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# The Effects of 12 Weeks of Instructor-Led Yoga Classes on Balance in Older Adults

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# THE EFFECTS OF 12 WEEKS OF INSTRUCTOR-LED YOGA CLASSES ON BALANCE IN OLDER ADULTS

by

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## DEDICATION

This project is dedicated to my loving, and patient husband who was so supportive and understanding during this long arduous process. Thank you for strongly encouraging me to begin this program, five years ago. Now you are strongly encouraging me to begin another program because you feel I will be bored when I am finished! I am sorry honey, but I do not think I am going to take your advice this time!

## ACKNOWLEDGMENTS

Julie A. Koch, DNP, RN, FNP-BC, provided continuous guidance and support during project development, implementation, and data analysis; this project could not have been completed without her support. You have been an incredible mentor and instructor, and for that I am eternally grateful. The collaborative efforts of the yoga instructor, the director of nursing, and the activities director within the senior living center were essential to project success. I am grateful to the residents that volunteered to participate in the Yoga classes. They were so engaged and truly wanted me to be successful with this EBP project.

## PREFACE

The power of love to change bodies is legendary, built into folklore, common sense, and everyday experience. Love moves the flesh, it pushes matter around….Throughout history, “tender loving care” has uniformly been recognized as a valuable element in healing ~ Larry Dossey

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## ABSTRACT

Participation in a regular exercise program is an effective way to reduce and/or prevent a number of functional declines associated with aging (Chodzko-Zajo et al., 2009). Older adults are advised to participate in regular aerobic activity and practice muscle strengthening activities and exercise that maintains or improves balance (U.S. Department of Health and Human Service, [USDHHS], 2012). Less than one third of older adults engage in 30 minutes of low to moderate intense physical activity at least five days a week as recommended in current guidelines (USDHHS, 2012), and these guidelines fail to address losses in strength and flexibility seen among adults as they age. Extended periods of sitting or lack of movement can lead to muscular shortening, tightening, and weakening; joint deterioration; loss of flexibility; and lack of balance. Using the Iowa Model of Evidence-based Practice to Promote Quality Care and Kotter's Eight Steps of Change as guides, this EBP project was implemented with the objective of evaluating the effect of 12 weeks of instructor-led yoga on physical balance of older adults residing in a retirement home. A pre- and post-intervention Berg Balance Scale (BBS) assessment was performed on15 older adults and scores were evaluated using paired sample *t*-tests. The BBS assessment score increased from $M = 38.67$ pre-intervention to $M = 40.53$ post-intervention, increase of 1.86 points ($p = .001$). Statistically significant increases were also noted in (a) standing unsupported with eyes closed ($p = .001$) and (b) sit to stand ($p = .002$). Overall, the yoga classes demonstrated a significant improvement in the balance of participants. These results indicated residents would benefit from continued yoga classes and implementation of a balance assessment.



*Keywords:* yoga, older adults, balance, Berg Balance Scale (BBS)

# CHAPTER 1

## INTRODUCTION

One objective for healthcare improvement for the 21st century is for clinicians to be dedicated to providing high-quality, effective care based on research**.** Evidence based practice (EBP) is the conscientious use of current best evidence in making decisions about patient care (Bauer, 2010). This is a problem solving approach to practice that incorporates a systematic search for and critical appraisal of the most relevant evidence to answer a burning clinical question, one's own clinical expertise, and patient preferences and values (Bauer, 2010). Without the implementation of current best evidence, clinical interventions become rapidly obsolete, often to the detriment to the patients (Melnyk & Fineout-Overholt, 2011). The steps of the EBP process, coupled with the guidance from an EBP practice model and nursing theory equips the advanced practice nurse (APN) to effectively map out and accomplish the EBP journey. According to Melnyk and Fineout-Overholt (2011), the first step in the EBP process begins with the spirit of inquiry and the formation of a compelling clinical question. Next, the search for the best evidence is set forth in motion, and then critical appraisal of evidence commences. In the final three steps, the APN integrates the EBP protocol, evaluates the process, and disseminates the EBP project findings.

### Background

The world is facing a great challenge: the aging of the global population. Developed countries lead the way. In the United States, adults age 65 years and older represent the fastest growing sector of the country's inhabitants (Kloubec, Roga, & Block, 2012). This group is expected to more than double to over 80 million by the year 2050, with nearly one quarter of these older adults being 85 years and older (Kloubec et al., 2012). Furthermore, people reaching age 65 years of age have an average life expectancy of an additional 18.8 years (U.S. Department of Health and Human Services [USDHHS], 2012). The average profile of older adults, 65 years and older has at least one chronic health condition, and 50% of this age group

have at least two (Kloubec et al., 2012). Older adults face a broad array of health challenges, ranging from arthritis and incontinence to hip and knee replacement, heart disease, and cancer. More than half of all adults over 65 years of age have a disability, and more than one third have severe disability (Kloubec et al., 2012).

Aging is associated with profound changes and reduced efficacy in a set of physiological processes. Reduced mass and muscle strength, as well as decreased resistance and articular mobility are the main alterations in the neuromuscular system. Attributed to cerebral cortex degeneration, older adults can experience problems in cognitive functioning associated with motor function. Consequently, adults over the age of 65 years of age can experience physical limitations (e.g., impaired balance and mobility, decreased muscle strength of the limbs, and sleep disturbances). These physical limitations and sleep disturbances have been found to contribute to a decreased quality of life in older adults (Bankar, Chaudhari, & Chaudhari, 2013). Older adults, particularly those who have already retired are subject to clinical depression associated with thoughts of death, health problems, and despair in their lives (Lee & Hung, 2011).

When older adults acquire physical limitations in activity, they may lose their ability to live independently. These functional difficulties and gait disturbances are often attributed to multiple medical conditions such as disease of the nerves, disc disease, and strokes. Such conditions can precipitate difficulty with balance as well as disturbances in gait. According to Ebnezar and D'Ortho (2011) balance is defined as staying upright. The loss of ability to maintain balance may be linked with a higher risk of falling, increased dependency, illness and sometimes death (Chiacchiero, Dresely, Silva, De Los Reyes, & Vorik, 2010). Fifteen thousand adults ages 65 years and older in the United States die from falls every year (Lee & Hung, 2011).

Participation in a regular exercise program is an effective way to reduce and/or prevent a number of the functional declines associated with aging (Chodzko-Zajo et al., 2009). Older adults are advised to participate in regular aerobic activity and practice muscle strengthening

activities and exercise that maintains or improves balance (USDHHS, 2012). Yet, fewer than 20% of older adults, over 65 years of age, participate in physical activities or leisure time activities (Eldeman & Mandle, 2010). Furthermore, fewer than one third of older adults engage in 30 minutes of daily low to moderate intense physical activity at least five days a week as recommended in current guidelines (USDHHS, 2012). A lack of movement and stretching leads to joint deterioration and loss of flexibility. Extended periods of sitting can lead to muscular shortening, tightening, and weakening, and lack of balance.

An increasing prevalence of inactivity among older adults may create a potential burden to the healthcare system. Older Americans spend 13.2 % of their total expenditures on health (USDHHS, 2012). A five-year study of Medicare costs indicated older adults who were sedentary averaged $6,780 more in annual Medicare costs than those who engaged in low-intensity exercise (Geda et al., 2012). Geda et al. (2012) determined that older adults who were more resilient had fewer co-morbidities as well as stronger positive outcome expectations and weaker negative outcome expectations. Self-efficacy and negative outcome expectations were found to directly influence exercise behaviors (Geda et al., 2012). Those individuals with stronger self-efficacy expectations and weaker negative outcome expectations were found to spend more time in exercise (Geda et al., 2012). Thus, making exercise opportunities easily accessible to older adults has shown to increase their likelihood of engaging in regular exercise (Geda et al., 2012).

According to Quilty, Saper, Goldstein, and Khalsa (2013) yoga has been shown to improve musculoskeletal flexibility, balance, strength, memory, endurance, and quality of life. This mind body exercise originates from India and has been in use for thousands of years (Quilty et al., 2013). Most recently, yoga was implemented as a therapeutic intervention for health maintenance (Quilty et al., 2013).

Within the National Health Interview Survey (NHIS), the Centers for Disease Control and Prevention (CDC) reported 16 million adults have tried yoga, with 20% of yoga users being

adults over the age of 60 years (Barnes & Bloom, 2008). The aim of yoga is to promote overall movement, health and wellness (Krucoff, Carson, Peterson, Shipp, & Krucoff, 2010). It is a process for elevating oneself through calming of the mind (Krucoff et al., 2010). The principles of yoga affirm that the mind is the seat of all diseases and it later engulfs over four layers of human existence (Krucoff et al., 2010). One of yoga's tenets is "Control the mind to control the disease" (Krucoff et al., 2010, p. 904). According to Ebnezar & D'Ortho (2011), the World Health Organization (WHO) defines the state of health as "a state of complete *physical, mental* and *socia*l well-being and not merely an absence of disease or infirmity" (Ebnezar & D'Ortho, 2011, p. 93); and the WHO also suggested a fourth dimension of health, *spiritual* well-being. It is clear from this definition that "*health*" and "*ill health*", commonly understood as two distinct entities, should instead be conceived as a continuum indicating the state of well-being (Ebnezar & D'Ortho, 2011, p. 93). Ebnezar and D'Ortho (2011) opined that due to its body-mind approach, yoga appears to fulfill the WHO criteria of health.

Although teaching yoga to older adults presents some risk, the rewards may be extraordinary (Krucoff et al., 2010). Older adults can be extremely receptive to the profound benefits offered on all levels: physical, emotional, mental, and spiritual. Unlike younger individuals who are distracted by the desire for shapelier bodies, older adults typically have ripeness for the experience of ease and union, which provides an amazing opportunity for yoga teachers (Krucoff et al., 2010). Yet with the increased physical vulnerabilities present in an aging population, it is imperative for yoga instructors to be guardians of safety. This requires a solid understanding of common medical conditions and their associated risks, as well as an ability to use this knowledge as a foundation for creating a safe and effective yoga practice. It is a great honor and responsibility to meet older adults where they are, as they are, and to celebrate however they can participate in the practice of yoga with great love and integrity (Krucoff et al., 2010).

Yoga teachers who work with older adults represent a blend of scientific knowledge and research, philosophy, and opinion based on direct experience (Krucoff et al., 2010). It is imperative to “first do no harm” (Krucoff et al., 2010, p. 901).Yoga teachers working with seniors should recognize the importance of adapting the practice to senior bodies, minds, and spirits (Krucoff et al., 2010). Creating a safe environment for older adult students is of paramount importance. 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” (Krucoff et al., 2010, p. 900).

From the training manual titled Therapeutic Yoga for Seniors, Teacher Training Manual (2008), the principles of practice for older adults include (a) first, do no harm, (b) create a safe environment, (c) encourage yogic balance, (d) meet people where they are, (e) emphasize feeling over form, (f) honor the inner teacher, (g) encourage gratitude and joy, (h) emphasize fluidity, (i) use skillful language, (j) respect our scope of practice, and (k) be a guardian of safety (Krucoff et al., 2010). While acknowledging the inevitable changes inherent in life, it is essential to recognize the unchanging spirit of all beings (Krucoff et al., 2010).

## Statement of the Problem

Prior to project implementation, a balance assessment was not performed on the residents at the senior living center, and there were no exercise or yoga programs provided. A fall with injury would most likely necessitate transfer elsewhere, decreasing the center’s occupancy rate and resulting in decreased revenue.

### Data from the Literature Supporting the Need for the Project

Exercise, through many factors including anti-inflammatory effects and enhanced fitness can (a) help prevent and treat many chronic diseases and (b) help maintain independent living. To date, the focus of many exercise interventions with older adults has been on improving aerobic fitness (Kraemer & Marquez, 2009). Unfortunately, this focus has failed to address losses in strength and flexibility seen among older adults as they age. Decreased strength and

flexibility (a) reduce mobility and the ability to perform activities of daily living and (b) prevent many older adults from participating in the physical activity needed to maintain health. These losses in physical function impair health and quality of life. Exercise programs for older adults should place an emphasis on the use of stretching, range of motion, and muscle strengthening to prevent injuries that can occur during normal exercise. Activities should have low impact, thereby reducing the amount of force on the musculoskeletal and joint structures. The physical positions of yoga provide a low-intensity exercise that improves muscle strength, flexibility, and body alignment. Group-based therapeutic exercise such as yoga has been shown to reduce risk of falling and fall occurrence in community-dwelling adults (Chiacchiero et al., 2010). Yoga is one of the “top10” commonly used alternative therapies available to the community-dwelling adult population (Zettergren, Lubeski, & Viverito, 2011).

**Clinical Agency Data Supporting the Need for the Project**

A senior living center in Northwest Indiana was chosen as the project site. The staff at the residential center consisted of two medical directors, one director of nursing, and an additional licensed practical nurse. Thirty older adults resided in this center: a mixture of married couples and singles, ranging in age from 66 to 85 years. The residents lived in either apartments or villas. The ethnicity of the residents was Caucasian American. The facility’s average occupancy rate was 90%. Upon or prior to relocating to the center, the resident’s family physician verified the resident was (a) not a fall risk and (b) did not have dementia. The financial viability of this center depended on keeping rooms full; if residents were unable to care for themselves, they would be moved to a different facility, where skilled nursing care could be provided. A fall resulting in injury would most likely necessitate transfer elsewhere, decreasing the center’s occupancy rate and resulting in decreased revenue.

At the time of project planning, a balance assessment was not performed on residents prior to admission. Yet implementation of a balance assessment tool was determined to be helpful in identifying residents who were at risk for falls, but had not previously been identified

as such. Because researchers had determined (a) a well-designed program that incorporates balance and strength training contributes to prevention or reduction of falls and (b) group-based therapeutic exercise has been able to reduce risk of falling and fall occurrence in community-dwelling aging adults (Zettergren et al., 2011), a group exercise program was appropriate within this center. At the time of project planning, there were no exercise or yoga programs provided at the senior living center. Therefore, yoga instructional classes were designed to be implemented with the goals of (a) improving residents' balance and (b) lessening fall risk.

## Purpose of the Evidence-Based Practice Project

### Compelling Clinical Question

This EBP project was designed to determine the effects of 12 weeks of instructor-led yoga on physical balance of older adults residing in a retirement home. Following an assessment of needs of the older adults in regards to balance, the PICOT format (i.e., patient population, intervention of interest, comparison intervention or status, outcome, and time) was used to guide the project and facilitate obtaining the most relevant and best evidence. The following PICOT question was developed to answer the compelling question as to what strategies would provide meaning or insight: in older adult retirement home residents (P), what is the effect of instructor-led yoga classes (I), compared to baseline assessment prior to instructor-led yoga classes (C), on balance (O) after 12 weeks (T)?

## Significance of the Evidence-Based Practice Project

Evidence supported the premise that regular practice of yoga can improve balance, coordination, strength level and flexibility (Chen et al., 2009; DiBenedetto et al., 2005; Ebnezar & D'Ortho, 2011; Galantino et al., 2012; Kloubec et al., 2012; Patel, Newstead, & Ferrer, 2011; Schmid, Puymbroeck, & Koceja, 2010; Tatum & Bradley, 2011;Tiedemann, O'Rourke, & Sherrington, 2013; & Zettergren et al., 2011). These skills contribute to maintaining functional autonomy and self-confidence, prevents falls, and reflect positively on the performance of activities of daily living. Functional autonomy and quality of life are related to socio-demographic

factors, subjective perception, physical and mental health, independence in daily activities, social and family support and the use of services (Schmid et al., 2010). Interventions designed to prevent the decline in functional capacity should promote better life conditions and decrease the clinical institutionalizations for older adults. Improved physical aptitude may promote greater ease in the performance of the activities of daily living, prolong functional autonomy, and allow the elderly to live self-sufficiently and with dignity for as long as possible, thereby improving their quality of life. The APN, with knowledge of the value of this intervention and equipped with an effective strategy for implementing a yoga program in a senior living center was in a prime position to affect practice change that would improve outcomes in this population.

This EBP project was developed to provide additional evidence to the body of knowledge regarding the benefits of yoga as an exercise for older adults. It was the hope of this doctor of nursing practice (DNP) student that the findings from this EBP project would provide evidence that supported the use of yoga to improve balance in older adults.

# CHAPTER 2

# THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

In this chapter, a review of the evidence-based and theoretical frameworks used to guide this EBP project will be discussed. Also, a review of the literature regarding yoga and older adults will be appraised and applied to the clinical question.

## Evidence-Based Framework: Iowa Model of Evidence-Based Practice

The Iowa Model of Evidence-based Practice to Promote Quality Care (Titler et al., 2001) was used to guide the development of this EBP project. The Iowa Model was initially developed and implemented in 1994 at the University of Iowa Hospitals and Clinics (UIHC) to promote the translation of research to practice, improving health care outcomes for patients; thus, the model was initially titled Iowa Model of Research-based Practice to Promote Quality Care (Doody & Doody, 2011). At that time, the framework served as a guide for nursing to identify areas of clinical inquiry that may be addressed through synthesis and application of research findings. But in 2001, the model was revised based on feedback from users, and to reflect changes in the healthcare environment to (a) incorporate new terminology and feedback loops, (b) address changes in the health care market, and (c) encourage the use of other types of evidence when research findings are unavailable to guide practice (Titler et al., 2001).

The term evidence-based practice (EBP) was emerging and quickly replaced the existing term, research utilization (Titler et al., 2001). Adoption of the term evidence-based practice then became widely accepted in the literature and was linked to reimbursement and process improvement. Titler and colleagues (2001) made the decision to change the name of this model to The Iowa Model of Evidence-based Practice (EBP).

