Steer, & Brown, 1996). This scale is recommended for assessing severity in depressive symptomology in clinical settings and with healthy populations (Lee et al., 2018). The scoring consists of 4 groups, ranging from minimal to severe depression. Since the BDI-II is often used for diagnosis in clinical settings, severe scores of the BDI-II were going to be approached by the yoga instructor/researcher to ensure student safety and refer to the counseling services on campus. There was no student with alarming scores for in this study. The Beck Depression Inventory – Second Edition is shown in Appendix K.

Anxiety

The Beck Anxiety Inventory (BAI) was developed to distinguish reliability between symptoms of anxiety and depression (Beck, Epstein et al., 1988). Similarities to BDI-II in format, number of items (21) and scoring allows for simplicity in data analysis (Arthur & Hayward, 1997). BAI is well-established (de Oliveira et al., 2015) with a high internal

consistency reliability coefficient α = .91 to .94 (de Ayala et al., 2005). BAI inquiries about physical and mental aspects of anxiety (Lee et al., 2018). This assessment is common in treatment (Kamaradova et al., 2015), healthy populations (Oh et al., 2018), and yoga research (Lia & Goldsmith, 2012). Scoring for the BAI has four groupings, ranging from minimal to severe anxiety. Since this assessment is often used in clinical settings, researchers were prepared to approach any students ranking severe anxiety to ensure student safety and refer to campus counseling services, but no students were deemed at risk and none of the participants were approached. The Beck Anxiety Inventory is shown in Appendix L.

Intervention Fidelity

The yoga instructor completed all Likert items on the Essential Properties of Yoga Questionnaire (EPYQ), after each yoga class. This new and extensive questionnaire was recently developed for researchers to objectively characterize yoga interventions of types and styles (Park et al., 2018). The EPYQ's development underwent multiple stages starting with focus groups and completed with reliability and validity of the final EPYQ items and factors (Park et al., 2018). Internal consistency reliability showed most Cronbach's alphas above .80 with none below .70. Test re-test correlations were satisfactory for all scales except the category of health benefits. Confirmatory factor analysis showed reasonable fit with a root mean square error of approximation (RMSEA) of .064 and a standardized root mean square residual (SRMR) of .068.

The EPYQ consists of two sections with almost one-hundred items. In this study, only the first section of the EPYQ completed daily and analyzed. This section consists of sixty-two Likert style items regarding the fourteen components of yoga interventions and can be reviewed in Appendix E. The second section records information that is covered in different areas of the

study such as style and physical space of the yoga intervention. The EPYQ's four components of interest in this study are the following: breathwork, physicality, meditation, and mindfulness.

Analysis

Three groups were analyzed on four validated scales. Multivariate analysis of the variance (MANOVA) was used to evaluate potential contrasts between the three groups at different time points. Potential differences within each group over the course of the study was investigated through a repeated-measures analysis of variance (ANOVA) and a paired sample t-test statistical model. The repeated measures ANOVA is the analysis used on the treatment group because there are three measures, pre-mid-post. The control and mindfulness groups only have the pre and post assessments, it is more appropriate to use a paired-sample t-test when only two time points. The analysis is divided in the following three sections: data screening, model assumptions, then results of both repeated measures ANOVA (within group analysis), and MANOVA (between group analysis).

Data Screening

Missing Data & Sample Size

Missing data patterns were evaluated and deemed minimal and missing at random. Mean imputation was the chosen method for dealing with missing data. No dataset showed monotone missing data, indicating that participants completed each survey. The amount of data missing was so minimal that the standard deviations in variables were barely detectible; stress was the most affected variable with a standard deviation decrease of .41 after removing outliers.

Adequate sample size is often dependent on the number of dependent variables and groups in the study (Cohen, 1988; Kirk 2013). There were 67 individual items in this pre and post assessment and less than fifty participants in each group, violating the assumption. A sum

for each scale was used in the analysis for this study to meet this assumption and simplicity of results. There were two measurements for sleep, amount of sleep and a sum of Likert items on the PSQI. The assessments are often used in research and clinical practice with the sum, grouping individuals based on severity of construct.

Multivariate Normality

Evaluation of continuous and categorical variables range, realistic means ($\bar{x}$) and standard deviations (σ), evaluation of missing data and identifying extreme outliers. Some scales showed high standard deviations, but a two-way MANOVA indicated that there were no differences between groups at the pre-assessment, $F(10, 198) = 1.509$, $p = .138$; Wilks' $\Lambda = .86$; partial $\eta^2 = .071$.

Data Distribution

Lack of criteria for participation in the study increased the chances for outliers. Moderators leading to variations in mental health factors in university students are imaginably endless. The irregular data points in this study were deemed random, not due to systematic or error.

Outliers. Outliers were present only in the post assessment. Multivariate Outliers were found using the Mahalanobis Distance from the mean vector (μ) for each measurement scale used. Identified outliers were removed in attempts to meet the assumption of normally distributed data (discussed in following section). There were six multivariate outliers at post assessment that were removed from analysis.

Univariate Outliers were found through scatterplots. The control group's depression scores and the yoga group's stress and sleep scores showed univariate outliers. ANOVA is robust to deviations from normality (Scott & Delaney, 1990). Thus, the three univariate outliers were

noted, but kept in the analysis. These outliers appear to skew the data distribution slightly, discussed next.

Normal distribution. No distributions showed significant kurtosis. Some data were marginally skewed. MANOVA and ANOVA are robust to modest skewness (Rencher & Christensen, 2012), and psychological data is often non-normal (Lantz, 2013). No transformations or adjustments were made because with relatively small sample sizes, ANOVA tends to perform better than common adjustments, Brown-Forsythe or Welch, to non-normality (Lantz, 2013).

The stress scores distribution in yoga group were positively skewed with a skewness of 1.095 ($\sigma_{\bar{x}}$ = .343), resulting in a skewed z-score of 3.19. This is interesting to note considering the yoga group was still the lowest mean with a significant difference between the yoga and other groups. The control's depression scores were positively skewed at 1.132 ($\sigma_{\bar{x}}$ = .350), resulting in Z = 3.23. The mean ($\bar{x}$ = 9.99) and standard deviation (σ = 7.68) of control group were comparative to the other groups.

Model Assumptions

Multicollinearity

Stress, anxiety, and depression were all highly correlated with each other, indicating multicollinearity. This is not surprising as we know these factors are highly related from previous research (Song et al., 2017; Benham, 2019; Doğan & Doğan, 2019). Peculiarly, sleep quality scores and amount of sleep were not highly correlated (r = -.052, *p* = .6). Multicollinearity has no impact on the overall model and associated statistics, but rather an issue in effects of individual predictors (Baguley, 2012). Principal components analysis was not

conducted in response to the multicollinearity among factors because this analysis is looking at effects from yoga on the variables, not the relationship between the variables of interest.

Linear relationship

There was a linear relationship in the different groups for all variables and groups, except the mindfulness group, as assessed by scatterplot. In the mindfulness group, the Pittsburg Sleep Quality Index (measuring sleep quality) did not have a linear relationship with any other variables and the Perceived Stress Scale only had a linear relationship with the Beck Anxiety Index. Combining the mindfulness group with the other control groups resulted linear relationships, indicating small sample size may be to blame for this violation of assumption.

No data was transformed and the less power in the mindfulness group was accepted. It is suspected that the MANOVA's power is not significantly affected because the shape of this distribution is not curvilinear (Cole et al., 1994). The mindfulness class was found when searching for controls and was not an intended part of the study. The results from this class are supplementary and not included in the overall analysis or conclusion of this study.

Homogeneity of Variance and Covariance

All dependent variables showed homogeneity of variances in pre assessment, as determined by Levene's Test of Homogeneity of Variance ($p > .05$), the closest violation of this assumption was in anxiety ($p = .073$). In post analysis, sleep showed significance, ($p = .047$). In response, Pillai's Trace (V) is used instead of Wilk's Lambda (Λ) in analysis of amount of sleep in results (Phakiti, 2015).

Box's Test of Equality of Covariance Matrices has adequate power for small sample sizes (Cohen, 2008; Hahs-Vaughn, 2016), but the individual groups have a sample size that is slightly less than the minimum of 30 participants for an adequate sample size. A smaller alpha level was

used ($p < .001$) because of the test's sensitivity and in response to this issue of power. There were no violations in covariance homogeneity, the closest two violation was anxiety ($p = .075$) in the control group.

Sphericity

In repeated measures ANOVA, the assumption of sphericity is comparable the MANOVA assumption of homogeneity of variance in between group (Lane, 2016). Sphericity is regarding variances of different scores (Phakiti, 2015) as well as variances and covariances of orthogonal contrasts (Stevens, 2000; Lane, 2016). Assumption violation is checked with Mauchly's significant test statistic *($p < .05$)*. Violation results in an inflated Type I error rate (Lane, 2016). Assumption of sphericity is violated in yoga group's sleep and anxiety data. Greenhouse-Geisser adjustment is used in cases where sphericity is violated, and this adjustment affects the degrees of freedom for both time and error effect (Greenhouse-Geisser, 1959).

Between Groups MANOVA

A MANOVA with pre-assessment data was conducted to ensure that the groups were the same at baseline; no significant differences between groups were found at baseline, $F(5,88) = .706$, $p = .620$, Wilk's $\Lambda = .961$; partial $\eta^2 = .039$. The post assessment was significant between groups $F(5,88) = 5.760$, $p < .001$, $\Lambda = .753$; partial $\eta^2 = .247$ and Box's M was not violated, $p = .099$. The mindfulness group was not included in any omnibus assessments because it was not part of the research question.

ANOVA and Tukey analysis were conducted to further evaluate results. ANOVA showed amount of sleep, perceive stress, and anxiety were all significant between the three groups at post assessment. Significant ANOVAs were followed with Tukey post hoc for pairwise comparisons. Table 4 shows pre and post group means. Only pairwise comparisons were made with the

mindfulness group data and results are presented as supplemental information; due to lack of significance, depression (BDI-II) and sleep disturbances/quality (PSQI) between groups are not discussed in this section.

Chapter 4: Results

Between Groups Post Comparisons

Amount of Sleep.

Amount of sleep is an item in the PSQI but is analyzed independently due to the difference in measurement to other items. The sleep quality index consists of Likert scale items and the amount of sleep is a raw number of hours. Pairwise comparisons showed significant differences between control and yoga at the post assessment. The control group reported less amount of sleep ($\bar{x}$ = 6.69, σ = .836) than the yoga group ($\bar{x}$ = 7.16, σ = 1.23), with the differences being significant at p = .025. The mean increase of the yoga group relative to the control group was .457, 95% CI [.025, .882]. The amount of sleep reported in the mindfulness group ($\bar{x}$ = 7.542, σ = .865) also differed significantly relative to control by .843, 95% CI [-1.509, -.176], p = .014, but there was no significant difference between the mindfulness and yoga group. Results of between group comparisons are shown in Table 4.

Stress.

There was a statistically significant difference in stress scores between yoga ($\bar{x}$ = 19.92, σ = 4.519) and control ($\bar{x}$ = 21.97, σ = 3.477), with the control group reporting more perceived stress with a mean increase of 2.052, 95% CI [.415, 3.689], p = .016 compared to the yoga group. The mindfulness group scored highest on the stress scale ($\bar{x}$ = 22.42, σ = 3.63) with a 2.5 mean increase compared to the yoga group. Despite the contrast between mindfulness and yoga, the difference was not significant, 95% CI [-5.061, .061]. This lack of significance is likely due to small sample size.

Anxiety.

The lowest mean score was in control ($\bar{x}$ = 8.606, σ = 7.221). The difference in anxiety between control and yoga ($\bar{x}$ = 12.063, σ = 9.773) was nearly significant at .05. The control mean was less than the yoga group by 3.46, 95%CI [-.075, 6.989]. In comparison, mindfulness scores ($\bar{x}$ = 14.417, σ = 8.140) were significantly higher (p = .039) by 5.811, 95% CI [.302, 11.320]. Further analysis on the control group's low anxiety scores can be found in the repeated measures ANOVA section.

Comparing Styles of Yoga

Between group statistical analysis evaluated the two vinyasa yoga styles in study, Ashtanga and slow flow. Groups were small, with moderate demographic differences. There were twenty-six students in Ashtanga and twenty-two students in slow flow; no demographics differences were significant. Assumption of homogeneity of variance-covariance was violated, p >.018. MANOVA is robust against violations if sample size is greater than 30 (Rencher, 2012). There are less than thirty participants in each yoga group, thus an alpha of .001 would be considered significant. An omnibus analysis comparing the two styles of yoga showed no significance F(5,45) = .181, p = .652, Λ = .927; partial η^2 = .073.

