CASUAL WALKING AND NIGHTTIME SLEEP QUALITY AMONG OLDER ADULTS: EVIDENCE FROM KANEOHE, HAWAI’I UTILIZING THE PITTSBURGH SLEEP QUALITY INDEX

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Thank you to my parents for raising me twice- once as a child and once as a brain injury survivor- and thank you to the rest of my family for their assistance and support when I needed it most. Last but definitely not least, thank you to my wife for her love, support and assistance, and for marrying me and helping me create wonderful, amazing children.
ABSTRACT

The studies included in this dissertation examine the relationship between casual walking and nighttime sleep quality among older adults. Previous research shows that sleep would be influenced from walking briskly or for long periods of time. This research tested whether casual walking a few days per week improved sleep. Sleep quality was assessed prior to and following one month of walking with the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), an instrument proven to be valid and reliable with numerous different populations.

In a preliminary study, a volunteer convenience sample of 30 older adults was recruited in 2002 from an Assisted Living Facility (ALF) in Tallahassee, Florida. After hearing a presentation about the benefits of walking on sleep, residents were invited to participate in the study. Everyone attending two presentations agreed to walk and walks took place either in the morning or afternoon in the halls of the ALF, in two groups of 15. Half (50%) of the residents that participated for one month experienced an improvement in the quality of their sleep, 30% experienced no change, and 19% experienced a decrease in the quality of their sleep. The improvement, however, was not statistically significant.

Subsequently, while a research student in the Graduate School of Medicine, Department of Social Gerontology at Tokyo University, a Nepalese colleague offered to conduct comparative research with older adults in Kathmandu. In 2009, 43 older Nepalese adults were recruited in a volunteer convenience sample at Pashupati Briddaashram, a social welfare facility in Kathmandu, to walk there with Hom Nath Chalise, Ph.D., one of the directors of Geriatric Center Nepal, and several volunteers. Every attempt was made to recreate the research conducted in Tallahassee; however, walks took place early in the morning and occurred outside. Since the studies in Kathmandu and Tallahassee are not comparable, the Nepalese research became a second preliminary study.

To increase the ability to make generalizations from this research, arrangements were made to conduct another study with older adults on Oahu walking outside utilizing a control group. The results of the study on Oahu, as well as the two preliminary studies are contained in this dissertation.

The evidence presented shows that, while walking is a beneficial activity and has numerous other benefits for an older adult, casually walking is not sufficient to significantly improve older adults' nighttime sleep quality.
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CHAPTER 1

Introduction

As life expectancy continues to increase, with the oldest post World War II baby boomers turning 65 in 2011, the United States will see tremendous growth among its senior population. The U. S. Census Bureau projects that the number of older people in the nation will increase dramatically during the 2010-2030 period. The older population in 2030 is projected to be twice as large as its counterpart in 2000, growing from 35 million to 70 million and comprising 20% of the entire population. While growing older has its advantages – for example, older adults in the United States tend to have more acquired wealth than their younger counterparts – it is also accompanied by an increased risk for disease and health disorders (Federal Interagency Forum on Aging, 2010; Fry, Cohn, Livingston, & Taylor, 2011).

Sleep difficulties are fairly common and tend to increase as people age, and lack of proper sleep contributes to numerous health complications. There is abundant research suggesting that older adults are highly susceptible to experiencing sleep difficulties (Bliwise, 2010; Cole, Motivala, Buysse, Oxman, Levin, & Irwin, 2006; Horne, 2010; Shubert, Cruickshanks, Dalton, Klein, Klein, & Nondahl, 2002; Simon & Ludman, 2006; and Walsh, Salkeld, Knowles, Tasker, & Hunneyball, 2010). Benloucif, Orbeta, Ortiz, Janssen, Finkel, Bleiberg, and Zee (2004) report that more than half of individuals over the age of 65 experience at least one sleep complaint. Moreover, of the time they spend in bed, only about 70% to 80% is spent actually sleeping (Ancoli-Israel, 2000). The remainder of time may be time spent trying to return to sleep after waking.
As they get older, adults frequently develop a polycyclic or polyphasic sleep pattern, one that consists of several sleep-wake cycles occurring every 24 hours instead of a monophasic one (Stampi, 1992). A monophasic sleep pattern, on the other hand, reflects a single-slotted, longer duration sleep time. Polyphasic sleep, (also known as the Da Vinci sleep cycle, named for one of the most successful polyphasic sleepers who voluntarily slept that way), is a sleep pattern that greatly reduces the time spent sleeping, from around six to nine hours to about two to five hours each day. In polyphasic sleep, individuals take catnaps throughout the day rather than sleep for a long period of time at night (Stampi, 1992). A polyphasic pattern is similar to the normal sleep pattern of infants where sleep episodes are spread across a 24-hour period. Frequent naps, however, may cause some adults to report a decrease in creativity and alertness. A fragmented polyphasic sleep pattern results in an uncompleted sleep demand, which, in turn, leads to compensation by taking more naps, or it may cause fatigue or sleepiness during the day (Dinges & Broughton, 1989; Horne, 2010; Neubauer, 2003; and Walsh et al., 2010). Moreover, beginning as early as middle age and increasing with each decade of life, recorded sleep in adults is characterized by reductions in deep or slow-wave sleep and increases in “lighter” stages of sleep (Beloucif et al., 2004).

