YOGA FOR SENIORS: UNDERSTANDING THEIR BELIEFS ABOUT AND BARRIERS TO PARTICIPATION

by

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ABSTRACT

Extensive research has been published on the benefits of yoga for older adults; however, little is known about older adults' beliefs and perceived barriers to participating in yoga. The purpose of this research was to conduct an exploratory study that examined older adults' beliefs about yoga with regard to experiences, knowledge about location, affordability, accessibility, and perceived barriers to engaging in yoga. A convenience sample of faint-and-fall clinic patients aged 55 years and older was surveyed about home environment and physical activity levels. The Beliefs About Yoga Scale (BAYS) was used to measure beliefs about and perceived barriers to yoga. Participants were asked to describe intentions to practice yoga, as well as social and environmental barriers. Survey data were linked to demographic and health-status medical record data. The theoretical framework, Theory of Planned Behavior, guided this research. Participants (N = 37) had a mean age of 72.81 years; 59.5% were female. Participants were prefrail (66.7%) or frail (33.3%), and most (78.4%) had fallen in the past year. The majority (>72%) did not engage in more than light physical activity. The BAYS mean score was 59.17 (SD = 12.5), with a possible range of 11 to 77. This score was not significantly different than a previously reported BAYS score (M = 55.62; SD = 8.58) (p = 0.138; t (28) = 1.53; independent sample t-test). The study sample had fairly positive beliefs about yoga, as measured by the BAYS, and mean scores did not differ significantly from previously reported scores from a middle-aged sample. More than 90% of participants had no past or

current yoga experience, 97.1% had no intentions to practice yoga, 61.8% did not know locations of classes, 82.4% did not know the average class cost, and only 56.3% reported having available transportation to yoga classes. The top three barriers to practicing yoga were level of difficulty, lack of motivation, and fear of injury. Interestingly, 23.7% of participants did not answer questions about yoga, even though they answered questions about physical activity. Overall, participants held positive beliefs about yoga, yet showed limited experience and little intention to participate in a yoga program. More research to devise yoga classes tailored to the needs of older adults is warranted.

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LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations

ADL	Activities of daily living
BAYS	Beliefs About Yoga Scale
BDNF	Brain-derived neurotrophic factor
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
FFFC	Faint, Fall, and Frailty Clinic
HP	Health promotion
IADL	Instrumental activities of daily living
MBSR	Mindfulness-based stress reduction
QOL	Quality of life
RAPA	Rapid Assessment of Physical Activity scale
REDCap	Research electronic data capture
ROM	Range of motion
TPB	Theory of Planned Behavior

CHAPTER 1

INTRODUCTION

In recent years, there has been a considerable shift toward an aging population in the United States. This trend was especially noticeable in the year 2011, when the first wave of baby boomers turned 65 years of age (Felix & Watkins, 2013). Baby boomers are now turning 65 at a rate of one every 8 seconds (Mitchell & Barlow, 2011), and this aging population growth is projected to reach 19% by the year 2030 (Felix & Watkins, 2013) and 20% by the year 2050 (McLaughlin, Connell, Heeringa, Li, & Roberts, 2010). The effect of an aging population in the United States is significant, as it greatly impacts healthcare and quality of life for older adults and society as a whole (McLaughlin et al., 2010). This phenomenon has led to a recent discussion on how the U.S. healthcare system might address important issues related to the health and well-being of this growing population (Mitchell & Barlow, 2011).

One issue that has been connected with the advent of an aging society is the concept of health-related quality of life (HRQOL; Brovold, Skelton, Sylliaas, Mowe, & Bergland, 2014). Increased life expectancy has created the need for improving HRQOL for older adults throughout aging, a process which is often associated with chronic disease and decline (Yorston, Kolt, & Rosenkranz, 2012). Functional decline has been described as “a loss of the possibility to independently perform activities of daily living

(ADL) such as bathing, dressing and toileting, and/or instrumental ADL (IADL), such as travelling, house cleaning and shopping" (Hoogerduijn, Grobbee, & Schuurmans, 2014, p. 107). Functional decline also jeopardizes HRQOL for older adults, as it precipitates the degeneration of health and incidence of chronic disease (Chen et al., 2010; Danon-Hersch, Rodondi, Spagnoli, & Santos-Eggimann, 2012). Chronic disease leads to even greater decreased physical capacity and the development of frailty in the older adult population (Collard, Boter, Schoevers, & Oude Voshaar, 2012). Frailty among this population can be broadly described as "a complex state of impairment that signifies loss in areas of physical functioning, physiological resiliency, metabolism, and immune-response" (Fried, 2001, as cited in Hackstaff, 2009, p. 800). Therefore, as life expectancy increases, the need for understanding frailty as it relates to HRQOL has become a significant issue, because it affects health in later life and can define health status and health care needs for older adults (Heath & Phair, 2011).

While several studies have determined the specific risk factors for frailty, such as decreased strength, impaired balance, and loss of flexibility (Martin, 2011; Tatum, Igel, & Bradley, 2009), there is evidence that regular exercise can slow the rate of functional decline and the development of frailty (Krucoff, Carson, Peterson, Shipp, & Krucoff, 2010). Exercise has been associated with not only sustained physical functioning, but also a better perception of one's health, as it affects one's quality of life (Brovold et al., 2014; Taylor, 2014). However, despite the known benefits of exercise, older adults remain the least physically active of all age groups (de Rezende, Rey-López, Matsudo, & de Carmo Luiz, 2014). Because sedentary behavior has been shown to contribute to the development of chronic diseases and frailty, promoting exercise among older adults has

become a priority goal for improving HRQOL for this population (Wanderley et al., 2011).

Yoga is one form of exercise that could support physical functioning and decrease frailty risk factors, and thus improve HRQOL (Sohl, Schnur, Daly, Suslov, & Montgomery, 2011). Yoga has been described as "a system of movement and breathing exercises meant to foster a mind–body connection" (Verrastro, 2014, p. E1) and has been recognized as effective in treating chronic health conditions (Sohl et al., 2011), as well as benefiting physiological "protective and regulatory systems" (Olivo, 2009, p. 163). Yoga is an adaptable form of exercise that can help maintain physical functioning by improving gait speed, muscle strength, and cardiovascular support (Patel, Newstead, & Ferrer, 2012). Forms of yoga, such as Hatha and Iyengar, may be suitable for older adults, because they encourage general movement, which supports health and well-being. These forms of yoga can be adapted to the physiological needs of many older adults through the use of chair postures, as well as assistive belts and other supportive devices (Patel et al., 2012).

Even with the known health benefits of regular adherence to a health-promotion (HP) program such as yoga, Wright and Hyner (2011) determined that many older adults still fail to participate in exercise activities due to a number of barriers. As the authors pointed out, "perceived barriers, whether real or imagined, is an important variable affecting participation in HP programs" (p. 1030), and such barriers, ultimately, will determine the success or failure of these programs for active aging and improved HRQOL for older adults (Plouffe & Kalache, 2010).

To date, little is known about older adults' perceptions or beliefs about yoga. Sohl

et al. (2011) developed the Beliefs About Yoga Scale (BAYS) to measure the knowledge, beliefs, and perceived barriers that adults have about yoga as a form of exercise. The BAYS is made up of three factors measuring expected benefits (five items), expected discomforts (three items), and expected social norms (three items). Level of agreement for each item is scored with a seven-point Likert scale (Appendix A). The original study by Sohl et al. (2011) consisted of middle-aged, urban adults. However, to my knowledge, the BAYS has never been used to study older adults' beliefs about yoga.

Statement of the Problem

Much has been published about the benefits of yoga as a form of exercise for older adults; however, there is little research on the knowledge and beliefs that the aging population holds about yoga programs. The BAYS measures adults' beliefs about yoga in order to determine the exact perceptions and potential inhibitions they have toward engaging in yoga for physical activity (Sohl et al., 2011). Sohl and colleagues (2011) found that their study participants had "generally positive beliefs about yoga" (p. 89); yet, as the authors noted, optimistic beliefs about yoga in their middle-aged sample population could have been influenced by the fact that 60% of them had previously attended yoga classes. Recent literature has also promoted yoga as a beneficial form of exercise for older adults (Schmid, Puymbroeck, & Koceja, 2010; Tatum et al., 2009;). It is therefore necessary to identify the knowledge of, beliefs about, and perceived barriers to beginning a yoga program among the general population of older adults with and without previous exposure to the practice.

CHAPTER 2

REVIEW OF THE LITERATURE

Aging Demographics

The rate of aging among the global population is increasing, with considerable social and health-related effects now and in years to come. In 2009, 21% of the world's population was over age 60 (McNaughton, Crawford, Ball, & Salmon, 2012); by the year 2050, this percentage is predicted to increase to 33%, and equates to roughly 2 billion seniors over the age of 60 years worldwide (Yorston et al., 2012).

Such a rapid increase in the older adult population has a significant impact on developed countries. In the approaching decades, the proportion of older adults aged 65+ years living in the United States alone will reach record-breaking highs, rising from 4% at the beginning of the 20th Century to roughly 20% by the year 2050 (McLaughlin et al., 2010). It has been projected that by the year 2030, the older adult population will more than double from the year 2000 (Kozar-Westman, Troutman-Jordan, & Nies, 2013). This means that in 2050, there will be triple the number of age 65+ older adults in the United States as there are children under the age of 4 years (Wheeler & Guinta, 2009). As McLaughlin et al. (2010) suggested, this recent phenomenon of the rapid aging of America carries with it several aging-related health issues of great social significance.