### Description of the Iowa Model of Evidence-based Practice

After a review of the literature and an assessment of the clinical site, the Iowa Model was chosen as the framework for the project. EBP models, such as the Iowa Model, promote complete implementation of practice change and maximize the use of time and resources. The

first step in the Iowa Model begins with identifying the problem or recognizing a need for change. As part of the coursework within the DNP program at Valparaiso University, the EBP project manager identified a problem focused trigger which provided major impetus for the change process. The project manager reviewed the national guidelines regarding exercise and older adults. This led to the identification of a clinical problem: within the senior living center targeted for this project, the majority of the residents did not participate in strength training or exercise. This can lead to a loss in flexibility and balance. These losses in physical function impair not only health but also impact quality of life.

**Trigger identification.**

The Iowa Model utilizes a five-step approach to promote change in practice. Higher priority is typically given to problem-focused or knowledge-focused issues that address high-risk, high-cost procedures or those affected by institutional or market forces. The first step of the Iowa Model of EBP was used to identify a trigger or clinical problem that would benefit from change. This EBP project began with a problem-focused issue; the identified trigger that served as a stimulus for the change was that the staff at the senior living center did not perform a balance assessment on residents prior to admission. The center's financial viability depended on keeping rooms full. If a resident could not care for him or herself, he or she would be moved to another facility where skilled nursing care would be available. Unfortunately, a fall with injury would necessitate moving the resident to a different facility.

**Organizational priority.**

After the trigger or problem was identified, it would be important to consider if a balance assessment and the intervention of yoga classes fits the perception and understanding of the organization and staff (Doody & Doody, 2011). Consideration should be given to where the topic fits in relation to the specific priorities at every level-organization, department, and unit (Doody & Doody, 2011). This step would be imperative to garner the support and resource needed to sustain changes in practice (Doody & Doody, 2011). Titler et al. (2001) have pointed out that the

commitment to evidence-based practice must be at multiple levels, from clinicians to high level management.

At the time of project development, a balance assessment was not performed on the residents prior to admission. It was determined that implementation of a balance evaluation tool would help the retirement home staff identify residents at risk for falls. Because researchers have determined (a) a well-designed program that incorporates balance and strength training contributes to prevention or reduction of falls and (b) group-based therapeutic exercise has been able to reduce risk of falling and fall occurrence in community-dwelling aging adults (Zettergren et al., 2011), a group exercise program was deemed appropriate within this center. As there were no exercise programs provided at the senior living center, yoga classes, which could be continued after project completion, were determined to be an intervention to improve residents' balance and lessening fall risk.

**Multidisciplinary team formation.**

Within the Iowa Model, once the topic is deemed to be a priority for the center, a team should be formed to develop, implement, and evaluate the practice change. Since the Iowa Model promotes use of teams, it would be difficult for an individual practitioner who is not involved with others to utilize this model. The Iowa Model promotes a team composition that should encompass stakeholders in the practice change, including nurses, managers, and advanced practice nurses (Titler, 2001).

Within this EBP project, the EBP project manager identified the stakeholders at the center who would be involved in the practice change. The key stakeholders included the director of nursing, the licensed practical nurse, the yoga instructor, one of the two medical directors, and the EBP project manager.

**Evidence retrieval**.

Early identification of the PICOT question allowed the project manager to identify and retrieve the appropriate evidence to support implementation of a balance assessment and

continued yoga classes. To address this question, multiple literature searches were conducted using established search engines. The searches yielded numerous randomized control studies, meta-analyses, systematic reviews, descriptive studies, expert opinions, and clinical guidelines.

**Grading the evidence.**

Once all of the literature and their bibliographies were searched, the studies were evaluated for utilization. Factors that were considered for inclusion during this synthesis process were (a) overall scientific merit, (b) types of subject's enrolled, and (c) clinical relevance (Titler et al., 2001) To appraise the quality of evidence, studies that met inclusion criteria were graded with the Critical Appraisal Skills Program (CASP) (Young & Solomon, 2009).The overall quality score was determined and tabulated.

**Developing an evidence-based standard.**

After synthesizing and grading the selected studies, the next step for the project manager and team members was to determine if sufficient data existed to guide the project. The following criteria were used in judging usefulness of a study: (a) consistency of findings (b) type and quality of study, (c) clinical relevance to practice, (d) sample characteristics similar to those to which the findings were to be applied, (e) feasibility of implementing findings in practice, and (f) the risk-benefit ratio (Titler et al., 2001). It was determined that sufficient high-quality evidence was available to support the intended change in practice, and the evidence was applied to guide this EBP project.

**Literature search, critique, and synthesis.**

Guided by the Iowa Model, this step involved searching literature for evidence to guide this project. The EBP project manager gathered evidence-based data that involved systematic reviews and clinical studies. Following the collection of relevant research and related literature, the project manager then critiqued and synthesized the research. The evidence and critique included within this paper was presented to the team, who determined there was sufficient research base to pilot a change in practice.

### Strengths and Limitations of the Iowa Model

The Iowa Model had strengths that facilitated its implementation. The model takes into account the entire system, including patient, provider and the organization. This approach allowed for the integration of research along with the use of clinical guidelines, expert opinions, and case reports which ultimately should lead to improvements in patient outcomes and clinical excellence. Piloting and feedback loops have allowed for continuous process improvement and the opportunity for modification (Titler et al., 2001). This ongoing process and straightforward methodology allowed for integration of evidence within this EBP project and adoption of the proposed change into practice.

## Theoretical Model: Kotter's Eight Steps of Change

In addition to the Iowa Model, the proposed change in practice was guided by Kotter's Eight Steps of Change. The philosophy behind the Kotter theory in managing change is that (a) the fundamental purpose of management is to keep the current system functioning and (b) the fundamental purpose of leadership is to produce useful change (Kotter,1996). In the 1990's Kotter determined that more than 50% of all major changes in organizations failed; he then identified strategies to manage change (Kotter, 1996). Kotter noted that factors key to facilitating change include (a) identifying why the organization resists the needed change, (b) determining what process can be used to overcome the inertia, and (c) understanding why the leadership skills to drive the change are so important (Kotter,1996). Kotter suggested never underestimating the magnitude of forces within an organization that reinforce complacency and help to maintain stagnation or status quo (Kotter, 1996).

### Kotter's Eight Steps of Change

Kotter identified key barriers to change within the organization and came up with an eight-step change process, to be used in sequential order. Kotter's stages are similar to Kurt Lewin's (1951) three stages, unfreezing, moving, and freezing/refreezing, and must be completed in proper order to ensure success. But Kotter (1996) provided additional guidance through eight

steps: (1) establishing a sense of urgency, (2) forming a powerful guiding coalition, (3) developing a change in vision, (4) communicating the vision, (5) empowering a broad-based action plan, (6) generating short-term wins, (7) consolidating improvements and produce more change, and (8) maintaining the change.

**Step one: Creating a sense of urgency.**

Kotter (1996) noted it was imperative to create a sense of urgency to overcome the stagnation and complacency. According to Kotter, 75% of the leadership needs to be convinced that a change is needed. Kotter also noted that a significant amount of time and energy needs to be spent in building urgency, before moving on to the next steps. Kotter also realized that crisis is considered a positive impetus for change.

A summary of the current literature regarding balance and falls in older adults was presented to the stakeholders at the senior living center. It contrasted the reduction in the center's population if falls with injury resulted in residents' transfer to an increased-care facility with the center's goal of keeping beds full and revealed how falls with injury would negatively impact the center's bottom line.

**Step two: Forming a coalition to guide the process.**

The second step, similar to the Iowa Model, involved creating a coalition to guide the process. Kotter (1996) posited that coalitions are best guided by individuals with position, power, credibility, expertise, and leadership skills. Kotter noted that managing change is not enough-you have to lead it. At the senior living center, the guiding coalition included one of the two medical directors and the director of nursing.

**Step three: Developing a vision.**

Consistent with Lewin's unfreezing, Kotter's third step involved the development of a vision to guide the direction of change and a strategy to coordinate action and motivate others. Kotter noted that a clear vision can facilitate understanding of why people are being asked to do something. The ultimate vision for this EBP project focused on (a) implementing a balance

assessment screening tool to identify those who were at risk for fall and injury, (b) continuing yoga classes after project conclusion to maintain balance and decrease risk of falls, and (c) maintaining a positive financial balance by having the facility remain full of residents.

**Step four: Communicating the vision and strategy.**

Within the fourth step, the leader should recognize that the vision and strategy are most effective when there is a common understanding of goals and direction. Kotter (1996) noted that the vision needs to be communicated frequently, by a simple, clear message which communicates the core elements. The vision for this EBP project was communicated to the staff and administration of the senior living center by continuously reinforcing the goal of fall prevention through improved balance of the residents, which keeps the residents in the senior living center.

**Step five: Empowering a broad based action plan.**

Within Kotter's framework, a broad-based action plan, in step five, allows change agents to use the talents and resources of members to move through the change process and improve organizational performance. This is where obstacles are recognized, where existing processes or systems that are getting in the way of the change vision are identified (Kotter, 1996). Within this EBP project, the action plan included ideas from the team as to who would be responsible for performing the balance assessment on the residents post completion of the project. The team identified the director of nursing and the licensed practical nurse as the responsible parties.

**Step six: Generating short-term successes.**

Because major change takes considerable time, Kotter's sixth step focuses on short-term successes that will provide momentum to continue the progress through step seven. It is important to create short-term targets, not just one long-term goal (Kotter, 1996). The first short term goal was to have the nursing staff (the licensed practical nurse and the director of nursing) observe two balance assessments and then participate in the balance assessment of at least

five balance assessments during the first ten days of project implementation. However, for undetermined reasons, the licensed practical nurse and the director of nursing did not observe or participate in the performance of the BBS assessment. Other short term goals were achieved; older adults registered for the yoga classes and initial attendance and feedback was positive.

**Step seven: Building on the change.**

Within Kotter's framework, each success provides an opportunity to build on what went right and identify what can be improved (Kotter, 1996).This is similar to Lewin's freezing/refreezing.

The first short-term success was the achievement of residents registering and initially attending classes. The director of nursing encouraged the residents to register and attend the yoga classes. She was recognized by the project manager in the form of a written thank you note from the project manager. At the time of achieving the first short-term success, the director of nursing and the licensed practical nurse were also advised of the next short-term success: continued attendance at the yoga classes.

**Step eight**: **Maintaining the change.**

Similar to Lewin's freezing/refreezing, Kotter's eighth step then solidifies or sustains the change. In part, the solidification is based on identifying the connection between the recent change and organizational success (Kotter, 1996).

Within this EBP project, the second goal involved the adoption of incorporating a balance assessment for all new residents of the senior living center. The results of this EBP project were disseminated to the stakeholders. The project manager left the senior center with nursing staff, who remained somewhat resistant to change, but had been (a) educated on the balance assessment tool, (b) provided a tracking tool to measure the compliance of using the tool, and (c) provided a list of yoga instructors that would be willing to continue offering yoga classes at the center.

## Application of Theoretical Framework to this EBP Project

Kotter's change theory was used as a guide to implement a balance assessment tool for the residents at the senior living center. The change theory also supported the continued offering of yoga classes.

### Strengths of the theoretical framework.

A strength of using Kotter's (1996) eight steps of change for this EBP project stemmed from the tips and key points readily available within the literature. Kotter has previously provided multiple examples of what the change agent could do during each step to facilitate the process. The steps themselves could be used as a checklist to monitor progress. The steps have provided some flexibility, and multiple steps could take place simultaneously during a larger organizational change. Because of the ease of use, a variety of healthcare organizations and other industries have made use of Kotter's model.

An additional positive aspect of employing Kotter's change model within this EBP was the seamless fit with the Iowa model. Within this designed project, the knowledge that the residents were not screened for balance prior to admission to the senior living center was thought to provide an impetus for change. A coalition, consisting of the project manager, medical director, and the director of nursing was formed. Within this facility, the coalition possesses the position power, credibility, expertise, and leadership skills to move the project forward. Small goals were set during implementation, and when these goals were achieved, rewards were given in the form of written and verbal recognition.

### Limitations of the theoretical framework.

While Kotter's step-by-step approach may be an identified strength, it may also be considered a limitation. Kotter (1996) asserted that the use of this model is interactive; one step can be used to accomplish another step, and implementation relies on the skills and knowledge of who is employing the change. Kotter indicated that the change process goes through a series of phases that usually require a considerable length of time. Considering the twelve-week time

frame allotted for the implementation of this EBP project, coupled with the actual time it took for organizational change to occur, allowing an appropriate amount of time to progress through each step of the change process was not entirely feasible. To successfully complete all eight stages, sustainability should be addressed while complacency is challenged (Kotter, 1996).

## Literature Search

As a crucial step within EBP practice, the literature search allowed the project manager to review the aggregate evidence available to answer the compelling clinical question. Researchers have also noted that if the search finds sufficient evidence in the literature, that evidence then requires appraisal for its strength and significance (Schmidt & Brown, 2012). Research has noted that a lack of evidence may not justify allocation of resources required for changes in current clinical practice; however, sufficient evidence may be used to strengthen commitment from project stakeholders (Schmidt & Brown, 2012). A search for relevant literature was undertaken to assemble, critique, and synthesize the best available evidence relating to the exercise yoga and the benefits of improving balance in older adults.

### Sources Examined for Relevant Evidence: Search Engines and Key Words

Database sources examined included CINAHL (Cumulative Index to Nursing and Allied Health Literature), ProQuest, MEDLINE (Medical Literature Analysis and Retrieval System Outline) via PubMed, Joanna Briggs Institute, Cochrane Library, and SPORTSDiscus.The MeSH (medical subject heading terms) system was used to explore key words for consistency and applicability. This project manager met with Valparaiso University's Librarian to ensure saturation was reached with the literature search. The keywords "elderly" or "older adults", "yoga", and "balance", were used to search databases for literature with human subjects published in English within the past 10 years (if searching required a specific number of years) or from January 1, 2004 to March 1, 2014 when specific dates could be entered. These terms were used in various combinations in order to obtain the most results from these databases. Searches included peer-reviewed, systematic reviews, meta-analyses, practice guidelines,

clinical trials, randomized controlled trials (RCTs), qualitative studies, descriptive studies, and EBP. After elimination of duplicate citations among all searched databases, a total 103 abstracts were initially reviewed. Of the 103 abstracts reviewed, 16 met inclusion criteria. Twelve articles met both the inclusion and exclusion criteria as well as quality appraisal standards and were used in the final project (see Table 2.1).

**Inclusion/Exclusion Criteria**

The inclusion criteria for full text article evaluation included articles (a) written in English, (b) using human subjects, (c) using adults age 65 years and older, and (d) articles published from the years 2004-2014. Articles were then screened for topic relevance, originality and quality; articles were excluded if they were not relevant to the topic (e.g., yoga used for treating diseases, or yoga use in teenagers), or were duplicates. The exclusion criteria included articles that (a) focused solely on fall risk or general exercise, but did not include a yoga intervention and (b) included or focused on frail or cognitively impaired older adults.

Table 2.1

*Summary of Evidence*

| Database | Articles Found | Initial Review | Duplicates | Full-text Review | Included in Analysis |
|---|---|---|---|---|---|
| Cochrane | 14 | 8 | 2 | 3 | 2 |
| JBI | 1 | 1 | 0 | 0 | 0 |
| Proquest | 102 | 20 | 10 | 2 | 1 |
| CINHAL | 26 | 12 | 6 | 6 | 6 |
| MEDLline Via Pub Med | 140 | 60 | 7 | 4 | 2 |
| SPORTSDiscus | 2 | 2 | 0 | 1 | 1 |
| Total: | 285 | 103 | 25 | 16 | 12 |

## Description of Levels of Evidence

The levels of evidence used to rate the research studies for this EBP project were based on the guidelines from Melnyk and Fineout-Overholt (2011). Level I includes evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs); level II includes evidence obtained from at least on well-designed RCT; level III focuses on evidence obtained from well-designed controlled trials without randomization; level IV includes evidence from well-designed case control or cohort studies; level V consists of evidence from systematic reviews of descriptive and qualitative study; and level VI includes evidence from the opinions of authorities and/or reports of expert committees. The levels of evidence critiqued for this EBP project include level I through level VI. Twelve pieces of evidence supported the physical benefits of yoga: one systematic review (Patel et al., 2011), one RCT (Tiedemann et al., 2013), three quasi-experimental studies (Chen et al., 2009; Goncalves, Vale, Barata, Varejao, & Dantas, 2011; Zettergren et al., 2011); and seven descriptive reviews (Brown, Koziol, & Lotz, 2008; DiBendetto et al., 2005; Galantino et al., 2012; Roland, Jakobi, & Jones, 2011; Schmid et al., 2010; Tatum & Bradley, 2011; Vogler, O'Hara, Gregg, & Burnell, 2011).

### Levels of Evidence

The purpose of evidence appraisal prior to its application to practice was essential. Studies that met inclusion criteria were appraised and graded with the Critical Appraisal Skills Program (CASP). Critical appraisal has been identified as a systematic process through which the strengths and weaknesses of a research study can be identified (Young & Solomon, 2009).The CASP tool has been used to assess both internal and external validity and establish whether to use a study in clinical practice (Young & Solomon, 2009).This grading process has utilized ten questions in a check list format with specific questions that assess a study design, bias, and level of evidence, quality, consistency, statistical analysis, and relevance (Young & Solomon, 2009). Each question in the CASP is scored and assigned two points with a potential maximum score of 20; this score reflects the quality of the study and scoring with CASP is as

follows: 0-7 is unacceptable, 8-14 is fair, and 15-20 is excellent (Young & Solomon, 2009). Within this EBP project, this process enabled the DNP student to assess a study's usefulness and to determine whether the findings were trustworthy.