Research exists on sleep difficulties experienced by a variety of people, from pregnant women (Skouteris, Wertheim, Germano, Paxton, & Milgrom, 2009), obese women (Teixeria et al., 2004), middle-aged women (Cartwright, 2009), and perimenopausal women (Arigo et al., 2007; and Kloss, Tweedy, & Gilrain, 2004), to Turkish nurses (Karagozoglu & Bingöl, 2008), and Japanese people who use alcohol as a sleep aid (Kaneita et al., 2006). And while there is substantial research verifying that
older adults experience sleep difficulties, not much has focused on how to alleviate those difficulties. Since the number of older adults is increasing and that cohort is highly susceptible to experiencing sleep difficulties, further research on improving older adults’ sleep is warranted. Improving their quality of sleep will also improve the quality of those individuals’ lives.

A time-tested method to all types of wellness challenges is to have an active lifestyle. An active lifestyle is particularly important for older adults. One of the most frequently recommended strategies is to remain being physically active through walking, as it is a helpful activity and one that generally does not damage the body over time (Fenton, 2000; Grove & Spier, 1999 and King, Oman, Brassington, Bliwise, & Haskell, 1997). Previous relevant research suggests that walking is an excellent way to remain physically active (King et al., 1997; and Voelkl, 1993). Research further suggests that an active lifestyle reduces sleep difficulties (Buchner, 1997; Butler, Davis, Lewis, Nelson & Strauss, 2000; Christiano, 2000; Davia, 2002; Dement & Vaughn, 1999; Espie, 1991; Ford, 1995; Gingbold, 1992; Godbey, Wolfe, George & Chillot, 1997; Haber, 1994; King et al., 1997; Lamberg, 1997a; Marttila, Laitakari, Nupponen, Miilunpalo & Paronen, 1998; McAuley, 1993; Minkler, Schaufer & Clements-Nolle, 2000; O’Connor, Youngstedt, Shawn, King, Haskell, Bliwise et al., 1997; Pinkowish, 1998; Sherrill, Kotchou & Quan, 1998 and Youngstedt, 2000). Logically then, by walking regularly, older adults should be able to remain well and potentially improve their nighttime sleep quality.

Research indicates that moderate-intensity walking alone is sufficient to help older adults improve their sleep quality (Butler et al., 2000 and Davia, 2002). Home-
dwelling older adults, walking in the community, have been studied to test this hypothesis a number of times. Far less attention has been paid to adults living in independent or assisted living facilities, although the number of adults entering such facilities is growing rapidly and this is expected to continue (Shippee, 2009).

There is far less research focusing on whether casual walking has similar benefit as in the previous studies where walking was done more vigorously or for longer periods of time, particularly among older adults who are residents of independent/assisted living facilities. Because the rapidly increasing population of older adults is causing a higher number to leave home-dwelling situations to live in group facilities, and research suggests that those who cohabitate in facilities with similar-aged peers frequently have poor sleep quality, those individuals are the focus of this research.

**Purpose of the Study**

The research presented here builds upon two preliminary studies, one conducted by the researcher in Tallahassee, Florida, and the other conducted by the researcher and a colleague in Kathmandu, Nepal, respectively. These studies both sought to determine whether daily casual walking over one month’s time improved the sleep quality of older adults who resided in an Assisted Living Facility (ALF). Both studies used the Pittsburgh Sleep Quality Index (PSQI), a standardized instrument for measuring sleep quality, to assess subjects’ reported sleep quality pre and post participation. In neither study was a significant difference found in participants’ sleep quality at the end of one month’s walking.

Each of the studies had design and analysis problems that might have affected the results, however, and this research sought to correct for those flaws. Both studies
included only a treatment group and had no control group with which to compare. The studies were also designed in such a way that individual participants’ pre and post test scores could not be compared. This research corrected for those problems and included both a treatment and recorded data to allow for a comparison of individuals’ pre- and post-walk scores on the PSQI.

The two studies also were conducted in two vastly different locales and cultures. Tallahassee is in the United States, a developed Western nation where the way of life for older adults, and arguably most of the population, is very different from that of Kathmandu. The literacy rate for older adults in Florida is quite high, the life expectancy and access to healthcare is much more readily available. Kathmandu is an undeveloped nation in Asia with a different set of social norms, geographic location and climate, demographics, and socio-economics and healthcare options. Hawai‘i is located in middle of the Pacific Ocean, is home to the largest percentage of Asian Americans of any state in the United States, and also has the longest life expectancy of any state in the United States. It has one of the most comprehensive health insurance and healthcare systems in the United States. In terms of demographics, climate and socio-economics, it is similar to Florida, however the strong Asian influence is a potential factor to consider.