The Impact of Aging on Quality of Life

One of the most important issues facing older adults today is how to improve quality of life (QOL) during the aging process, which has been defined by the World Health Organization (WHO) as "individuals' perceptions on their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns" (WHO, 1995, p. 1403, as cited in Brovold et al., 2014, p. 405). McNaughton et al. (2012) noted that as the average life expectancy increases, so does the desire for improved QOL through the aging process, yet the increased rate of population aging has had somewhat of the opposite effect: With the extension of life, society has seen a dramatic rise in the frequency of associated chronic diseases and decreased physical functioning, a development that imposes major physiological and economic stress on society and, overall, can decrease one's QOL (Yorston et al., 2012). As life expectancy increases, the societal need for improved QOL becomes of great importance for the older adult population. This is especially true for those suffering from chronic diseases, which substantially increase from the age of 45 years (McNaughton et al., 2012). The incidence of chronic disease starting in middle-adulthood continues, despite the fact that the majority (up to 80%) of age-related health issues can be prevented with health-based modifications made by the ages of 55–66 years of age (McNaughton et al., 2012).

Health-Related Quality of Life and Physical Functioning

Brovold et al. (2014) examined the distinction between the broad meaning of QOL and the QOL that is associated with optimal health, HRQOL, defined as one's personal awareness of one's total health and well-being throughout life. This more

inclusive assessment of the definition of QOL as it relates to health had previously been suggested by Rowe and Kahn (1997) when they stated that the concept of successful aging should be thought of as the "avoidance of disease and disability, maintenance of high physical and cognitive function, and sustained engagement in social and productive activities" (as cited in Duggleby et al., 2012, p. 1212). HRQOL, then, is a complex, multifaceted measure of not just statistical reports on morbidity and mortality rates, but a more comprehensive assessment of one's total perceived health (Thompson, Zack, Krahn, Andersen, & Barile, 2012).

Older adults' perceptions of HRQOL are intricately tied to their level of physical activity and general level of fitness. Research has shown that increased physical activity and better health status are positively related to HRQOL (Brovold et al., 2014). Conversely, chronic disease can significantly affect one's HRQOL and overall perceived functional status and well-being. With 75% of older adults in the United States suffering from at least one chronic disease and one in five disabled from disease, the concept of healthy aging, the improvement of physiological functioning, and the avoidance of chronic illnesses are now of great importance for geriatric healthcare workers and the aging population (Wanderley et al., 2011). Equally so, research has demonstrated that older adults without previous disabilities could actually delay functional decline through engaging in regular exercise, which helps to improve HRQOL and independence (Taylor, 2014).

Decreased Physical Functioning

One of the major social issues associated with increased life expectancy is the advent of decreased physical functioning and increased risk for frailty among the aging.

Tatum et al. (2009) defined the term *functional capacity* as "the ability to perform everyday activities such as self-care, getting in and out of bed or a chair, walking, and even rising from the floor" (p. 70). Throughout the course of the natural aging process, these practical abilities decline, resulting in diminished flexibility, muscle strength, and balance, which can result in decreased physical functioning and increased dependence on others (Beavers et al., 2014; Tatum et al., 2009). The need for delaying functional decline and supporting independence has become a leading healthcare priority (Brovold et al., 2014).

Functional Decline and Frailty

Functional decline often triggers a myriad of chronic health problems (Chen et al., 2010; Danon-Hersch et al., 2012) that are related to increased incidence of frailty in the older adult population (Collard et al., 2012). Frailty is typified by a deficit in physiological abilities and a resulting state of fragility (Danon-Hersch et al., 2012; Davis, Rockwook, Mitnitski, & Rockwood, 2011). Frailty in older adults often precedes poor health outcomes, disability, and placement into long-term-care facilities (Collard et al., 2012; Davis et al., 2011). Moreover, frailty has been identified as an independent predictor of recurrent falls, disability, hip fractures, and hospitalizations that can lead to long-term-care placement and death (Danon-Hersch et al., 2012). Falls among seniors age 65 and older are a major healthcare concern today. There are more than 11 million falls occurring each year in the 65+ population, resulting in injuries that often require hospitalization and cost the healthcare system more than $20 billion in treatments (Tatum et al., 2009).

Several extant studies have established common risk factors associated with

frailty in the older adult population, including a reduction in musculoskeletal strength, balance, range of motion (ROM), mobility, and gait function (Martin, 2011; Tatum et al., 2009). Health promotion and maintenance of prefrail and frail older adults in the form of physical activity is one of several critical steps that should be supported in order to reduce risk of frailty, improve strength and balance, and lower healthcare costs (Chen et al., 2010; Martin, 2011). In fact, recent research suggests that regular, physical activity throughout life and into the later years largely determines the speed of aging and frailty of older adults (Krucoff et al., 2010).

Physical Inactivity and Frailty

Current research has shown that physical inactivity among older adults leads to chronic disease, diminished perceptions of HRQOL, and an overall decline in physical functioning—factors that could lead to an increased risk for frailty. The probability for developing chronic diseases has been shown to increase with age (de Rezende et al., 2014; Taylor, 2014), and lack of exercise has been connected to increased likelihood for developing chronic diseases and, effectively, decreasing HRQOL (Aoyagi, Park, Park, & Shephard, 2010). Physical inactivity among older adults not only reduces HRQOL, but has been linked to frailty risk factors such as muscular atrophy, decreased strength, decreased endurance, and impaired balance—all factors that limit functional independence (Taylor, 2014).

Increasing physical activity levels by engaging in exercise is one of the most significant interventions to improve HRQOL and preserve functional independence among older adults (Brovold et al., 2014; Taylor, 2014); however, even with the known health benefits of exercise, older adults remain the most physically inactive of all age

groups. Studies from the United States and Europe have shown that adults 60+ years old spend around 80% of their waking hours (8–12 hours/day) in sedentary behaviors (de Rezende et al., 2014). It has been reported that about one in three older adults living in the United States are considered sedentary, and less than a third of all older adults are currently achieving the recommended physical activity levels for their age group (Bethancourt, Rosenberg, Beatty, & Arterburn, 2014). Because physical inactivity is a major contributor to chronic diseases and frailty, promoting exercise programs is a practical and important health intervention that can improve HRQOL for older adults (Wanderley et al., 2011).

The Benefits of Yoga on Physical Functioning

Decreased Inflammation

Yoga has been proposed as one way to decrease chronic inflammation that is associated with aging (Brown & Gerbarg, 2009; Olivo, 2009). According to Brown and Gerbarg (2009) and Olivo (2009), the process of aging is largely a result of immunosenecence—neuroimmunoendocrine changes that have an overall degenerative effect and cause an increase in systemic inflammation and, at the same time, a decrease in immune function. The elevation of baseline inflammation has been associated with a number of conditions related to aging, including heart disease, metabolic disorders such as type II diabetes, Alzheimer's disease, and several cancers (Olivo, 2009); thus, considerable gerontological research today focuses on the effects of chronic inflammation on accelerated aging and immune dysregulation (Bushell, 2009). The continued practice of yoga and meditation have been shown by recent studies to have anti-inflammatory effects on the body and to actually improve the body's ability to regulate the

inflammatory response and improve immune functioning; both of the latter mechanisms may slow the process of immunosenescence (Bushell, 2009; Olivo, 2009).

Improved Flexibility, Balance, and Strength

Older adults who regularly participate in a yoga program have the potential for improved flexibility, balance, and muscle strength. One study that tested flexibility in an experimental yoga group and a control group showed significant improvement in ROM over time among the yoga group and a decrease in flexibility for the control group during the posttest (Wang, 2009). ROM areas tested were reach, trunk extension, shoulder flexion, and right and left ankle flexibility, all of which showed increased rigidity among the control group.

Another important skill to help prevent falls and improve health is the ability for older adults to maintain balance as they age. A pilot study that examined the effect of yoga practice on balance ability found that regular practice improved balance in three areas: "the Berg Balance Scale, the one-leg stand test, and the Activities-Specific Balance Confidence Scale" (Wang, 2009, p. 93). Another study revealed improvements in muscular strength and physical ability after a 12-week yoga program (Wang, 2009). Wang (2009) and Bhavanani (2012) concluded that yoga can improve musculoskeletal problems and actually speed the recovery process and improve functional ability for some who have suffered accidents and physical traumas.

Decreased Pain Perception

Another possible benefit of regular yoga practice for seniors is the improved perception of pain from physiological complications such as osteoarthritis, carpal tunnel syndrome, and low back pain. Yoga has been associated with decreased pain perception

in several studies. One study examined the effects of yoga on pain perception in AIDS patients and revealed a decrease in the use of pain medication (Bonura, 2011). Another study tested the effects of yoga practice on chronic pain and found that overall perception of pain might be reduced with a combination of yoga practice and a technique called mindfulness-based stress reduction (MBSR) (Bonura, 2011). Participants in this study who had multiple causes of pain were most successful in reducing pain and increasing functional ability after practicing yoga with MBSR. The effect of reduced pain that results in increased functional abilities was explained by Bonura (2011), who argued that yoga reduces muscular tension, a precipitating factor of the sensation of pain. Bonura's study suggests that yoga can serve as a preventive and protective measure against pain.

The Psychological Benefits of Yoga

Stress Relief

Bonura (2011) asserted that older adults would benefit from a general sense of well-being through participation in a yoga program, an important factor to improving HRQOL. Yoga has been associated with reducing feelings of aggression and fear, and with general improvement in mood for older adults with cognitive disorders and also for their caregivers. Brown and Gerbarg (2009) further emphasized the benefits of yoga practice in reducing stress and stress-related disorders. The holistic interventions of yoga practice use stress-reducing techniques that focus one on breathing, meditating, centering one's thoughts, and visualization to relieve several mental and physical problems exacerbated by stress. Moreover, meditation and yoga have been shown to also reduce caregiver stress and help relieve associated experiences with depression and anxiety (Olivo, 2009).