**Level I evidence.**

Patel et al. (2011) conducted a systematic review with both narrative synthesis and meta-analysis to appraise the comparative effectiveness of yoga, on measures of health and physical functioning in older adults. Searches were conducted in MEDLINE/PUBMED, PSYCINFO, CINAHL, Web of Science, and SCOPUS. Original studies evaluating the effects of yoga on older adults from 1950 to November 2010 were sought. The search was restricted to randomized controlled trials (RCTs) of yoga in subjects greater than 60 years of age, and published in English. The search yielded 18 eligible studies (*n* = 649). The studies reported on older adults across a range of settings, intervention intensity, and outcome measures. The majority of the studies had less than 35 participants. The mean age of participants ranged from 63.5 to 77.5 years, and the majority (71%) was female. Thirteen studies were conducted in community settings, four studies included institutional/residential or senior communities, and four studies reported on stable patients from the community. Ten studies were designed to evaluate yoga as the primary intervention, whereas eight studies were designed with aerobic exercise as the primary intervention and yoga as the active control.

The yoga intervention varied in frequency from once to twice a week, for 12 weeks to 14 months. The studies assessed various primary outcomes: maximum aerobic capacity ($Vo_2$) depression, sleep, measures of cognition, health related quality of life (HRQoL), upper-and lower-extremity strength, blood pressure, total cholesterol, body mass index (BMI), bone density, dyspnea intensity, and kyphosis. The yoga group had improvements in physical measures (i.e., timed one leg standing and forward flexibility) as well as HRQoL measures related to sense of well-being, energy, and fatigue, compared to an aerobic exercise control group. Within the studies that compared yoga to aerobic exercise, the yoga group experienced

a 4.4% greater improvement in flexicurve kyphosis angle and a 5% greater improvement in kyphosis index than the aerobic group. The yoga group demonstrated an increase in the physical component scale results (*SMD* 0.96, 95% CI [0.80, 1.33], $p = 0.029$), compared to the intervention group, *SMD* 0.41, 95% CI [0.04, 0.78]. There was no significant change in body weight, BMI, percentage of body fat, fat-free mass, appendicular muscle mass or bone mineral density (BMD) for either the resistance training group or the yoga group. Body flexibility had significantly improved in both the upper and lower body in the yoga group, with improved lower-limb muscle endurance and walking speed.

Patel et al.'s (2011) review indicated several limitations in the available evidence-based practices. First, there was wide variability in the interventions. Second, poor adverse event reporting in most of the studies limited any conclusions about the safety of yoga as an exercise. Third, sample sizes were small, which limited the precision and generalizability of the estimates. Fourth, the interventions' durations varied considerably across studies.

Within their summary, Patel et al. (2011) recommended yoga, with careful observation and monitoring of side effects for older adults. Patel et al. (2011) suggested that yoga may be superior to conventional physical-activity interventions in older adults. Thus, this systematic review provided evidence to support this EBP project.

**Level II evidence.**

Tiedemann et al. (2013) conducted a pilot randomized controlled trial (RCT) evaluating the feasibility and effect of a 12-week yoga program on balance and mobility in older people. A blinded, randomized controlled pilot trial with intention-to-treat analysis was conducted. Participants were 54 community dwellers ($M = 68$ years), who were not currently participating in yoga or Tai chi. The intervention group ($n = 27$) (a) participated in a 12-week, twice-weekly yoga program that focused on standing postures and (b) received a fall prevention education booklet. The control group ($n = 27$) was a social-contact control group who received the education booklet only.

The primary outcome within the Tiedemann et al. (2013) study was the standing balance component of the short physical performance battery with addition of one-legged stance time (standing balance). The secondary outcome measures were (a) the timed sit-to-stand test, (b) timed 4-meter walk, and (c) one-legged stand with eyes closed. All analyses used an intention-to-treat approach. Analyses used the linear regression approach to analysis of covariance (ANCOVA) with group as the independent variable, change score on the outcome measures as the dependent variable, baseline score on the outcome measure as a covariant, and statistical significance set as $p < .05$.

Fifty-two participants completed follow-up assessments at the end of the 12-week intervention. Average class attendance was 20 to 24 classes. No serious adverse events occurred among either the control or intervention group.

Tiedemann et al. (2013) found that the most significant improvements in test performance were seen for the timed 4-meter walk and sit-to stand test ($p < 0.001$), where the intervention group performed faster at follow-up and the control group performance declined compared with baseline, with significant between-group differences at follow-up. The intervention group significantly improved compared with control group on standing balance (*MD* = 1.52 seconds, 95% CI [0.10, 2.96], $p = .04$), sit-to-stand test (*MD* = -3.43 seconds, 95% CI [-5.23, -1.64], $p < .001$), 4-meter walk (*MD* = -.0.50 seconds, 95% CI [-0.72 , -0.28], $p < .001$), and one-legged stand with eyes closed (*MD* = 1.93 seconds, 95% CI [0.40, 3.46], $p = .02$).

Tiedemann et al. (2013) noted that previous research had determined that the sit-to-stand test and walking speed timed for 6-meter were valid predictors of falls in older people. People unable to achieve this test speed had twice the risk of multiple falls in the following year than those able to achieve this test performance (*RR* = 1.99, 95% CI [1.31, 3.01]). In the Tiedemann et al. (2013) study, the control group mean was slower than this cutoff at follow-up (13.6 seconds, *SD* 6.1) and the intervention group was clearly faster than this cutoff (8.8 seconds, *SD* 2.6). Furthermore, the proportion of people able to complete the sit-to-stand test in less than 12

seconds at follow-up were significantly higher in the yoga group compared with the control group (96% vs. 56% respectively, $p$ = .001).

The improvement in sit-to-stand ability indicated improved functional balance and lower limb strength after the yoga intervention with a corresponding likelihood that fall risk would also be reduced. The feasibility of the yoga program was also demonstrated by the ease of recruitment in a short period of time from a small geographical area and very good attendance at the classes. These findings demonstrated that the yoga program (a) was an appropriate intervention which addressed the abilities of the older participants and (b) was also enjoyable, with participants reporting perceived benefits as a result of attendance. In addition to its low risk of bias, a key strength of this study was its written protocol that could easily be implemented elsewhere by a certified yoga instructor.

Despite the strengths within the Tiedemann et al. (2013) study, limitations were noted. First, the small sample size made it difficult to draw conclusions about wider implications of the results. Second, the use of a social-contact control group may have reduced the uncertainty about observed balance and mobility improvements simply being the results of general increases in physical activity, resulting from travel to and from the yoga classes each week. The Tiedemann et al. (2013) trial demonstrated the balance and mobility-related benefits and feasibility of yoga for older people. Thus, this trial provided evidence to support this EBP project.

**Level III evidence.**

Chen et al. (2009) conducted a quasi-experimental, pre-post-test design study, to evaluate older adults' physical fitness after a 24-week silver yoga exercise program. A convenience sample of 204 subjects was recruited from eight senior centers from southern Taiwan. The intervention group ($n$ = 62) received 70-minute silver yoga classes, conducted three times per week, for 24 weeks; the control group ($n$ = 66) received no intervention. Physical fitness indicators (i.e., weight, BMI, blood pressure, flexibility, range of motion, endurance and walking speed) were measured at baseline, at 12-weeks and at 24-weeks (the end of the intervention).

The baseline comparisons between the two groups indicated that only habitual sleep efficiency ($t$ = -2.74, $p$ = .007) and physical health perception ($t$ = 2.37, $p$ = .020) had significant differences between the subjects in the experimental and the control groups. At baseline, the control and intervention groups were similar for all physical fitness indicators. At 12-weeks the experimental group had a significant increase in physical health perception (baseline $M$ = 47.77, $SD$ = 7.13; 12-weeks $M$ = 47.77, $SD$ = 7.13) and mental health perception (baseline $M$ = 50.29, $SD$ = 8.75; 12-weeks $M$ = 55.62, $SD$ = 8.18) compared to the control group. At the end of the 24-week study the experimental group had a significant increase in physical health perception ($F$ = 16.30, $p$ = .000), and mental health perception ($F$ = 6.02, $p$ = .003) compared to the control group. The control group experienced a decrease in physical health perception, whereas the experimental group improved. Yogic stretching and breathing program had a markedly invigorating effect on perceptions of increased physical energy (Chen et al., 2009). The silver yoga exercise program used stretching to improve joint flexibility and muscular strength; massage blood vessels; and improve blood circulation of the participants (Chen et al., 2009).

The study limitations included the use of convenience, rather than probability sampling. Random assignment was applied, but without random sampling, it was possible that some older adults who met the sample selection criteria and represented critical differences from the sample studied were not recruited. Furthermore, male older adults and those age 75 years and older were under-represented in the Chen et al. (2009) study. This study sample was comprised of healthy older adults who had less than one chronic illness, on an average, which may be different from the older population in general. These participants were highly educated, possessed good health promotion concepts and most of them had regular exercises. Therefore, generalizability of the results was limited. A randomized control trial with a large random sample might provide stronger causal relationships in the results.

Chen et al. (2009) opined yoga uses stretching to improve joint flexibility and muscular strength in older adults. Chen et al. (2009) concluded fairly positive outcomes for applying the

silver yoga exercise program with a sample of healthy community-dwelling young-older adults. Thus, this trial provided evidence to support this EBP project.

This EBP project was also supported by evidence from Zettergren et al. (2011). Zettergren et al. examined the impact of an eight-week therapeutic yoga program on postural control, mobility, rising from the floor, and gait speed in community-living older adults. The design was pre-test/post-test with an experimental group and an age-matched control group. Inclusion criteria included subjects that were aged 65 years or older, able to maintain static standing with eyes open, arms crossed, and feet bare independently for 30 seconds without a device. In addition, subjects presented with intact lower extremity sensation, visual acuity 20/20 (with or without correction), and Mini-mental State Examination scores of 24 or more. Exclusion criteria included history of neurologic pathology, recent (within the past three years) orthopedic surgery of the lower extremities, and serious visual impairments. The eight research participants were all female, with a mean age of 84 years; of the eight control participants, five were women and three were men, with a mean age of 81.3 years. All participants in the intervention arm were naïve to yoga.

The intervention was an eight-week, 80-minute, biweekly yoga class designed specifically for community-dwelling older adults. The yoga program designed for this study included activities of standing, sitting, and lying on the floor. The yoga class was performed at a local continuing care retirement community. All testing was performed at the site. Postural control (Berg Balance Scale [BBS]), mobility (Time to Rise from the Floor to Standing and Timed Up and Go), gait (usual and fast gait speed), and balance confidence (Activities Balance Scale) were measured. Changes over time (pre-test to post-test) were evaluated in all outcome measures using paired *t*-test. Baseline BBS for yoga participants was 51.3. After yoga intervention, the BBS increased to 55.00, ($t = 4.51$, $p = .003$). Yoga participant baseline for fast gait was 1.38 milliseconds. After intervention increased to 1.55 milliseconds, ($t = 2.69$, $p = .03$). Floor-to-test time at baseline was 9.40 seconds. After intervention, this time decreased 2.42

seconds, ($t$ = 1.20, $p$ = .09). The Timed Up and Go test at baseline was 9.38 seconds. After intervention, this time decreased to 8.41seconds, ($t$ = .87, $p$ = .41). The Four-Square Step Test time at baseline was 10.45 seconds. After intervention, this time decreased slightly to 10.40 seconds, ($t$ = 0.03, $p$ = .98). The average score of the Activities-Specific Balance Scale (ABC) at baseline was 86.83. After the intervention, the mean score increased to 87.43, ($t$ = 0.83, $p$ = .44). No other significant changes were noted. Improvements in postural control as measured by the BBS and gait as measured by fast gait speed indicate that research subjects benefited from the yoga intervention.

Although the subjects demonstrated benefits from yoga, this study had a number of limitations that may have impacted on results. The sample used was a sample of convenience, rather than a randomly selected sample. The sample size was small, and as a result, power to determine differences in function on post-test were likely insufficient. Replication using this study's methods, with a larger sample randomized into yoga and control groups, would be more effective in determining the impact of yoga on function performance. Yoga sessions were limited to only eight weeks and there was no clear evidence for determining dose, frequency, and duration for the most effective yoga program. Zettergren et al. (2011) opined that a longer post exercise follow-up would be needed to determine whether improvement in function was stable over time.

The yoga program designed for this study included the activities of standing, sitting, and lying on the floor. Therefore, subjects perform activities during yoga that can improve postural control, mobility, and gait speed. Zettergren et al. (2011) opined that yoga may be a safe and effective alternative intervention for aging adults. Thus, this study provided evidence to support this EBP project.

Goncalves et al. (2011) conducted a quasi-experimental design study to assess the levels of flexibility, functional autonomy and quality of life (QoL) in older adult yoga practitioners in Brazil. Participants were 120 older females, aged 60 years or older, retired or not, from any

socioeconomic class, being independent in activities of daily living (ADL), and not engaged in physical exercises for at least the previous six months. Exclusion criteria included severe osteoporosis, advanced arthritis, fractures, cardiopathies, cancer, obstructive respiratory, musculoskeletal and neurological disorders, or were using antidepressants for tranquilizers. The intervention group ($n$ = 52) received yoga classes two days a week, 60 minutes duration, for 14 weeks. The control group ($n$ = 31) received no intervention. Outcome measures included anthropometric (Filizol tool), range of motion (Goniometry), functional autonomy (LADEG protocol), and quality of life (QoL) (WHOQoL).

The measured articular range of motion in the yoga group showed increased articular range from the pre-test to the post-test: shoulder abduction (SA) change = 20.58, $p$ = < .011; horizontal shoulder extension (HSE) change = 13.10, $p$ = .0001; lumbar spine flexion (LSF) change = 7.27, $p$ = .0001; hip flexion change (HF) = 20.00, $p$ = .0001; and knee flexion (KF) change = 4.65, $p$ = .045. The yoga group showed higher variations in the range of motion in SA when compared to the control group: SA % change = 14.11%, $p$ = 0.0001; HSE % change = 33.90, $p$ = .0001; LSF % change = 50.74, $p$ = .0001; HF % change = 33.75, $p$ = .0001; HE % change = 10.93, $p$ = .021; and KF % change = 3.90, $p$ = .001.

The functional autonomy test results in the yoga group showed reduced execution times from pre-test to post-test: 10 meter walk (10mW) change = -1.66 seconds, $p$ = .0001; rising from a sitting position (RSP) change = -1.75 seconds, $p$ = .0001; rising from the ventral decubitus position (RVDP) change = -1.26 seconds, $p$ = .001, and rising from a chair and moving about the house (RCMH) change = -6.76 seconds, $p$ = .0001. The yoga group exhibited higher variations in the execution of the same tests compared to the control group: 10 mW change = -18.63 %, $p$ = .0001; RSP change = -14.00%, $p$ = .0001.

There were no limitations to this study. Goncalves et al. (2011) suggested that future investigations assess the relationship between the variables examined in the current study and

muscle strength, emotional balance and hormone secretion (e.g., estrogen, which tends to diminish with advancing age, and cortisol, owing to its association with stress).

Goncalves et al. (2011) concluded that the regular practice of yoga contributed to increased articular range of motion, reduced execution time in the activities of daily living and consequent improvement in the functional autonomy and quality of life of older adult females. The findings supported that yoga can be prescribed as an effective physical exercise to minimize the harmful effects of aging. Thus, this study provided evidence to support this EBP project.

L**evel VI evidence.**

Because fear of falling is a disabling symptom of impaired mobility among older people, it has been associated with depression, functional limitations, and gait impairments. Schmid et al. (2010) conducted a single armed pilot study to evaluate the effects of yoga on fear of falling and balance in older adults. A convenience sample of adults (*n* = 14) over 65 years of age, who all endorsed a fear of falling, were given a 75-minute, biweekly, 12-week yoga intervention. The setting was a retirement community in the Midwest. The outcome measures were fear of falling (FoF) (Illinois FoF measure), and balance (BBS).

There was a modest decrease (6%) in FoF from baseline to 12-weeks (baseline = 36.76, 12-weeks = 34.69, *p* = .137). The total BBS (baseline = 49.86, 12-weeks = 50.64, *p* = .280), and dynamic balance (baseline = 23.21, 12-weeks = 23, *p* = .732) scoring did not significantly change from baseline to 12 weeks. But, static balance scoring increased significantly between baseline and post-intervention (26.64 +/- 2.24 vs 27.64 +/- .74, *p* = .045). While upper body flexibility did not change significantly (baseline -11.71, 12-weeks -11.61, *p* = .94), there was a 34% increase (*p* = .29) in lower body flexibility (baseline = -3.96, 12-weeks = -2.62) over the 12-week intervention.

Schmid et al. (2010) identified limitations to this study. First, because this was a pilot study, the ability to find relationships between variables was limited; thus, adequate power to

detect modest but potentially important improvement in the outcomes. Second, study participants themselves were a limitation. Participants were generally healthy, white, and relatively well-off financially and well-educated. They were not screened for pre-existing conditions. Third, while in order to be in the study everyone endorsed a FoF by a yes/no question, the FoF assessment indicated relatively mild FoF at baseline. Thus, the study participants had a small margin for improvement on the outcome scales. Fourth, fall histories were self-reported. Because of recall bias, it was unclear if all falls during the 12-week intervention were reported. Finally, assessments were completed at baseline, at six weeks, and at 12 weeks. There was no change on any variables at six weeks. Therefore, changes likely occurred between six and 12 weeks, but authors were not able to speculate on the true timing of such changes.