Thus, the purpose of this study is twofold. First, it sought to examine whether one month of casual walking improves sleep quality in older adults living in an ALF. Second, it looks whether research design and analysis, including both a treatment and control group, as well as examining individual pre- and post-walk scores, leads to a better understanding of the effect of casual walking and sleep quality.
Research Methods

The research in Tallahassee, Florida initially involved 30 participants; however, four dropped out during the course of the study. In Kathmandu, Nepal, there were 43 participants and all completed the entire month of walking. Both studies used a quasi-experimental design with the studies’ populations serving as its own control group, comparing the pre- and post-walk treatment data.

Because the results of the preliminary studies did not prove significant in terms of the treatment and improved sleep quality, the research design was changed for the Kaneohe, Hawai‘i study. There was both a treatment group and a control group. The study design allowed for individual participants’ scores from the pretest and posttest to be compared. Additionally, because of the small sample size, several nonparametric tests were used to analyze the results of the PSQI scores and changes in individuals’ scores were recoded as an ordinal, rather than an interval, outcome.

The third research question regarding policy and policy implications used secondary data derived largely from research foundation reports, demographic and census projections, and research articles.

Organization of the Report

This report is organized into five chapters. Following this introduction is a review of the literature related to the benefits of walking on sleep quality in older adults and how this might contribute to healthy aging. The third chapter presents the methodology used in this study, and provides an overview of the research methods used in the preliminary studies. The fourth chapter presents the results from and discusses the preliminary studies, as well as this research, and concludes with a discussion comparing the three
studies, including their commonalities and differences in design, findings, and policy implications. The fifth chapter presents the conclusions and recommendations for future research and public policy.

**Definitions**

For the purpose of this study, the following definitions were used:

**Activities of Daily Living (ADLs)** - an ADL is an activity that is necessary for daily care of oneself and independent community living. It includes using the toilet and grooming, dressing, and feeding oneself; independent community living includes driving, shopping, homemaking, care of family, and work activities.

**Assisted Living Facility (ALF)** - these are communities that promote independence in a private residence setting, but offer personal assistance for meals, bathing, dressing and/or medication on an as needed basis. In addition, transportation and social activities may also be available. They may be stand alone or part of an Independent Living community.

**Healthy Aging** - healthy aging is about much more than staying physically healthy—it is about maintaining a sense of purpose and a zest for life. While the specific ingredients of healthy aging are different for everyone, the common factors are good mental health and the ability to manage stress. Most people find that eating a variety of healthy foods, practicing portion control and including physical activity in your daily routine can go a long way toward keeping healthy.

**Independent Living** - communities designed for adults who want an independent lifestyle while enjoying the benefits a full service community offers. Full service communities typically provide meals in a restaurant setting, housekeeping, transportation and various social activities.
**Older Adult** - an older adult is an individual that resides in an ALF in Tallahassee, Florida a social welfare facility in Kathmandu, Nepal, or a facility serving older adults in Kaneohe, Hawai‘i. Those individuals’ ages ranged from 55 to 91 in Tallahassee with a mean age of 80 years, from 60 to 86 in Kathmandu with a mean age of 75.67 years, and from 74 to 94 in Kaneohe with a mean age of 85.55.

**Sleep Quality** - better nighttime sleep quality was operationally defined by lower scores on the Pittsburgh Sleep Quality Index assessment measure. The scores reflect the perceptions of participants about the “quality” of their sleep rather than an actual clocked quantity of time slept.

**Social Well-Being (SWB)** – SWB is an individual’s sense of psychological wellbeing as well as continuing to be socially engaged.

**Walk Leader** – a walk leader serves as the activity promoter, encouraging older adults to walk.

**Limitations of the Study**

There were at least ten considerations that may have constituted limitations in this research. First, it was extremely difficult to locate facilities that serve older adults in Hawai‘i that were willing to participate in the research and have someone organize a walking program for their residents. The researcher contacted every facility on the island of Oahu and only one agreed to participate.

A second limitation was that residents at each of the sites of the three studies were not monitored at all times during the day. Though the walking was strategically planned to occur during the most frequent nap times – either in mid-morning or during the midday dip in alertness after lunch (Dement & Vaughn, 1999; Horne, 2010), the researcher was
not able to prevent napping at other times. Naps taken at other times during the day have the potential to reduce individuals’ overall sleep debt and reduce the quality of their nighttime sleep.

Third, other physical activity opportunities may have been available, or residents may have been active on their own. Such activity could have interfered with the benefit of casual walking on those individuals’ nighttime sleep quality.

Fourth, since this study was designed to allow the residents to be in control of their own walking programs, other activities sometimes took precedence over participation in walking each day. A doctor’s appointment was the most frequently used excuse for missing a walk.

Fifth, this particular research was limited by having no delayed follow-up with the older adults, either assessing their physical activity or perceived nighttime sleep quality. Consequently, it was not possible to weigh the possible influence of walking at two different points of time.