Depression and the Regulation of Brain Function

Chronic depression has a significant negative impact on brain health, which affects QOL. Brain-derived neurotrophic factor (BDNF) is responsible for good brain functioning and plays a role in the growth and development of nervous tissue, nerve repair, and brain plasticity. Activities such as yoga and other antidepressant treatments have been shown to increase BDNF, and may also aid in maintaining cognitive functions for the older adult; however, chronic stress and depression can disrupt normal nerve growth, development, and functioning, and may decrease BDNF (Brown & Gerbarg, 2009). The harmful effect of depression on brain and cognitive functioning has been shown to greatly improve with yoga practice, which may decrease depression in older adults. In fact, in one study, older adult participants who suffered from depression reported improvement in mood after just three repeated short sessions of yoga and deep-breathing therapy (Bonura, 2011). Another yoga/depression study that continued for 24 weeks with six sessions per week reported that participants of the yoga group experienced significant improvement in their depression at both the 3- and 6-month marks, while the control group showed no improvements in their depression, as measured by the Geriatric Depression Scale–15, even though both groups had similar levels of depression at the start of the program (Wang, 2009).

Improved Sleep Intervals and Sleep Quality

Wang (2009) reviewed nine studies examining the physiological and psychological effects of yoga therapy on older adults. One study used a randomized controlled trial to examine depressing-level outcomes of older adult participants who participated in a 24-week yoga intervention, an Ayurvedic treatment, or a control group.

This study, conducted by Krishnamurthy and Telles (2007, as cited in Wang, 2009), also found positive effects of yoga practice on sleep for the older adult. Yoga improved sleep quality and reduced the amount of time it took for an older adult to fall asleep. Older adult participants of this yoga, depression-level, and sleep study reported improvement in their sleep cycle and increased hours of sleep at 3- and 6-month assessments, yet older adult participants of the Ayurveda and control groups reported no difference to their sleep cycle (Manjunath & Telles, 2005, as cited in Wang, 2009). In another review, Bonura (2011) described how the continued practice of yoga and meditation has been thought to also decrease chronic insomnia and general sleep disturbances in the older adult population. Insomnia has been shown to be highly responsive to regular yoga practices, which employ skillful breathing methods to reduce sleeptime anxiety and stimulate physical and mental peace and well-being that encourage a calm, sleep-like state. Thus, the regular practice of meditation and yoga has shown significant improvements to getting deeper and more physically restorative sleep for older adults (Bonura, 2011).

The Impact of Yoga on Frailty Risk Factors

Falls

Current research on the topic of preventing falls among older adults has indicated that exercise programs such as yoga have been proven effective for this population in reducing the incidence of falls. The practice of yoga can yield several advantages in prevention of falls through improvement of strength and balance—factors such as retention of strength in abdominal and leg muscles as well as maintaining flexibility in joints associated with balance (Tatum et al., 2009). Hatha yoga is a branch of yoga that may serve to reduce fall risk factors by implementing a sequence of balance postures that

are also synchronized with breathing and meditation. This therapeutic form of exercise requires active awareness of one's mind–body connection and, as a result, promotes a deeper focus on the inner workings of the body as well as a greater sense of spatial and physical awareness (Schmid et al., 2010). The discipline of yoga increases one's self-awareness in relation to one's environment—a concept defined as proprioception (Schmid et al., 2010). Mindfulness of oneself in relation to one's environment is thus enhanced through yoga practice and may aid in the prevention of falls through improved proprioception.

Gait

In addition to promoting better awareness and proprioception, recent research has focused on utilizing yoga therapy for improving gait among the elderly. One specific study done by the Gait Study Center found that after a 9-week Iyenger yoga program, participants showed improvement in their overall walking ability (Tatum et al., 2009). Success measures were determined by faster strides, better ROM in legs, and improved one-legged standing balance postures. Two other studies demonstrated similar results in overall improved gait and balance. Ülger and Yagli (2011) reported measured improvement in gait through more consistent step lengths, better walking speed, and better distribution of balance or a reduction of swaying tendency while standing among the 27 participants who completed their yoga program. Another study found that their yoga intervention improved upper body trunk strength and endurance. Moreover, the 23 participants, aged 62 to 83, showed better hip extension and step length, and less anterior pelvic tilt—factors that improve overall gait, balance, and continued physical functioning (Chen et al., 2010).

The implications of these studies are important because musculoskeletal disorders can lead to limited mobility, decreased strength, and a reduction in balance and gait among the elderly—factors that increase the risk for developing frailty (Ülger & Yagli, 2011). Regular yoga practice, thus, provides one alternative form of therapeutic exercise that has been shown to improve gait, balance, strength, and flexibility for the aging population (Chen et al., 2010; Roland, Jakobi, & Jones, 2011; Ülger, & Yagli, 2011). Moreover, yoga programs designed for older adults could offer an inexpensive method for reducing or even preventing aging-associated diminished gait function (Chen et al., 2010).

Older Adults' Perceived Barriers to Yoga

The Centers for Disease Control and Prevention (CDC) named several barriers that many adults face in beginning an exercise program. Reasons for reluctance included socioeconomic, environmental, and other personal factors such as physical discomfort and disability (CDC, 2008, as cited in Patel, Akkihebbalu, Espinoza, & Chiodo, 2011). Furthermore, older adults may have the attitude that "exercise is for young people and not for them, implying that they are too frail or disabled to exercise" (Patel et al., 2011, p. 152). As an explanation for the low turnout of seniors in yoga classes, Patel et al. (2011) stated that there is a lack of acceptance and understanding about yoga as a beneficial form of exercise in the older population. Furthermore, Wang (2010) found that older adults may need prior education as well as motivational reasons for engaging in yoga before they are willing to join a class.

Fear of Injury

Studies have demonstrated that the perception of limited physical abilities and current medical circumstances are common concerns that older adults have about beginning a yoga class, and many fear that they will injure themselves and further complicate their condition (Wang, 2010). Thus, increased anxiety and fear about physical limitations may inhibit older adults from attempting yoga and gaining the many physical and psychological benefits of yoga as a form of exercise. Therefore, yoga instructors would first need to address any misconceptions older adults may hold about the safety and efficacy of yoga practice in order to reduce fear and reluctance (Wang, 2009; Wang, 2010).

Safety Concerns

Krucoff et al. (2010) discussed the many safety challenges that yoga can pose for older adults, especially when performed incorrectly or with unrealistic expectations about their own body mechanics. Because older adults are at increased risk for fractures due to osteoporosis as well as cardiovascular complications such as heart attacks or strokes, these physiological challenges can greatly impede their participation due to the physical aspects of yoga. Moreover, physical issues such as diminished vision and hearing, as well as problems with incontinence and cognitive disabilities, need to be addressed before older adults can safely and confidently engage in this form of physical activity (Krucoff et al., 2010). Even though the need for establishing safety in yoga practice is essential for the beginner older student, Krucoff et al. (2010) argued that “equally essential is ensuring that this imperative of safety does not translate into establishing a fearful or limiting tone, but rather invites the empowering recognition of yoga’s highest teachings that our true

nature is already whole" (p. 900). A true understanding about the principals of yoga reinforces acceptance of self-limitations and a detachment of expectation of what should be to what is right now (Krucoff et al., 2010). Practicing yoga with a qualified instructor who teaches safe adaptations to poses and, at the same time, letting go of expectations allows the older adult to safely and effectively engage in yoga practice.

Adaptability, Cost, and Convenience

Because older adults may have a variety of physical limitations and health problems, yoga in a group setting can prove challenging, as each individual is physically or mentally at a different level of ability. Thus, creating a program that is adaptable to individual needs can be difficult within the class environment. In an effort for instructors to level the playing field and create an exercise routine in which everyone can participate, those who have better health and greater ability may not find the program physically or mentally stimulating, or may not observe much improvement afterward. On the other hand, if the program is too challenging for those with greater limitations, frustration, injury, or nonparticipation could result (Wang, 2010). Therefore, instructors should modify their programs to fit the wide array of physical and mental needs of the older adult student in order to positively influence physical performance and participation in this population (Roland et al., 2011; Wang, 2010). Such considerations might mean teaching participants how to modify their personal practice to fit their needs within the group setting.

Not only does the group setting for practicing yoga present adaptability issues for the older adult with complex needs, but the cost for participating in community yoga programs are beyond the budget of many older adults. Thus, even though there may be

interest in joining a program and a general understanding of the benefits, those living on a tight budget will likely not be able to participate if there is a fee attached (Patel et al., 2011). Moreover, transportation to community yoga programs may not be easily obtainable, making participation inconvenient or impossible for some (Patel et al., 2011). These issues raise valid concerns for older adult participation in a yoga program, and necessitate more research on older adult perceptions about yoga and research on developing programs tailored to fit this population.

Measuring Beliefs About Yoga

The Beliefs About Yoga Scale (BAYS), by Sohl et al. (2011), was adapted from a previous scale established in India. The BAYS was developed to measure the knowledge and beliefs that middle-aged adults in the United States have about engaging in yoga for exercise. Specifically, the BAYS was designed to understand Americans' perceived knowledge of and barriers to yoga that may make them more or less willing to join a yoga class. The BAYS measures understanding of yoga in relation to yoga's physical requirements, such as the necessary level of strength, flexibility, and balance needed to do yoga, as well as cost and convenience factors related to joining a program. Sohl et al. (2011) suggested that adults who could benefit from participating in yoga may never receive its therapeutic benefits if practitioners are unable to address their specific needs and misunderstandings about yoga. However, to my knowledge, the BAYS has never been applied to an older adult population.