Despite the small sample size, Schmidt et al.'s (2010) population was similar to the participants within this EBP project. Although the FoF did not decrease to a statistically significant level, the improvement in static balance with the yoga intervention provided additional evidence to support this EBP project.

Because reduced hip extension is accompanied by a compensatory increase in anterior pelvic tilt and may be the primary mechanism underlying the age-related reduction in stride length, a hallmark of diminished walking performance in older adults and an important predictor of falls, dependency, institutionalization, and mortality in older adult populations, DiBenedetto et al. (2005) conducted a single group pre-test/post-test exploratory study examining the effects of yoga in older adults. DiBenedetto et al.'s objective was to determine if a tailored yoga program could improve age-related changes in hip extension, stride length, and associated indices of gait function in healthy older adults, changes that have been linked to increased risk for falls, dependency, and mortality in geriatric populations. A 3-dimentional quantitative gait evaluation, including kinematic and kinetic measurements, was performed pre-and post-intervention. Changes over time (baseline to post intervention) in primary and secondary outcome variables

were assessed using repeated-measures analysis of variance (ANOVA). Yoga exercises were performed in an academic medical center (group classes) and in the subjects' homes (yoga home-practice assignments). Pre-and post-assessments were performed in a gait laboratory. The participants were 23 healthy adults (age range, 62-83 years) who were naïve to yoga. An eight-week yoga program specifically tailored to older adults and designed to improve lower-body strength and flexibility was the intervention. Participants attended two 90-minute yoga classes per week, and were asked to complete at least 20 minutes of directed home practice on alternate days. The primary outcome measures were peak hip extension, average anterior pelvic tilt, and stride length at comfortable walking speed. The secondary outcome measures were ankle plantar flexion and power generation, and walking speed.

In the yoga group, peak hip extension and stride length significantly increased ($F$ 1.18 = 15.44, $p < .001$; $F$ 1.18 = 5.57, $p = .03$, respectively). A trend toward reduced average pelvic tilt was observed ($F$ 1.18 = 4.10, $p = .06$); adjusting for the modifying influence of frequency of home yoga practice strengthened the significance of this association (adjusted $F$1.17 = 14.30, $p = .001$).Both the frequency and duration of yoga home practice showed a strong, linear, dose-response relationship to changes in hip extension and average pelvic tilt. The change in peak hip extension was strongly and negatively related to change in average anterior pelvic tilt ($r$ = -.83, $p$ = 001 and positively related to change in stride length ($r = .55$, $p = .02$). Changes in secondary outcome measures were in the expected direction, but were not statistically significant. However, change in peak hip extension was strongly and positively related to change in ankle plantar flexion ($r = .55$, $p = .01$) and ankle joint power ($r = .48$, $p = .04$). Stride length was strongly and positively related to all secondary outcome measures, including walking speed ($r = .08$, $p < .001$).

A serious limitation of this exploratory study was the lack of a control group, raising the possibility that the positive results may in part reflect a placebo response, a temporal trend unrelated to yoga, or a coincident change in other activities. The generalizability of the study

was limited due to the study was restricted to a small number of healthy, motivated older adults. Larger randomized controlled trials were recommended to confirm the findings of this study.

DiBenedetto et al. (2005) suggested yoga practice may improve hip extension, increase stride length, and decrease anterior pelvic tilt in healthy older adults, and that yoga programs tailored to older adults may offer a cost-effective means of preventing or reducing age-related changes in these indices of gait function. Thus, this study provided evidence to support this EBP project.

Because falls are among the most common problems affecting older adults and yoga has demonstrated efficacy for decreasing falls in at-risk populations, Galantino et al. (2012) conducted a pilot study to study the safety and feasibility of modified chair-yoga on functional outcomes among older adults with risks of falls. Eligible participants were over 65 years of age from an assisted living community, who experienced a fall in the past six months and an increased fear of falling as a result. Exclusion criteria included a diagnosis of Alzheimer's disease, and the inability to weight bear on upper extremities. Twenty participants were enrolled in the study, all were non-Hispanic white residents, retired, and with a college education. The age range of participants was 68 to 97 years, with the mean age of 87.7 years. The intervention was yoga classes, meeting for 60 minutes, two times a week for eight weeks at the assisted living center. Participants performed the sessions from a chair and were given the appropriate props when indicated. Yoga was the only intervention the participants received during the week period for balance and fall reduction.

Outcome measures (a) Sit to Stand, (b) Timed Up and Go (c) anxiety subscale, and (d) fear of falling were measured at baseline and at eight weeks (conclusion). From baseline to the end of the study, the intervention group improved in Sit to Stand (0.31 to 0.93, $p = .021$) and reduction in Timed Up and Go (22.57 to 18.97, $p = .22$), which indicated improved trends in mobility. The anxiety subscale showed a reduction from baseline, although the reduction was not statistically significant (6.10 to 4.86, $p = .072$) and fear of falling improved to a statistically

significant level (5.27 to 2.60, $p$ = .029). These trends point to improved confidence and self-efficacy in activities of daily living.

Despite these positive trends, there were limitations to this study. The sample size of this pilot study was intended for the development of evidence to support further studies. There was not a control group in this study.

Galantino et al. (2012) concluded that a chair yoga based program in an assisted living community among 80 year old adults was both feasible and safe. Thus, this study provided additional evidence to support this EBP project.

A review of the literature was performed by Roland et al. (2011) to investigate whether physical fitness and function benefits are engendered through the practice of yoga in older adults. The following databases were searched: PubMed, Scholars Portal, AgeLine, CINAHL, EBSCO, MEDLINE, SPORTDiscus, PsycINFO, and EMBASE. The key search terms were yoga, older adults, senior, elderly, and aged. Publication dates for articles were1970 to 2009. Inclusion criteria were (a) human subjects, (b) articles published in English, (c) healthy and, (d) older adult, 65 years plus. A yoga intervention was administered. Outcome measures were physical fitness-related (e.g., strength, flexibility, balance, cardiorespiratory function, body composition) and function-related (e.g., mobility). The search primarily targeted randomized controlled trial study designs. A comprehensive review of the literature yielded 507 studies. Ten studies with 544 participants, mean age of 69.6 years were included. The reviewer, who was not blinded to the purpose of the evaluation, appraised the abstracts according to the inclusion criteria.

The yoga-intervention groups improved lower body flexibility and endurance ($ES$ = 0.70) and shoulder and hip range of motion ($ES$ = 0.25) compared with wait-list controls; shoulder flexion and right (9.6 degrees +/- 12.5 degrees) and left (11.8 degrees +/- 13.4 degrees), shoulder abduction compared with pre-test scores ($ES$ < 0.10). Right hip flexion improved significantly (17.2 degrees +/- 13.5 degrees) compared with baseline ($ES$ < 0.10). Lower body strength

showed significant improvement with the yoga intervention (*ES* = 0.51) compared with the control group. Improvements between baseline and three months were seen in the Berg Balance Scale (*ES* = 0.63), One-Legged-Standing Test (*ES* = 0.88), and Activities of Balance Confidence Scale (*ES* = 0.66). Improvements from baseline in peak hip extension was positively correlated with improvements in pelvic tilt (*ES* = 0.83), ankle power (*ES* = 0.48), ankle flexion (*ES* = 0.55), stride length (*ES* = 0.55), and walking speed (*ES* = 0.80).

Limitations of this literature review included the use of a variety of yoga styles used in the studies, making comparisons between them difficult. The authors concluded that future studies need to be adequately powered with a focus on physiological benefit before clinical significance can be demonstrated.

This review conducted by Roland et al. (2011) concluded yoga had a beneficial effect of maintaining body flexibility and strength, which are important for preventing falls and subsequent loss of independence. The effects of yoga on lower leg and ankle strength and balance measures suggested improved mobility and lowered risk for falls. Thus, this study provided evidence to support this EBP project.

Floor transfer ability is important for the daily household and recreational activities for older adults (e.g., cleaning, home repairs, and playing with the grandchildren). Older adults who fall must get up from the floor; therefore, the ability to rise from the floor, or floor transfer, is a key factor in overall safety, independence, and quality of life (Tatum & Bradley, 2011).Tatum and Bradley (2011) conducted a study to determine whether yoga was effective in improving the ability to transfer from the floor in healthy older adults. Participants were healthy, community-dwelling older adults new to yoga, ranging in age from 58 to 83 years of age (*M* = 68.7 years), recruited through advertisements in local publications and physician referrals. The intervention was a 13-week yoga class, meeting weekly for 90 minutes. The sample consisted primarily of women (*n* = 37) with fewer male participants (*n* = 8).

Outcome measures included (a) rating of perceived fitness & mobility, (b) active and passive ankle joint dorsiflexion, (c) seated knee extension/quadriceps strength, (d) standing balance, using the BBS, (e) floor transfer ability, and (d) transfer difficulty. Affective data (i.e., transfer perception and balance perception) were collected with a pencil and paper questionnaire; and physical data (BBS and transfer ability scale) were collected by a licensed physical therapist. The researchers used an interrupted time-series design with two pre-treatment and one post-treatment collection periods.

A dependent *t*-test was conducted on pre-intervention and post-intervention transfer ability scores. Gains were statistically significant ($t = 11.25$, $p < .001$) with a large magnitude of effect ($d = 1.36$) reflecting a 42-percentile gain over the duration of the study. Pre- and post-intervention results respectively, included improvement in affective data: (a) transfer perception, *M* increase = 1.31($p = .001$) and (b) balance perception *M* increase = 0.82 ($p = .001$). Participants also had improvement in BBS scores, *M* increase = 5.13 ($p = .001$) and transfer ability scale scores, *M* increase = 3.08 ($p = .001$). There was no statistically significant improvement in the remaining parameter: transfer difficulty scale scores.

In addition to the overall effect, a series of nested regression models were used to determine which independent variables best predicted transfer ability. Tatum and Bradley (2011) determined that balance and quadriceps strength were best predictors of transfer ability, noting that the practical significance of the improvement in transfer ability can be interpreted as a percentile gain. Tatum and Bradley noted that for the general older adult population, the individual who is able to get up from the floor unassisted will rank at the 50$^{th}$ percentile or higher. After the 13-week yoga intervention, this same individual is predicted to perform at approximately the 92$^{nd}$ percentile (Tatum & Bradley, 2011). In other words, the average participant will experience a 42$^{nd}$ percentile point gain in floor transfer ability based on the developed scale for this study (Tatum & Bradley, 2011).

There were no limitations noted by the authors of this study. Tatum and Bradley (2011) opined that yoga is a valuable tool for older adults in the area of functional mobility. Tatum and Bradley also opined that the ability to rise from the floor or floor transfer is a key factor in overall safety, independence, and quality of life of older adults. Furthermore, Tatum and Bradley concluded that therapeutic yoga addresses the changing needs of an aging population. Thus, this study provided evidence to support this EBP project.

Because more than a third of adults' ages 65 years or older fall each year in the United States, Brown et al. (2008) conducted a study to evaluate if a yoga-based exercise program could reduce fall risk in older adults.

Participants, ($n$ = 27) ages 65 years and older were recruited from a local retirement community. The intervention was a 12-week yoga class, held weekly for 45 minutes. Outcome measures were (a) BBS, (b) One Leg Standing Test (OLST), and (c) ABC scale. Outcome measures were performed prior to initiation and after completion of the 3-month yoga program.

The participants had improved BBS scores after three months relative to baseline. The median BBS change at three months was 3.5 ($p < .0001$); the median ABC change at three months was -3 ($p = .0054$); and, the median OLST change at three months was 3 ($p = .002$). There were no significant differences between males and females in any of the outcomes measures. Similarly, there were no significant differences on the basis of age. Those who completed exit questionnaires indicated a 25% improvement in posture, 21% improvement in breathing, 15% improvement in stepping or walking, 13% improvement in coordination and flexibility, 8% improvement in torso strength, and 6% improvement in reaching.

There were no identified limitations to this study. The authors demonstrated the beneficial effects of yoga on balance in older adults as measured by improvements in OLST and the BBS. Thus, the findings from this study provided evidence to support this EBP project.

Significant physical changes occur on a physical level as people age: muscle strength and joint flexibility decrease, and the function of the endocrine, nervous, pulmonary, cardiovascular,

and immune systems declines. Balance can be impaired as a result of these changes which can contribute to an increase risk of falling in older adults. Vogler et al. (2011) conducted a study to determine the impact of a short-term Iyengar yoga program on physically inactive older adults.

Thirty-eight older adults (*M* = 73.21 years), who participated in less than 30 minutes of moderate physical activity per day were recruited from a retirement resort in Australia. Participants were randomly assigned to either a yoga group (*n* = 19), or a wait-list control group (*n* = 19). The yoga intervention consisted of an eight-week yoga program. Participants attended two 90-minute group-based yoga classes per week and were asked to engage in at least 15 to 20 minutes of home practice on three other days each week. The outcomes measures were (a) functional health, (b) general health and well-being, (c) physical health and well-being and (d) physical function. Data was collected at baseline and upon completion of the yoga intervention.

There were significant changes in a number of the measures of physical function within the yoga group: median overall muscle strength increased by 12% in the yoga group ($p$ = .001), but did not change significantly in the control group; median active range of motion for the upper extremities ($p$ = .001) and hip flexion ($p$ = .008) both improved in the yoga group, but remained unchanged in the control group; median active range of motion for trunk rotation improved significantly in the yoga group ($p$ = .001) and decreased significantly in the control group ($p$ = .01); significant positive changes in median hip abduction ($p$ = .001) and hip extension ($p$ = .003) were observed within the yoga group. In addition, the median changes in all of these variables were significantly different between the groups, except for the median change in hip flexion. The overall muscle strength, median change, 11.5 (0 to 34.6); range of motion (ROM) upper extremities (cm): median change, -7 (-33 to 0); ROM trunk rotation, median change, 16 (0 to 60); ROM hip flexion, median change, 10 (-18 to 72); ROM hip abduction, median change, 16 (-8 to 36); and ROM hip extension, median change, 4 (-4 to 12).

There were limitations to this study. The study was conducted in a retirement resort and therefore the results may not be generalizable to the population of older people as a whole. It

was beyond the scope of this study to determine if the resort residents were more or less healthy or frail than older people generally. A larger sample size would have increased the power of the statistical analyses and reduced the potential for type II errors. Results from the questionnaires may have been inflated because statistical analyses did not protect against the potential for error that can arise when two instruments measure similar constructs. Participants in the control group were not asked to record their physical activity during the intervention period. As a result, it was not known if their activity levels changed, and if so, how this may have influenced their results.

Vogler et al. (2011) opined these findings were consistent with other research using yoga interventions that demonstrated improvements to musculoskeletal health. Participants in the yoga group demonstrated significant improvement in trunk rotation, which may be associated with enhanced spinal joint movement, a factor that has been described as fundamental to intervertebral disc nutrition during the aging process. Vogler et al. found that participants in the control group significantly deteriorated in trunk rotation over the eight weeks, raising concern that deterioration in flexibility can occur rapidly in absence of physical activity. Furthermore, this study demonstrated the beneficial effects of yoga on flexibility, balance, and coordination, which are important for older people, as this can reduce the risk of falls. Thus, this study provided evidence to support this EBP project.

**Synthesis of Appraised Literature**

Studies included in the appraised literature revealed comparable findings and recommendations. Altogether, the critically appraised literature provided good quality evidence for using yoga as an exercise for older adults to improve balance and quality of life. The systematic reviews, meta-analyses, descriptive studies, literature reviews and RCTs, contained no major conflict in results. No major methodological concerns were identified. The results of the evidence were consistent with the most current evidence and demonstrate that yogic practices enhance muscular strength and balance and improve the mobility in older adults. According to

Patel et al. (2011), yoga may be superior to conventional physical-activity interventions in older adults. These discoveries further expanded the current base of evidence and supported nursing practice changes.

**Best Practice Model**

The practice model recommendation developed for this project was synthesized from the best available evidence integrated from the critically appraised literature. Titler et al. (2001) noted that teamwork and collaboration were powerful intervention features for introducing practice change (Titler et al., 2001). Within this project, the team leader (DNP student/project manager) used the Iowa Model to identify the system-based problem and search for solutions. This process was enmeshed with Kotter's (1996) first three steps of change and relied on input from team members to design or tailor the intervention. The procedure guideline was supported by evidence in the literature. The healthcare providers had an opportunity to communicate a common understanding of the goals (Kotter's fourth step) and were empowered with an action plan (Kotter's fifth step). The project manager proposed implementation of the balance assessment tool and recommended continuation of yoga classes at the center after completion of the project.

# CHAPTER 3

# IMPLEMENTATION OF PRACTICE CHANGE

## Sample and Setting

A senior living center in Northwest Indiana was chosen as the project site. The center had been open since 2010 and was a part of a large chain of senior living centers in Indiana. The staff at the residential center consisted of two medical directors, one director of nursing, and an additional licensed practical nurse. Thirty older adults resided in this center: a mixture of married couples and singles, ranging in age from 66 to 86 years. The residents resided in either apartments or villas. The ethnicity of the residents was Caucasian American. The facility's average occupancy rate was 90%. Upon or prior to relocating to the center, the resident's family physician verified the resident was (a) not a fall risk and (b) did not have dementia. To participate in the intervention residents (a) registered for the yoga classes via email or telephone call to the project manager and (b) were able to walk or drive from their apartment or villa to the recreation room where the yoga classes were held. The goal was to recruit 15 to 20 residents, approximately 50% of the population, to participate in the intervention.