Sixth, the sleeping arrangements in Nepal may have substantially influenced Pashupati Briddaashram residents’ sleep. Those individuals all sleep together on the floor in rooms separated by gender. Communal sleeping, as was done in Kathmandu, likely results in poorer sleep quality than in Tallahassee or Kaneohe, where residents slept in their own rooms, possibly with a spouse.

Seventh, due to the fact that most Nepalese participants were illiterate, many even to the use of a clock, sleeping times were frequently estimates.
Eighth, part of this study is comparing the results from two different cultures. Eastern and Western cultures are different and those cultures’ views on aging and/or caring for relatives may influence inferences that can be drawn from this research.

Ninth, the research in Hawai’i involved a treatment group that casually walked for one month and a control group that did not walk. While every attempt was made to ensure the treatment and control groups were similar, reviewers of this research should be aware that it is not possible to ensure similarity.

Finally, a tenth limitation is that in all three studies, sample sizes were small and participants were not randomly assigned, limiting the ability to make inferences from this research.
CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

This review of the literature presents research and statistics relevant to the body of knowledge regarding the benefits of walking on the nighttime sleep quality for older adults, and how it can contribute to healthy aging. The first section presents a discussion of age-related function loss and osteoporosis. The second section presents information about sleep quality. The third section presents information about the potential benefits from walking that may offset the costs associated with implementing a walking program. The next two sections cover the implications for Hawai‘i and the benefits of a walking program. The final section of this chapter summarizes all the information presented.

This study uses Mackenzie and Rakel’s (2006) definition of healthy aging, which is increasing longevity as well as increasing the average number of years of healthy life span. However, other authors claim that healthy aging involves growing older with minimal interruption of usual functioning, regardless of whether disease, chronic illness or disability is present (Minkler et al., 2000). A similar concept is “successful aging,” which has been described as an optimization model that emphasizes attaining maximal age-related functioning and preparing for future challenges (Celso, 1998).

At the beginning of the twentieth century, aging was not a prime concern among researchers and public health officials in the US because older individuals were a comparatively small portion of the population. During the twentieth century, however, there was a dramatic increase in the number of older adults. The percentage of the
population age 65 and over was 4.1% in 1900 compared to 12.4% in 2000 (Hobbs & Stoops, 2002). To put those numbers in perspective, there were approximately 80 million Americans living in the US at the turn of the 20th century; at the end of that century - in Census 2000, 281.4 million people were counted in the US - and roughly 80 million of them were over the age of 65 (Christiano, 2000 and Perry & Mackun, 2001).

The increase of older adults will continue as baby boomers, those individuals born between 1946 and 1964, continue aging. Every eight seconds, another “boomer” gets an invitation to join the AARP, formerly known as the American Association of Retired Persons; however, the majority of boomers will turn 65 between 2010 and 2030 (Christiano, 2000). Subsequently, all those aging boomers will increase the percent of the population 65 and over from 12.4% of the population to 19.6% in 2030 (Goetzel et al., 2007). Roughly 1 of every 5 people will be 65 years old or older.

**Loss Associated with Aging**

It is possible to classify life as a terminal illness because all living creatures must eventually die. Before death, it is normal or common to experience loss or losses in functioning. Aging itself is not a disease, but it does promote disabling and life-threatening conditions (Lazarus & Lazarus, 2006). Aging and loss are positively and highly correlated. Consequently, the end of each person’s life, sometimes called the “Autumn” of his or her life, is a time fraught with loss. Some losses, like the ability to walk, are visible and easily detected, whereas others, like deafness, remain invisible unless the person with deafness exhibits unusual behavior that suggests a deficit. Whether detectable or not, ability losses may have an enormous impact on people and can influence their motivation as well as their ability to persevere - two factors that may make
the difference between aging successfully and aging unsuccessfully (Lazarus & Lazarus, 2006).

For older adults, losing the ability to independently perform activities of daily living (ADLs) frequently implied that the next residence for that individual was a nursing home. However, there is now evidence that certain lost activities may be recoverable by increasing activity levels (Loss of ADLs, 1998; Applegate & Pahor, 1997). In a study of 283 older adults, for example, 28% recovered functioning in one or more of their ADLs, such as dressing and bathing (Loss of ADLs, 1998). In related research, Applegate and Pahor (1997) found similar results. Both lower-body and upper-body weight resistance training increased the range of ADLs that older adults could perform. Up to age 85, only three of the 66 older adults in their study failed to regain any functioning; however, 5% of those over the age of 85 regained any functioning (Loss of ADLs, 1998). Hearing that some losses are recoverable may influence older adults to change their ways.

Retaining functioning is also beneficial because deficits may further limit older adults by decreasing their choices of potential activities. While age and loss are positively correlated, age and physical activity are negatively correlated. Ironically, as older adults lose more functions and abilities, they are often reluctant or resistive to participate in walking or other physical fitness activities which can slow down or postpone further decline (Davia, 2002).