Study Purpose

Better understanding of older adult perceptions of and barriers to beginning a yoga program could help to promote increased enrollment in yoga programs and sustain the development of more senior-designed yoga classes. Therefore, the purpose of this project was to conduct a 12-month, exploratory study to assess the knowledge, attitudes, and perceived barriers that prefrail and frail community-dwelling older adult patients at the University of Utah Faint, Fall, and Frailty Clinic (FFFC) had toward participating in current or future yoga programs. This study, focused on yoga and older adults, was part of a larger, parent study that measured prefrail and frail older adult attitudes toward physical activity at the FFFC. A goal of this current yoga study was to better understand how to promote active aging in the community and discover methods for enhancing future opportunities for yoga participation among seniors. Upon completion of this study, the following research questions were examined:

1. What are older adults' beliefs and attitudes about yoga?
2. What experiences do older adults have with yoga?
3. What is the knowledge level that older adults have about affordability and accessibility of yoga in their community (e.g., cost and location of classes)?
4. What are perceived barriers to beginning a yoga class for older adults?

Theoretical Framework

Older adult attitudes about and perceived barriers to beginning a yoga program may be explained by social-cognitive theories such as the Theory of Planned Behavior (TPB) (White et al., 2012). Figure 1 presents a schematic outline for the TPB, representing yoga as the behavior. The TPB posits that health-behavior transitions are preceded by intentions, which are controlled by three factors: attitude, subjective norm,

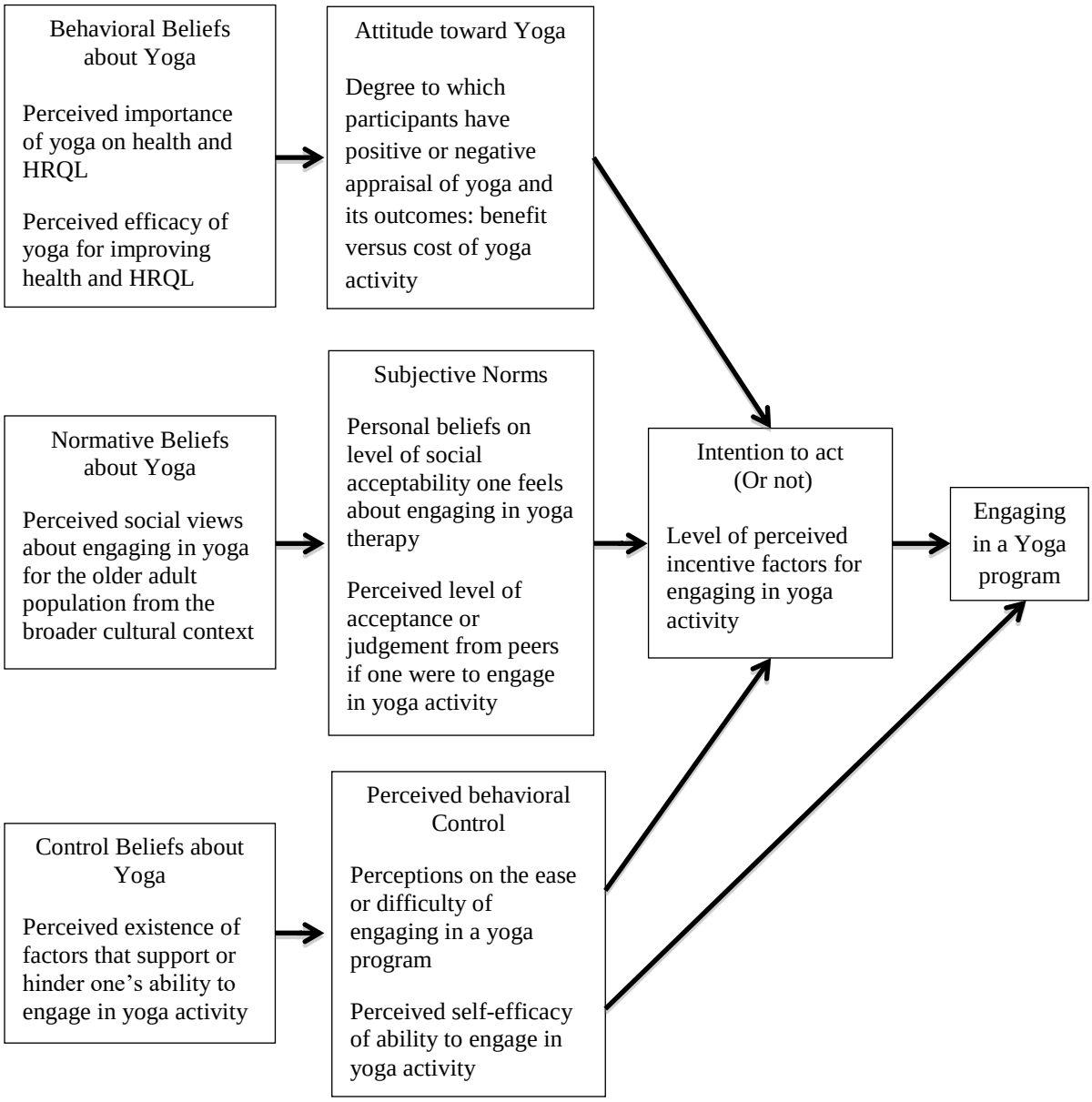

Figure 1. A schematic outline of the Theory of Planned Behavior for yoga, as adapted from White et al. (2012).

and perceived behavioral control. Attitudes have been categorized as an individual's personal assessment of the behavior (positive or negative). Subjective norms are identified as one's perceived assessment of what others believe about the behavior (positive or negative) and to what extent others' opinions of the behavior influence the individual.

Perceived behavioral control is the believed level of control the individual has over a behavior, which affects both the individual's intentions and behavior (White et al., 2012). The three constructs of TPB are regulated further by perceived outcomes of the behavior, beliefs surrounding the behavior, and supportive and inhibitive aspects of the behavior. The TPB framework has been specifically used in several studies to predict a wide range of health-related behaviors, including exercise habits and beliefs (White et al., 2012).

The TPB was purposely chosen for this study because it provides an explanation of how older adults' acceptance and implementation of a health-related behavior such as yoga practice could be largely regulated by their predetermined personal attitudes toward yoga, their perceptions of yoga practice as a socially acceptable activity by friends and family, and their believed level of ability to appropriately practice yoga and access yoga classes from physiological, financial, and social perspectives. The TPB provided a structure for examining factors that affect yoga behaviors among older adults. Moreover, it provided a basis for developing social-cognitive research questions that explored the personal and social attitudes older adults have about yoga practice as well as their level of perceived self-efficacy and control in implementing yoga practice as a health behavior.

CHAPTER 3

METHODS

Study Design

This quantitative, descriptive study examined the beliefs and knowledge that older adults have about yoga for physical activity. This was part of a larger study on physical activity levels in older adult participants who were patients of the University of Utah FFFC. Patients from the FFFC who were willing to complete a multicomponent, quantitative survey packet including the BAYS during their appointment at the FFFC were recruited to participate in the study. Eligible patients were provided a consent form, and their enrollment into the study was determined by their willingness and ability to sign the consent-to-participate form as well as their completion of the survey packet.

Sample

The study population included older adult participants recruited from the FFFC located inside the University of Utah hospital. Participants were recruited into the parent study through convenience sampling methods. The FFFC provided an ideal setting for studying older adults at risk for progressive functional decline, increased frailty risk factors, and decreased HRQOL.

Participants selected for this study were men and women aged 55 years and older, current patients of the FFFC who had undergone a standard FFFC assessment, and were

determined to be cognitively able to independently answer questionnaire items from the survey packet.

Human Subjects Protection

The proposal for this study ensured that respect for persons, beneficence, and justice were maintained throughout the study. Two specific measures were taken to ensure these goals. First, the principal investigator obtained prior institutional review board approval from the University of Utah, a process that ensures physical and psychological protection of human subjects in research. Second, consent was obtained from each participant at the FFFC. Consent to this study was a process that involved providing potential participants with a consent form that comprehensively explained the purpose, design, and selection process of the study, and the procedures for collecting data. Participants were given proper disclosure of all the researchers' credentials and qualifications to perform the study, such as full name, occupation, and affiliated university. The consent form informed all potential participants about any possible benefits of and risks from participating in the study, and assured them that participation was voluntary, and that no negative consequences would exist for leaving the study at any time. All potential participants were provided with time to read the consent form, and study personnel at the FFFC were available to answer questions. A copy of the signed consent form was provided to each participant.

All data collection was focused around protecting the privacy and dignity of each participant, as well as protecting them from harm. This goal involved keeping all completed surveys and consent forms locked when stored, not disclosing patient health information to unauthorized persons, and excluding all identifying information from the

written work of the research. Exclusion of participants' names and patient health information ensured complete anonymity and privacy of all participants in the study.

Measurement

Because the proposed research was part of a larger parent study, some quantitative measurement questionnaires and scales from the parent study were utilized for the yoga study. Following is a description of the sample population and a comprehensive list of the questionnaires and scales used to answer the research questions.

Demographics of Sample Population

A one-page questionnaire collected participant data on marital status, living situation, number of persons in the home, home environment, house type, and fall risk factors. Answers provided from this questionnaire were scored quantitatively by assigning a nominal value (1 to 5) for each option. The demographic questionnaire provided descriptive data on the types of participants enrolled into the study (Appendix B).

Supplemental data on sample population demographics were collected from the FFFC patient database and included age and gender of each participant. Ages of participants were collected and a mean age of the sample was quantified. The gender of participants was scored by assigning a unique number value (0 to1) for each option, with "0" equaling male and "1" equaling female. This supplemental data on the sample demographics also provided descriptive data of participants enrolled into the study, and the mean age and sex were then quantified.

Health Status of Participants

A body mass index (BMI) scale was quantified through weight and height data collected from the FFFC patient database. Data from this scale were used to describe a mean BMI of male and female participants in terms of underweight, normal weight, overweight, and obese as part of the descriptive data. BMI was categorized into the following cutoff points: underweight (<16.00–18.49), normal weight (18.50–24.99), overweight (≥25.00), and obese (≥30.00) (World Health Organization [WHO], 2015).