The financial viability of this center depended on keeping rooms full; if residents were unable to care for themselves, they were moved to a different facility, where skilled nursing care could be provided. A fall resulting in injury would most likely necessitate transfer elsewhere, decreasing the center's occupancy rate and resulting in decreased revenue.

A balance assessment was not performed on residents prior to admission. Yet implementation of a balance assessment tool would help the center identify residents at risk for falls. Because researchers have determined (a) a well-designed program that incorporates balance and strength training contributes to prevention or reduction of falls and (b) group-based therapeutic exercise has been able to reduce risk of falling and fall occurrence in community-dwelling aging adults (Zettergren et al., 2011), a group exercise program was appropriate within

this center. Yoga instructional classes were implemented with the goals of (a) improving residents' balance and (b) lessening fall risk.

## Outcomes

The outcome "balance" was measured using the Berg Balance Scale (BBS). The pre- and post-intervention (BBS) was administered by the yoga instructor, with the project manager assisting. The testing was performed at the senior center. Having one person completing the measures provided better inter-rater reliability and accuracy for the measure (Qutubbin et al., 2005).

## Intervention

The yoga intervention was a gentle form of yoga that was practiced sitting in a chair or standing and using a chair for support. Chair yoga is appropriate for older adults, especially those with osteoarthritis, who are unable to participate in regular standing yoga or other exercise. Chair yoga, is safe to practice, easy to learn, and not likely to lead to falls (Park & McCaffrey, 2012). Chair yoga requires less physical strength than a strenuous exercise, and can allow frail older adults to practice individually or in groups. Chair yoga was designed for older adults by Kristine Lee, a yoga instructor with more than 20 years of experience (Park & McCaffrey, 2012).

The yoga class was conducted biweekly, 60 minutes in duration, for 12 weeks. The classes were held in the large recreational room at the center. There was ancillary staff located in an open office space which was approximately six feet from the recreational room. The instructor's usual fee was waived for all participants. The class was conducted by an experienced yoga instructor who had a degree in exercise physiology. The yoga instructor had 11 years of experience teaching yoga to adults and older adults and to post-stroke patients for improvement of balance. The participants were provided with the chairs for the yoga classes. The yoga class agenda (a) the first ten minutes was warming up with a focus on breathing techniques, stretching of the arms and guided-imagery meditation (b) the next 40 minutes was

the yoga poses and, (c) the last 10 minutes was cooling-down by relaxing and meditating sitting in the chair. The instructor played relaxing music during the last 10 minutes of class. There was only one enrollment period.

## Planning

### Recruiting Participants

An introductory program was held at the senior center with the goals of (a) introducing the project manager and the yoga instructor, (b) explaining the project, (c) demonstrating the yoga classes by the instructor, and (d) explaining the registration process. Two weeks prior to the program, an introductory flyer (Appendix A) was posted on bulletin boards located in the main lobby and the recreational area of the senior living center. These flyers were also placed in the residents' mailboxes. Additionally, the flyers were made into tent cards and were placed on the tables in the dining room. The introductory meeting date and time was posted on the large activity calendar that was in the main lobby of the senior living center. Also, the director of nursing and the licensed practical nurse distributed the flyers, attended the presentation, and encouraged participation by speaking to each resident individually.

All of the residents were invited to participate in this EBP project. They were informed that there was one open enrollment date. Upon completion of the introductory meeting, the project manager left written instructions for the residents as to how to register for the classes. The director of nursing offered to assist the residents in registering. The project manager contacted the registered participants and scheduled 30 minute appointments to (a) obtain written informed consent, (b) administer the 15-minute BBS test, performed by the yoga instructor and, (c) articulate starting date and time of yoga classes.

## Data

### Measures and their reliability and validity

The BBS (Appendix E) was the measurement tool used to evaluate balance and postural stability. This tool was chosen because it is a well-accepted tool that has excellent reliability and

validity with older adults (Qutubuddin et al., 2005). The BBS was developed to measure changes in functional standing balance over time (Qutubuddin et al., 2005). The BBS is a 14-item scale that rates each function from 0 (lowest) to 4 (highest) on a dependence-independence continuum. The scores are interpreted as follows: (a) a score of 41-56 indicates a low fall risk, (b) a score of 21-40 indicates a medium fall risk and, (c) a score of 0-20 indicates a high fall risk (Lusardi, 2004). The tool takes approximately 15 minutes to complete per individual. The BBS has been established as safe and easy to use and has strong internal consistency with a Cronbach alpha of 0.96 and good reliability with many disease populations (Qutubbin et al., 2005). A negative aspect with this tool is a potential ceiling effect with higher functioning persons (Lusardi, 2004).

In addition to balance, participant satisfaction was also evaluated. The participants completed a satisfaction survey (Appendix C) to measure their satisfaction with the yoga classes. The rationale for this survey was because if participants are satisfied, then it was anticipated that the organization would consider continuing the yoga instruction after the project ended.

**Collection**

The BBS was administered by the yoga instructor at pre-intervention and again at post-intervention. The project manager assisted the yoga instructor. After completion of the BBS, the yoga instructor gave the project manager the results. The results of the tests were locked in a desk in the project manager's home to ensure confidentiality and safety of the data.

**Management and Analysis.**

The effect of this EBP project was measured using the pre- and post-intervention BBS score of the participants. The data was analyzed using the SPSS-18 statistical package and paired and independent *t*-tests of the participants' outcome measures (both pre-and post-yoga intervention) were analyzed. Demographic information was calculated using descriptive statistics.

**Protection of Human Subjects**

Preparation for practice change required significant early preparation to ensure protection of human subjects. In the early planning stages, the project manager completed training through the National Institutes of Health focusing on the protection of human subject. The project manager was in agreement with the ethical principles regarding all research involving humans as subjects as set forth in the report of the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research titled, “The Belmont report: Ethical principles and guidelines for the protection of human subjects of research “ (1979). The project was approved by the Valparaiso University’s Institutional Review Board (IRB).

The project site agreed to accept the approval of Valparaiso University’s IRB; additional, site-specific IRB approval was not available. Informed consent (Appendix B) was obtained from all participants after the risk and benefits were discussed both verbally and in writing. All questions were answered. All participants in the program were adults who were cognitively and legally able to provide informed consent. Responses to questionnaires and results from the outcome measures were kept confidential and anonymity was assured. All data was kept in a locked drawer in the project manager’s home when not in use. Participants were informed that withdrawing from the project would cause no penalty within the Senior Living Center. Professionalism was upheld through demonstration of positive personal behavior and appearance.

# CHAPTER 4

# FINDINGS

The purpose of this EBP was to determine if 12 weeks of instructor-led yoga classes would increase the balance of older adult retirement home residents. Prior to project implementation, a balance assessment was not performed on the residents at the time of admission, yet it was recognized that implementation of a balance assessment tool could help identify residents at risk for falls. An injury resulting from a fall would most likely necessitate transfer to a hospital or skilled nursing facility, decreasing the center's occupancy rate and resulting in decreased revenue. Because researchers have determined (a) a well-designed program that incorporates balance and strength training (e.g., yoga) contributes to prevention or reduction of falls and (b) group-based therapeutic exercise reduces risk of falling and fall occurrence in community-dwelling aging adults (Zettergren et al., 2011), initiating a group exercise program was determined to be appropriate within this center. Therefore, yoga instructional classes were implemented with the goals of (a) improving residents' balance and (b) ultimately lessening fall risk.

The objective of this EBP project was to answer the compelling question: In older adult retirement home residents, what is the effect of instructor-led yoga classes, compared to baseline assessment prior to instructor-led yoga classes, on "balance" after 12 weeks? Data were analyzed using the SPSS-18 statistical program. Descriptive analysis was performed on demographic data for the sample. A paired-samples *t*-test was calculated to compare group mean scores of BBS pre-intervention and post-intervention. Statistical significance for all analyses was established as $p < .05$.

## Sample Characteristics

Twenty-two retirement home residents ranging from age 65 to 86 years ($M = 75.67$) enrolled in the yoga classes and were administered the BBS baseline assessment. However, seven residents dropped out of the classes during the first week; fifteen older adults completed

100% of the yoga classes. The participants completing the sessions were all Caucasian American: two males and 13 females. One of the two male participant's ages was > 84 years of age; the other was between 70 and 74 years of age. The 13 female participant's ages were as follows: (a) six in the age group > 84 years, (b) three in the age group 80 to 84 years, (c) two in the age group 70 to 74 years, and (d) two in the age group 65 to 69 years.

The leisure activities the residents participated in before the yoga classes included Tai chi (1 resident), cards (14 residents), reading (10 residents) and crafts (11) residents; all participants were naïve to yoga.

**Changes in Outcomes**

The primary goal of this EBP project was to improve balance in older adults residing with the senior center in Northwest Indiana. Fifteen participants completed the yoga intervention and increases in total BBS scores and specific items within the BBS associated with a reduction of fall risk were achieved. Thus, the EBP project results supported the PICOT question.

**Statistical testing and significance**

Statistical analysis was performed to answer the PICOT question. A paired samples *t*-test was calculated to compare the mean pre-intervention total BBS score to the post-intervention total BBS score and to individual components of the BBS (for example, sitting to standing, standing unsupported). Descriptive analyses were conducted to compare the pre- and post-intervention BBS assessments.

**Findings**

The pre-intervention total BBS assessment score for the 15 participants completing the 12-week sessions was $M = 38.67$ ($SD = 11.51$). The post-intervention BBS assessment score was $M = 40.53$ ($SD = 9.94$). Thus, comparing the means pre- and post-intervention BBS revealed a mean increase of 1.86 points. A paired samples *t*-test of the means revealed that the increase was statistically significant ($p = .001$). Increases were also noted within sections of the BBS for the 15 participants, although not all changes were statistically significant: (a) sitting to

standing, $p$ = .015, (b) standing unsupported, $p$ = .885, (c) sitting unsupported feet on floor, $p$ = .001, and (d) standing unsupported one foot in front, $p$ = .398.

Interestingly, the male participants had higher pre-intervention and post-intervention BBS scores than the females. Although the small number of male ($n$ = 2) participants limited the ability to statistically analyze the data, the BBS mean total score increased only slightly from 44 at baseline to 45 post-intervention. The one male participant who did not complete the 12-week session also had a baseline BBS score of 44.

Within all female participants completing the yoga intervention, their mean pre-intervention BBS was 37.85 and mean post-intervention BBS was 39.85, an increase of 2.00. But, the BBS pre-intervention and post-intervention of the female participants did vary according to age groups. For those 84 years of age and older ($n$ = 6) the pre-intervention BBS was 38.67, post-intervention BBS was 40.17, an increase of 1.50. Within this age group, statistically significant increases were noted in (a) standing unsupported with eyes closed ($p$ = .001) and (b) sit to stand ($p$ = .002). Women age 80 to 84 years ($n$ = 3) achieved the greatest increase in BBS following intervention from 29.33 at baseline to 33 post-intervention, an increase of 3.67. Within all female participants completing the yoga intervention, their mean pre-intervention BBS was 37.7.85 and mean post-intervention BBS was 39.85, an increase of 2.00. But, the BBS pre-intervention and post-intervention of the female participants did vary according to age groups. For those 84 years of age and older ($n$ = 6) the pre-intervention BBS was 38.67, post-intervention BBS was 40.17, an increase of 1.50. Within this age group, statistically significant increases were noted in (a) standing unsupported with eyes closed ($p$ = .001) and (b) sit to stand ($p$ = .002). Women age 80 to 84 years ($n$ = 3) achieved the greatest increase in BBS following intervention from 29.33 at baseline to 33 post-intervention, an increase of 3.67. Within this age group, statistically significant increases were noted in (a) standing unsupported with eyes closed ($p$ = .001), (b) count number of times step touch measured stool ($p$ = .002), and (c) transfers ($p$ = .004). Women in the age 70-74 age category ($n$ = 3) the pre-intervention BBS was

38.67; post-intervention BBS was 40.67, an increase of 2 points. Within this group, statistically significant increases were noted in (a) standing unsupported with eyes closed ($p$ = .001), (b) transfers ($p$ = .001), and standing unsupported with feet together ($p$ = .009). Interestingly, the two women within the 65 to 69 age category ($n$ = 2) did not have an increase in the BBS. Pre-intervention BBS was 56 and the post-intervention BBS was 56. Not surprisingly, these younger participants had the highest pre-intervention BBS of all women, at least 16 points higher than any of the other age groups.

Statistical analyses also afforded the opportunity to evaluate for differences in those who completed the yoga intervention versus those who initially enrolled, but did not complete the intervention. The six female participants that did not complete the yoga classes had a mean pre-intervention BBS of 46.70. The pre-intervention BBS grouped females 80 to 84 years was 47.2 ($n$ = 3), as compared to 44.45 for the females aged 70 to 74 years ($n$ = 2), and 46.2 for the female aged 65 to 69 years ($n$ = 1). The male participant that dropped out of the yoga classes was in the 65 to 69 age group and had a pre-intervention BBS of 44. The pre-intervention BBS of those males that completed the yoga classes was 44. The pre-intervention BBS of non-completers was 46.70. Those who were most at need of the yoga classes, based on the pre-intervention BBS were the ones who self-selected to participate in the entire 12-week program.

The reasons given for not completing the program varied; three residents left the retirement home, one was hospitalized with pneumonia, and the other three stated they were involved with other activities and did not have time to participate in yoga.

Overall, the yoga classes demonstrated a significant improvement in the balance of participants. These results indicated residents would benefit from implementation of a balance assessment and continued yoga classes. The interpretation and significance of the results from the analysis will be further discussed in Chapter 5.