One common loss that accompanies aging is a loss of bone strength, osteoporosis. Seventy to eighty percent of osteoporosis-related fractures and associated costs are incurred by both women and men aged 65 and older (Burge, Dawson-Hughes, Solomon, Wong, King & Tosteson, 2007). Osteoporosis is a metabolic disease that causes bones to
become porous and susceptible to fracture and, although men can experience it, that condition disproportionally affects women more than men (International Osteoporosis Foundation (IOF), 2011). Osteoporosis affects 200 million women worldwide—approximately one-tenth of women aged 60, one-fifth of women aged 70, two-fifths of women aged 80, and two-thirds of women aged 90 (IOF, 2011).

Even though bones can be broken when a person with osteoporosis falls, hip fractures are the most serious and lead to a high incidence of hospitalizations, health problems, and deaths (Cornell University, 2011). Partially because hip fractures are more common among women than men, Stevens and others (2006) determined medical expenditures for women are two to three times greater than for men in all treatment settings. Treatment of hip fractures typically includes surgery, hospitalization frequently followed by nursing home admission and extensive rehabilitation. Preventing a broken bone, especially a hip fracture, will greatly enhance the chances of aging successfully (Stevens et al., 2006).

However, even though research shows walking can help older adults prevent a hip fracture and possibly postpone their deaths, that information may not convince older adults to walk. Although Burge and others (2007) determined there were more than 2 million hip fractures in the US, costing nearly $17 billion in 2005, and Kanis, Oden, Johnell, De Laet, Jonsson, and Oglesby (2003) determined, at all ages, there is a marked increase in risk of dying within the first 1 year following a hip fracture compared with that of the general population, the time and effort involved with joining a walking or flexibility group that may help prevent a hip fracture only increases life expectancy by a number of days. Walking and flexibility groups only increase life expectancy by 26.8,
27.1, and 22.6 days in men aged 60, 70, and 80 years, respectively and 31.5, 30.5, and 23.5 days for women at the same ages (Kanis et al., 2003).

Certain metabolic changes that accompany aging are inevitable, common, and do not necessarily suggest a problem. Endurance capabilities, for example, may be diminished due to decreased oxygen consumption, which was determined a long ago to be a common feature of aging (Kety, 1954). However, decreased oxygen consumption or diminished endurance is not a sufficient reason to avoid walking. The cardiovascular responses of older adults to submaximal exercise- exercises developed to meet the needs of people with various functional limitations or disabilities or the needs of older adults (Noonan & Dean, 2000) are in many ways similar to those of vigorous exercises, which are more commonly engaged in by younger adults and people without any limitations (Mazzeo et al., 1998 and Rodgers et al., 1995). This means benefit can be seen as long as effort is being put forth and older adults need not overexert themselves.

Sensory ability functioning also declines with age and those decreased sensory functions may unnecessarily influence older adults or limit participation in activities (Heine & Browning, 2002). Specifically, impaired hearing or vision is associated with decreased mobility, increased physical disability, increased imbalance and fall risk, a reduction in interpersonal activities, lower cognitive and emotional functioning, and a diminished perception of the quality of life (Abyad, 1997 and Heine & Browning, 2002). Simply having some degree of loss may limit older adults’ participation because of the difficulty they have in communicating with their peers.

Age-related vision loss is another problem for older adults, but is less common than age-related hearing loss (Crews & Campbell, 2004). The presence of a visual
impairment, defined as vision that impedes the performance of at least one ADL, is reported to be present in at least 10 to 13% of individuals over the age of 65, but the presence progressively increases to between 25 and 35% for individuals over the age of 75. For the oldest of the old, those over the age of 85, estimates are low because since many cases are unreported as older adults residing in long-term care facilities are generally not included in studies (Abyad, 1997).

One estimate indicates that more than two-thirds of all individuals with low vision are over the age of 65 (Lemme, 2002). Their vision is typically threatened by one of four common conditions. The four most common conditions are cataracts, age-related macular degeneration, diabetic retinopathy, and glaucoma (Heine & Browning, 2002).

A cataract is a clouding of the lens of the eye, which develops slowly, over months to years of time; and the prevalence increases with age. The prevalence of cataracts for individuals 65 to 74 is 18%, whereas for individuals 75 to 85, it is about 46%. Heine and Browning (2002) determined that cataracts are the major cause of blindness in older adults, however, others claim age-related macular degeneration is the leading cause of blindness in people over 65 years of age (Abyad, 1997). Age-related macular degeneration (AMD) is a chronic disease that occurs when tissue in the macula, the part of your retina that is responsible for central vision, deteriorates. The result is blurred central vision or a blind spot in the center of your visual field (Buettner, 2002b). Glaucoma is a group of diseases affecting the eyes with common features that affects more than two million older adults (Abyad, 1997 and Heine & Browning, 2002). Glaucoma is caused by a malfunction of the eye’s drainage system (Heine & Browning, 2002). Diabetic retinopathy occurs as a result of longstanding diabetes mellitus and
results in blurred, distorted vision of the central visual field (Buettner, 2002a). Certain people may be discouraged to walk if they are unable to clearly see or view their surroundings.