Frailty assessment data were collected from the FFFC patient database. Data from this assessment were quantified by assigning a unique number (-1 to 1) for each category of frailty level: "-1" = robust, "0" = prefrail, and "1" = frail. This scale aided in describing the level of frailty of the sample population.

Activities of daily living (ADL) and instrumental activities of daily living (IADL) assessment data were collected from the FFFC patient database to describe the sample populations' physical and developmental functioning status, respectively. The ADL assessment scored participant answers on a scale of one to six activities and the IADL scored participants on a scale of one to seven activities based on positive answers about independently performing each activity. Higher scores indicated a greater level of functional (ADL) and developmental (IADL) health status.

The Katz Index of Independence in Activities of Daily Living (Katz ADL) graded independence in performing six functions: bathing, dressing, toileting, transferring, continence, and feeding (Shelkey & Wallace, 2012). Based on yes/no responses, participants were ranked according to level of independence for each activity: 6 = complete physical functioning, 4 = mild deficiency, and 2 = considerable deficiency in

physical functioning.

The Lawton IADL scale was used to assess eight developmental living skills: using the telephone, shopping, food preparation, housekeeping, laundry, transportation, taking medication, and financial management (Graff, 2013). Like the Katz ADL, scores were based on yes/no responses and participants were ranked according to their level of independence for each category. Scores were determined by highest level of functioning (8) down to lowest level of functioning (0).

A falls screen and five fall risk factors: fear of falling, having two or more falls in a year, use of an assistive device, having stairs present in the home, and impaired gait and balance data, were collected from the FFFC patient database. Data from these variables were quantified by assigning a unique number value (0 to 1), with "0" = negative and "1" = positive for all variables. These elements were included to describe factors contributing to the frailty status and fall risk of participants.

Activity Level

One scale on activity level was included in the survey packet: The Rapid Assessment of Physical Activity scale (RAPA) (Topolski et al., 2013). To assess the level of physical activity, participants were asked seven yes/no questions on their current activity level (light, moderate, vigorous) and two yes/no questions about their current activity level related to strength and balance, for a total of nine questions. Each was assigned a "1" for a positive answer and a "0" for a negative answer. The RAPA scale helped to gain greater understanding about the sample populations' general level of physical activity (Appendix B).

The BAYS was included in the survey packet of the parent study. The BAYS was

utilized to quantify data on participants' knowledge of, beliefs about, and barriers to engaging in a yoga program, and to answer Research Question 1. The BAYS is the first and (to date) only quantitative measurement tool published in the United States to assess behavioral attitudes about yoga (Sohl et al., 2011), and has a concise format designed for simplicity and ease of use. Validity of the BAYS was determined by a panel of health psychology professionals and yoga practitioners who reviewed and improved the quality of the questionnaire items. Other criterion-related validity measures were taken from a study that measured "significant associations between the BAYS and indicators of attitude and intention" (Sohl et al., 2011, p. 89). The BAYS utilized a 7-point Likert scale to score level of agreement with 11 total statements about yoga. The 11 statements fell into three major categories: expected benefits (five statements), expected discomfort (two statements), and expected social norms (four statements; Sohl et al., 2011; see Appendix A).

Additional investigator-initiated statements about yoga that measured three main categories were included in the survey packet: (a) past, current, and future participation in yoga classes; (b) knowledge about location, cost of attendance, and ability to obtain transportation to classes; and (c) barriers to practicing yoga. The first two measurement tools, together, included six statements that utilized a dichotomous yes/no answer format that scored positive answers with a numerical value of 1 and negative answers with a numerical value of 0. A higher numerical value indicated a greater level of attendance and a better understanding of location, cost, and convenience factors. These two tools were utilized to answer Research Questions 2 and 3. The third measurement tool included 11 select-all-that-apply statements concerning reasons one might not practice yoga. A

greater number of selections from this tool indicated a higher level of perceived barriers to participating in yoga. Answers were ranked from greatest to least, and served to answer Research Question 4 (Appendix D).

Data Collection and Analysis

The survey packet for the combined studies was structured so that all data could be quantified and entered into Research Electronic Data Capture (REDCap). REDCap is a software tool that advances the electronic collection of research data from research studies. REDCap software provided a secure platform for entering data and developing dynamic collection, access, and analysis tools that could be stored, retrieved, and updated from single or multiple users (Wright, 2016). Each questionnaire in the survey packet was entered into REDCap under the appropriate survey heading. REDCap software enabled secure storage and organization of all data for retrieval and analysis once all data were completed and put into production mode.

This descriptive study was aimed at answering research questions utilizing descriptive statistical analyses. Data collected from all surveys were entered into the Statistical Package for the Social Sciences (SPSS) version 22; significance was set at $p<0.05$. Means and standard deviations were utilized for continuous variables; numbers and percentages were used for nominal and ordinal variables. To analyze Research Question 1, the one-sample *t*-test was utilized to determine differences in BAYS scores for this older-adult study population and the original population of the BAYS study. The independent samples *t*-test was utilized to determine differences between participants who did and did not complete the BAYS.

CHAPTER 4

RESULTS

Demographic Data

Demographic data are reported in Table 1. The 37 participants in this study had a mean age of 72.8 years (*SD* = 9.05; range 54–89 years). Of these, 40.5% were male and 59.5% were female. The majority of participants were married (63.9%); 19.4% were widowed, 2.8% were single, and 13.9% were divorced. Thirty-six percent reported living alone and 64% reported living with others. The mean number of household members was 1.64 (*SD* = .487; range 1–2 persons). Housing type was reported as follows: 80.6% lived in a private house, 8.3% lived in a private apartment/condominium/townhome, and 11.1% lived in senior housing facilities.

Health Status

Health status data are shown in Table 2. The following health status measurements were collected to describe the sample population: BMI; frailty; ADL; IADL; falls screen; and fall risk factors, which included fear of falling, having two or more falls in the past year, use of assistive devices, having stairs in the home, impaired gait and balance, and physical activity level (RAPA). BMI was categorized in the following manner: underweight, normal weight/overweight, and obese, according to the

Table 1

Demographics

Category	Mean/%	*SD*	*n*	*Nonresponse*
Age	72.81	9.05	37	
Sex				
Female	59.5%		22	
Male	40.5%		15	
Marital Status				
Married/partnered	63.9%		23	
Widowed	19.4%		7	
Single	2.8%		1	
Divorced	13.9%		5	1
Household Members				
Lived alone	36.1%		13	
Lived with others	63.9%		23	1
Average Number Per Household	1.64	.487	36	1
House Type				
Private house	80.6%		29	
Private apartment/condominium/ town home	8.3%		3	
Senior housing	11.1%		4	1

Note. *SD* = standard deviation.

Table 2

Health Status

Category	Mean %	*SD*	*n*	*Nonresponse*
Weight				
BMI	29.32	5.77	36	1
Underweight	5.6		2	
Normal weight/overweight	47.2		17	
Obese	47.2		17	1
Frailty Status				
Robust	0		0	
Prefrail	66.7		24	
Frail	33.3		12	1
Functional Capacity				
ADL	5.64	.899	36	1
IADL	6.75	1.56	36	1
Falls Screen: Previous Fall				
No	21.6		8	
Yes	78.4		29	
Fall Risk Factors				
Fear of Falling				
No	18.8		6	
Yes	81.3		26	5
Two or More Previous Falls				
No	37.1		13	
Yes	62.9		22	2
Use of Assistive Devices				
None	54.3		19	
Cane	31.4		11	
Walker	14.3		5	2
Stairs in Home				
No	22.2		8	
Yes	77.8		28	1
Gait and Balance Problems				
No	20.0		7	
Yes	80.0		28	2
RAPA Scale				
Rarely or Never Active				
Disagree	57.6		19	
Agree	42.4		14	4
Light Activity				
No	15.2		5	

Table 2 (Continued)

Category	Mean %	*SD*	*n*	*Nonresponse*
Yes	84.8		28	4
Moderate Activity				
No	72.7		24	
Yes	27.3		9	2
Vigorous Activity				
No	85.3		29	
Yes	14.7		5	3
Strength Exercises				
No	83.3		30	
Yes	16.7		6	1
Flexibility Exercises				
No	70.6		24	
Yes	29.4		10	3

Note. $N = 37$; BMI = body mass index; *SD* = standard deviation; ADL = activities of daily living; IADL = instrumental ADL; RAPA = Rapid Assessment of Physical Activity scale.

cutoff points listed in the Methods section. Results from BMI data showed that 5.6% were considered underweight, 47.2% were normal weight/overweight, and 47.2% were obese.

Frailty status measurements revealed that 66.7% of participants were considered prefrail and 33.3% were considered frail; none of the participants were in the robust category. The mean score for ADL was 5.5 (*SD* = 0.62), with a minimum score of 4.0 and a maximum score of 6.0. The mean score for IADL was 6.8 (*SD* = 1.5), with a minimum score of 3.0 and a maximum score of 8.0. These results indicate that on average, participants of this study were generally functionally independent in both ADLs and IADLs. Interpretation of cutoff scores as they relate to levels of physical and developmental functioning are described fully in the Methods section.

Falls-screen data were measured by whether participants had experienced one or more falls in the past. Results from the falls screen revealed that 21.6% of participants had never experienced a fall and 78.4% had suffered one or more falls in the past. The majority (81.3%) reported a fear of falling and 62.9% reported having two or more falls in the last year. More than half (54.3%) of the participants denied the use of any assistive device for walking. Only 31.4% reported using a cane and just 14.3% reported using a walker; 1 participant did not respond. Data collected on the presence of stairs in the home showed that the majority of participants (77.8%) lived in a home with stairs. Gait and balance data indicated that only a small fraction of respondents screened (20%) did not have problems with gait and balance.