Figure 4.1. Gender of Participants

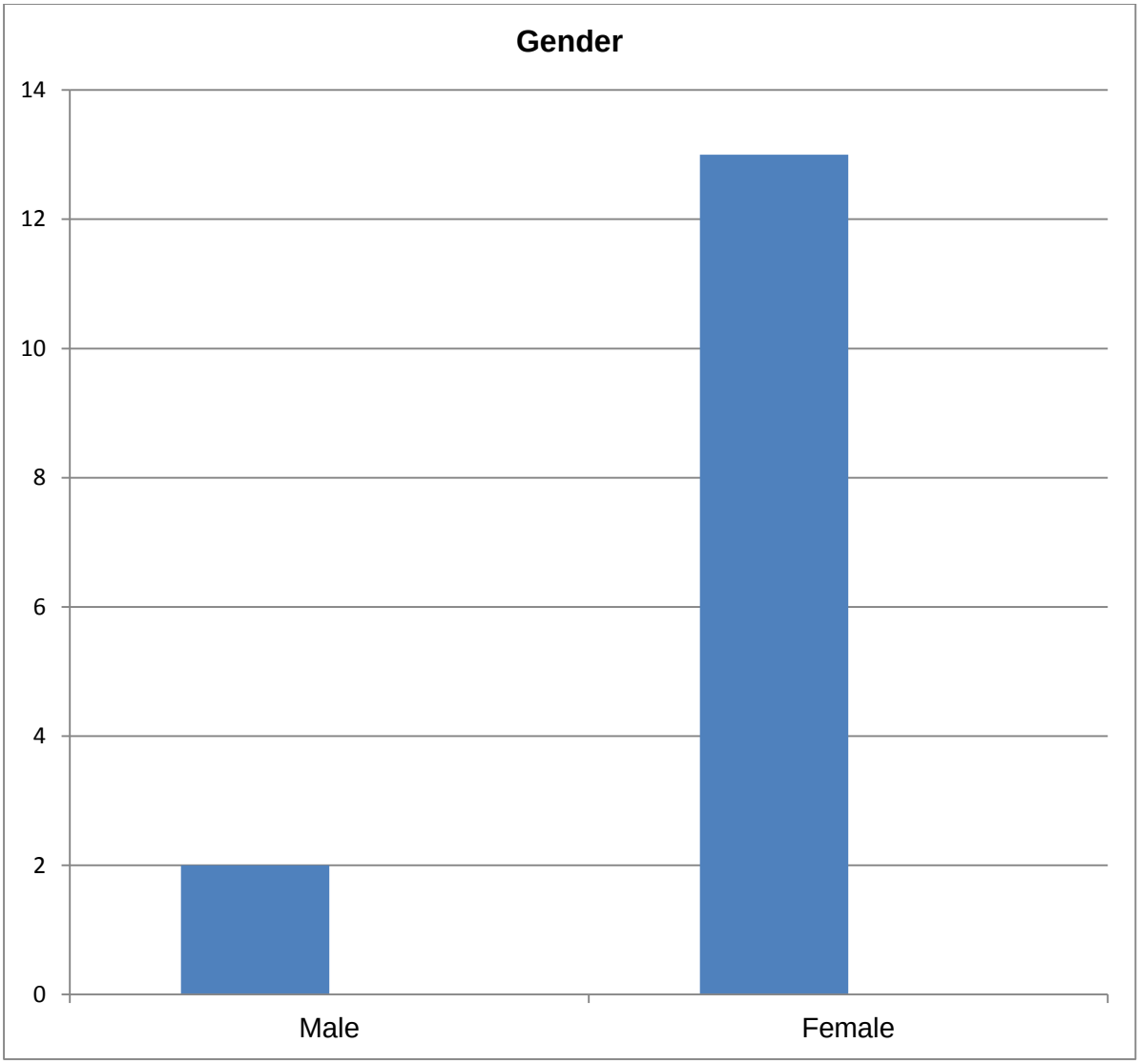

Figure 4.2. Participant Ages by Group

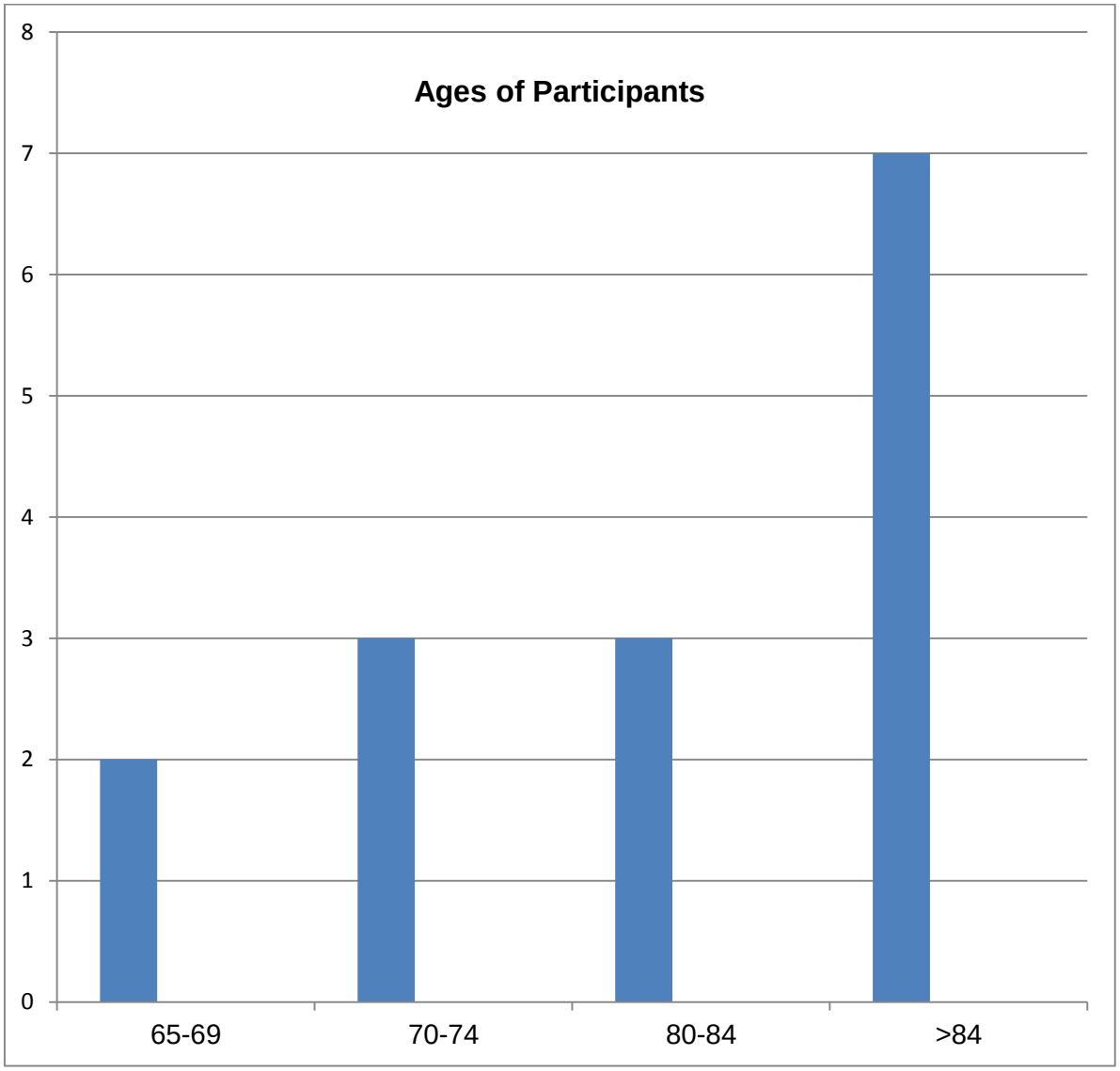

Table 4.1

Paired Samples Statistics of BBS Pre- and Post-intervention

| | Pre-Intervention BBS | Post-Intervention BBS | *p* value |
|---|---|---|---|
| Total (*N* = 15) | 38.67 | 40.53 | .001 |
| Women (*n* = 13) | 37.85 | 39.85 | .001 |
| Ages | | | |
| 65-69 (*n* = 2) | 56.0 | 56.0 | N/A* |
| 70-74 (*n* = 2) | 38.67 | 40.67 | N/A* |
| 80-84 (*n* = 3) | 29.33 | 33.0 | N/A* |
| >84 (*n* = 6) | 38.67 | 40.17 | .001 |
| Men (n = 2) | 44.0 | 45.0 | N/A* |
| Ages | | | |
| 70-74 (*n* = 1) | 44.0 | 45.0 | N/A* |
| >84 (*n* = 1) | 44.0 | 45.0 | N/A* |

N/A* = statistical analyses could not be calculated due to sample size

# CHAPTER 5

# DISCUSSION

This EBP was designed to answer the PICOT question: In older adult retirement home residents, what is the effect of instructor-led yoga classes, compared to baseline assessment prior to instructor-led yoga classes, on “balance” after 12 weeks? This chapter provides an explanation of the project findings, evaluates the theoretical and EBP frameworks utilized to guide this EBP project, and offers implications for future projects.

## Explanation of Findings

Evidence supports the premise that regular practice of yoga can improve the balance of older adults (Chen et al., 2009; DiBenedetto et al., 2005; Ebnezar & D’Ortho, 2011; Galantino et al., 2012; Kloubec et al., 2012; Patel et al., 2011; Schmid et al., 2010;Tatum & Bradley, 2011; Tiedemann et al., 2013; & Zettergren et al., 2011). Participation in a regular exercise program has been shown to be an effective way to reduce and/or prevent a number of the functional declines associated with aging (Chodzko-Zajo et al., 2009). According to Patel et al. (2011) yoga may be superior to conventional physical-activity interventions in older adults, and superior to aerobic exercise interventions.

Data for this EBP project were collected through administering a pre- and post-intervention BBS assessment and then analyzed using SPSS-18. The data were reviewed for demographic characteristics and mean BBS scores pre-and post-intervention.

The feasibility of the yoga program was also demonstrated by the ease of recruitment in a short period of time and, despite a 68.18% completion rate (15 of 22 residents), a very good attendance at the classes. This demonstrates that the yoga program was appropriate to the abilities of the older participants and also enjoyable, with participants reporting perceived benefits as a result of their attendance. This was consistent within the study conducted by Tiedemann et al. (2013). The duration of the yoga classes was consistent with previously

published literature, but according to Zettergren et al. (2011) there has been no clear evidence for determining dose, frequency, and duration for the most effective yoga program.

After reviewing and evaluating the current literature, it was determined that the BBS was a well-accepted tool that had excellent reliability and validity with older adults (Qutubuddin et al., 2005). The Chronbach's alpha was .951, reflecting a high degree of internal consistency. Furthermore, the BBS had previously demonstrated reliable use in clinical practice for assessing balance and postural control in older adults over time (Qutubuddin et al., 2005). Reproducible results were seen within this EBP project. There was a significant increase in the post-intervention BBS score of the residents: from a mean score of 38.67 at baseline to 40.53 post-intervention ($p < .001$). The age group 65 to 69 years had the highest pre-intervention BBS, at least 16 points higher than any of the other age groups. This was consistent within the literature. The female participants that completed the yoga classes had a 2.00 point increase in their BBS from pre-intervention to post-intervention. The male participants had a higher pre-intervention and post-intervention BBS than the females. The male participant's BBS mean total score increased only slightly from 44 at baseline to 45 post-intervention. However these findings were not congruent with the findings in a study by Brown and Koziol (2008) who found there were no significant differences between males and females in any of the outcome measures (e.g., BBS).

The participants within this EBP project were naïve to yoga, which was consistent with the literature. The increases within the BBS questions for the 15 participants were as follows (a) sitting to standing, $p = .015$, (b) standing unsupported, $p = .885$, (c) sitting unsupported feet on floor, $p = .001$, and (d) standing unsupported one foot in front, $p = .398$, which were consistent with the findings of other researchers (Galantino et al., 2012; Goncalves et al., 2011; Schmid et al.,2011); Tatum & Bradley,2011;Tiedemann et al.,2013; Zettergren et al., 2011). Tiedemann et al. (2013) noted that the "sit- to-stand" question within the BBS was a sensitive indicator of fall risk in older adults.

Women in the age group older than 84 years had statistically significant increases within the BBS in (a) standing unsupported with eyes closed ($p$ = .001) and (b) sit to stand ($p$ = .002). Women in the age category 80 to 84 years, had statistically significant increases within the BBS in (a) standing unsupported with eyes closed ($p$ = .001), (b) count number of times step touch measured stool ($p$ = .002), and (c) transfers ($p$ = .004). The women in this age category also achieved the greatest increase in BBS following intervention, an increase of 3.67 which was consistent with the findings reported in by Zettergren et al. (2011).Women in the age category 70 to 74 age category had significantly significant increases within the BBS in (a) standing unsupported with eyes closed ($p$ = .001), (b) transfers ($p$ = .001), and standing unsupported with feet together ($p$ = .009).

Patient satisfaction of participants in this project was similar to the findings within the literature. All of the participants rated the yoga classes “appropriate for their level of fitness”. All of the participants strongly agreed the classes were enjoyable and easy to learn. Seventy-five percent strongly agreed that their confidence in walking improved. Another finding within this EBP project that was consistent with previous literature was the value of group exercise with older adults. Participants verbalized their enjoyment of performing the poses in a group because of the support and encouragement they received from the other participants. The participants stated the yogic stretching and breathing had a markedly invigorating effect on perceptions of increased physical energy; these subjective reports are consistent with the findings reported by Chen et al. (2009). Furthermore, participants reported improvements in their sense of well-being, falling asleep faster, and staying asleep longer; these subjective reports are consistent with the findings reported by Patel et al. (2011).The participants verbalized they felt safe because they had chairs available to sit in or use as props during the yoga classes. Galantino et al. (2012) concluded a chair yoga based program in an assisted living community among older adults was both feasible and safe.

Another finding consistent with those in the literature was the value of the instructor-participant relationship. Adherence was promoted by cohesive group dynamics, and strong instructor leadership. Roland et al. (2011) opined that yoga will be made more palatable to older individuals through clearly described yoga interventions and readily available guidance from the yoga instructor during the intervention. All the participants within this EBP project verbalized how knowledgeable and caring the yoga instructor was. They were satisfied with how she connected each yoga pose to improvement in balance. The participants were observed modeling the yoga instructor, and this resulted in increased participation and an eagerness to replicate the poses correctly in class. The yoga instructor's mantra was "adapting your body to the pose" (Yoga Instructor, personal communication, October, 2014). Furthermore, "it does not matter if you cannot do the pose exactly as demonstrated; do what your body can do" (Yoga Instructor, personal communication, October, 2014). The residents were reluctant to listen to music during the yoga classes because it interfered with their hearing the yoga instructor. However, they agreed to music during the relaxation phase of the class only after the yoga instructor correlated this to balance. She explained that "we all have over 2000 thoughts going through our brains at one time. By listening to music and focusing on the music; we are training our brains to focus on one thing, which helps us focus on our balance" (Yoga Instructor, personal communication, September, 2014). The participants requested home practice during the implementation phase, but their request was denied due to not being planned at the beginning of the project. As researchers have found a benefit in home yoga practice, home practice instructions were given to the participants at the completion of the project. The residents articulated their interest in continued yoga classes after the project concluded; fearing their improvements in balance would not be sustained if they stopped practicing yoga. Vogler et al. (2011) opined deterioration in flexibility can occur rapidly in absence of physical activity (e.g., yoga) in as little as eight weeks.

Unfortunately, the continued use of a balance assessment tool was not accepted by the director of nursing at the senior center at the time of project completion. However, the medical director did note that he planned to implement a balance assessment tool in the future, once additional resources were available. But, on a positive note, yoga classes were continued at the retirement home following the end of the intervention, with the residents paying for the classes.

**Implications for the APN Role**

The EBP project manager fulfilled many of the DNP roles while implementing this project. As a change agent, the project leader identified a need in the retirement home. The project was implemented to demonstrate the benefits of yoga on the balance of older adult retirement home residents. At times, the older adults challenged the leadership of the EBP project manager. The participants of the yoga classes articulated early in the implementation that they did not agree with the confidentiality the DNP student needed to maintain. They articulated the confidentiality involved with the BBS assessments was “silly”, but agreed to “follow the rules” to make the project manager successful. Additionally, the older adults requested written examples of yoga poses that they could perform at home. The residents articulated understanding that this was not possible during the project because it could impact the final BBS measurement and the project was not designed to include and/or track home yoga exercise participation. Once again, they articulated this was “silly”, but agreed to refrain from home yoga exercises so that an accurate assessment of the effects of the group instruction could be made.

The leadership role was also demonstrated in interactions with the nursing director and medical director of the facility. The director of nursing was a licensed practical nurse who had not been previously exposed to evidence-based practice. The project manager educated her on best practices and reviewed research related to the project. Introduction of evidence-based practice is a tremendous opportunity for the APN in retirement home settings, as the majorities are staffed with licensed practical nurses. The post-project goals were implementation of a

balance assessment tool and continued yoga classes. The leadership role of the project director resulted in continued yoga classes for residents; and although the nursing director will not continue to implement a balance assessment for residents, the medical director has expressed the intent to do so once additional resources are available.

As a consultant, this DNP student collaborated with the medical director and the director of nursing. Using Kotter's (1996) first step, the DNP student created a sense of urgency to convince the director of nursing and the medical director that a change is needed. The medical director supported implementation of a balance assessment and the director of nursing was opposed. The DNP had to be diplomatic in discussions with each to prevent a power struggle during the project. In fulfilling the role of consultant and educator, the project manager generated knowledge about what is known on the topic of yoga and older adults to demonstrate competency and expertise on the project. The yoga intervention was focused on balance and postures, as well as improving confidence in movement. The yoga instructor emphasized how each pose could improve balance. Early in the project, the director of nursing apologized for never obtaining a registered nurses license and being content in her role of a licensed practical nurse. Thus, the EBP project manager felt the need to be cautious not to offend the director of nursing because of the level of education possessed by the DNP student.

**Applicability of the Evidence-Based Practice Framework**

The Iowa Model of Evidence-based Practice to Promote Quality of Care and Kotter's Eight Steps of Change served as the framework for the successful implementation of this EBP project. The Iowa Model guided the implementation of evidence into practice for the success of the project. The Iowa Model considers the provider, the patient, and the organization while guiding practice decisions (Titler et al., 2001). Using the Iowa Model, several steps facilitated the identification of the problem and the solution as it relates to incorporating evidence into practice. In the first step, the knowledge focus trigger that served as a stimulus for the change was the staff at the senior living center did not perform a balance assessment on residents prior

to, or at the time of, admission and no yoga or exercise programs were provided at the senior center. A fall with injury would necessitate residents being moved to another facility whereby skilled nursing care could be provided. This transfer would result in a decrease in patient census, thus negatively affecting the financial viability of the senior center. The decrease in patient census was the problem section of the model. Keeping residents at the senior center was considered to be a priority for the organization as they worked towards sustaining their financial viability. In the second step of the Iowa Model, the goal within this EBP project was to review and critique relevant literature for the project. The project manager conducted an extensive review of the literature to identify if there was sufficient evidence to make a practice change. Adequate evidence was found that supported the change in practice. The project manager presented the evidence to the team for feedback and recommendation. The team noted that evidence seemed sufficient to support the project and a practice change was initiated.

**Applicability of the Theoretical Framework**

The proposed change in practice was guided by Kotter's Eight Steps of Change. Utilization of Kotter's eight steps allowed the DNP student to develop an EBP project that would take into account the barriers to organizational change and ensure success. In addition, the use of this model assisted the DNP student in considering factors such as organizational culture, communication, and goals of the senior living center stakeholders during project development.

According to Kotter the first step was "creating a sense of urgency", which, within this project, was achieved by providing a summary of the current literature regarding balance and falls in older adults to the stakeholders at the senior living center. Of primary importance was the reduction in the center's population and revenue if a fall with injury resulted in residents' transfer to an increased-care facility. The second step, similar to the Iowa Model, involved creating a coalition to guide the process. At the senior living center, the guiding coalition included one of the two medical directors and the director of nursing. Obtaining the support from

this coalition truly guided the process and was important to the project's success. Step three involved the development of a vision to guide the direction of change and a strategy to coordinate action and motivate others. The ultimate vision focused on (a) implementing a balance assessment screening tool to identify those who are at risk for fall and injury, (b) continuing yoga classes after project conclusion to maintain balance and decrease risk of falls, and (c) maintaining a positive financial balance by having the facility remain full of residents. These goals were met, as the yoga classes will be continued instructions have been provided for home exercises, there is a plan to implement a balance assessment when resources are available, and no residents within the yoga group reported a fall during the project implementation period. Within the fourth step, the project leader recognized that the vision and strategy were most effective when there was a common understanding of the goals and direction. The vision was communicated to the staff and administration of the senior living center by continuously reinforcing the goal of fall prevention through improved balance of the residents, which keeps the residents in the senior living center. The broad-based action plan, in step five, allowed the team to be responsible for deciding who would perform the balance assessments on the residents post completion of the project. The medical director decided to implement a balance assessment at a later date, after increased resources became available. The sixth step focused on short-term successes. The initial short-term success included participation of the residents in the introductory program, which introduced the program, project manager, and yoga instructor to the residents. Another short-term success was enrollment of participants and then having those enrolled attend the classes. The project manager sent out thank you notes to participants to encourage continued participation. Another short-term success was the enthusiasm shown by the participants and the developing positive group dynamics of the participants.