Mean pairwise comparisons of Ashtanga and slow flow vinyasa are shown on Table 5. Ashtanga group scored lower on all measures, except stress. Ashtanga post stress scores in were slightly lower than the slow flow group. The largest difference between yoga groups is seen in anxiety scores. The slow flow yoga group anxiety mean was higher ($\bar{x}$ = 13.46, σ = 10.47) than the Ashtanga group ($\bar{x}$ = 10.89, σ = 9.18) by 2.57, 95%CI [-8.279, 3.139] with relatively similar standard deviations.

Repeated measures analysis for different yoga styles showed significant improvements over time in stress for both groups, but only Ashtanga showed significant decrease (p = .003) for sleep disturbances over the course of the eight weeks. When the two yoga styles were evaluated as one yoga group, all measures except for depression showed significant improvements over the course of the eight weeks. The lack of significance in the analysis for individual yoga styles could be due to small sample size after dividing the yoga group into two separate groups. Due to lack of significance and to maintain analyses power, both yoga styles are analyzed as one yoga group in the other analysis in this study.

Within Groups Repeated Measures ANOVA

Repeated measures ANOVA was conducted to assess changes in reported sleep quality, perceived stress, symptoms of anxiety and depression over time in participants in two weekly yoga classes for eight weeks. The yoga group was assessed at three different time points, pre/mid/post, but the final analysis give focus to pre and post assessments. Repeated measures ANOVA was also conducted for pre and post assessments in the control and mindfulness groups for comparison. Table 7 displays within group repeated measure ANOVA results.

Sleep Disturbances

Yoga. The Pittsburgh Sleep Quality Index (PSQI) and reported amount of sleep were measures used in assessing effect of sleep. Only the yoga group showed significant changes over time in measures of sleep. Mauchly's Test of Sphericity was not violated in PSQI data, χ^2 (2) = 1.954, p = .376. Within subject's effects showed significant changes quality over time, F(1, 47) = 11.847, p = .001, partial η^2 = .201. Mean scores of each time point show a steady improvement in sleep quality from pre assessment ($\bar{x}$ = 14.21, σ = 5.59), decreasing significantly

at post assessment ($\bar{x}$ = 11.9, σ = 5.87). Comparison from pre to post assessment means show a significant total decrease of *M* = 2.313, 95% CI [.961, 3.664], *p* = .001.

Control. There were no significant changes in sleep scores over time for the control group F(1,45) = .009, *p* = .926, partial η^2 = .014. The control group showed almost exact same scores at pre assessment ($\bar{x}$ = 13.21, σ = 5.57) and post assessment ($\bar{x}$ = 13.11, σ = 5.48), with a mean decrease of .095, 95% CI [-1.94, 2.13]. The mindfulness group showed no statistically significant changes in quality of sleep over the course of the study, *M* = .148, 95% CI [-4.383, 4.678], F(1, 11) = .072, *p* = .944, partial η^2 <.001.

Amount of Sleep

Yoga. Amount of sleep is a part of PSQI but is analyzed separately to lesson potential error due to the difference in measurement in comparison to other PSQI items. Mauchly's Test of Sphericity was violated in amount of reported sleep χ^2 (2) = 33.25, *p* <.001. Therefore, Greenhouse-Geisser correction was applied (ε = .660). Within subject analysis showed significant increase in yoga group's amount of reported sleep, F(1, 47) = 5.3, *p* = .026, partial η^2 = .101. Mean scores of post assessment ($\bar{x}$ = 7.16, σ = 1.23 hours), decreased from pre-assessment ($\bar{x}$ = 6.62, σ = 1.06 hours), indicating more amount of sleep over course of yoga intervention, a statistically significant mean increase of M = .535, 95% CI [-1.0035, -.068], *p* = .026.

Control. The control group showed slight decreases in amount of sleep over time in amount of sleep, M= .238, 95% CI [-.168, .64], but none of the changes in control were significant changes over time F(1,45) = 1.834, *p* = .246, partial η^2 = .03. The Mindfulness group showed slightly less sleep from pre assessment ($\bar{x}$ = 7.75, σ = 1.14) to post assessment ($\bar{x}$ = 7.53,

σ = .865), but there was no significance in the mindfulness group and reported amount of sleep, *M* = .208, 95% CI [-.800, 1.217], *t*(11) =.455, *p* = .658 , *d* = .131.

Stress

Yoga. Mauchly's Test of Sphericity not violated $x^2(2) = 1.741$, *p* = .419. Tests within-subjects effects showed significant results F(2, 47) = 13.471, *p* <.001, partial η^2 = .26. Stress scores post scores ($\bar{x}$ = 22.92, σ = 3.61) decreased M= 3.0, 95% CI [1.513, 4.487], *p* <.001 from pre-scores ($\bar{x}$ = 19.92, σ = 4.52).

Control. The control group showed no statistically significant changes in perceived stress over the course of the study, *M* = .173, 95% CI [-1.36, 1.706], *F*(1,45) = .228, *p* = .821, partial η^2 = .001. Stress in the mindfulness group were slightly higher than the control, *M* = -.50, 95% CI [-4.298, 3.298], but the changes were not significant F(1,11) = .084, *p* = .777, partial η^2 = .008.

Anxiety

Yoga. Mauchly's Test of Sphericity was violated $x^2(2) = 8.366$, *p* =.015. Therefore, Greenhouse-Geisser correction was applied (ε = .857). The yoga intervention elicited significant results F(1, 47) = 6.175, *p* = .017, partial η^2 = .116. The averaged reported symptoms of anxiety dropped at post intervention ($\bar{x}$ = 12.06, σ = 9.77) by 3.162 points, 95% CI [6.13, .826], *p* =.017 from pre intervention ($\bar{x}$ = 15.28, σ = 11.68).

Control. Anxiety is the only measure with significant changes over time in the control group *F*(1,45) = 3.37, *p* = .002, partial η^2 = .202. The control group's mean anxiety scores decreased by .407, 95% CI [1.637, 6.499]. A subgroup of freshman in the control showed a significant mean decrease of anxiety scores over the course of the study. The post assessment scores ($\bar{x}$ = 10.87, σ = 7.92) were lower than pre assessment scores ($\bar{x}$ = 6.99, σ = 5.99) by 3.0, 95% CI [3.797, 10.185]. This drop in scores was significant, F(1,15)= 2.44, *p* = .028, partial η^2 =

.61. Although not significantly, the freshman subgroup post anxiety scores were less than the rest of the control group ($\bar{x}$ = 9.46, σ = 7.75).

The mindfulness group showed no significant changes over the course of the study in anxiety $F(1,11) = -1.182$, $p = .262$, partial $\eta^2 = .113$. This was the smallest group, consisting of only twelve participants, lack of significance may be due to small sample size. However, it should be noted that this is the only group in study with increased anxiety scores overtime, with a mean increase of 3.833 from pre ($\bar{x}$ = 10.75, σ = 6.05) to post ($\bar{x}$ = 14.42, σ = 8.14) assessment.

Depression

Yoga. Depression was the only assessment without significant results in any of the three groups. The depression scores decreased by 1.25 from the pre-assessment ($\bar{x}$ = 12.23, σ = 9.365) to the post assessment ($\bar{x}$ = 10.98, σ = 9.362), but not significantly $F(1, 47) = 1.082$, $p = .304$, partial $\eta^2 = .022$. Mauchly's Test of Sphericity not violated $x^2(2) = 4.971$, $p = .083$. Future studies should work with participants meeting criteria for a depressive disorder in order to best evaluate effects.

Control. The control group showed no statistically significant changes in depression scores over the course of the study, $M = .41$, 95% CI [-1.99, 2.81], $F(1,45) = .118$, $p = .732$, partial $\eta^2 = .063$. The mindfulness group showed no statistically significant changes in depression over the course of the study, $F(1,11) = 1.59$, $p = .233$, partial $\eta^2 = .126$. This mean depression scores increased by 3.833 from pre ($\bar{x}$ = 8.67, σ = 1.7) to post ($\bar{x}$ = 12.5, σ = 2.58), 95% CI [-10.524, 2.857]. Mirroring anxiety results, the mindfulness group is the only group with an increase in scores over time.

Essential Properties of Yoga Questionnaire

After every class, the yoga instructor completed sixty-four Likert items regarding fourteen different domains of yoga. Six of these domains were emphasized in this study. The components of interest are the following: acceptance/compassion, breathwork, physicality, active postures, body awareness, and mindfulness meditation. Items for these components of interest are shown on Table 8. Breathwork and physicality were expected to vary between the two styles in this study, but acceptance/compassion, body awareness, and mindfulness meditation were expected to be present in both styles equally.

Descriptive statistics showed both interventions, Ashtanga and slow flow vinyasa, indicated an acceptable amount of each component. The components of interest violated homogeneity of variance ($p < .001$) and showed significance, $F(6, 47) = 5.118$, Wilks = .605, $p < .001$, partial $\eta^2 = .395$. As anticipated, the only components with significant differences between the two styles of yoga were breathwork and physicality. No further analysis was conducted for acceptance/compassion, body awareness, and mindfulness meditation. EPYQ component means for the two styles of yoga are shown in Table 9.

Breathwork

The five items in the breathwork domain were analyzed closer to best understand the differences in interventions. Analysis of this domain showed overall significance, $F(3, 50) = 5.528$, $p = .002$, $\Lambda = .751$, partial $\eta^2 = .249$. Two of the five breathwork items showed significant differences between styles. “Instruction of pranayama” was significantly higher in the Ashtanga group ($\bar{x} = 3.462$, $\sigma = 1.029$) with a mean difference of 1.140, 95% CI [.560, 1.720] to the slow flow group ($\bar{x} = 2.321$, $\sigma = 1.090$). This variable’s significance, $F(1,52)= 15.559$,

$p < .001$, partial $\eta^2 = .230$, indicates intervention fidelity was met because only the Ashtanga intervention focused on a specific pranayama, ujjayi breathing.

The item "why pranayama is important" was significant between styles $F(1, 52) = 5.224$, $p = .026$, partial $\eta^2 = .091$. Ashtanga group ($\bar{x} = 3.55$, $\sigma = 1.21$) with a mean difference of 2.344, 95% CI [-.219, 4.908] to the slow flow group ($\bar{x} = 1.21$, $\sigma = .418$). The Ashtanga group was exposed to a specific pranayama; it is assumed that the instructor mentioned its importance alongside the instructions to implement.

Physicality

There were eight items on physicality. An omnibus comparison of only physicality items did not show an overall difference between groups $F(8, 45) = 1.642$, $p = .140$, $\Lambda = .140$, partial $\eta^2 = .226$. However, mean comparison showed significant differences on two of the individual items. This lack of significance in the omnibus analysis could be due to the additional three items in the physicality domain.

The item "physical flexibility" had a significant ANOVA between groups, $F(1, 52) = 8.747$, $p = .005$, partial $\eta^2 = .144$. Ashtanga's mean ($\bar{x} = 3.423$, $\sigma = .758$) was higher by .423, 95% CI [.136, .710] than the slow flow's mean ($\bar{x} = 3.0$, $\sigma = .000$). Many of the individual postures were purposefully aligned in both interventions, and the reasoning for this difference is unclear.

"Vigorous activity or physical exertion" was the other item with a significant difference between groups, $F(1, 52) = 5.997$, $p = .018$, partial $\eta^2 = .103$. Once again, Ashtanga was higher ($\bar{x} = 2.62$, $\sigma = .496$) than the slow flow intervention ($\bar{x} = 2.21$, $\sigma = .686$). The mean difference was .401, 95% CI [.072, .730]. This was also an expected difference due to Ashtanga sequencing

being more physically demanding and starting off at an accelerated pace in comparison to the slow flow sequence.

Modifications. A couple of participants in the Ashtanga group required some asana modifications. These two students started the class with minor knee injuries and wore a knee brace. Both students were given special attention and appeared to take extra precaution throughout the course. These students moved slowly throughout the asana flow and skipped one-leg balancing. The instructor gave a block to these students to support the lumbar spine during backbends, relieving required strength in the legs to hold the postures. The student chooses a block height and placed it on the pelvis.

Chapter 5: Discussion

There are a multitude of factors affecting anxiety, depression, stress and sleep. There are just as many potential elements in a yoga intervention. Additionally, university life is endlessly complex. This chapter discusses findings and recommendations for future research on this topic.

Introduction

This study was conducted to assess yoga classes as a mental health prevention strategy for healthy college students. The interventions were not designed to be therapeutic, but still had characteristics common in therapeutic yoga interventions such as a focus on the breath and mindfulness meditation skills. Yoga positively affecting mental health has been well documented, but research is needed in the components and best practices of yoga for desired effects.

Limitations

This study uses a convenience sample that is small and limited in diversity. It is argued that "samples only need sufficient variability along key characteristics, enough to provide adequate leverage on the question being asked" (Kelley et al., 2017, p. 1341). The sample reflects predictors of yoga practitioners (Cramer, Lauche, Langhorst & Dobos, 2016), yet this convenience sample interfered with restrictions on participants and harder to control for potential effect mediators, and the small sample size made controlling for these potential mediators obsolete. Future studies are needed with different and diverse populations.