Physical activity levels of participants were evaluated with the RAPA scale based on responses to the following yes/no questions: rarely or never do physical activity, light

physical activity, moderate physical activity, vigorous physical activity, and questions related to strength and flexibility exercises. Almost half (42.4%) responded that they rarely or never engaged in any physical activity. When asked more specifically about the type of activity, 84.8% reported doing some light physical activity every week; however, only 27.3% answered that they did any moderate activity weekly and just 14.7% reported engaging in vigorous activity weekly. Very few participants engaged in strength-building exercises (16.7%) or flexibility exercises (29.4%) (Table 2).

Beliefs About Yoga

Results from the BAYS showed that of the 37 respondents, 23.7% did not answer any of the BAYS questions. Of those who chose not to respond, the following written responses were included: “No education about yoga”; “I am not familiar with yoga”; “N/A”; “I know nothing about yoga!”; “?”; “Some would help, but some movements would be impossible for me to move in. I hear all would be helpful”; “I don’t know anything about yoga-haven’t tried it”; “I don’t”; and “I don’t have enough energy or physical strength to practice yoga.” Participants who did not complete the BAYS questions were significantly older, at an average age of 82.38 years (SD = 5.15), compared to those who completed the BAYS questions, who were an average age of 71.46 years (SD = 7.98); the two-tailed significance was p = 0.001 for the independent samples t-test. While only 16.7% of prefrail participants did not complete the BAYS questions, half of the frail participants did not complete them; however, this trend did not reach significance: $\chi 2$ (1, n= 32) = 3.6, p = 0.059.

The overall BAYS score was utilized to answer Research Question 1: What are older adults’ beliefs about yoga? The mean total score on the BAYS for this study was

59.17 (*SD* = 12.5). Scores ranged from 11 to 77 possible points, and higher scores showed more optimistic beliefs about yoga. In contrast to the original BAYS study by Sohl et al. (2011), this study was administered to a sample population who were, on average, 32 years older than the original sample population; however, this sample had similar positive beliefs about yoga as compared to the original sample population studied by Sohl et al. (2011), in which the mean total score on beliefs about yoga was 55.62 (*SD* = 8.58). A one-sample *t*-test conducted between the original sample in the Sohl et al. (2011) study and the sample in the current study was used to determine if there was a significant difference in total BAYS scores between each sample population; the two-tailed significance was $p = 0.138$, indicating no significant difference between the two samples: $t(28) = 1.53$ (Table 3).

Investigator-Initiated Questions Added to the BAYS

In order to answer Research Questions 2 and 3, this investigator devised supplemental questionnaires for the BAYS. Responses to the questions "What experiences do older adults have with yoga" and "What is the knowledge level that older adults have about affordability and accessibility of yoga in their community?" are quantified and summarized here.

The three questions relating to past, current, and future experiences with yoga revealed that 91.2% had never practiced yoga. Of all 37 respondents, 100% answered that they were currently not taking any yoga classes and 97.1% replied that they had no intentions of taking a future yoga class. It must be taken into account, however, that overall, these results also described a fairly sedentary sample population. In answering Research Question number two, on knowledge about affordability and accessibility of

Table 3

One-Sample t-*Test for the BAYS*

t	*df*	Sig. (2-tailed)	Mean Difference	95% CI of the Difference	
				Lower	Upper
1.527	28	.138	3.56	-1.21	8.32

Note. Test value = 55.62; *t* = critical value; *df* = degrees of freedom; Sig. (2-tailed) = <0.05.

yoga classes in the community, 61.8% answered that they did not know where yoga classes were held in their community, 82.4% said they did not know the average cost of yoga classes, and 43.8% responded that they were not able to drive to yoga classes or arrange transportation to a class. Results from the supplemental questions to the BAYS are reported in Table 4.

Finally, Research Question 4, "What are perceived barriers to beginning a yoga class for older adults?" was quantified through a select-all-that-apply supplemental questionnaire to the BAYS regarding reasons for not practicing yoga. Eleven items from this questionnaire were ranked from greatest to least percentage of respondents who selected answers. Data analysis for this questionnaire revealed the top three reasons respondents perceived barriers to yoga as a physical activity, and were ranked as follows: (a) other physical activities would be easier and just as beneficial—60%; (b) respondents did not feel motivated to practice yoga—54.3%; and (c) respondents did not feel they could do yoga safely—39.4%. For a complete list of older adult barriers to engaging in yoga, in order from the greatest to the least barrier, see Table 5.

Table 4

Yoga Experience, Cost, and Accessibility Data

Category	Mean %	*n*	*Nonresponse*
Previous Yoga Experience			
No	91.2	31	
Yes	8.8	3	3
Current Yoga Participation			
No	100	34	
Yes	0	0	3
Future Yoga Participation			
No	97.1	33	
Yes	2.9	1	3
Know Locations for Yoga Classes			
No	61.8	21	
Yes	38.2	13	3
Know Average Cost of Yoga Classes			
No	82.4	28	
Yes	17.6	6	3
Available Transportation to Yoga Classes			
No	43.8	14	
Yes	56.3	18	5

Table 5

Barriers to Practicing Yoga

Category	Rank	Mean %	*n*
Other physical activities would be easier and just as beneficial.	1	60.0	21
I do not feel motivated to practice yoga.	2	54.3	19
I do not feel I could do yoga safely.	3	39.4	13
Yoga classes do not fit into my financial budget.	4	27.3	9
I have been or could be injured during a yoga class.	5	25.7	9
Transportation to yoga classes is an issue for me.	6–7	24.2	8
Yoga classes are not offered during times that I would be able to attend.	6–7	24.2	8
I don't have anyone who could go to class with me.	8	22.9	8
I don't feel like I can fit in and belong in a yoga class.	9	14.3	5
I do not notice a physical benefit from attending yoga classes.	10	9.1	3
I don't feel like I can connect with anyone in a yoga class.	11	8.6	3

Note. $N = 37$.

CHAPTER 5

DISCUSSION

The purpose of this study was to explore the following: (a) older adults' beliefs about and attitudes toward yoga, (b) older adults' experiences with yoga, (c) the knowledge older adults have about the affordability and accessibility of yoga in their community (e.g., cost and location of classes), and (d) the perceived barriers to beginning a yoga class for older adults. Below, the significant findings for each research question are discussed, while considering current literature that supports yoga as a beneficial form of exercise for the older adult population. Also discussed are pertinent demographic and health-status results that may relate to the outcomes for each research question. In addition, the TPB theoretical framework is discussed as it relates to the results for each research question.

Research Question 1

Research Question 1 explored older adults' beliefs about and attitudes toward yoga using the BAYS questionnaire to quantify the expected benefits, discomforts, and social norms that this sample population had about yoga. Demographic data from the study revealed that the participants were, on average, 33 years older than the participants in the original study by Sohl et al. (2011) using the BAYS. Surprisingly, according to the *t*-test for equality of means, the age difference between the two samples did not seem to

have an effect on favorable attitudes about yoga, and it could be concluded that age does not necessarily contribute to older adults' beliefs and attitudes about yoga. This is a notable finding, because current literature suggests that even though older adults may have positive attitudes toward yoga activity, there is low participation in yoga classes among this population. In part, this could be explained by a lack of knowledge about the benefits of yoga on the part of older adults (Patel et al., 2011).

Moreover, almost one fourth of the participants in this study did not complete the BAYS questions, and these participants were significantly older and frailer than their counterparts. It may be that these participants, whose mean age was more than 80 years, did not answer the BAYS questions because of lack of knowledge about yoga and fear of injury. The qualitative comments made by those participants who chose not to answer the BAYS questions may indicate that this sample population believed that yoga is for people who are physically more active or more knowledgeable about yoga in general. This idea has been supported in current literature. Patel et al. (2011) proposed that older adults may believe that they are too frail or too disabled to engage in yoga, and that they may not understand the actual benefits of yoga specific to their age group. Furthermore, older adults may need more education about yoga before they can accept it as a useful form of activity in their lives (Wang, 2010).

Furthermore, when comparing the age and physical ability of participants who answered the BAYS questionnaire and those who did not, it was revealed that those who chose not to respond wrote explanations for why they elected to leave the questionnaire blank. These responses suggested a lack of understanding or lack of certainty about the questions themselves. It could be inferred by the responses given that approximately 25%

of the respondents felt unqualified to give any response at all regarding their beliefs about yoga. As indicated previously, a few of those who did not answer the BAYS questions suggested that they felt apprehensive about answering the questions on their beliefs about yoga because they were physically too weak or exhausted to ever practice yoga. Others who chose not to complete the BAYS wrote responses suggesting that yoga was just not applicable to their lives. These answers reveal a possible misunderstanding about the purpose of the questionnaire, or perhaps a lack of understanding about yoga as a feasible form of exercise for older adults. The latter explanation is supported by the fact that nearly all respondents (>94%) answered questions on the RAPA, which measured their weekly level of general physical activity: light, moderate, or vigorous.

Wang (2010) concluded that older adults' perceptions of yoga could be influenced by their perceived physical limitations and their fear of injury. This conclusion can also be explained by the TPB theoretical framework. The TPB explains possible reasons why older adults may have favorable attitudes about yoga yet have low participation rates. According to the TPB, older adults may have a positive attitude about yoga and find yoga a socially acceptable form of exercise but, at the same time, have lower control beliefs about yoga—factors that can hinder their perception of self-efficacy and their belief of their personal ability to successfully engage in a yoga program. So, according to the TPB, older adults may exhibit positive behavioral and normative beliefs about yoga yet also have negative control beliefs and lack self-efficacy for actually engaging in a yoga program, consequently affecting their intention to act or not act.