### Strengths of the Evidence-Based Project

This EBP project had significant strengths despite the difficulties encountered with the resistance of the director of nursing. Implementation of the EBP project was effective in demonstrating significant improvement in the post-intervention BBS scores of the participants. This project increased awareness of the importance of maintaining or improving the balance of older adults.

Each yoga class ran more smoothly as the participants became more confident in their ability to perform the yoga poses. The project manager regularly attended the yoga classes, offering encouragement to the participants. The yoga instructor connected each yoga pose to improvement in balance. She offered brief episodes of reinforcement of poses at the start of each yoga week. It has been noted that yoga programs that are too complicated to learn or perform are likely to discourage older learners, lower their self-esteem, diminish interest, and decrease participation (Chen et al., 2009).

A major strength of this project included the high rate of participant satisfaction with the yoga classes. Not only did results suggest improvement in their confidence with walking, but residents indicated they truly enjoyed the yoga and wanted to continue with yoga classes. High rates of intervention adherence demonstrated the feasibility and participant enjoyment of the yoga program, which was consistent with the literature.

The participants were very interactive during the classes. They demonstrated determination to improve their balance through practicing yoga. They were enthusiastic and supported each other during the yoga classes. The participants brought friends and family members to the yoga classes and encouraged them to participate in the classes.

Application of the Kotter's eight steps of change served as a suitable framework to guide this EBP project. The step-by-step approach of the model was an identified strength because, if each of the steps was successfully completed, continued implementation of a balance assessment and continued yoga classes will be inherent.

**Limitations of the Evidence-Based Project**

A weakness of this EBP project was the small number of participants, which limited data analyses, and within data analyses conducted (similar to research studies), the small number of participants could impact the statistical power of the results. In addition the small number of residents included within this project may have limited its applicability to organizational change within larger facilities, although the small number of participants were consistent within five of the previously published studies that were reviewed during the search for supportive evidence (Brown et al., 2008; DiBenedetto et al., 2005; Galantino et al., 2012; Schmid et al., 2010; Zettergren et al., 2011).

Another weakness of this EBP was the homogeneity of the sample. The participants in this EBP project were a homogenous group of older adults with 100% being Caucasian and predominately female (87%). Although this limits the generalizability of the benefit of yoga to older adults males, the participants illustrated in this EBP project were consistent with previous studies in the literature (Brown et al., 2008; DiBenedetto et al., 2005; Galantino et al., 2012; Goncalves et al., 2011; Patel et al., 2011; Roland et al., 2011; Schmid, et al., 2010; Tatum & Bradley, 2011; Tiedemann et al., 2013; and Zettergren et al., 2011). The lack of diversity also limits the ability to generalize these findings to address the benefits of yoga to diverse ethnic populations.

The center's daily activities served as a barrier during early implementation. According to Patel et al. (2011), the most commonly cited barriers to ongoing participation in yoga classes were inconvenience of class times. The participants, as a group, decided upon the day and time of the yoga classes. However, only after input from the activities director was a date and time established that did not result in a conflict for the residents. Of the 22 residents who registered for the classes, 15 (68.17%) of participants completed the classes. Three of those seven, who initially participated, noted that they were unable to complete the 12-week sessions because of "other obligations".

Another limitation to this EBP project was the lack of guidance in this organization that was not previously ingrained within a culture of change. The twelve-week time frame allotted for this EBP project implementation, coupled with the actual time it takes for organizational change to occur, and progression through each step within an appropriate amount of time was not feasible, and was identified as a weakness. It was recommended that a greater period of time would allow the stakeholders to progress through each of the stages of change more naturally, thus allowing the change in provider behavior to be more gradual and readily accepted.

## Implications for the future

### Practice

The positive realization of the project outcomes would suggest that this EBP project was successful in meeting its goal of continued yoga classes and implementation of a balance assessment in the future. Practice implications for this EBP project focus on the role of the APN in disseminating these findings in an attempt to motivate the other retirement homes within the project site chain to implement a balance assessment and to offer yoga instruction. APNs are in an ideal position, by virtue of their holistic background, to suggest and encourage the utilization of complementary and alternative approaches to maintaining balance in older adults. APNs caring for older adults residing in senior living centers can advocate for yoga within those facilities. They also can provide referrals to yoga tapes and or instructional videos or pamphlets to do so. And, the APN completing a physical assessment on the older adult prior to the resident entering the center could conduct the BBS.

### Theory

The Iowa Model and Kotter's Eight Steps of Change were useful for this EBP project. All stages of the Iowa Model and Kotter's Eight Steps of Change were used and were a good fit for this project. Kotter's theory allowed for analysis of the project at each of the eight stages. Staff tended to be more involved with the yoga classes when they were offered incentives, such as written thank you notes from the project manager. The activities director encouraged the

residents to attend the yoga classes. She received a thank you note from the project manager and this note was placed in her personnel file. After this, she observed many of the yoga classes and articulated support for the BBS. In the third stage of Kotter's theory, for people to accept the change and contribute to making the change successful, they need to understand how the changes will benefit them. The project manager communicated the goals of improving balance to prevent falls with injury to the stakeholders weekly. Theory development occurs through different methods, although research is most commonly accepted method. When research findings are consistent over multiple studies, theories develop and evolve (Peterson, 2009). As this project exhibited consistent findings with the literature, it provides for an increased database of knowledge to increase the utility of the BBS and yoga classes in retirement homes.

**Research**

Results obtained from this EBP project build upon existing knowledge and lead the profession towards areas that may need further development. Despite the success of this EBP, ethnic disparities remain a concern. This EBP project, as designed and implemented, had participants that were Caucasian American. Nonetheless, additional research is needed to determine if ethnic populations would benefit from yoga to improve balance. Further research should then focus on overcoming the identified barriers so that ethnic minorities receive the same benefits of yoga as their Caucasian counterparts. The majority of the yoga participants were female which is consistent with the literature. Additional research is needed to determine if males would benefit from yoga to improve balance. Continued use of a balance assessment and continued yoga classes can serve as a promoter for EBP initiatives in practice. More high-quality research needs to be conducted to elucidate the degree to which fitness benefits might be engendered in older adults through regular yoga participation (Roland et al., 2011). Further research to inform the development of yoga programs specifically for the growing older adult population would be of benefit to the broader yoga community (Vogler et al., 2011).

**Education**

Education is essential to the evidence based process as dissemination of the results allows for providers to keep abreast of current changes and practice in caring for older adults. This EBP project provides direct implications for nursing education. Education was the key to keeping the stakeholders knowledgeable about current practices. According to the Iowa Model, a team should be formed to help develop, implement, and evaluate the practice changed. The team composition should encompass stakeholders in the practice change, nurses, managers, and advanced practice nurses (Titler, 2001). The EBP project manager identified the stakeholders in the center that were involved in the practice change. They key stakeholders included the director of nursing, the medical director, and the project manager. Education is important to help the nursing profession grow and continue to make a difference to the community. Data from the literature was shared with the team supporting the need for the project. Specifically, to date, the focus of many exercise interventions with older adults has been on improving aerobic fitness (Kraemer & Marquez, 2009). Unfortunately, this focus fails to address losses in strength and flexibility seen among older adults as they age. Decreased strength and flexibility has a negative effect on balance. The physical positions of yoga provide a low-intensity exercise that improves muscle strength, flexibility, and body alignment, which improves balance. Yoga is one of the “top 10” commonly used alternative therapies available to the community-dwelling older adult population (Zettergren et al., 2011).

The practitioner is integral in the continuation of EBP, especially when considering the implication for future practice. APN’s are in the unique position to educate older adults to alternative modalities in maintaining balance. Older adults should be made to feel empowered to maintain or improve their balance, and APN’s are in a prime position to be change agents so as to allow change to become common practice. The APN focus of education would include incorporating the BBS in the assessment of older adults in physical assessment courses, reviewing the benefit of yoga in fall reduction when discussing content related to disorders of

older adults (e.g., osteoporosis, osteoarthritis), and working within the community to educate the community general older adult population, and directors of senior living centers.

**Conclusion**

The primary outcome for this EBP project was to determine if yoga would improve the balance of older adult retirement home residents. Overall, the project was considered a significant success. Results from this project are consistent with the literature and demonstrate that yoga is safe and effective at increasing the balance of older adults. Yoga is a feasible and safe intervention for older adults even in their ninth and tenth decades of life (Galantino et al., 2012). Yoga instructors have a solid understanding of common medical conditions and their associated risks, as well as an ability to use this knowledge as a foundation for creating a safe and effective yoga practice (Krucoff et al., 2010).

The DNP student was the ideal candidate to lead this EBP. Additional education provided the DNP student with the knowledge and tools to become a transformational leader: inspiring, challenging, and enabling others throughout the change process. Within this project, the change began as a vision for identifying residents that were at risk for falls and the financial viability of the center for keeping beds full, continued as the DNP student perused through a wealth of information, and ultimately manifested in project completion. The Iowa model was an appropriate guide to project selection, but provided less guidance for sustaining implementation process. Instead, Kotter's steps of change proved to be essential to ensuring the continued participation of the stakeholders. Stakeholders developed a common understanding of goals and direction; focusing on short-term successes provided momentum to overcome complacency and achieve the overall goal. Participation in this EBP has now launched an organizational change, albeit with some resistance from the director of nursing. Still, future residents within this facility will benefit from the implementation of a balance assessment tool and continued yoga classes.

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## Patricia C. Hart

Mrs. Hart graduated from Purdue University with an Associate degree in the Science of Nursing in 1973. She worked in various critical care settings before returning to Valparaiso University for her BSN in 1993. She continued at Valparaiso University and received her MSN in 1996. She is currently attending Valparaiso University to earn a DNP in 2015. Mrs. Hart has held many clinical and administrative positions, and is currently the chief operating officer/chief nursing officer at a hospital in Crown Point Indiana. Mrs. Hart is a member of CAPNI and AANP. She co-authored an article that was published in Nursing Management titled *Hourly Rounding*. Mrs. Hart is passionate about the health of older adults. Her EBP project was titled *The Effects of 12 Weeks of Instructor-Led Yoga Classes on Balance in Older Adults.*

## ACRONYM LIST

ADL: Activities of Daily Living

ABC Scale: Activities-Specific Balance Scale

APN: Advanced Practice Nurse

BBS: Berg Balance Scale

BMD: Bone Mineral Density

BMI: Bone Max Index

CASP: Critical Appraisal Skills Program

CDC: Centers for Disease Control and Prevention

CES-D: Center for Epidemiological Studies-Depression Scale

CINAHL: Cumulative Index to Nursing and Allied Health Literature

DNP: Doctor of Nursing Practice

EBP: Evidence-based Practice

FoF: Fear of Falling

GDS: Geriatric Depression Scale

HF: Hip Flexion

HRQoL: Health Related Quality of Life

HSE: Horizontal Shoulder Extension

JBI: Joanna Briggs Institute

KF: Knee Flexion

LSF: Lumbar Spine Flexion

MEDLINE: Medical Literature Analysis and Retrieval System Outline

MeSH: Medical Subject Heading Terms

NHIS: National Health Interview Survey

OLST: One Leg Standing Test

PICOT: Population, Intervention, Comparison, Outcome, Time

PSS-Perceived Stress Scale

QoL: Quality of Life

RCT: Random Control Trials

RCMH: Rising from a Chair and Moving About the House

ROM: Range of Motion

RSP: Rising From a Sitting Position

RSVD: Rising From the Ventral Decubitus Position

SA: Shoulder Abduction

10mW: Ten Meter Walk

USDHHS: United States Department of Health and Human Services

$Vo_2$: Maximum Aerobic Capacity

WHOQoL: World Health Organization Quality of Life

WHO: World Health Organization

**APPENDIX A**
Evidence Data Table

| **Author(s), Publication, Level of Evidence/Quality** | **Population, Setting** | **Design, Intervention(s), Comparisons** | **Outcomes and Effect measures** |
|---|---|---|---|
| Patel et al. (2011)<br><br>*Journal of Alternative & Complimentary Medicine*<br><br>Effects of yoga on physical functioning and health related quality of life in older adults: A review<br><br>*Level I*, good | *N* = 649<br><br>Mean age = 63.5 to 77.5 years<br><br>71% were females<br><br>Four countries represented: United States, Cuba, Taiwan, and India<br><br>Range of settings, intervention intensity, and outcome measures | Systematic review & meta-analysis of 18 studies published through from 1950-2010 evaluating the effectiveness of yoga, compared with other exercise interventions as shown on measures of health and physical functioning.<br><br>Yoga intervention varied in frequency from 12 to 14 weeks, from once to twice a week<br><br>Ten studies evaluated yoga as the primary intervention, eight studies evaluated aerobic exercise as the primary intervention and yoga as the active control. | Within the studies that compared yoga to aerobic exercise, the yoga group experienced a 4.4% greater improvement in flexicure kyphosis angle and 5% greater improvement in kyphosis index than the aerobic group. |
| Tiedemann et al. (2013)<br><br>A 12-week Iyengar yoga program improved balance and mobility in older community-dwelling people: A pilot randomized controlled trial<br><br>*Journal of Gerontology*<br><br>*Level II*, Good | *N* = 54<br><br>Females = 43<br><br>Males = 11<br><br>Mean age 68 years<br><br>Community dwellers of Sydney, Australia | RCT with intention to treat<br><br>Twice-weekly yoga, 60 minute duration, for 12 weeks<br><br>Comparing intervention group with control group | Yoga group improved: Standing test difference = 1.52 second, 95% CI [0.10, 2.96], $p = .04$; sit-to-stand test difference = -3,43 seconds, 95% CI [ - 5.23, -1.64], $p < .001$; 4-meter walk difference = - .50 seconds, 95% CI [-.072, - 0.28], $p < .001$; and one-legged stand with eyes closed difference 1.93 seconds, 95% CI [0.40, 3.46], $p = .02$. |

| | | | |
|---|---|---|---|
| Chen et al. (2009)<br><br>Sleep quality, depression state, and health status of older adults after silver yoga exercise: Cluster randomized trial<br><br>*Journal of Clinical Nursing*<br><br>*Level III,* Good | *N* = 62<br><br>Age 60 years and older<br><br>Community dwellers, from Southern Taiwan.<br><br>Naïve to yoga | Cluster randomized trial assessing six months of silver yoga exercises on sleep quality, depression state, and health status<br>Measured at baseline, three months, and six months. | Body weight, BMI and systolic blood pressure scores were significantly lower in the yoga group; lower body flexibility, lower limb muscle endurance, and walking speed and range of motion of both shoulder and hip joints were all significantly higher in the yoga group (all $p < .005$).<br><br>Physical health perception ($t = 2.37$, $p = 0.20$) had a significant difference between the subjects in the experimental and control group at baseline.<br><br>Physical health perception had a significant improvement in the control group at the conclusion of the intervention ($F = 15.58$, $p = .000$). |
| Zettergren et al. (2011)<br><br>Effects of a yoga program on postural control, mobility, and gait speed in community-living older adults: A pilot study<br><br>*Journal of Geriatric Physical Therapy*<br><br>*Level III,* Good | *N* = 8<br><br>Females = 5<br><br>Males = 3<br><br>Mean age of 84 years<br>Community-living adults | Quasi experimental design assessing postural control, mobility, and gait speed<br><br>Intervention group and control group<br><br>Intervention: 8-week, 80-minute, biweekly yoga class | Intervention group improved on Berg Balance Scale, $t = 4.51$, $p = .0003$; fast gait speed $t = 2.69$, $p = .03$; floor-to-stand time, $t = 1.20$, $p = .09$, four-square step test, $t = 0.03$, $p = .98$; time to rise from the floor and timed up and go test decreased $t = 0.87$, $p = .41$, a clinically relevant finding; however these changes did not reach statistical significance. |

| | | | |
|---|---|---|---|
| Goncalves et al. (2011)<br><br>Flexibility, functional autonomy and quality of life (QoL) in elderly yoga practitioners<br><br>*Archives of Gerontology & Geriatrics*<br><br>*Level III*, Good | *N* = 83<br><br>Females, aged 60 years or older<br><br>Enrolled in the Elderly Health Program in Belem, Brazil | Quasi-experimental design<br><br>An intervention of a yoga program, 60 minute duration, biweekly, for 14 weeks | Percent of Improvements of the yoga group compared to control group:<br>Shoulder abduction, 14.11%, *p* = .0001<br>Horizontal shoulder extension, 33.90%, *p* = .0001<br>Lumbar spine flexion, 50.74%, *p* = .0001<br>Hip flexion, 33.75%, *p* = .0001<br>Hip extension, 10.93%, *p* = .021<br>Knee flexion, 3.90%, *p* = .001<br>Overall quality of life, 8.13%, *p* = .046 |
| Galantino et al. (2012)<br><br>Safety and feasibility of modified chair-yoga on functional outcome among elderly at risk for falls<br><br>*International Journal of Yoga*<br><br>*Level VI*, Good | *N* = 16<br><br>Females = 12<br><br>Males = 4<br><br>Older adults age 68-97 years. Mean age 87.7 years that experienced a fall in the past six months and an increase fear of falling<br><br>Participants lived in an assisted living community in the United States | Single arm pilot descriptive design. Yoga class, 60 minute duration, biweekly, for eight weeks.<br><br>Comparison of baseline and post-intervention assessment of Timed Up and Go, Berg Balance Scale, and fear of Falling. | From baseline to the end of the study, the improvement in the Sit to Stand Scale, 0.31 to 0.93, *p* = .021 and reduction in Timed Up and Go, 22.57 to 18.97, *p* = 0.22. The HADS anxiety subscale showed a reduction from baseline, 6.10 to 4.86, *p* = .072. Fear of falling improved, 5.27 to 2.60, *p* = 0.029. |
| Roland et al. (2011)<br><br>Does yoga engender fitness in older adults? A critical review<br><br>*Journal of Aging and Physical Activity*<br><br>*Level VI*, Good | *N* = 544<br><br>71% were female<br><br>Mean age of participants 69.6<br><br>Living in North America | Critical review of 10 studies<br><br>RCTs = 5<br>Single-group pre-post design = 5<br><br>Intervention group and control groups matched for age, sex, and health | Moderate improvement in gait, Effect size (*ES)* = 0.54, 0.80; balance, *ES* = 0.25-1.61, upper/lower body flexibility, *ES* = 0.25, 0.70, lower body strength, *ES* = 0.51, and weight loss, *ES* 0.73, 0.99. |