Older adults participation can also be influenced by a diminished sense of smell or taste- chemosensory impairments- which tend to become noticeable at about age 60, although diminished functioning in those areas can occur earlier (Schiffman, 1997). Losses may become severe in adults over the age of 70. Perhaps chemosensory impairments do not seem like they would influence older adults participation, but, in a meta-analysis of over 30 years of literature, Schiffman (1997) determined that older adults with protein malnutrition and an involuntary weight loss, sometimes referred to as wasting, is related to older adults experiencing a broad range of tastes as less intense than younger adults. Because older adults may not gain as much pleasure from food, they may not be as inspired to eat. By not eating, consequently, they may not eat enough protein-rich foods which would give them the energy for walking. Chemosensory impairments are possibly also the reason why some older adults like spicy foods or prefer adding extreme flavors to their food (Chernoff, 2006).

Briefly, however, the most common chemosensory impairments are: ageusia (an absence of taste), hypogeusia (a diminished sensitivity of taste), dysgeusia (a distortion of normal taste), anosmia (an absence of smell), hyposmia (a diminished sensitivity of smell), and dysosmia (a distortion of normal smell). Besides contributing to the problem of wasting and not giving them the protein they need for walking, chemosensory impairments also put older adults at risk for noxious chemicals and poisonings since those cues do not provide adequate warnings about chemical risk (Schiffman, 1997).
As can be seen, losses are common with aging, either in one’s ability to perform ADLs, their sense, bone strength, chemosensory cues or even in the amount of oxygen they consume; however, as was said at the beginning of this section, all living things must eventually die. A good death is preferable to any other kind of death (Caprio et al., 2008). A “decent or good death is one that is: free from avoidable distress and suffering for patients, families, and caregivers; in general accord with patients’ and families’ wishes; and reasonably consistent with clinical, cultural, and ethical standards” (Mahor, 1997, p. 566).

Many of the losses that may accompany the aging process were presented in the previous section. As people age, a loss of abilities is a common occurrence.

**Sleep Quality**

Sleep is a critical life behavior and as individuals age, it becomes increasingly important to get adequate rest and to do so regularly (Ancoli-Israel, 2000). To determine age-related changes in sleep, Ohayon, Carskadon, Guilleminault, and Vitiello (2004) conducted a meta-analysis of 65 articles published between 1960 and 2003. They determined, in adults, total sleep time, sleep efficiency, and other components all significantly decreased with age; but sleep latency and wake after sleep onset significantly increased with age. In older adults, however, only sleep efficiency continued to significantly decrease after 60 years of age.

At the end of their article, Ohanyon and others (2004) found, when comparing young adults to middle-aged adults or middle-aged adults to older adults, it was difficult to identify trends because the age-related changes are subtle. They could only identify
trends when comparing younger and older adults. The following seven conclusions were identified in that meta-analysis (Ohanyon et al., 2004, 1627-1628).

1. Sleep latency (sleep latency is calculated as minutes from “lights out” to the first epoch of any sleep (Geisler et al., 2006)) increases with age. Overall, it appears in their research, sleep latency modestly but significantly increases with age. However, the change is subtle when comparing young adults to middle-aged adults, or when comparing middle-aged adults to older adults, and sleep latencies were comparable. The significant difference appears only when young adults are compared to older adults. The overall increase in sleep latency between 20 and 80 years is less than 10 minutes.

2. Percentage of stage 1 sleep [the first of 5 stages which lasts an average of 5-10 minutes] increases with age- stage 1 is the period of time between wakefulness and sleep. Stage 1 sleep is characterized by slower and more even breathing, the heartbeat becomes regular, blood pressure falls, brain temperature decreases, blood flow to the brain is reduced, and there is little or no body movement. The significant increase in stage 1 sleep is found between young and middle-aged adults and between middle-aged and older individuals, which means that percentage of stage 1 sleep significantly increases across all adulthood.

3. Percentage of stage 2 sleep [the second of 5 stages which lasts approximately 20 minutes] increases with age- in this stage, sleep is characterized by larger brain waves and occasional quick bursts of activity, the sleeper will not see anything even if the eyes are opened, a sleeper can easily be awakened by sounds, and bodily functions slow down - blood pressure, metabolism, secretions, and cardiac activity decrease. The increase in
stage 2 sleep was present across the full age range studied, from childhood (5 years and older) until age 60.

4. Percentage of REM sleep [the fifth of 5 stages] decreases with age in adults. REM sleep is characterized by the brain waves becoming smaller and more irregular with bursts of eye activity. The brain wave activity in REM sleep resembles waking more than it does sleeping, the body's activity perks up considerably during this time, blood pressure may increase drastically, pulse rates increases and in an irregular way- a sleeper with cardiac problems faces the greatest risk of heart attack at this time, breathing becomes irregular and oxygen consumption increases. Because of the increased brain activity, most dreaming occurs in this stage. During REM sleep, the chin is slack, the face, toes and fingers may twitch, sleepers’ large muscles are literally paralyzed and they cannot move their torsos, arms, or legs, the body seems to have abandoned its effort to regulate its temperature during the REM phase, and shivering and sweating cease at this time as the body's temperature drifts gradually toward the temperature of its environment.