Research Question 2

Research Question 2 explored older adults' experiences with yoga. Despite data from the BAYS showing that more than half of the participants held generally positive beliefs about yoga, the majority of respondents reported very minimal actual participation in yoga in the past. None of the respondents were currently practicing yoga, and the majority of them (97+%) stated that they had no intention of practicing yoga in the future. These results might again be explained by their overall physical activity levels and their frailty status. According to data from the RAPA and the health status assessment, this population could be described as generally physically inactive, and all were in the prefrail or frail category. While 57.6% stated that they engaged in light physical activity on a weekly basis, the majority of respondents stated that they did no moderate or vigorous physical activity (72.7% and 85.3%, respectively). Moreover, most respondents reported engaging in almost no exercise to improve strength and flexibility (83.3% and 70.6%, respectively). The majority of the sample population (66.7%) was categorized as prefrail and a third (33.3%) were considered frail; none were categorized as robust. It could thus be concluded that participants in this study were generally physically inactive, prefrail or frail, and engaged in only light physical activity. It must be taken into account that while this sample population showed limited past and current experience and very low future intentions of participating in yoga for exercise, they also showed limited physical activity overall. Therefore, low intentions to engage in yoga for exercise may have been influenced by current activity levels as well as health and frailty status.

Research Question 3

Research Question 3 focused on the knowledge level that older adults had about the affordability and accessibility of yoga classes in their community. Results from this questionnaire showed that the majority of participants (61.8%) did not know where yoga classes were held in their community, nor did they know the average cost of yoga classes (82.4%). Just over half (56.3%) indicated that they had available transportation to yoga classes, even though none had ever participated in a class or reported intention to do so in the future. Based on the results from this questionnaire, it could be concluded that among older adults, there is a general lack of interest in or knowledge about the cost and location of yoga classes in the community, and a general lack of interest in finding transportation to those classes. Patel et al. (2011) reinforced the issues of cost and transportation by stating that while adults may be aware of the benefits of yoga, the cost of classes could be prohibitive to many and transportation is not always available for all.

Research Question 4

Research Question 4 explored the perceived barriers older adults had to engaging in yoga for exercise. Results for the top three such barriers are discussed in descending order: (a) the majority of participants agreed that the greatest barriers to yoga were that other physical activities would be easier and just as beneficial, (b) participants stated a lack of motivation to do yoga, and (c) participants felt they could not do yoga safely.

The first barrier to engaging in yoga is supported by the literature. Wang (2010) cited studies that confirmed the overall perception among older adults that yoga is not adaptable to their physical needs, and that before the older adult population is willing to consider yoga as a practical and valuable option for exercise, they may need more

education about the specific benefits and flexibility of yoga classes.

Data from the health-status section of this study indicated that a majority of participants rarely did strength-building exercises (83.3%) or flexibility exercises (70.6%); however, the majority of participants (78.4%) had experienced a previous fall, and over half (62.9%) had experienced two or more falls in the last year. These are factors that increase frailty risk (Ülger, & Yagli, 2011). In addition, 81.3% stated having a fear of falling and 80% showed diminished gait and balance—factors associated with increased fall risk. Yoga has been shown to improve fall risk factors by building strength and improving flexibility in the leg muscles and joints that help with balance (Tatum et al., 2009). Because yoga has been shown to improve strength, balance, and gait in the elderly population (Chen et al., 2010; Roland et al., 2011; Ülger & Yagli, 2011), older adults could benefit from a better understanding of the specific physiological and protective benefits of yoga.

The second greatest barrier participants listed for not engaging in yoga was that they did not feel motivated to do so. Lack of motivation could be due to either insufficient knowledge about the overall benefits of yoga in reducing frailty risk factors or a more general level of sedentary behaviors among this population. As mentioned, the CDC identified several barriers that older adults might have to engaging in any new exercise program, such as socioeconomic and environmental factors, as well as concern over physical discomfort and lack of ability (Patel et al., 2011). Perhaps in order to motivate older adults to try yoga, it would be necessary for them to receive more education on the physiological and psychological incentives for practicing yoga (Wang, 2010). Moreover, education and motivational factors are important to stress in order to

help older adults understand that frailty can be a result of decreased mobility, strength, balance, and gait (Ülger, & Yagli, 2011), and that several studies have shown that yoga practice can improve these factors (Chen et al., 2010; Roland et al., 2011; Ülger, & Yagli, 2011).

As stated, lack of motivation to engage in yoga among older adults may also be a result of general physical inactivity. Older adults spend between 8 and 12 hours per day in a sedentary state, making them the most sedentary of all age groups (de Rezende et al., 2014). Sedentary behavior among the participants was also evidenced by results from the RAPA. These results showed that while most participants (84.8%) engaged in some light activity weekly, the majority did not participate in any amount of moderate or vigorous physical activity weekly (72.7% and 85.3%, respectively). Therefore, it is not surprising that the second most common barrier to yoga was lack of motivation. It is possible that if participants were asked what barriers they had to engaging in moderate and vigorous general physical activity, answers to these questions might have yielded a similar response. Because of this second factor, it seems important to conduct future research studies to explore what other barriers contribute to lack of motivation to engage in any form of exercise, and whether it is due to overall limited understanding of the benefits of exercise or due to general sedentary behaviors. Such understanding of overall barriers to exercise among this population may help in developing specific motivational and educational resources to promote yoga for older adults.

The third greatest barrier to beginning a yoga program noted by participants was fear of not being able to practice yoga safely. According to the literature, this fear presents a very realistic concern for many older adults. There are several safety issues

identified in the literature associated with doing yoga incorrectly, such as increased fractures from falls in those with osteoporosis, and cardiovascular problems such as heart attacks and strokes for those with existing heart conditions (Krucoff et al., 2010). Diminished vision and hearing and cognitive decline also present numerous safety risks (Krucoff et al., 2010).

The above-mentioned threats to safety were demonstrated in this sample population, among whom 66.7% were categorized as prefrail and 33.3% were frail. Fear of injury from sustaining a fall was a concern, as 78.4% had already experienced one fall in the past and 80% were shown to have diminished gait and balance, which also could contribute to falls and increased safety risk. It is also worth mentioning that a contributing factor to participants' fear of not being able to safely practice yoga could be partially explained by the TPB framework. Again, perceived control issues, factors that can hinder one's ability to engage in yoga or affect their level of self-efficacy, could be inherently tied to barriers about safety. As such, modified yoga poses and tailored classes to fit the physical and cognitive needs of this population would be beneficial in decreasing this barrier of fear of injury from yoga practice (Wang, 2010).

CHAPTER 6

CONCLUSION

Summary

The overall purpose of this research was to better understand the knowledge and beliefs older adults have about yoga for exercise. A recent search of current literature revealed that, to date, there appears to be a very limited body of research on this subject focused on the older adult population, so it was a goal of this pilot study to explore the above research questions with the purpose of better understanding older adults' knowledge and beliefs about and barriers to practicing yoga, as well as to add valuable research on this topic.

This research utilized a quantitative, exploratory approach with a convenience sampling method to examine demographic characteristics, health-status traits, and older adult knowledge, beliefs, and barriers with respect to yoga through the implementation of a multicomponent survey given to participants, and from data retrieved from the patient database at the FFFC at the University of Utah. The aim of this study was to describe the results of each research question while discussing the relationships and characteristics of participant demographics and health-status data, and how these variables related to each research question. Moreover, this study was grounded in the TPB theoretical framework, and aimed to discuss the results of the data as it related to the TPB model. The major

findings of this study are listed below in order of the research questions.

The purpose of Research Question 1 was to describe the findings related to older adults' knowledge and beliefs about yoga. The results showed overall positive beliefs about yoga among this sample population. They also showed no significant statistical difference in means between this study's sample and the original Sohl et al. (2011) BAYS study sample, even though there was an average age difference of about 33 years between the samples. However, nearly 25% of respondents in the current study chose not to answer questions from the BAYS, while more than 90% of respondents did choose to answer questions related to general physical activity levels.

The goal of Research Question 2 was to define past and current experiences with yoga and future intentions among the participants to begin yoga. The major findings from this research question were that the majority of respondents had very little past and current experience with yoga, and no future intentions to begin a yoga program.

The focus of Research Question 3 was to describe the sample population's knowledge of where yoga classes were held, the cost of classes, and transportation abilities to attend yoga classes. These findings showed that over half of the participants did not know the location of yoga classes. The majority of them also did not know the average cost of classes, and slightly under half reported no ability to find transportation to classes.

The purpose of Research Question 4 was to understand the barriers that this sample population had to engaging in a yoga program. The top three findings were that (a) other physical activities were perceived to be easier and just as beneficial, (b) there was a general lack of motivation to engage in a yoga program, and (c) yoga was

considered to be unsafe by the majority of the participants.

Limitations

There were several limitations to this study. First, survey participants were recruited from the FFFC using a convenience sampling method; therefore, results may not be generalized to the larger population of older adults in the community. For example, participants selected from the FFFC were all categorized as prefrail or frail, indicating diminished functional ability and not necessarily being indicative of the general population of all older-adult Americans. Moreover, participants were categorized as being physically inactive, as the majority stated that they did not engage in moderate or vigorous physical activity on a weekly basis. It is possible that the results from this study might have been different if a portion of the sample population had been in the robust category. Results, then, describe a specific group of older adults living in the community, and may have been influenced by the sampling frame and the overall health status of the participants.

Second, the sampling frame itself presented a limitation. It was the goal of this study to enroll a minimum of 5 participants per week from the FFFC throughout the duration of the research; however, the FFFC produced a low volume of qualified participants. Therefore, the sample size was small, with just 37 individuals enrolled in the study. Results from the study are limited to a specific, small group of participants and may not be easily generalized to the larger population of older adults in the community.