There are strengths and weaknesses to the yoga instructor selected. The yoga instructor was also the lead researcher. This could be viewed as positive as the yoga instructor was immersed with components and protocol of interventions. On the other hand, chances of experimenter bias, where the scientist(s) performing the research influence the results (Strickland

& Mercier, 2014), is higher as the researcher plays multiple roles in this study. Comparing two different yoga styles with the same teacher allows to control for the teacher influence, but then questions the degree of difference between the two different interventions. There are reports of lead researchers also instructing the yoga intervention (Cowen & Adams, 2004). Future studies should compare interventions designed and utilized in this study with different teachers to better understand the teacher influence.

The researcher is the only one who completed the Essential Properties of Yoga Questionnaire (EPYQ). It is suggested that a trained expert completes this questionnaire (Park et al., 2018). Ideally, there would be more than one rater due to personal perception of properties and implementation. For example, the instructor, a person who has practiced yoga for years, may consider a class difficulty level mild, but a student may consider the class moderately difficult.

Completion of the EPYQ after every class session strengthens intervention fidelity, enabling averages to show presence of components throughout the intervention. It's important to note the purpose of using EPYQ in this study is to describe the intervention. Each individual session tends to vary slightly (Groessl et al., 2015). This study assessed the effects of an intervention, not a single session.

Data collection was not consistent between groups. Control participants completed assessments in person while treatment group used an online format. Although all assessments inquired about experiences in the last month, the treatment groups could have been more at ease while completing the assessments at their own convenience instead of during class time of a school day. It is possible that current mental state affected responses.

Self-report measures carry their own bias and limitations as participants may respond with answers deemed more socially acceptable (Gallagher, 2012; Credé & Niehorster, 2012;

Much & Swanson, 2010), and subject responses are dependent on self-awareness. Additionally, all measures used in this study inquire about the past month, which could be difficult for anyone. Future studies should use smart watches to track biomarkers such to best evaluate sleep and physical symptoms of anxiety.

Self-report measures are commonly used in research and clinical settings (Williamson, 2007), but self-report measures are fundamentally susceptible to bias due to their subjective nature (Bizet, 1998; Lezak, 1995, Williamson, 2007). Misinterpretation of questions and different denotation of answers will always be a concern (Eisenberg, 1941). Naturally, recall bias is a concern when self-report measures inquire for experience over time as the ones used in this study (Waganaar, 1986). This study approached the biases of self-report measures by using well-established scales, but bias will never be eliminated.

Discussion

This study indicates university students may experience positive effects in sleep, stress, and anxiety from a short, eight-week vinyasa yoga intervention. The assorted properties and components in yoga classes are vast, leaving much unknown about what works best for different people and conditions. This study shows that these components within yoga classes can be researched and better understood. Replicability of interventions are imperative in research and these interventions need to be replicated by other researchers and yoga instructors.

There were no significant effects or differences found in sleep quality through the PSQI for the yoga group. However, when dividing the yoga group into two sub-groups for different styles, Ashtanga and slow flow vinyasa, the Ashtanga group did show significant improvements in sleep quality over the course of the eight weeks. The relationship between sleep quality and

components of a yoga intervention is in its infancy, but it could be that a more physically demanding yoga asana intervention renders more positive effects in terms of sleep quality.

Although there were not significant changes in reported sleep quality in the yoga, there was a significant difference between the amount of reported sleep. Over the course of this intervention, the yoga group reported significantly more hours of sleep (p <.001); all other groups reported less sleep at post than the pre assessment. The slow flow yoga group reported the most sleep, significantly more than the Ashtanga yoga group (p = .016). There are many factors that affect sleep and future research is needed to better understand yoga's effects on sleep.

It has been well established that yoga can help people feel less stressed (Gaskins et al., 2014). Even with completion of the post assessment falling during midterms, students participating in the yoga intervention reported less stress than they did the first week of school. The two styles, Ashtanga and a slow flow vinyasa, showed no significant differences. The differences in anxiety scores between styles could be indicative that Ashtanga, a more physically vigorous yoga practice, is more effective in treatments of anxiety while a slow flow vinyasa may be more effective in treating perceived stress.

This could be because Ashtanga is the more challenging yoga class and students could feel overwhelmed or distressed. The modified Ashtanga sequence in this class omits almost all vinyasas to make it more accessible to all students and vinyasa is considered a foundational part of the Ashtanga yoga practice (Jois, 1999). It could be that there is less of a flow experience with syncing the breath and movement once vinyasas are not practiced. Fifteen of the twenty-one items on the Beck Anxiety measure relate physical effects, such as "sweaty palms" and

"numbness or tingling" (shown in Appendix L). Perhaps the more physically challenging yoga class is more effective in the treatment of physical manifestations of anxiety.

Results from the EPYQ confirm that the Ashtanga yoga class was more physically challenging, but that pranayama was more present in the Ashtanga class as well. All yoga classes emphasized the synching of breath and movement, but only the Ashtanga class was prompted to engage in a specific yogic breathing technique, ujjayi. It could be that ujjayi breathing is more important than the physicality of yoga classes.

There were mixed results for anxiety. Only the mindfulness group reported more anxiety at the post assessment. The yoga group reported significantly less anxiety symptoms significantly ($p = .014$) after the intervention, but there was not a significant difference between the yoga styles. Cowen and Adams (2005) conducted a similar study with university students. Students did yoga twice a week for eight weeks and the two yoga styles implemented were Ashtanga and Hatha. Both yoga groups showed an increase in anxiety symptoms at the end of the eight weeks, and it was proposed that the increase was due to midterms happening at the time of the post assessment. Research is needed to better understand the components of yoga interventions that work with best for varying symptoms of anxiety.

The control group also reported significantly less symptoms of anxiety at post assessment ($p = .002$). This improvement could be from the larger proportion of freshman in the control group because when analyzed individually, freshman decreased the most in anxiety, scoring lower than all other groups ($\bar{x} = 6.99$). It was initially assumed that freshman would increase in anxiety because navigating university level midterms for the first time, but perhaps there is more anxiety at the beginning of the semester due to the new setting and initial adjustments.

Although yoga positively affecting depression symptomology has been shown through past studies (Butterfield et al., 2017), there were no notable changes in depression symptoms in this study. Perhaps depression symptoms did not show significant improvements over the course of the intervention due to the students reporting so few symptoms at the start of the intervention. The yoga group mean decreased by 1.25 and the control group only decreased by .51, indicating yoga may help alleviate depressive symptoms for people who do not meet diagnostic criteria. Longitudinal data is required to know if yoga can help prevent depression symptomology.

The mindfulness class gave the most conflicting results. The students in the mindfulness class did worse on all measures than the other groups. There is no information on the mindfulness class besides the name of the instructor; nothing is understood about the content or structure of the course. Research has shown that instructors with a personal mindfulness practice and a strong theory have more positive results in students than teachers who do not (Seema & Sare, 2019). This may indicate that teaching the concepts is not enough, which could also be the case for yoga instructors.

Although researchers have indicated that selection of yoga instructors is important, there is an absence of research on the effects of different instructors. Training, experience, personal practice, and personal character of the instructor may all affect the experience of a class and outcomes in participants. Researching effects of various instructor traits and training is less developed than understanding components of yoga interventions. The important components of instructors need to be identified and researchers should be able to give that information as a major part of the yoga intervention.

Implications and Conclusion

The current study gives insight between two different styles of yoga. Both styles showed positive impacts over the course of eight weeks in university students, but the more physically demanding style could produce more positive effects in this population. Both styles were implemented by the same instructor, in the same location, at the same times of day and with many of the same components emphasized. The major differences were the movement pace and pranayama instruction. More research is needed to understand the effects of pranayama and physicality by controlling for one of these components.

Two items in the breathing component were significantly different, instruction of breathing technique (p <.001) and instruction of why breathing is important (p = .026) were both higher in the Ashtanga group. This difference is expected due to the usage of ujjayi breathing in Ashtanga. Physiological markers related to stress, such as blood pressure (Mahour & Verma, 2017), cardiorespiratory efficiency (Gopal et al., 1973), and basal parasympathetic activity (Pal et al., 2004), have shown improvement after pranayama interventions. However, not much has been assessed on phycological markers such as stress and anxiety; there is a lack of studies comparing breathing exercises used with yoga postures such as vinyasa. It could be that ujjayi breathing helps regulate physiological symptoms but does not do enough to adjust the state of mind. Future studies need to compare yoga classes with identical physicality and sequences but different implementations of pranayama.

Yoga teachings acclaim ujjayi breathing as a technique to build an internal heat that cleanses the body as one practices with asanas. This specific breathing technique may act as a stimulant, thus not aiding practitioners to reach the relaxation benefit of yoga. Ujjayi may not be a beneficial technique for persons with anxiety but might be good for people with moderate

depression or fatigue. Longitudinal studies need to be conducted to assess if method requires more than eight weeks to develop and benefit, and more controlled studies with specific populations are needed to understand mental health benefits.

Yoga research is ahead in terms of number of studies, but behind in terms of definitive understanding of components, protocol, and methods. This study implements needed structure to yoga interventions while assessing common mental health ailments claimed to be helped through yoga. This methodology can serve as a template to researchers, instructors, and mental health professionals to better establish yoga protocols, treatment plans, and prevention strategies.

This research gives insight on potential differences on yoga styles and the vary effects from differing styles. The questions answered in this project lead to more questions in terms of yoga interventions, targeted populations, and varying mental health effects. As yoga research develops, the implementation of yoga interventions in clinical settings expands.

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Appendices

Table 1

Health Conditions with Positive Effects from Yoga Interventions

Cardiovascular disease	Chu et al., 2016
Lymphoma	Kaur et al., 2018
Hypertension	Tyagi & Cohen, 2014
Asthma	Freitas et al., 2013
Multiple Sclerosis	Oken et al., 2004
Irritable Bowel Syndrome	Schumann el at., 2018
Osteoarthritis	Kuntz et al., 2018
Arthritis	Haaz & Bartlett, 2011
Inflammation	Kiecolt-Glaser et al., 2010
Immune Function	Falkenberg et al., 2018
Menstrual Disorders	Oates, 2017
Chronic Obstructive Pulmonary Disease	Fulambarker et al., 2012
Cancer	Culos-Reed et al., 2012
Eating Disorders	Carei et al., 2010
Body Image	Neumark-Sztainer et al., 2018
Drug Addiction	Posadzki et al., 2014
Diabetes	Mondal et al., 2018
Obesity	Bernstein et al., 2014
Depression	Cramer, et al., 2017
Anxiety	Liu et al., 2014
Stress	Singh, 2018
Sleep	Cohen, Warneke et al., 2004
Mood	He et al., 2018
Post-Traumatic Stress Disorder	Duan-Porter et al., 2016

Table 2
Group Demographics

	Yoga	**Control**
Number of Participants	48	46
Caucasian Ethnicity	94%	85%
Female Gender	88%	83%
Full Time Student	59%	41%
Off-Campus Living	79%	44%
Prior Yoga Experience	69%	70%
Regular Exercise	58%	67%

Table 3
Mental Health Diagnosis & Treatment

	Yoga	**Control**
Depression	20%	20%
Anxiety	40%	22%
Sleep Disorder	6%	4%
Mood Disorder	0	0
ADHD	15%	17%
Prior Counseling	29%	22%
Current Counseling	25%	7%
Prior Psychiatric Care	13%	13%
Current Psychiatric Care	10%	7%

Table 4

Between Groups Post Comparison

Group	$\bar{x}$	SD	$\bar{x}$ Difference	Std. Error	*p*	95% CI Lower	95% CI Upper
Sleep Disturbances							
Yoga	11.9	5.87	1.22	1.15	0.302	-3.548	1.112
Control	13.11	5.48					
Amount of Sleep							
Yoga	7.16	1.23	0.457	0.218	0.039	0.025	0.882
Control	6.7	0.84					
Stress							
Yoga	19.92	4.52	2.05	0.834	0.016	0.415	3.689
Control	21.97	3.48					
Anxiety							
Yoga	12.06	9.77	-3.46	1.778	0.055	-0.075	6.989
Control	8.61	7.22					
Depression							
Yoga	10.98	9.36	0.984	1.771	0.58	-2.5	4.5
Control	10	7.68					