Percentage of REM sleep first increased from childhood to adolescence, then decreases between young and middle-aged adults, and remains unchanged in subjects older than 60 years of age.

5. In adults, the increase in the percentage of stage 2 sleep with age and the decrease of REM latency with age appears to be sensitive to psychiatric disorders, use of drugs or alcohol, sleep apnea, and other sleep disorders.

6. In their meta-analysis, Ohanyon et al. (2004) determined that with children 5 years and older and in adolescents, the apparent decrease in total sleep time with age appears to be related to environmental factors rather than to biologic changes.
7. While almost all studies in children 5 years of age or older and adolescents do not find significant changes in REM sleep with age, it appears that there actually is a modest but significant increase in the percentage of REM sleep from childhood to the end of adolescence. After that age, the percentage of REM sleep remains relatively stable until 60 years of age, when it again begins to decrease.

The previous seven conclusions indicate that sleep deteriorates with age. Nevertheless, sleep quality is an important clinical construct because sleep complaints are common and they also are an important indicator of many medical and disorders (Buysse et al., 1989). Besides the age-related changes in sleep just presented that may result in poor sleep quality, individuals may have one or more of the following sleep difficulties. Insomnia is the most frequently reported sleep complaint (Espie, 1991; Hauri & Linde, 1996; Mayo Clinic, 1999; Morin, 1993; Rajput & Bromley, 1999); however, others exist.

In the American Family Physician, David N. Neubauer, M. D. (1999) of the Johns Hopkins Sleep Disorders Center in Baltimore, Maryland, claims that a primary sleep disorders is one that causes a delay in sleep onset, causes multiple nighttime arousals or awakenings, or it promotes excessive daytime sleepiness. Common primary sleep disorders associated with aging include Restless Legs Syndrome (RLS), which is characterized by an intense discomfort in the legs during the evening when the person is at rest. Periodic limb movement disorder may accompany RLS or occur independently; it is idiopathic condition characterized by episodes of movement, usually of the legs, although sometimes affecting other muscle groups, including the arms. Sleep apnea is another primary sleep disorder associated with aging. Sleep apnea involves intermittent airway closure and the two main types are obstructive sleep apnea, result from complete
or partial occlusion of the airway and, less commonly, central sleep apnea, which occurs from a decrease in the respiratory drive. Another primary sleep disorder older adults may experience is a rare REM-behavior disorder, which involves a inhibits processes that normally prevent muscle activity during dreaming. The patient may thrash about in bed, fall out of or leap from the bed and incur an injury.

Insomnia, however, is the most prevalent sleep disorder affecting older adults (Ancoli-Israel, 2000). Insomnia not only affects those people that cannot fall asleep at night, but also refers to the perception or experience of inadequate or poor-quality sleep. People with insomnia may have difficulty falling asleep or may awaken too early; they may not feel refreshed; or, they may wake frequently during the night with difficulty returning to sleep (National Institutes of Health (NIH), 1995). Individuals with insomnia have difficulty initiating, maintaining, or terminating sleep (Espie, 1991). Although individuals with insomnia often have poor quality of sleep, and insomnia is a symptom in many disorders, it is not an illness (Mendelsohn, 1980).

In a study of one hundred subjects with no complaint of sleep disturbance or daytime sleepiness, 10 men and 10 women each from 5 age decades from 20 to 69 years, Geisler et al. (2006) determined there is a U-shaped age distribution of mean sleep latency caused by an interaction of 2 age-related processes. The level of arousal and the resistance to sleep during the daytime appear to peak in early school age and then decline progressively. This first process seems to be counteracted by a decrease in the ability to initiate and maintain sleep with increasing age. The shortest sleep latencies in their sample were found in the subjects around 40 years of age. This is later in life than would be expected from the literature. Specific cultural influences, such as sleep deprivation due
to school schedule and social obligations in young adulthood, and methodologic
differences between separate studies may influence the exact positioning of the minimum
of sleep latencies. To clarify this issue, studies covering the complete age range from
adolescence to mature age are needed. Even though the title of the article by Geisler et al.
(2006) claims it covers the influence of gender on sleep quality, they fail to do so; the
article mainly covers the age-related changes in sleep.

Moreover, Fiorentino, Marler, Stepnowsky, Johnson, & Ancoli-Israel (2006), in
their study of seventy Caucasian Americans and seventy African Americans, determined
that there are racial and ethnic differences in the prevalence and severity of certain
conditions. Their study, however, only analyzed differences in sleep quality between two
different races. Nevertheless, after controlling for other variables, the Caucasian
Americans woke up significantly more often than the African Americans. While there
were no other significant differences in sleep variables between the two groups, time
awake at night was related to being male, having depression, walking less, and having a
lower income and having more awakenings during the night was related to being
Caucasian. Those authors also claim Caucasian Americans and African Americans differ
in their willingness to disclose mental and medical problems. Further research with a
much more diverse sample is warranted.