Third, the wording on the BAYS questionnaire may have led to several respondents electing not to answer any of the BAYS questions. It appears that several participants may have thought that they needed previous knowledge or experience with

yoga to be qualified to answer the BAYS questionnaire. Therefore, results from the BAYS may not be truly indicative of this sample population due to a potentially misleading introduction to the BAYS and its instructions for completing the questionnaire.

Implications

Findings from this study indicate that older adults from this sample population had overall positive beliefs about yoga, yet very few stated an intention to ever begin a yoga program for exercise, and a majority of participants reported several physical, motivational, and convenience barriers to engaging in a yoga program. These results imply a need for greater yoga health-promotion interventions. In addition, this study indicates a greater need for development of yoga classes tailored to older adults, and more awareness among this population about class locations and the cost of classes. Moreover, just under half of the respondents did not have transportation to yoga classes. More research on ways to effectively develop community yoga programs that provide cost-effective transportation to classes might be a positive outcome of this study.

This was apparently the first study to focus on the knowledge and beliefs about yoga in the older-adult prefrail and frail population. The original BAYS study by Sohl et al. (2011) examined knowledge and beliefs about yoga among a middle-aged sample, but as far as this author is informed, the current pilot study was the first to use the BAYS questionnaire to quantify knowledge, beliefs, and barriers related to yoga in an older adult sample population. Dissemination of this research will contribute to the fields of yoga for older adults, active aging, and management of frailty and functional decline factors through the use of yoga programs.

Once disseminated, results from this study could be used by health care practitioners to educate older adults about yoga, its health benefits, and its role in managing functional decline, fall prevention, and frailty risk factors. Moreover, results could be used to inform yoga practitioners about knowledge deficits, beliefs, and barriers to beginning or continuing a yoga program among the older adult population. A better understanding of these factors could help to guide yoga practitioners in developing yoga programs suited to older adults' needs and abilities.

It is hoped that this study will promote future research on the knowledge, beliefs, and perceived barriers that older adults have about yoga. Future research on this topic could add a greater, more in-depth understanding in this area, and provide results from a larger, perhaps more diverse sample population of older adults, with the intention of exploring methods for promoting and modifying yoga classes to fit older adults' physical and cognitive requirements.

Conclusion

This research explored older adults' knowledge and beliefs about yoga, their experiences with yoga and intentions to engage in yoga classes, their knowledge of the cost and convenience of classes, and their perceived barriers to joining a yoga program. The studied population was found to have overall positive beliefs about yoga, but limited experience with yoga and little intention to join a yoga program in the future. It is suggested that more research be devoted to educating older adults about the physical and psychological benefits of yoga, as well as to developing more yoga-promotion interventions to increase interest among the older adult population. Moreover, it would be worthwhile for health practitioners and yoga instructors to develop more yoga programs

tailored to older adults' physical and psychological needs, and for community yoga programs to address financial and transportation issues of older adults in order to increase enrollment in community yoga classes.

APPENDIX A

BELIEFS ABOUT YOGA SCALE (BAYS)

Beliefs About Yoga Scale (BAYS)

Adapted from Sohl et al., (2011)

If I practiced yoga…		***Circle one number according to level of agreement.***						
Factor 1:	***Expected Benefits***	**Extremely Likely**					**Extremely Unlikely**	
	It would help me focus	7	6	5	4	3	2	1
	It would improve my overall health	7	6	5	4	3	2	1
	It would help me gain self-awareness	7	6	5	4	3	2	1
	It would help me sleep better	7	6	5	4	3	2	1
	I would become more flexible	7	6	5	4	3	2	1
Factor 2:	***Expected Discomforts***							
	The teacher would make me uncomfortable (-)	7	6	5	4	3	2	1
	I wouldn't be good at it (-)	7	6	5	4	3	2	1
	I would be embarrassed in class (-)	7	6	5	4	3	2	1
Factor 3:	***Expected Social Norms***							
	There would only be women in class (-)	7	6	5	4	3	2	1
	There would only be "new age" people in class (-)	7	6	5	4	3	2	1
	I would have to be more flexible to take a class (-)	7	6	5	4	3	2	1
Total Score:								
								***Note*: (-) reverse score item**

- ***Key for coding answers:***
- A response of 7 = extremely likely.
- A response of 1 = extremely unlikely.
- A score of 77 indicates very high expected benefits, very low expected discomforts and very low expected social norms.
- A score of 1 indicates very low expected benefits, very high expected discomforts, and very high expected negative social norms.
- All scores range for 11-77 and indicate a range of expectations from:
- Very high, high, somewhat high, neutral, somewhat low, low, very low

APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE

Demographic Questions

The following questions are about you and your living situation.

1. I am:
   - ☐ Married/partnered
   - ☐ Widowed
   - ☐ Single
   - ☐ Divorced

2. Where do you live?
   - ☐ Private House
   - ☐ Private Apartment/Condominium/Town Home
   - ☐ Senior Housing
   - ☐ Assisted Living
   - ☐ Skilled Nursing Home
   - ☐ Other
     (Please describe):_____

3. How many people live with you?
   - ☐ I live by myself
   - ☐ I live with others
     Not counting myself, I live with _____ people.

4. If you do not live alone, who lives with you?
   - ☐ Spouse/Partner
   - ☐ Children
   - ☐ Grandchildren
   - ☐ Other
     (Please describe) _____

5. Do you have stairs in your home?
   - ☐ Yes
   - ☐ No

6. What kind of assistive devices do you use to move around your home?
   - ☐ I don't use any
   - ☐ Cane
   - ☐ Walker

- Wheel Chair
- Other (Please describe): _____

APPENDIX C

RAPID ASSESSMENT OF PHYSICAL ACTIVITY (RAPA)

RAPA (How Physically Active Are You?)

An assessment of level and intensity of physical activity
University of Washington Health Promotion Research Center

Rapid Assessment of Physical Activity

Physical Activities are activities where you move and increase your heart rate above its resting rate, whether you do them for pleasure, work, or transportation.

The following questions ask about the amount and intensity of physical activity you usually do. The intensity of the activity is related to the amount of energy you use to do these activities.

Examples of physical activity intensity levels:

Light activities
- your heart beats slightly faster than normal
- you can talk and sing

Stretching

Walking Leisurely

Vacuuming or Light Yard Work

Moderate activities
- your heart beats faster than normal
- you can talk but not sing

Aerobics Class

Fast Walking

Strength Training

Swimming Gently

Vigorous activities
- your heart rate increases a lot
- you can't talk or your talking is broken up by large breaths

Jogging or Running or Stair Machine Tennis, Racquetball, Pickleball or Badminton

How physically active are you? *(Check one answer on each line)*
Part I

I rarely or never do any physical activities.	Yes No
I do some **light** or **moderate** physical activities, but not every week.	Yes No
I do some **light** physical activity every week.	Yes No
I do **moderate** physical activities every week, but less than 30 minutes a day or 5 days a week.	Yes No
I do **vigorou**s physical activities every week, but less than 20 minutes a day or 3 days a week.	Yes No
I do 30 minutes or more a day of **moderate** physical activities, 5 or more days a week.	Yes No
I do 20 minutes or more a day of **vigorous** physical activities, 3 or more days a week.	Yes No

Part II

I do activities to increase muscle **strength**, such as lifting weights or calisthenics, once a week or more.	Yes No
I do activities to improve **flexibility**, such as stretching or yoga, once a week or more.	Yes No

Scoring Instructions

RAPA 1: Aerobic

To score, choose the question with the highest score with an affirmative response. Any number less than 6 is suboptimal.

For scoring or summarizing categorically:

Score as sedentary:

1. I rarely or never do any physical activities.

Score as under-active:

2. I do some light or moderate physical activities, but not every week.

Score as under-active regular – light activities:

3. I do some light physical activity every week.

Score as under-active regular:

4. I do moderate physical activities every week, but less than 30 minutes a day or 5 days a week.

5. I do vigorous physical activities every week, but less than 20 minutes a day or 3 days a week.

Score as active:

6. I do 30 minutes or more a day of moderate physical activities, 5 or more days a week.

7. I do 20 minutes or more a day of vigorous physical activities, 3 or more days a week.

RAPA 2: Strength & Flexibility

I do activities to increase muscle strength, such as lifting weights or calisthenics, once a week or more. (1)

I do activities to improve flexibility, such as stretching or yoga, once a week or more. (2)

Both (3)

None (0)

APPENDIX D

ADDITIONAL STATEMENTS ABOUT YOGA

Statements about Yoga: Experience, Location, Cost, and Transportation

Directions*:* Please read and answer each statement about yoga, and answer by circling either "yes" or "no."

1:	In the past, I used to participate in yoga classes.	Yes	No
2.	Currently, I am taking yoga classes.	Yes	No
3.	In the future, I am planning to take yoga classes.	Yes	No
4.	I know where yoga classes are held in my Community.	Yes	No
5.	I generally know the average cost for yoga classes.	Yes	No
6.	I am able to drive to yoga classes or I have transportation to get to yoga classes in my community.	Yes	No
Total Score:			

Statements about Yoga: Barriers to Participation

Directions: If you are not currently practicing yoga, please read the following statements and mark all that apply for reasons you do not practice yoga.

- ☐ Yoga classes are not offered during times that I would be able to attend regularly
- ☐ Yoga classes do not fit into my financial budget
- ☐ Transportation to yoga classes are an issue for me
- ☐ I do not feel like I could do yoga safely
- ☐ I do not notice a physical benefit from attending yoga classes
- ☐ I have been or cold be injured during a yoga class
- ☐ I decided that other physical activities would be easier to do and just as beneficial
- ☐ I do not feel motivated to practice yoga
- ☐ I don't have anyone who could go to class with me
- ☐ I don't feel like I can connect with anyone in a yoga class
- ☐ I don't feel like I can fit in and belong in yoga classes

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