Table 5

Pairwise Comparisons of Ashtanga and Slow Flow Vinyasa

	Pre		Post		$\bar{x}$ Difference	Std. Error	*p*	95% CI	
Group	$\bar{x}$	σ	$\bar{x}$	σ				**Lower**	**Upper**
Sleep Disturbances									
Ashtanga	6.57	1.12	11.4	6.37	1.031	1.713	0.55	-4.48	2.416
Slow Flow	6.68	1	12.5	5.32					
Amount of Sleep									
Ashtanga	14.15	5.43	6.96	1.17	-0.425	0.355	0.24	-1.14	0.289
Slow Flow	14.27	5.88	7.39	1.29					
Stress									
Ashtanga	21.04	3.33	20	3.5	0.182	1.323	0.89	-2.48	2.845
Slow Flow	22.82	4	19.82	5.58					
Anxiety									
Ashtanga	14.73	11.2	10.89	9.18	-2.57	2.836	0.37	-8.28	3.139
Slow Flow	15.93	12.5	13.46	10.47					
Depression									
Ashtanga	11.92	8.27	10.23	8.8	-1.633	2.73	0.55	-7.13	3.864
Slow Flow	12.59	10.7	11.86	10.13					

Table 6

Within Group Mean Comparison

	Yoga							
	Pre		Post		$\bar{x}$	Std.	95% CI	
Factor	$\bar{x}$	σ	$\bar{x}$	σ	**Difference**	**Error**	**Lower**	**Upper**
Sleep Disturbances	14.2	5.59	11.9	5.87	2.313	0.672	0.961	3.664
Amount of Sleep	6.62	1.06	7.16	1.23	0.535	0.233	-1.003	-0.068
Stress	22.9	3.61	19.92	4.52	3	0.739	1.513	4.487
Anxiety	15.3	11.7	12.06	9.77	3.162	1.296	6.13	0.5826
Depression	12.2	9.37	10.98	9.36	1.25	1.202	-1.168	3.668
	Control							
	Pre		Post		$\bar{x}$	Std.	95% CI	
Factor	$\bar{x}$	σ	$\bar{x}$	σ	**Difference**	**Error**	**Lower**	**Upper**
Sleep Disturbances	13.2	5.57	13.11	5.48	0.095	1.012	-1.944	2.133
Amount of Sleep	6.93	1.04	6.7	0.836	0.238	0.201	-0.168	0.64
Stress	22.1	5.58	21.97	5.48	0.173	0.761	-1.359	1.706
Anxiety	12.7	9.42	8.61	7.22	0.407	1.207	1.637	6.499
Depression	10.4	8.02	10	7.68	0.41	1.19	-1.988	2.807

Table 7

Within Group Repeat Measures ANOVA

			Yoga			
Factor	**F**	**Hypo df**	**Error df**	***p***	**η2**	**Power**
Sleep Disturbances	11.847	1	47	0.001	0.201	0.921
Amount of Sleep	5.3	1	47	0.026	0.101	0.616
Stress	16.48	1	47	< .001	0.26	0.978
Anxiety	6.175	1	47	0.017	0.116	0.682
Depression	1.082	1	47	0.304	0.022	0.175
			Control			
Factor	**F**	**Hypo df**	**Error df**	***p***	**η2**	**Power**
Sleep Disturbances	0.009	1	45	0.926	0	0.051
Amount of Sleep	1.834	1	45	0.246	0.03	0.21
Stress	0.052	1	45	0.821	0.001	0.056
Anxiety	11.357	1	45	0.002	0.202	0.909
Depression	0.118	1	45	0.732	0.003	0.063

Table 8

EPYQ Items of Interest

Acceptance/Compassion
Setting intentions or goals for the class
Acceptance of your body while doing yoga
General thoughts of gratitude, love, kindness, etc.
Self-Compassion
Acceptance of things as they are
Breathwork
Placing one's focus on the breath
Deep breathing (full inhalation and exhalation)
Linking breathing with movement
Instruction of a breathing technique (pranayama)
Instruction about why breathing is important
Placing one's focus on the breath
Physicality
Physical balance
Physical flexibility
Physical strength Vigorous activity/physical exertion
Being in constant motion (vinyasa or flow)
Challenging one's physical balance
Challenging one's physical strength
Body Awareness
Body awareness/paying attention to one's body
Asking students to concentrate on postural alignment
Asking students to concentrate on bodily sensations
Meditation & Mindfulness
Quieting the mind
Mindfulness (nonjudgmental awareness)
Meditation during the session
Meditation (dhyana)
Withdrawal of the senses (pratyahara)
Concentration (dharana)

Table 9

EPYQ Components Means

Component	Ashtanga		Slow Flow	
	$\bar{x}$	σ	$\bar{x}$	σ
Acceptance/Compassion	2.17	0.399	2.079	0.614
Breathwork	4.046	0.377	3.664	0.331
Physicality	3.365	0.412	3.121	0.3145
Active Postures	3.548	0.283	3.375	0.551
Meditation & Mindfulness	1.71	0.238	1.74	0.359
Body Awareness	3.83	0.779	4.01	0.625
Restorative Postures	2.069	0.24	2.2	0.218
Mental & Emotional Awareness	1.623	0.569	1.786	0.724
Health Benefits	1.05	0.1735	1.027	0.079
Individual Attention	1.35	0.305	1.26	0.246
Social Aspects	1.22	0.248	1.32	0.3452
Spirituality	1	0	1	0
Body Locks	2.55	0.993	2.51	0.706
Yoga Philosophy	1	0	1	0
Outside of Class	1.12	0.431	1.07	0.262

Appendix A

Ashtanga Asana Sequence

Surya Namaskara A (3x)

1st time: Hold each poster for at least three breaths and do a modified up-dog (cobra)
2nd time: Hold each posture for two breaths
3rd time: Move fluidly, one breath with each movement, holding down dog as before.

Surya Namaskara B (2x)

Each Sun B does Chaturanga Dandasana only once, after both warriors.

1st time: Hold Virabhadrasana I for at least three breaths
2nd time: Hold Virabhadrasana I for 1-2 breaths

Standing Sequence

Stand Tall (Tadasana/Samastitihi)
Forward Bend (Padangusthasana)
Triangle (Trikonasana)
Side Angle (Parsvakonasana)
Kneeling Revolved Side Angle (Parivrtta Parsvakonasana - modification)
Wide-Legged Bend (Prasarita Padottanasana A & C)
Hand-to-Big-Toe Pose (Utthita Hasta Padangusthasana - modification)
Tree (Vrksasana)
Chair (Utkatasana)
Warrior I (Virabhadrasana I)
Warrior II (Virabhadrasana II)

Seated Sequence

Staff Pose (Dandasana)
Seated Forward Bend (Paschimottanasana)
Reverse Table (Purvottanasana - modification)
Seated Figure Four (Arda Baddha Padma Paschimottanasana - modification)
Seated Tree (Janu Sirsasana A)
Marichyasana A & C
Boat Pose (Navasana)
Wide-Legged Bend (Kurmasana -modification)
Bound Angle Pose (Baddha Konasana A)
Reclining Hand-to-Big-Toe Pose (Supta Padangusthasana -modification)

Closing

Bridge (Setu Bandha Sarvangasana) Up to 3 times, 5 Breaths Each
Knees-to-Chest (Apanasana)
Happy baby (Ananda Balasana)
Side twists (Supta Parivartanasana) 1 Minute Each
Savasana (5-10 minutes)

Appendix B

Slow Flow Asana Sequence

Sukhasana (seated) Scan Body, Mind, Breath. 360 breath
Neck Stretch side-to-side
Neck Stretch forward-back
Full Neck Circles
Shoulder Circles
Side Stretch
Seated Spinal Twist (Parivrtta Sukhasana)
Table-Top (Bidalasana)
Cat/Cow
Lift the right-arm and left-leg.
Lift the left-arm and right-leg.
Wrist Therapy
Extended Child's Pose (Utthita Balasana):
Downward Facing Dog (Adho Mukha Svanasana)
Walk hands back, coming into a forward fold at the back of your mat.
Ragdoll to standing
Stand tall – (Tadasana or Samastitihi)
Standing Side Stretch (Parsva Urdhva Hastasana)

Standing Sequence 1:
Crescent High Lunge (5 breaths) (Ashta Chandrasana)
Warrior I (Virabhadrasana I)
Warrior II (Virabhadrasana II)
Reverse Warrior II
Triangle Pose (Utthita Trikonasana)
Extended-Side Angle (Utthita Parsvakonasana)

Vinyasa 1
Chaturanga Dandasana
Baby Cobra (Bhujangasana variations)
Adolescent Cobra
Cobra 1 Hover the hands above the floor
Cobra 2 Using strength of arms and shoulders
Table-Top
Downward Facing Dog (Adho Mukha Svanasana)

Vinyasa 2
Chaturanga Dandasana
Shalabhasana 1 Hands reaching back
Shalabhasana 2 Hands in cactus
Shalabhasana 3 Repeat B with Superman arms
Table-Top (Bidalasana)

Thread-the-Needle (Urdhva Mukha Pasasana) “A”
Downward Facing Dog (Adho Mukha Svanasana)

Standing Sequence 2:

Chair Pose (Utkatasana)
Standing-Forward-Bend (Uttanasana)
Rag Doll
Wide-Legged Forward Fold (Prasarita Padottanasana A & C)
Wide-Leg fold - Twist (Parivrtta Ardha Prasarita)
Crouching Tiger, Hidden Dragon
Stand tall (Tadasana)
Tree (Vrksasana)
Eagle or Eagle Prep (Garudasana)

Vinyasa 3

Chaturanga Dandasana
Roll over each shoulder
Grab arms without lifting chest
Grab arms with lifting chest
Bhujangasana
Bhujangasana with tucked toes and lifted thighs

Seated Sequence

Wide Diamond
Close Diamond (Baddha Konasana)
Dandasana
Seated-Forward-Bend (Paschimottanasana)
Janu Sirsasana A
Marichyasana C
Wide-Leg-Bend (Upavistha Konasana)
Wide-Leg-Bend Side Stretch (Parivrtta Janu Sirsasana)

Closing (Hold for longer on average)

Upside-Down Pigeon (Eka Pada Raj Kapotasana prep)
Bridge (Setu Bandha Sarvangasana) *2-3 Times
Knee to Chest (Apanasana)
Happy Baby (Ananda Balasana)
Reclined Side Twists (Supta Parivartanasana) - at least 10 breaths on each side
Savasana (5-10 Minutes)

Appendix C

Ashtanga Sequence Verbal Prompts

1st Surya Namaskara:

Mountain Pose, (Tadasana/Samastitihi)

- Subtly lifting through the spine, elongating through the neck
- Shoulders and face remain soft
- Deep breathing – expand the ribs in all directions, 360 breaths
- Engage ujjayi breathing

2-3 Breaths

Inhale – Reach arms above the head

- Palms facing
- Shoulders down, away from the ears
- Gaze at the fingertips

Exhale – Forward bend (Uttanasana) fold at the waist

- Bend knees if a strain
- Grab opposite elbows, allowing more space in the shoulders

5 Breaths

Inhale – Lift spine halfway

- Create an "L" shape with the body

Exhale – Step the feet back

- A high plank/pushup position

Inhale – In place (stay in high plank)

- Press firmly into the arms gripping with the fingers
- Toes are tucked (if possible)
- Engage the legs and core

Exhale – Chaturanga Dandasana

- Lower to the floor with elbows bending back, arms should be lightly grazing against the side of the torso
- Once on the floor, place entire forearm on floor with the elbows under the shoulders

*Modification

- Bring knees to floor, creating a slanted table shape
- Maintain a strong and straight spine
- Bend elbows back, as close to torso as possible without strain
- Lay flat on floor

Inhale – Cobra (Bhujangasana)

- Inner elbows touching sides of torso,
- Lift chest off the floor, curving the upper back
- Press shoulders down, away from ears
- Softly pull shoulder blades together, creating a wider chest

Exhale – Release the hand and arms to place chest on floor

- Widen the knees and tuck the toes and place palms on the floor, under the shoulders

Inhale – Table-top (Bharmanasana)

- Press into the hands and knees, lift to sitting on knees and hands

Exhale – Down dog (Adho Mukha Svanasana)

- Tuck the toes, pressing the ball of the feet into the floor
- Lift the hips up and back, creating a slanted "V" shape
- Feet are hip width distance apart
- Grip with fingers, pressing firmly into the mat with the arms
- Bend the knees as needed

*Modification – table-top or child's pose (Balasana)

5 Breaths

Exhale – Prepare, bend the knees and gaze at the fingers

Inhale – Walk hands forward, towards the hands

- Bend knees as needed

Exhale – Forward bend (Uttanasana)

*Modify as needed for comfort

2-3 Breaths

Inhale – Ragdoll to standing

- Shoulders and head raise be last
- Move slowly

Exhale – Mountain Pose (Tadasana/Samastitihi)

2nd Surya Namaskar A:

Differences from 1st:

- Uttanasana has less breaths (2-3 at most)
- **Inhale** – Upward facing dog
- **Exhale** - Chaturanga Dandasana – Keep the body slightly above the floor, hovering

  Elbows bend back, not out – could rest torso on triceps

*Keep previous modification and previous form if needed/desired

Inhale – Upward facing dog (Urdhva Mukha Svanasana)
*Cobra modification if needed
1-2 Breaths