| | | | |
|---|---|---|---|
| DiBenedetto et al. (2005)<br><br>Effect of a gentle Iyengar yoga program on gait in the elderly: An exploratory study<br><br>*Journal of Geriatric Physical Therapy*<br><br>*Level VI*, Good | *N* = 19<br><br>Females = 13<br><br>Males = 6<br><br>Healthy, non-obese adults over the age of 62 years<br><br>Mean age = 70.5<br><br>Naïve to yoga | Single group pre-post-test exploratory study design<br><br>Intervention of 8-weeks of yoga, tailored to older persons, 90-minute duration, biweekly.<br><br>Also asked to complete at least 20 minutes of directed home practice on alternate days.<br><br>Intervention and control group | Outcome measures: 3-dimensional quantitative gait evaluation, including kinematic and kinetic measurements.<br><br>Changes over time (baseline to post-intervention) in primary and secondary outcome variables were assessed using repeated-measures ANOVA.<br><br>Intervention group significantly increased: peak hip extension, $F = 15.44$, $p < .001$; stride length, $F = 5.57$, $p = .03$, reduced pelvic tilt, $F = 4.10$, $p = .06$, adjusting for the modifying influence of frequency of home yoga practice strengthened the significance of this association. |
| Tatum & Bradley (2011).<br><br>Therapeutic yoga to improve balance and floor transfer in older adults<br><br>*Topics in Geriatric Rehabilitation*<br><br>*Level VI*, Good | *N* = 45<br><br>Females = 37<br><br>Males = 8<br><br>Healthy, independent, community-dwelling older adults, living in the United States<br><br>Mean age = 68.7 years | Quasi experimental design to measure transfer and balance ability. Pre/post testing performed<br><br>Intervention group<br><br>Intervention: 13-week, 90 minute, weekly yoga class | Intervention group improvement from pre-test to post-test respectively: Transfer perception, $M = 2.48$, $SD = 0.67$, $M = 3.80$, $SD = 0.81$, $M$ increase = 1.32; balance perception, $M = 2.16$, $SD = 0.6$, $M = 2.98$, $SD = 0.54$, $M$ increase = 0.82; berg balance scale, $M = 48.98$, $SD = 5.40$, $M = 54.11$, $SD = 1.85$, $M$ increase = 5.13; transfer ability scale, $M = 5.16$, $SD = 2.23$, $M = 8.24$, $SD = 2.10$, $M$ increase = 3.08. |

| | | | |
|---|---|---|---|
| Brown et al. (2008).<br><br>A yoga-based exercise program to reduce the risk of falls in seniors: a pilot and feasibility study<br><br>*Journal of Alternative Complementary Medicine*<br><br>*Level VI,* Good | N = 22<br><br>Females = 18<br><br>Males = 6<br><br>Retirement community older adults, living in the United States<br><br>Age: 65 years and older<br><br>Median age = 82 years | A pilot study design to measure balance in older adults. Pre/post testing performed<br><br>Intervention: 12-week, 45 minute, weekly yoga class | Improved BBS scores after three months relative to baseline, 95% Cl [41. 81, 81.3%]; improved ABC scores after three months, 95% Cl [38.2 to 79.3%]; and improved OLST scores after three months, 95% Cl [45.1 to 86.1%]. The median BBS change at three months was 3.5 (range: -1 to 8; $p < .0001$); the median ABC change at three months was -3 (range - 20 to 3; $p = .0054$); and, the median OLST change at three months was 3 (range -3 to 22; $p = .002$). There were no significant differences between males and females in any of the outcomes measures. Similarly, there were no significant differences on the basis of age. |
| Schmid, et al. (2010)<br><br>Effect of a 12-week yoga intervention on fear of falling and balance in older adults: A pilot study<br><br>*Archives of Physical Medical Rehabilitation*<br><br>*Level VI, Good* | *N* = 14<br><br>Older adults, over 65 years<br><br>Mean age = 78.36<br>A retirement community in the Midwest | A single-armed pilot study<br><br>Biweekly, 75 minute, 12-week yoga intervention | Fear of falling, (FoF scale) and balance, (BBS).<br><br>Upper and lower body flexibility measured by the Back Scratch Test and Chair Sit and Reach Test.<br><br>FoF decreased by 6%, static balance increased by 4% ($p = 0.45$), and lower-body flexibility increased by 34%. Upper body flexibility did not change significantly. |

| | | | |
|---|---|---|---|
| Vogler, et al. (2011)<br><br>The impact of a short-term lyengar yoga program on the health and well-being of physically inactive older adults<br><br>*International Journal of Yoga Therapy*<br><br>*Level VI*, Good | Older adults, mean age 73.21 years<br><br>Physically inactive (participating in less than 30 minutes of moderate physical activity per day<br><br>Residing in a retirement resort in Australia | Descriptive study<br><br>Biweekly, 90 minute duration, 8-week lyengar yoga intervention, plus at least 15 to 20 minutes of home practice on 3 other days each week | There were significant changes in a number of the measures of physical function within the yoga group: median overall muscle strength increased by 12% in the yoga group ($p$ = .001), but did not change significantly in the control group; median active ROM for the upper extremities ($p$ = .001) and hip flexion ($p$ = .008) both improved in the yoga group, but remained unchanged in the control group; median active ROM for trunk rotation improved significantly in the yoga group ($p$ = .001) and decreased significantly in the control group ($p$ = .01); significant positive changes in median hip abduction ($p$ = .001) and hip extension ($p$ = .003) were observed within the yoga group. |

# Appendix B
## Berg Balance Scale

Scoring: Mark the lowest category that applies for each function.
Recommended for ACL of 4.0 or greater

**Date Date Date Date**

**Sitting to Standing:**
*(Instructions: "Please stand up. Try not to use your hand for support.*")
4 = able to stand, no hands, and stabilizes independently
3 = able to stand independently using hands
2 = able to stand using hands after several tries
1 = needs minimal assist to stand or to stabilize
0 = needs moderate or maximal assist to stand

**Standing Unsupported:**
(*Instructions: "Stand for two minutes without holding.")*
4 = able to stand safely 2 minutes
3 = able to stand 2 minutes with supervision
2 = able to stand 30 seconds unsupported
1 = needs several tries to stand 30 seconds unsupported
0 = unable to stand 30 seconds unassisted

**Sitting Unsupported Feet On Floor:**
(*Instructions: "Sit with arms folded for two minutes.")*
4 = able to sit safely and securely for 2 minutes
3 = able to sit 2 minutes under supervision
2 = able to sit 30 seconds
1 = able to site 10 seconds
0 = unable to sit without support for 10 seconds

**Standing to Sitting**
(*Instructions: "Please sit down.")*
4 = sits safely with no or minimal use of hands
3 = controls descent by using hands
2 = uses back of legs against chair to control descent
1 = sits independently but has uncontrolled descent
0 = needs assistance to sit

**Transfers:**
(*Instruction: "Please move from chair to char/mat and back again. One way toward a seat with armrests and one way toward a seat without armrests.")*
4 = able to transfer safely with minor use of hands
3 = able to transfer safely, definitely need use of hands
2 = able to transfer with verbal cueing and/or supervision
1 = needs one person to assist
0 = needs two people to assist or supervise to be safe

**Standing Unsupported with Eyes Closed:**
(*Instructions: "Close your eyes and stand still for 10 seconds.")*
4 = able to stand 10 seconds safely
3 = able to stand 10 seconds with supervision
2 = able to stand 3 seconds
1 = able to stand for less than 3 seconds
0 = needs help to keep from falling

**Standing Unsupported with Feet Together:**
(*Instructions: "Place your feet together and stand without holding.")*
4 = able to place feet together independently and stand 1 minute safely
3 = able to place feet together independently and stand 1 min. with supervision
2 = able to place feet together independently but unable to hold for 30 seconds
1 = needs help to attain position but able to stand 15 sec. with feet together
0 = needs help to attain position and unable to hold for 15 seconds

56 – Maximum Score
> 45 – less likely to fall
< 45 – more likely to fall
49.9 - 51.1 – Needs no assistive device
47 - 49.6 – Use of cane needed for outdoors
44 – 46.5 – Use of can needed indoors as well as outdoors

26.7 – 39.6 – Needs to use walker at all times
Berg Balance Scale – Page 2
*The following items are to be performed wile in the standing unsupported position:*
**Reaching Forward with Outstretched Arm:**
*(Instruction: "Lift arm to 90º. Stretch out your fingers and reach forward as far as you can.")*
4 = can reach forward confidently > 10 inches
3 = can reach forward > 5 inches safely
2 = can reach forward > 2 inches safely
1 = reaches forward but needs supervision
0 = needs help to keep from falling
**Pick Up Object From The Floor:**
*(Instruction: "Pick up the shoe which is placed in front of your feet.")*
4 = is able to pick up object safely and easily
3 = is able to pick up object but needs supervision
2 = unable to pick up but reaches 1"– 2" from object and keeps balance independently
1 = unable to pick up and needs supervision while trying
0 = unable to try and/or needs assist to keep from falling
**Turning to Look Behind Over Left and Right Shoulders:**
*(Instruction: "Turn to look behind you, over toward left shoulder. Repeat to the right.")*
4 = looks behind from both sides and weight shifts well
3 = looks behind one side only; other side shows less weight shift
2 = turns sideways only but maintains balance
1 = needs supervision when turning
0 = needs assist to keep from falling
**Turn 360°:**
*(Instruction: "Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.")*
4 = able to turn 360° safely in < 4 seconds each side
3 = able to turn 360° safely, one side only < 4 seconds
2 = able to turn 360° safely but > 4 seconds
1 = needs close supervision or verbal cueing
0 = needs assistance while turning
*The following items measure dynamic weight shifting while standing unsupported:*
**Count Number of Times Step Touch Measured Stool:**
*(Instruction: "Place foot alternately on the stool (6" – 8"). Continue until each foot has touched the stool four times.")*
4 = able to stand independently and safely and complete 8 steps in 20 seconds
3 = able to stand independently and complete 8 steps > 20 seconds
2 = able to complete 4 steps without assistance, with supervision
1 = able to complete > 2 steps with minimal assistance
0 = needs assistance to keep from falling and/or unable to try
**Standing Unsupported One Foot in Front:**
*(Instruction: "Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heal of your forward foot is ahead of the toes of the other foot.")*
4 = able to place foot tandem independently and hold for 30 seconds
3 = able to place foot ahead of other independently and hold for 30 seconds
2 = able to take small step independently and hold for 30 seconds
1 = needs help to step but can hold for 15 seconds
0 = loses balance while stepping or standing
**Standing on One Leg:**
*(Instruction: "Stand on one leg as long as you can without holding.")*
4 = able to lift leg and hold > 10 seconds
3 = able to lift leg and hold 5 - 10 seconds
2 = able to lift leg and hold for > 3 seconds
1 = tries to lift leg, unable to hold 2 sec., but remains standing independently0 = unable to try or needs assistance to prevent falls
**TOTAL**

**Appendix C**
**Attendance Sheet**

**Date:** _____

**Please sign in below. OR please print your name below.**

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## Appendix D

## Introductory Flyer

Dear Friends,

Volunteers are needed to participate in a program involving senior yoga exercise for residents. The classes will be held twice a week, 60 minute duration, for 12 weeks. The classes will begin the 4th week of August, 2014.

Yoga has demonstrated to improve balance in older adults. It is a safe, low impact exercise with a high rate of participant satisfaction. Participants can participate in yoga by sitting in a chair, or using the chair as support. The chairs will be provided.

The program will be offered ***FREE*** at the Rittenhouse Senior Living Center. The classes will be taught by a certified yoga instructor that specializes in teaching yoga to older adults. Before the classes begin, participants will be given a balance assessment by the yoga instructor which takes approximately 15 minutes. This balance assessment will be given again at the completion of the classes. Participants will be asked to fill out a demographic form, which will take approximately 3 to 5 minutes to complete. Upon completion of the classes, participants will be asked to complete a satisfaction survey, which will take approximately 15 minutes to complete. The usual fee for this class is $100.00 for an eight week session.

Please attend an informational session on _____ in the recreational area, which will include a yoga demonstration by the yoga instructor.

Patricia Hart, MSN, RN, Doctor of Nursing Practice student at Valparaiso University College of Nursing and Health Professions

**Appendix E**
**Informed Consent**

***Introduction***

The purpose of this form is to provide you with information about an evidenced-based practice project being conducted at this Senior Living Center. Within research studies, yoga has been found to improve balance and decrease the risk of falls in older adults. This project will look at the effects of the exercise yoga on balance in older adults residing at this Senior Living Center.

***Project Manager***

The project manager is Patricia Hart, MSN, RN

***Procedure***

If you agree to participate in this project, you will be asked to agree to take part in a gentle form of yoga, which is practiced (a) sitting in a chair or (b) standing and using a chair for support. The classes will be 60 minutes, twice a week, for 12 weeks. Prior to starting the classes, you will be given a balance assessment that will take approximately 15 minutes to complete. You will be asked to fill out a demographic form which will take approximately 3 to 5 minutes to complete prior to the beginning of the yoga classes. You are strongly encouraged to attend all of the classes, but you should attend as many of the classes as possible. The yoga instructor will keep a log of those who attend so that class attendance can be compared to improvement in balance. Upon completion of the 12-week yoga class, the balance assessment will be repeated. You will be asked to complete a satisfaction survey at the completion of the yoga classes, which will take approximately 15 minutes to complete. The yoga classes will be taught by a certified yoga instructor that specializes in teaching yoga to older adults. She has 11 years of experience as a yoga instructor. The yoga classes are free of charge.

***Risks***

There is minimal risk to participating in the project. You may become tired during the yoga exercise. You may sit in a chair for the yoga classes, or stand using a chair for support.

***Benefits***

The benefits from the yoga exercise may improve your balance and reduce your risk for falls.

***Confidentiality***

I understand that participating in this project is totally voluntary.

I know that I may refuse to have my data included in the project evaluation.

There is no penalty for refusing to participate. Furthermore, I understand that I may withdraw from the project at any time without a penalty. I understand that the project information will be private. No personal information will be used in the evaluation or reporting of data

***Questions***

Questions concerning the project may be directed to Patricia Hart at (219) 776-9825. I can e-mail her at patricia.hart@valpo.edu. Further questions about the study may be directed to the DNP student advisor Dr. Julie Koch at julie.koch@valpo.edu. Or (219) 464-5291.

The project has been explained to me. I have read and understand this consent form. My questions have been answered. By signing this form, I agree to join the project.

_____

Participant signature/date

_____

Witness signature/date

## Appendix F

## Demographic Information

**Name** _____

**Please circle one.**

**Gender:** **Male** **Female**

**Marital Status:** **Single** **Married** **Widowed** **Divorced**

**Please check the appropriate box to identify your age and length of time living at Rittenhouse.**

**Length of Time Living at Center:**

| | |
|---|---|
| **Less than 1 year** | |
| **1 to 2 years** | |
| **3 to 5 years** | |

**Age:**

| | |
|---|---|
| **Less than 65 years of age** | |
| **65 to 69 years of age** | |
| **70 to 74 years of age** | |
| **80 to 84 years of age** | |
| **Over 84 years of age** | |

## Appendix G

**Please check the box of any of the leisure activities that you participate in and identify how many times you have undertaken this activity.**

| | |
|---|---|
| **Walking** | |
| **Jogging** | |
| **Swimming** | |
| **Yoga** | |
| **Tai Chi** | |
| **Going to a gym or health club** | |
| **Tennis** | |
| **Racket ball** | |
| **Playing cards** | |
| **Reading** | |
| **Crafts** | |
| **Aerobics** | |
| **Water aerobics** | |
| **Playing an instrument** | |
| **Lifting weights** | |
| **Other** | |
| **None of the above** | |

## Appendix H

## Post Program Survey

**Number of Classes attended: _____**

**Thank you for participating in the recent yoga program. I am asking for your opinion of the yoga program that has been provided. Rittenhouse may use the information from the "group" of those attending to plan other activities, including yoga, in the future. Your "individual" responses will be kept confidential.**

**Check the box that best describes what you thought about the yoga program.**

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|---|
| The program was appropriate for my level of activity | | | | | |
| The program was enjoyable. | | | | | |
| I was satisfied with the program | | | | | |
| Yoga was easy to learn | | | | | |
| Yoga was easy to perform | | | | | |
| Yoga made me confident in walking | | | | | |
| I would like to continue Yoga | | | | | |

**Thank you for your time and participation in this program.**