Exhale – Down dog (Adho Mukha Svanasana)
*Previous modifications

3rd Surya Namaskar A:

One-breath-one-movement, synching breath with movement, exceptions:
Hold high plank for an inhale (1 extra breath)
Down dog (Adho Mukha Svanasana) (5 breaths)

Inhale -Reach arms over the head, gazing at the fingertips

Exhale – Forward fold (Uttanasana)

Inhale – Halfway lift the spine

Exhale – Step back, into high plank

Inhale – High plank

Exhale – Chaturanga Dandasana

Inhale – Upward facing dog (Urdhva Mukha Svanasana)

Exhale – Downward facing dog (Adho Mukha Svanasana)
5 Breaths

Exhale – Bend the knees, gaze at hands

Inhale – Step or hop feet to the hands (front of mat)

Exhale – Forward bend

Inhale – Standing (Tadasana/Samastitihi)

1st Surya Namaskar B:

- Similar pacing structure as Surya Namaskar A (2x)
- Each Surya Namaskar B in this sequence consists of only one Chaturanga Dandasana, after both warriors

1st time: Hold Virabhadrasana I for at least three breaths
2nd time: Hold Virabhadrasana I for 1-2 breaths

Mountain pose – Standing with a straight spine, arms to either side

Inhale – Chair pose (Uttanasana)
2-3 Breaths

Exhale – Forward Bend

Inhale – Halfway lift, "L" shape

Exhale – Step left leg back
- Bend knees as needed
- Place left foot at a 45-degree angle
  (right leg will need to be bent for this)

*Modification – place foot facing directly forward

Inhale – Warrior I (Virabhadrasana I) -Right side
- Lift torso, standing in a lunge position
- Reach arms above head, palms facing

2-3 breaths

*Modification options: Arms at waist and/or back foot facing forward instead of 45-degree angle

Exhale – Downward facing dog (Adho Mukha Svanasana)
- Hinge at waist
- Place palms on floor, no wider than shoulders
- Step left foot back
- Push hips up and back, creating the slanted "V" shape

Inhale – Step left leg towards the hands, keep left knee bent

Exhale – Place right leg at 45-degree angle

Inhale – Warrior I (Virabhadrasana I) – Left side
- Lift torso, standing in a lunge position
- Reach arms above head, palms facing

2-3 Breaths

*Modification options: Arms at waist and/or back foot facing forward instead of 45-degree angle

Exhale – Hinge at waist, place hands on ground
- Place hands on ground, no wider than shoulders
- Step left leg back

Inhale – High plank

Exhale – Chaturanga Dandasana

Exhale – Downward facing down (Adho Mukha Svanasana)

5 Breaths

Inhale – Up dog (Urdhva Mukha Svanasana)

Inhale – Step/hop both feet forward

Exhale – Forward bend (Uttanasana)

Inhale – Chair (Utkatasana)
- Bend knees as if sitting in a chair or bar stool

Exhale – Mountain (Tadasana/Samastitihi)

2nd Surya Namaskar:

- If student abilities allow, do with one-breath-one-movement,
- Do not hold high plank, warrior I or chair
- If unable, repeat the first Surya Namaskar B instructions

One-breath-one-movement outline:

Mountain pose

Inhale – Chair pose

Exhale – Forward Bend (Uttanasana)

Inhale – Halfway lift, "L" shape

Exhale – Step left leg back

Inhale – Warrior I (Virabhadrasana I) - Right side

Exhale – Downward facing dog (Adho Mukha Svanasana)

Inhale – Step left leg towards the hands, keep left knee bent

Exhale – Place right leg at 45-degree angle (or modified version)

Inhale - Warrior I (Virabhadrasana I) – Left side

Exhale – Chaturanga Dandasana

Inhale – Up dog (Urdhva Mukha Svanasana)

Exhale – Downward facing down (Adho Mukha Svanasana)

5 Breaths

Inhale – Step/hop both feet to front of the mat

Exhale – Forward bend (Uttanasana)

Inhale – Chair (Utkatasana)

Exhale – Mountain (Tadasana/Samastitihi)

Standing Sequence

Each pose is held for 5 breaths
Movement in and out of the poses are synched with breath

Forward Bend (Padangusthasana)

From Mountain Pose (Tadasana/Samastitihi)
Inhale – Step feet about hip-width distance wide, feet facing forward
Exhale – Bend forward, hinging at the waist. Let knees have a soft bend

- Softly pull chest towards thighs while abdominals are engaged
- Come back to standing on an inhale

5 Breaths

Triangle (Trikonasana)

Step left leg about 3 feet back, parallel to the right
Square hips toward left side of the mat
Right foot is at a 90-degree angle and left foot is at a 5-degree angle
Keep knees straight, but not locked
Exhale – Reach forward and then down with right arm, towards the thigh, shin, or foot

- Attempt to keep the torso from moving forward, aiming for shoulders to align with the right let – as if body is fitting through a toaster or two planes of glass
- Avoid putting weight into the extended leg, torso stays strong

5 Breaths

Inhale – Lift torso, aligning shoulders above hips
Exhale – Reverse feet, left foot points towards back wall.
Inhale – Lift the spine, align torso and feet
Exhale – Left side reaches forward and down

5 Breaths

Inhale – Lift torso, aligning shoulders above hips

Side Angle (Parsvakonasana)

Exhale – Reverse feet, right foot 90-degree angle towards front of room
Inhale – Left foot 5-degree angle, spine lengthens, and arms reach wide
Exhale – Bend the right knee, aligning it above the ankle

*Modification with less of a bend if needed
- As knee bends, fold torso forward and down (similar to Trikonasana)
- Right arm rests on top of right leg
- Left arm reaches up and over
- Should feel an extension/stretch on the entire left side of torso, from tips of fingers to the outside of the foot pressing down

5 Breaths

Inhale – Lift torso and reverse feet
Exhale – Repeat on left

5 Breaths

Inhale – Lift torso and reverse feet

Modified-Side-Angle Twist (Revolved Parsvakonasana)

Exhale – Square hips towards front of room, come to kneeling, left knee to floor

- Unmodified version the back-leg stays lifted

Inhale – Reach left arm up and pull towards right

- Place left arm on outside or on top of right thigh

Exhale – Press into the palms to deepen the twist

- This is targeting the upper back, avoid the lumbar spine twisting

Inhale – Lengthen through the spine

5 Breaths

Exhale – Release the twist
Inhale – Lift to standing
Exhale – Step left leg forward and right foot back

5 Breaths

Repeat on Left

Wide Legged Fold (Prasarita Padottanasana A & C)

A Inhale – lift out of the twist and stand at the front of the mat
Exhale – Release the shoulders and lengthen the spine
Inhale – Step right foot back wide, squaring hips towards right side of the room
Exhale – Place hands on hips
Inhale – Lengthen the spine
Exhale – Bend forward at the waist
Inhale – Press palms into mat and lift spine
Exhale – Bend forward

5 Breaths

C Inhale – Press palms into mat and lift spine
Exhale – Place hands on hips
Inhale – Lift to standing
Exhale – Drop hands to side and lower shoulders
Inhale – Draw arms behind back and interlace the fingers
Exhale – Fold forward

*Arms can stay on lumbar spine or reach over the head

5 Breaths

Inhale – Release hands and lift torso to standing
Exhale – Step right foot forward, Tadasana at the front of the mat

Modified Extended Hand-to-Big-Toe Pose (Utthita Hasta Padangusthasana)

Find a gazing point, preferably something that won't move

Inhale – Left hand to left hip and raise right leg, knee aligned with hip

Two options:

OR

- Bend the right knee and place right hand under thigh for support

Advanced version:

- Straighten the right leg and reach further down the leg (towards the toes) for more difficulty

5 Breaths

Exhale – Take leg out to the right side

- Try keeping hips level and foot aligned with hip

5 Breaths

Inhale – Bring right leg back in front of body
Exhale – Release the leg

Repeat on left

Finish in Tadasana/Samastitihi

Tree (Vrksasana *Modified Ardha Baddha Padmottanasana)

Exhale – Left hand on left hip
Inhale – Bend right knee, lifting right heel off floor
Exhale – Place bottom of right heel on inner left leg
Inhale – Lift right leg up leg to entire foot is on the inner left leg

- Do NOT place foot on knee, either above or below

Exhale – Place hands on hips, together in prayer position, or lift with palms facing

5 Breaths

Repeat on left

Chair (Utkatasana)

Feet either hip-width distant apart OR have toes touching and heels slightly apart

Inhale – Bend knees, as if sitting in a chair or bar stool

- Reach arms overhead, palms facing

5 Breaths

Exhale – Fold Forward, stretching the backs of the legs and releasing the spine
Inhale – Rise to standing

Warrior 1 (Virabhadrasana I)

Inhale – Left leg steps 3 feet back, foot at a 45-degree angle (right foot 90-degree angle)
Exhale – Bend right knee, similar to Parsvakonasana, but with hips facing forward

- Reach arms above the head, palms facing

5 Breaths

Inhale – Straighten knee & reverse the pose

- Facing the back or the room with left leg in front
- Attempt to keep arms up through this transition

Exhale – Take Virabhadrasana I on the left

5 Breaths

Warrior 2 (Virabhadrasana II)

Exhale – From Virabhadrasana I, reach arms out to the either side as hips "open" right

- Arms reach wide, left pointing towards back of the room and right towards the front
- Left knee stays bent
- Hips are facing the right
- Shoulders are directly above the hips

5 Breaths

Inhale – Straighten left leg & reverse pose, bend the right knee

5 Breaths

Exhale – "Cartwheel" hands to the front of the mat, squaring hips & shoulders to the floor

Inhale – High plank
Exhale – Chaturanga
Inhale – Up dog
Exhale – Down dog
Inhale – Step or hop feet forward
Exhale – Sit on floor with legs in front

Seated Sequence

Vinyasas between sides are skipped completely
Vinyasas between poses are replaced with Purvottanasana

Staff Pose (Dandasana)

Sit bones are pressing on the floor & legs are extended in front of the body
Inhale – Place palms on floor, wrists pointing back and fingertips touching glutes
Exhale – Press firmly into palms, shoulders dropping down and away from the ears
Inhale – Lift chest and extend through the spine

5 Breaths

Seated Forward Bend (Paschimottanasana A, B, & C)

Exhale – Slowly "walk" hands forward, towards the feet

- Maintain the alignment in the spine from Dandasana
- Pause when the spine starts to curve

5 Breaths

Inhale – Lift torso, shoulders above hips
Exhale – Shoulders drop
Inhale – Reach arms up

Exhale – Bend forward, releasing any muscle control in the spine
- Notice what may feel different with this pose variation

5 Breaths

Inhale – Lift torso, shoulders above the hips
Exhale – Bend forward, reaching for the toes

5 Breaths

Modified Upward Plank Pose (Purvottanasana)

Inhale – Lift torso, shoulders above hips
Exhale – Bend knees and place bottoms of feet on the floor
- Feet are about hip width distance wide, 90-degree angle

Place palms about a foot behind torso, fingers facing forward
Inhale – Lift hips & chest, creating a table-top position
- Drop the head back
- Press shoulders together
- Arms and legs stay engaged, firmly pressing down

5 Breaths

Modified Half Lotus (Ardha Baddha Padma Paschimottanasana)

Exhale – Release Purvottanasana by lowering pelvis to floor
Inhale – Bring right leg across left thigh, creating a figure "4"
- Leg is above the knee
- Ankle is past the thigh and not bent in any way in this posture
- Keep holding or "cradling" the leg with arms if pressure is causing discomfort to the left thigh
- Bring right leg as close to hip as needed to feel a stretch
- There should not be any pressure on either knee

Exhale – Bend forward, bringing torso towards legs

5 Breaths

Inhale – Lift torso
Exhale – Release right leg
Inhale – Place left leg in position
Exhale – Bend torso

5 Breaths

Repeat on left

Inhale – Lift torso
Exhale – Release pose & place bottom of feet and palms on floor
- Set up for a short Purvottanasana

Inhale – Lift hips and chest, Purvottanasana
Exhale – Lower hips

One Leg Folded-Back Pose (Triang Mukha Eka Pada Paschimottanasana)

Inhale – Bend right knee, bringing right foot to the outside of right hip

- Shin and top of right foot will be on the floor
- May need to gently move the calf muscles to the right, making space for the thigh
- Do NOT let the knee feel any strain.

*Modification – Sit opposite sit bone on a block
(left sit bone when right knee is bent)

- The closer the knees are to each other the harder the stretch

Exhale – Bend forward

- Press palms in floor to support or reach them towards the extended leg

5 Breaths

Repeat on Left

Inhale – Lift torso
Exhale – Release pose & place bottom of feet and palms on floor
Inhale – Purvottanasana
Exhale – Release

Head-to-Knee (Janu Sirsasana A)

Inhale – Place bottom of right foot on inner left thigh

- This is the same positioning as Tree Pose (Vrksasana)
- Outside of right leg is touching the floor
- Square torso over extended leg

Exhale – Bend forward

- Place hands on floor or reach towards feet

5 Breaths

Inhale – Lift torso

Repeat on Left

Inhale – Lift torso
Inhale – Lift hips into Purvottanasana
Exhale – Release Purvottanasana, place sit bones on floor

Pose Dedicated to the Sage Marichi (Marichyasana A & C)

Inhale – Pull right knee towards right armpit, foot stays flat on floor
Exhale – Bend forward, both arms and shoulders on the inside of right leg

- Attempt to get the back of the right arm pressing into the right shin
- Press palms in mat and use arm to press leg back or reach forward

5 Breaths

Inhale – Lift torso
Exhale – Release pose

Repeat on Left

Inhale – Lift torso
Exhale – Press palms and feet into floor
Inhale – Lift hips into Purvottanasana
Exhale – Release Purvottanasana, place sit bones on floor

Boat (Navasana) *3 times
Inhale – Bend knees and pull towards torso
- Heels of feet are placed on floor, toes pointing up

Exhale – Lean torso back slightly and reach arms in front
- Arms are aligned with shoulders and palms facing
- Extended/straightening the legs creates more challenge

Inhale – Lift feet off floor
*Modification – lift only one-foot off floor, alternating feet
- Extended/straightening the legs creates more challenge
- Keeping the spine straight is more important than straightening legs
- Lift through the chest and engage the core

5 Breaths

Exhale – Lean forward and cross the legs at the shins
Inhale – Press palms into floor and lift the pelvis
- The pelvis may or may not lift off the floor
- The feet may or may lift off the floor
- Difficulty increases with height of the pelvis and feet from floor
- It is not of importance that body parts lift off floor, the importance is in the effort of lifting the torso and pressing down with hands

Repeat Twice (3 times total)
- Release on Exhale

Wide-Angle Seated Forward Bend (Upavistha Konasana)
Inhale – Widen legs, creating a "V" shape
- Does not matter how wide, individuals stay within their comfort
- If students create a lot of space, may have to stagger or turn sideways on mat

Exhale – Bend forward
5 Breaths

Inhale – Lift torso
Exhale – Press palms and feet into floor
Inhale – Lift hips into Purvottanasana
Exhale – Release Purvottanasana, place sit bones on floor

Bound Angle (Baddha Konasana A)
Inhale – Place bottoms of the feet together
- Allow students to choose how close or far feet are from the torso
- If feet are close to torso, grab outside of the feet, thumbs on inside
- Palms either pressed to support or arms reaching for more stretch

5 Breaths

Inhale – Lift torso
Exhale – Press palms and feet into floor
Inhale – Lift hips into Purvottanasana
Exhale – Release Purvottanasana, place sit bones on floor

Reclining Hand-to-Big-Toe (Supta Padangusthasana)
Lay flat on floor
Inhale – Lift right leg, hold thigh for support
- Reach lower, grabbing the big toe if level of flexibility allows
- Can rotate the foot in circles while lifted
- Leg does not have to be straight if too much

5 Breaths

Exhale – Release right leg
Inhale – Repeat on left
Exhale - Release

Closing

Bridge (Setu Bandha Sarvangasana)
Inhale – Bend knees, press bottom of feet on floor
Exhale – Pull heels as close to glutes possible, slightly on the outside of hips
- Reach towards feet, grabbing ankles if available
- If ankles are not available, press palms and shoulders down
- Arms are touching the floor regardless if holding the ankle

Inhale – Press firmly into the floor with the feet and lift the hips towards the ceiling
- Creates a slanted mini-table top position
- Keep legs and glutes strong
- Clasp hands together under glutes if available
- Learning opposite movements here, hips lifting, limbs pressing

5 Breaths

Exhale – Lower to floor
Windshield wiper – sway knees from side to side a couple times with feet on floor
Repeat 2-3 Times

Knees-to-Chest Pose (Apanasana)
Free Breath – Hug knees into chest and rock from side to side

Happy baby (Ananda Balasana**)**
*Optional
Free Breath – Bottoms of feet face ceiling, grab outsides of feet with palms facing
- Rock from side to side

Reclined Twist (Supta Parivartanasana)

Inhale – Hug knees into chest

Exhale – Place both legs to the right

- Free breathing
- Allow legs to adjust to be at ease
- Legs to NOT have to be aligned or parallel
- Cross legs with the one furthest from the floor on top for more difficulty
- Gently press opposite shoulder into mat
- Reach opposite arm away from body, aligned with shoulders

10 Breaths

Repeat on Left

Corpse Pose (Savasana)

- Lay flat on back
- Palms facing up, allowing shoulders to release
- Limbs placed in whatever way(s) comfortable for student
- Teacher sprays a lavender essential oil blend over students at beginning of Savasana

5-10 Minutes

Appendix D

Slow Flow Sequence Verbal Prompts

Centering (1-3 minutes)

Sukhasana – sit comfortably, soften the gaze or close eyes, bring attention inward, undistracted by what is around you.

Body Scan

- Face, Spinal posture, shoulders, arms - how the shoulder alignment affects the arms, sit-bones, legs.

Mind Scan

- Label your mood and/or emotion, energy level
- Think of how you felt when you first woke-up this morning, fast forward through the day, noting the different emotions and thoughts you've had

Breath

- Without altering it, notice your breath, what happens when you inhale and exhale as if you were going to explain it to someone.

- Adjusting posture/breath:
  - Take slightly bigger breathes, while noticing any changes in your body
  - Imagine a string on the tip of your head and one in middle of chest, both giving soft little tugs towards the ceiling, like a puppet
  - Let ribs get wide (left-to-right) with each breath
  - Get thicker (forward and back) with each breath
  - Taller (up and down) with each breath
  - Breathe utilizing the full 360-dimension capabilities of your lungs. Think of your lungs as balloons, the air goes evenly into all sides

Warm up (5-7 minutes)

Neck:

- Bring right ear towards the right shoulder
  - Soften face/shoulders
  - Stretch opposite arm as if touching the floor, furthering the stretch into shoulder
  - Move head as if saying "yes", soft movement can massage the areas being stretched
  - Softly pull head towards right shoulder with right hand

Repeat on Left

- Bring chin towards your chest. Bring hands behind you, fingers touching the floor – this is to keep chest lifted, as if trying to touch the sternum and chin.
  - Keep chest lifted, bring hands to top of the head, elbows stay wide, apply slight pressure to the head, furthering the stretch into the shoulders.
- Head drops back, chin lifting towards the ceiling.
- Hands come back behind you, fingertips on floor and leaning torso back a few inches.

Slowly move next in wide circles (big circles), try to feel each aspect of the movement. Can slowly pick up the pace if you'd like. Starting to link the movement with the breath.

Inhale - Head is up
Exhale - Head is down

Shoulder Circles

Start slowly, listen to your body and move in way(s) that feel good in your shoulders.

Seated Side Stretch

Place right hand out to the side, parallel to your hip, palm on floor. Either slide arm away or bend elbow to stretch the left side of your torso.

- Palm of right hand on floor
- Put weight into left sit-bone

Repeat Side Stretch on Left

2nd: Repeat side stretch, second time add reaching the left arm over head (if sliding to the right, the left arm would reach overhead, furthering the stretch up the torso than before)

Seated Spinal Twist (Parivrtta Sukhasana):

- Right hand reaches behind you, left hand placed somewhere on your right thigh, gaze over the right shoulder.
- Soft shoulders & face
- Lift through the spine with every inhale, soften on every exhale

Table-Top (Bidalasana):

- Hands under shoulders, knees under hips, toes either tucked or feet flat (tops of feet on floor)
- Deep, 360 breath

Cat/Cow:

- Cat - while exhaling, head drops press into arms, curve upper back (towards ceiling - looks like an upset cat)
- Cow - while inhaling, sink into the shoulders, drop the lumbar spine, gaze up

Go back and forth with your own breath, moving your entire torso – from the head to the hips, syncing breath with movement and listening to the way the physical movement feels.

- After a few times, invite students to switch the breathing and notice any differences (inhale with cat and exhale with cow)
- Move side-to-side, like **a cat that wants attention**.

Straight Spine

- Press the shoulder blades together, feel the chest drop –
- Zip up tight pants, feel the lumbar spine lift, balancing out the spine "flat table"
- While maintaining the straight spine, **lift the right-arm and left-leg.**

- Life up the left-leg and right-arm
  3 times on each side

- Flip wrists opposite direction (with opposite hand or press backs of hands against floor) "wrist therapy"

Extended child's pose (Utthita Balasana):

- Bring bum to the feet, sitting back
- Keep arms extended, unless need to support head with fists/forearms
- How close/far your legs and feet are is up to you
- Find a version of the posture that works for you, where you are able to soften your spine and let muscles release

Downward Facing Dog (Adho Mukha Svanasana)

- Tuck the toes, lift the hips, come into an upside-down "V" shape
- Feet hip-width distance wide, press into knuckles and grip with fingers
- Peddle feet/bend knees and move the hips if desired in this first one.
- Take a couple of breaths with a straight spine, bend knees if needed

Walk hands back, coming into a **forward bend** at the back of your mat.

- Place hands behind the head and apply light pressure.

Rag doll to standing- while inhaling, lifting torso up to a standing posture, shoulders and head come up last

<u>Standing Sequence 1:</u>

Mountain – (Tadasana or Samastitihi)

*Base pose of all other yoga postures

- Waist up - lift and lengthen through spine, shoulders & face soft
- Waist down - Knees softly bent – feet either hip width distance wide, or toes touching w/ heels slightly apart
  - Press firmly into the floor, as if leaving footprints. – Trying to catch a ball
- Lift toes and feel the 4-corners of feet, evenly distribute the weight into both feet

5 Breaths

- Notice your weight shifting as you move through the other postures and rebalance to as close as this posture (Samastitihi) as you can

Standing Side Stretch (Parsva Urdhva Hastasana)

- Right hand on right hip, fold towards the right at your waist, this looks like a teapot pouring out.
- Press firmly in left leg to re-balance the weight, try to keep your hips directly over your feet

Repeat on Left

- Do again, this time **adding the left (opposite) arm reaching over head** as you fold, furthering the stretch

Repeat on Left

- Clasp hands together behind back, lift chest towards the ceiling and slightly lean back.
- Shoulders lift as the arms reach down

<u>One sided sequence begins, do all postures on one side before going to other side.</u>
3 options for arms, at hips, in prayer position, or reaching towards ceiling with palms facing.

1. High Lunge (Ashta Chandrasana)

- Step Right foot forward, bend into right knee
- Hips, shoulders, & feet square towards the front
- Move in/out with breath 5 times, then hold for

5 Breaths

Warrior I (Virabhadrasana I)

- Everything stays the same, but back foot is placed at 45-degree angle, externally rotating the hips

Warrior II (Virabhadrasana II)

- Open towards the left, shoulders & hips square towards the wall on the left
- Arms reach into a "T" shape
- Shoulders directly above hips
- Press strongly into the outside of the back foot, shoulders press together & chest lifts

Reverse Warrior II

- Bottom half stays the same (hips and legs)
- Back arm drops & reach the front arm over your head and towards the back wall
- Bend strongly in the front leg & try to keep the shoulders squared towards the wall

Return to Warrior II for transition

Triangle Pose (Utthita Trikonasana)

- Straighten front leg, keep straight throughout pose
- Bend at the torso in the direction of the front foot
    - Reaching arm forward, then folding down to create space
- Back arm reaches towards the ceiling, shoulders are stacked
- Breath evenly into both lungs

Return to Warrior II for transition

Extended-Side Angle (Utthita Parsvakonasana)

- Bottom ½ stays same as WII

- Place forearm of front arm on the thigh of bent leg
- Reach the back-arm overhead, reaching towards the front of the room, palm facing down (if right leg is forward, this instruction is referring to left arm)
- Press firmly into back foot, stretching entire side of torso, from fingers to foot.

***Vinyasa 1**

Chaturanga Dandasana

- Elbows pressing into the torso, bring your belly all the way to the floor
- Keep torso flat, bend knees onto floor if needed **(knees, chest, chin)**

Baby Cobra (Bhujangasana variations)

- Bring elbows under the shoulders
- Forearms and palms press against the floor
- Lift and curve the upper back
- Gaze at the ceiling, relax forehead

Adolescent Cobra

- Pull arms back, hands are under the shoulders
- Keep elbows pressing against the torso
- Lift upper back, only going a little taller than the previous pose - elbows stay bent

Cobra 1

- Hover the hands above the floor OR raise palms, leaving fingertips on floor
- Using the strength of the torso, lift the chest off the floor

Cobra 2

- Hands back to floor
- Tuck the toes and engage the legs, most of legs off the floor
- Using strength of arms and shoulders (torso goes heavy), lift upper back off the floor

Table-Top

- Widen knees, tuck toes
- Press down with hands, lifting torso off the floor

Downward facing dog (Adho Mukha Svanasana)

- Tuck the toes, lift the hips, come into an upside-down "V" shape
- Feet hip-width distance wide, press into knuckles and grip with fingers
- Peddle feet/bend knees and move the hips if desired in this first one
- Take a couple of breaths with a straight spine, bend knees if needed

Walk hands back, coming into a **forward bend** at the back of your mat.

- Place hands behind the head and apply light pressure.

Rag doll to standing as before

Repeat *Standing Sequence 1* on Left

***Vinyasa 2**

Shalabhasana 1

- Hands reaching back, on side, palms facing up
- Lift upper back, arms, and feet off the floor
- Actively reaching arms back
- Gaze at ceiling, relax forehead

Shalabhasana 2

- Hands in cactus - elbows parallel to shoulders and bent
- Palms facing the floor, fingers pointing forward
- Lift upper back, arms, and feet off floor
- Press shoulders together
- Gaze at ceiling, relax forehead

Shalabhasana 3

- Repeat B
- Once lifted, reach arms in front, like Superman

Table-Top (Bidalasana)

- Widen knees, tuck toes
- Press down with hands, lifting torso off the floor

Thread-the-Needle (Urdhva Mukha Pasasana) "A"

- From table-top, align left hand with the throat
- Lift right arm towards the ceiling, squaring the chest to the right
- "Thread through" the right arm, bringing it BEHIND the left, twisting towards the left
- Rest the right forearm or right shoulder on the floor, sinking the torso down
    - Re-align the hips by pressing strongly into the right leg

Repeat on Left

Downward Facing Dog (Adho Mukha Svanasana)

- Tuck the toes, lift the hips, come into an upside-down "V" shape
- Feet hip-width distance wide, press into knuckles and grip with fingers
- Peddle feet/bend knees and move the hips if desired in this first one
- Take a couple of breaths with a straight spine, bend knees if needed

Walk hands back, coming into a **forward bend** at the back of your mat.

- Press weight into feet, lift toes and feel the 4 corners of feet

2 - 3 Breaths

- Softly sway from left to right, feeling weight in your feet shifting

3 - 5 Breaths

- Softy sway forward and back

3 – 5 Breaths

- Softly sway in circles, feeling the weight going in and out of the corners of your feet

3 – 5 Breaths

- Holding still, Press firmly into the 4 corners of the feet.

Standing Sequence 2:

Chair Pose (Utkatasana)

- Bend knees as you lift your torso, reach arms over-head, palms facing
- Sitting in an imaginary chair, or barstool
- Lengthen through spine, minimize the curve in the lumbar

Standing-Forward Bend (Uttanasana)

- Grab opposite elbows, let spine get heavy

5 Breaths

Rag doll to a standing posture, lift torso - shoulders and head come up last (inhale)

Wide-Legged-Forward-Bend (Prasarita Padottanasana A & C)

A Step right foot back, squaring hips and shoulders towards right side of your mat

- Hands on hips & lift the chest
- Lead with the chest to fold all the way to the floor
- Place hands on the floor, fingers parallel to the toes (bend knees if needed)

5 Breaths

Exhale hands on hips
Inhale lift torso all the way up

C Clasp hands together behind you (on lumbar spine)

- Inhale - Chest lifts and arms straighten
- Exhale – Bend forward

Hands either reach out or pull into body, but chest stays lifted

5 Breaths

Wide-leg-Bend-Twist (Parivrtta Ardha Prasarita)

- With knees bent as much needed, place left hand on floor, aligned with the throat
- Inhale the right arm up towards the ceiling, extending arms wide and twisting towards the right
- Press firmly into the left leg, trying to level out the hips.
- Exhale right arm down, place aligned with the throat

Repeat on Left

Crouching Tiger, Hidden Dragon

- Legs stay wide, bend the right knee, extending the left leg, inner thigh facing floor
    - Extended leg can be on heel or flat (harder)
    - Hands on floor or in prayer pose if wanting more challenge
- Walks hands over to switch sides

Repeat on Left. Repeat on both sides (total 2 - 3 on each side)
Step feet together at the front of the mat

Mountain Pose – Tadasana and/or Samastitihi (base pose of all other yoga postures)
Waist up - lift and lengthen through spine, shoulders & face soft

Prep for Balancing

- Find a gazing point (drishti), preferably something that won't move, can be directly in-front or on the floor, figure out your preference
- Deep & steady breaths (we want to hold our breath when concentrating)

Tree (Vrksasana)

- Right hand on right hip
- Slowly shift weight into the 4 corners of your right foot
- Bend the left knee, lifting the heel off the floor
- Externally rotate the right hip, bringing the bottom of the left heel on the right ankle
- Bring your left leg as far up your right inner thigh as you feel comfortable
- Do NOT place foot on your opposing knee, either above or below
- If balance is there, "grow your tree" by reaching the arms overhead

Repeat on Left

Eagle or prep (Garudasana)

Briefly explain post for first couple weeks, follow with the prep instructions and give full eagle instructions if people are attempting or appear ready (not in distress while in prep)

Pose: Cross the left leg over the right as you bend the right knee (as if sitting in a chair). Keep chest lifted, shoulders directly above the hips

Prep

- Keep the crossed leg (one on top) wide, making a "4" shape with leg
- Bring ankle past the thigh if there's discomfort
- Firm connection of the legs pressing against each other

Eagle

- Cross your legs at thighs as you bend standing leg
  (as if wearing a dress)
- Full pose it is crossing twice
  (thighs and calves, hooking foot on lower leg)

- Arms mirror the legs, if right leg is crossed over the left, right arm crosses over the left
    - Cross at elbows and wrists

- Press the palm of the top arm (right) into the fingers of the left arm
- Once arms are in place, start reaching arms towards ceiling
- Gaze at the fingers

Repeat on Left

*Vinyasa 3

Chaturanga Dandasana (all the way flat on the floor)
Roll over each shoulder
Interlace the fingers
With arms behind the person, interlace the fingers, palms facing each other
(The hands are typically aligned with lumbar spine or pelvis)
If you don't already Pull arms away from your lumbar spine without lifting chest
Interlace the fingers
Repeat the last posture, but if you want, lift the chest off the floor as well
Bhujangasana
Bhujangasana with tucked toes and lifted thighs

Seated Sequence

Wide Diamond

- Bottoms of feet together
- Feet as far away from torso possible while keeping bottoms of feet touching
- Fold torso forward (as if trying to touch the head and feet)

Close Diamond (Baddha Konasana)

- Keeping bottoms of feet touching, bring feet as close to torso as possible
- Fold torso forward, keep spine as straight as possible (lead with chest)

Dandasana

- Press palms into the floor, fingertips touching glutes
(can be further away from torso)
- Press shoulder blades together, lifting the chest
- Start to lower shoulders and bring them far behind you
- Lengthen through the spine, reaching towards the ceiling
Bring the chin in towards the chest for more difficult version

Seated-Forward-Bend - Paschimottanasana

- Legs either together or about hip with distance apart
1st - fold without worrying about the spinal alignment
2nd - place palms on floor, either side of legs and fold leading with chest
- As soon as back starts to curve in, pause there and take 5 breaths

Seated Tree (Janu Sirsasana A)

- From Paschimottanasana
- Bottom of right foot comes to inner left thigh

- Square torso towards extended leg (left)
- Fold forward

Marichyasana C

- Bottom of right foot on floor, bending knee towards ceiling
- Either pull right leg towards chest OR bring left arm to the outside of leg
- Twist towards the right
- Gaze over right shoulder (furthering the twist through the neck)

Left side of previous two postures (Janu Sirsasana A & Marichyasana C)

Wide-leg Bend (Upavistha Konasana)

- Spread legs wide, either stagger or turn to a side if needed (Lying latitudinal on mat)
- Fold forward, can support self with arms

Wide-leg Fold Side Stretch (Parivrtta Janu Sirsasana)

- Keeping left leg out at the angle, bring right leg to same position as Janu Sirsasana (bottom of foot and inner left thigh)
- Square torso over bent knee (soft twist in lumbar towards right)
- Slide the left arm towards the left foot
    - Maintain the torso in this position the entire time
- Press right sit-bone into the floor

Repeat on Left

Upside-Down Pigeon (Eka Pada Raj Kapotasana prep)

- Lay flat on back
- Bending the knees, place the bottoms of the feet on the floor
- Cross the right leg over the right, creating the "4" shape
    - If discomfort in ankle, bring ankle past the left thigh and engage the right leg the entire time
    - Do NOT bend the ankle
- Keep legs crossed & bring bottom of left foot off the floor
- Pull legs towards chest
- Wrap arms around the left leg, continuing to pull legs towards chest

<u>Closing</u> (Hold for longer on average)

Bridge (Setu Bandha Sarvangasana)

- Bottom of on floor, slightly wider than hips
- Reach towards ankles with hands, palms pressing down OR grab ankles
- Pressing into the 4-corners of feet, lift hips towards ceiling
- Engage the entire leg, soften the glutes and engage the calves
    - Hands can support lumbar spine OR
    - Clasp fingers together under glutes OR
    - Pressing into the floor on either side of torso

2-3 Times

Apanasana

Hold knees into chest, rock from side-to-side a couple of times

Happy Baby (Ananda Balasana) option:

- Bottoms of feet facing ceiling, grab outside of feet with palms facing
- Rock from side to side

Reclined Side Twists (Supta Parivartanasana) - at least 10 breaths

- Feet off the floor
- Knees parallel
- Bring both legs to the right
- Allow leg to be heavy, they do not have to stay parallel
    - Harder version: cross legs, leg furthest from floor is the one on top (left leg crosses over right when twisting towards the right)
- Reach opposite arm (left when twisting towards the right) out, keeping parallel to the shoulders
- Long, deep exhales

Repeat on Left

Savasana (3-5 minutes)

- Lay flat on back, legs extended, arms to side with palms facing up
- Allow students to lay in whatever way they are most comfortable
- Instructor sprays a water and essential oil mixture over students at the beginning

Transition to Seated (soft ques with more time in-between words)

- Starting to take deeper breaths…
- Feeling the support from the floor below you…. the light air around you….
- Bringing movement into your fingers and toes…...wrists and ankles
- Reach arms overhead, giving yourself a "good morning" stretch
- Rolling over to your right hand-side, let your arm be a pillow, knees can be bent...
- … make your way up to a seated position, just as we started class...

Appendix E

Essential Components of Yoga Questionnaire

The Essential Properties of Yoga Questionnaire (EPYQ)

HOW MUCH did the instructor mention or include...?	Not at all	A little bit	A moderate amount	Quite a bit	A very large amount
1. Setting intentions or goals for the class?	O	O	O	O	O
2. Acceptance of one's body while doing yoga?	O	O	O	O	O
3. General thoughts of gratitude, love, kindness, etc.?	O	O	O	O	O
4. Self-compassion (kindness / warmth towards oneself)?	O	O	O	O	O
5. Acceptance of things as they are?	O	O	O	O	O
6. Placing one's focus on the breath?	O	O	O	O	O
7. Deep breathing (full inhalation and exhalation)?	O	O	O	O	O
8. Linking breathing with movement?	O	O	O	O	O
9. Instruction of a breathing technique (Pranayama)?	O	O	O	O	O
10. Instruction of why breathing is important?	O	O	O	O	O
11. Physical balance?	O	O	O	O	O
12. Physical flexibility?	O	O	O	O	O
13. Physical strength?	O	O	O	O	O
14. Vigorous activity or physical exertion?	O	O	O	O	O

HOW MUCH did the instructor mention or include...?	Not at all	A little bit	A moderate amount	Quite a bit	A very large amount
15. Being in constant motion (vinyasa or flow)?	O	O	O	O	O
16. Challenging one's physical balance ("finding one's edge" in regards to physical balance)?	O	O	O	O	O
17. Challenging one's physical flexibility ("finding one's edge" in regards to physical flexibility)?	O	O	O	O	O
18. Challenging one's physical strength ("finding one's edge" in regards to physical strength)?	O	O	O	O	O
19. Alignment, form, and/or correct posture?	O	O	O	O	O
20. Modifications to increase the difficulty of a pose?	O	O	O	O	O
21. Holding poses (longer than a few seconds)?	O	O	O	O	O
22. Inverted poses (poses where the head is below the heart or hips)?	O	O	O	O	O
23. Resting between poses?	O	O	O	O	O
24. Modifications to make a pose easier?	O	O	O	O	O
25. Recovery type poses (poses used to rest or recover after more difficult poses)?	O	O	O	O	O
26. Restorative yoga poses (totally supported / relaxing poses typically held for a longer period of time)?	O	O	O	O	O
27. Savasana (Corpse Pose / the final lying down resting pose)?	O	O	O	O	O
28. Engaging muscles at the pelvic floor / region (engaging Mula Bandha)?	O	O	O	O	O

HOW MUCH did the instructor mention or include...?	Not at all	A little bit	A moderate amount	Quite a bit	A very large amount
29. Engaging muscles at the core / abdominal region (engaging Uddiyana Bandha)?	O	O	O	O	O
30. Engaging Jalandhara Bandha (drawing the chin back and lengthening the back of the neck)?	O	O	O	O	O
31. Body awareness / paying attention to one's body?	O	O	O	O	O
32. Asking students to concentrate on postural alignment?	O	O	O	O	O
33. Asking students to concentrate on bodily sensations (such as tightness, softness, and muscle awareness)?	O	O	O	O	O
34. Allowing or being present to emotions or feelings that come up while doing yoga?	O	O	O	O	O
35. Physical relaxation ("letting go" of physical tensions)?	O	O	O	O	O
36. Mental relaxation ("letting go" of mental tensions, worries, or mental stress)?	O	O	O	O	O
37. Emotional release ("letting go" of emotions)?	O	O	O	O	O
38. Visualization or guided imagery?	O	O	O	O	O
39. Physical health benefits of yoga?	O	O	O	O	O
40. Emotional health benefits of yoga?	O	O	O	O	O
41. Mental health benefits of yoga?	O	O	O	O	O
42. Spiritual benefits of yoga?	O	O	O	O	O

HOW MUCH did the instructor mention or include...?	Not at all	A little bit	A moderate amount	Quite a bit	A very large amount
43. Giving individual attention or feedback (instructor or assistants)?	O	O	O	O	O
44. Physically assisting students with poses (aligning, pressing, or stretching a student in a pose)?	O	O	O	O	O
45. Physical support / adjustment of students during Savasana (such as light facial massage, pressing shoulders, or pulling feet)?	O	O	O	O	O
46. Partner yoga (two or more persons connecting / touching in a posture)?	O	O	O	O	O
47. Time for introductions or greetings?	O	O	O	O	O
48. Teacher facilitated social interaction during the session?	O	O	O	O	O
49. Chanting and/or reciting mantras or saying "OM"?	O	O	O	O	O
50. Spiritual readings, quotes, sayings, teachings, or ideas?	O	O	O	O	O
51. Energy (prana, chakras, energy meridians, or nadis)?	O	O	O	O	O
52. Reference to a connection to a higher power or something greater than oneself (Spirit, God, Universe)?	O	O	O	O	O
53. Quieting the mind?	O	O	O	O	O
54. Mindfulness (non-judgmental awareness of one's thoughts, feelings, or movements)?	O	O	O	O	O
55. Meditation during the session?	O	O	O	O	O

HOW MUCH did the instructor mention or include...?	Not at all	A little bit	A moderate amount	Quite a bit	A very large amount
56. Meditation (Dhyana: deep absorptive meditation)?	O	O	O	O	O
57. Withdrawal of the senses (Pratyhara: directing the attention from the external toward an internal awareness)?	O	O	O	O	O
58. Concentration (Dharana: a state of complete absorption or concentration / focus of the mind)?	O	O	O	O	O
59. Ethical principles (Yamas: compassion, truthfulness, non-stealing, moderation, non-greediness)?	O	O	O	O	O
60. Personal observances [Niyamas: purity / cleanliness (includes diet / nutrition), diligence / focused effort, contentment, self-study, attuning oneself to the Divine]?	O	O	O	O	O
61. Union with the Divine or "pure awareness" (Samadhi)?	O	O	O	O	O
62. How yoga teachings / practice can be used in life outside of class?	O	O	O	O	O

Appendix F

Alternative Route Weekly Assignments Example

Instructions
All weekly assignments must be at least two pages long and in APA format (no cover page required). Each weekly assignment is due Sunday night by midnight. Please submit through Blackboard.

Week 1
Describe at least 3 different styles of yoga. Please indicate how they may be similar and different from each other.

Appendix G

Alternative Route Yoga I Final Assignment

Parts of Final for Research Articles

Content	Points
Presentation	40
Handout for Class (Only hardcopy of handout required)	40
Digital copy of articles	10
Send Handout in 1 email with subject: "Yoga I Final" By 10 am on the day of the presentations	10
Total	**100**

The articles you are covering for this presentation MUST be approved ahead of time. Nobody can do an article that has already been chosen by a classmate. Points will be deducted if a student does not get approved in time and presents on an article/book that has already been chosen.

Instructions for the Research Articles

Present a Review from Research: 2 Research articles related to yoga (any of the topics related: mindfulness, pranayama, yoga, etc.). MUST get approved by professor.

Rubric for Presentation & Hando

Article	**Name & Citation** 4pts	**Participants** 2 Pt	**Purpose** 10 pts	**Instrumentation & Procedures** 10 pts	**Results** 10 pts	**Implications** 4 pts
1	T: 4	T: 2	T: 10	T:10	T: 10	T:4
2	T: 4	T: 2	T: 10	T: 10	T: 10	T:4
Total	8	4	20	20	20	8 =80

Appendix H

Demographic Questions

Please indicate your gender:

Male
Female
Transgender male to female
Transgender female to male
Non-binary / Genderqueer

Your age (circle one):

18 19 20 21 22 23 24 Other (please list): _____

Please indicate the number of academic hours in which you are currently enrolled:_____

What best describes your current living situation? (Please select all that apply)

___ On campus dormitory
___ Off campus apartment
___ With parents/caretakers
___ With roommates
If you have roommates, please indicate how many _____

What best describes your racial/ethnic background? (check all that apply)

___ White/Caucasian
___ Black/African American
___ Hispanic/Latino
___ Asian American
___ Asian
___ Native American
___ Pacific Islander
___ African
___ Other (please indicate) _____

Please indicate your reasoning for enrolling in the PBHL 2101: Yoga I class
(check all that apply)

___ I needed a credit to maintain a scholarship
___ I needed a credit to maintain full-time student status
___ To help bring up my current GPA
____ Interested in the potential mental benefits of yoga
____ Interested in the potential physical benefits of yoga
____ Never done yoga and want to learn about yoga
____ I've done yoga before and want to learn more
___ Other (please indicate) _____

Have you done yoga before? Yes/No

If yes, about how many times have you done yoga? _____

If yes, please list any yoga styles that you are aware of practicing_____

_____

Do you exercise regularly? Yes/No

If yes, how many times per week? _____

If yes, please list the types of physical activity _____

Please indicate if you have received any of the following diagnosis:

____ Depression
____ Anxiety
____ Sleep Disorder
____ Mood Disorder
____ Attention Deficient Disorder

Please indicate any treatments you have received

____Psychiatric

If yes, do you currently receive Psychiatric care? (circle one) YES / NO

____ psychological and/or counseling

If yes, do you currently receive these services? (circle one) YES / NO

If you have any additional health concerns (physical and mental) that may affect your day-to-day life, please indicate:

_____

Appendix I

The Pittsburgh Sleep Quality Index (PSQI)

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

During the past month,

1. When have you usually gone to bed? _____
2. How long (in minutes) has it taken you to fall asleep each night? _____
3. When have you usually gotten up in the morning? _____
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) _____

5. During the past month, how often have you had trouble sleeping because you…	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):				
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
9. During the past month, how would you rate your sleep quality overall?				

Appendix J

Perceived Stress Scale (PSS)

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Please circle your response.

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

Appendix K

Beck Depression Inventory – Second Edition (BDI-II)

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully. And then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

Sadness
0. I do not feel sad.
1. I feel sad much of the time.
2. I am sad all the time.
3. I am so sad/unhappy that I can't stand it.

Pessimism
0. I am not discouraged about my future.
1. I feel more discouraged about my future than I used to.
2. I do not expect things to work out for me.
3. I feel my future is hopeless and will only get worse.

Past Failure
0. I do not feel like a failure.
1. I have failed more than I should have.
2. As I look back, I see a lot of failures.
3. I feel I am a total failure as a person.

Loss of Pleasure
0. I get as much pleasure as I ever did from the things I enjoy.
1. I don't enjoy things as much as I used to.
2. I get very little pleasure from the things I used to enjoy.
3. I can't get any pleasure from the things I used to enjoy.

Guilty Feelings
0. I don't feel particularly guilty.
1. I feel guilty over many things I have done or should have done.
2. I feel quite guilty most of the time.
3. I feel guilty all of the time.

Punishment Feelings
0. I don't feel I am being punished.
1. I feel I may be punished.
2. I expect to be punished.
3. I feel I am being punished.

Self-Dislike
0. I feel the same about myself as ever.
1. I have lost confidence in myself.
2. I am disappointed in myself.
3. I dislike myself.

Self-Criticalness
0. I don't criticize or blame myself more than usual.
1. I am more critical of myself than I used to be.
2. I criticize myself for all of my faults.
3. I blame myself for everything bad that happens.

Suicidal Thoughts or Wishes
0. I don't have any thoughts of killing myself.
1. I have thoughts of killing myself, but I would not carry them out.
2. I would like to kill myself.
3. I would kill myself if I had the chance.

Crying
0. I don't cry any more than I used to.
1. I cry more than I used to.
2. I cry over every little thing.
3. I feel like crying, but I can't.

Agitation
0. I am no more restless or wound up than usual.
1. I feel more restless or wound up than usual.
2. I am so restless or agitated, it's hard to stay still.
3. I am so restless or agitated that I have to keep moving or doing something.

Loss of Interest
0. I have not lost interest in other people or activities.
1. I am less interested in other people or things than before.

2. I have lost most of my interest in other people or things.
3. It's hard to get interested in anything.

Indecisiveness
0. I make decisions about as well as ever.
1. I find it more difficult to make decisions than usual.
2. I have much greater difficulty in making
decisions than I used to.
3. I have trouble making any decisions.

Worthlessness
0. I do not feel I am worthless.
1. I don't consider myself as worthwhile and useful as I used to.
2. I feel more worthless as compared to others.
3. I feel utterly worthless.

Loss of Energy
0. I have as much energy as ever.
1. I have less energy than I used to have.
2. I don't have enough energy to do very much.
3. I don't have enough energy to do anything

Changes in Sleeping Pattern
0. I have not experienced any change in my sleeping.
1a. I sleep somewhat more than usual.
1b. I sleep somewhat less than usual.
2a. I sleep a lot more than usual.
2b. I sleep a lot less than usual.
3a. I sleep most of the day.
3b. I wake up 1-2 hours early and can't get back to sleep.

Irritability
0. I am not more irritable than usual.
1. I am more irritable than usual.
2. I am much more irritable than usual.
3. I am irritable all the time.

Changes in Appetite
0. I have not experienced any change in my
appetite.

1a. My appetite is somewhat less than usual.
1b. My appetite is somewhat greater than usual.
2a. My appetite is much less than before.
2b. My appetite is much greater than usual.
3a. I have no appetite at all.
3b. I crave food all the time.

Concentration Difficulty
0. I can concentrate as well as ever.
1. I can't concentrate as well as usual.
2. It's hard to keep my mind on anything for very long.
3. I find I can't concentrate on anything.

Tiredness or Fatigue
0. I am no more tired or fatigued than usual.
1. I get more tired or fatigued more easily than usual.
2. I am too tired or fatigued to do a lot of the things I used to do.
3. I am too tired or fatigued to do most of the things I used to do.

Loss of Interest in Sex
0. I have not noticed any recent change in my interest in sex.
1. I am less interested in sex than I used to be.
2. I am much less interested in sex now
3. I have lost interest in sex completely

Appendix L

Beck Anxiety Inventory (BAI)

	Not at all	Mildly, but it didn't bother me much	Moderately - it wasn't pleasant at times	Severely - it bothered me a lot
Numbness or tingling	0	1	2	3
Feeling hot	0	1	2	3
Wobbliness in legs	0	1	2	3
Unable to relax	0	1	2	3
Fear of the worst happening	0	1	2	3
Dizzy or lightheaded	0	1	2	3
Heart pounding / racing	0	1	2	3
Unsteady	0	1	2	3
Terrified or afraid	0	1	2	3
Nervous	0	1	2	3
Feeling of choking	0	1	2	3
Hands trembling	0	1	2	3
Shaky / unsteady	0	1	2	3
Fear of losing control	0	1	2	3
Difficulty in breathing	0	1	2	3
Fear of dying	0	1	2	3
Scared	0	1	2	3
Indigestion	0	1	2	3
Faint / lightheaded	0	1	2	3
Face flushed	0	1	2	3
Hot / cold sweats	0	1	2	3

Appendix M

IRB Approval Letter

UNIVERSITY OF ARKANSAS

To:	Kati M Street BELL 4188
From:	Douglas James Adams, Chair IRB Committee
Date:	08/01/2019
Action:	**Expedited Approval**
Action Date:	08/01/2019
Protocol #:	1905195794
Study Title:	Yoga: A Comparison of Styles
Expiration Date:	05/12/2020
Last Approval Date:	

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

Adverse Events: Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

cc: Bart Hammig, Investigator