**Potential Benefits to Offset the Costs**

Fortunately, well-designed health promotion and risk reduction efforts pay for
themselves through lower healthcare expenditures. One low-cost strategy for improving
health is to walk. Walking is one way to remain active that is beneficial for older adults
(Butler et al., 2000; McAuley, 1993; Neergaard, 2001; and Voekyl, 1993). The benefits
are seen in their health, and walking helps prevent falls, improves balance and has numerous other attributes, such as weight control. Subsequently, older adults who walk regularly may require less healthcare and have lower medical expenditures. Moreover, because function loss, life events, and co-occurring illnesses are major factors associated with late-life depression, walking can also be one of the single strongest correlates of depression in older adults. Walking is important regardless of age, but may be even more important for older individuals because physical activity can be restorative of the whole person – physically, mentally, emotionally, and spiritually (Parmelee, Lawton & Katz, 1998).

Most people can walk, individuals are generally not hurt by walking, and walking has benefits for wellness. Piepkorn (1990) determined that as little as 30 minutes of walking may be sufficient to keep individuals moderately physically active. To acquire maximum benefit in the least amount of time, however, it is best to walk briskly if able. If the walking is done briskly, only 10 or 15 minutes may be necessary to gain all the benefit associated with any other type of physical activity (Ebersole & Hess, 1994). Walking is a convenient, inexpensive, safe and effective exercise that can be undertaken by most people, at almost any time and in almost any place (Gingbold, 1992).

Walking can even have benefits for and can lower the death rate in people between the ages of seventy to eighty-five years (Gingbold, 1992). The submaximal exercises, mentioned previously, should be employed here. Some people may think that slowing down in life or having to exercise submaximally is a negative aspect of aging; however, it can also be viewed as merely shifting from a growth orientation to one that actively avoids age-related decline. By remaining physically active, older adults may be
able to remain satisfied with their lives as they disengage from the unattainable goals and focus more on avoiding further losses in functioning and maintaining their current levels of functioning (Crawford, 1998).

Exercise also has affective benefits for exercisers. Holland, Greenberg, Tidwell, Malone, Mulan and Newcomer (2005) found lower depressive symptoms by individuals who get regular exercise. Those authors employed a randomized controlled design in their study with 504 subjects aged 65 or older. After 12 months, exercisers were engaged in significantly more stretching and aerobic exercise than the controls and depressive symptoms actually decreased among those individuals.

For the frail and very old, Mazzeo, Cavagnagh, Evans, Fiatricne, Hagberg, McAuley and others (1998) recommend that walking goals for younger adults, such as prevention of disease and an increase in life expectancy be replaced with a new set of goals. Modified or new goals should include minimizing biological changes of aging, reversing disuse syndromes, controlling chronic diseases, maximizing psychological health, increasing mobility and functioning, and assisting with rehabilitation from acute injuries and chronic illnesses. Ford (1995) even claims that by maintaining an active lifestyle, older adults can feel a third younger than their actual age. For example, regular walking by a 75 year-old woman means she can feel closer in age to 50.

It appears that promoting walking and promoting health can in fact save money. In a meta-analysis of 32 health promotion programs, 28 reported medical cost savings (Goetzel et al., 2007). Of the seven studies that calculated a cost-benefit ratio, an average of $3.48 in direct health care costs and the costs associated with illness-related absenteeism was saved from every dollar spent promoting health.
Goetzel et al. (2007) also report on another meta-analysis of 42 worksite health promotion programs that show a 25-30% reduction in medical and absenteeism costs over an average of 3.6 years. That meta-analysis was performed by Larry Chapman, MPH (2003) and, although he acknowledges there is a lack of standardization in the methodology used to analyze the benefit of worksite health promotion programs—only some studies report a benefit in terms of a reduction in sick days or a reduction in health care costs, he believes his analysis has profound implications for all American employers and should eventually lead to the institutionalization of appropriately designed and executed worksite health promotion programming. He also believes, based on his research, worksite health promotion represents one of the key strategies for maintaining the productivity of American workers at a time when their average age is increasing faster than most of their global competitors (Chapman, 2003).

Goetzel et al. (2007) believe focusing on prevention and health promotion is a promising approach to combat the current and future challenges facing the Medicare program. Saving Medicare money is imperative because healthcare costs continue to escalate. In 2005, healthcare spending in the US totaled $2 trillion or 16% of the gross domestic product (GDP). That amount is projected to increase to 18.4% of GDP by 2013, when more than one out of every four dollars of personal consumption will be spent on healthcare. The aging of Americans is a central component fueling cost increases (Goetzel et al., 2007). Many chronic diseases are particularly prevalent among older adults. Only five percent of Medicare beneficiaries, those older adults with chronic conditions, account for 47% of total Medicare spending. Preventing or postponing the onset of chronic diseases among older adults has the potential to compress the period of
morbidity prior to death. Moreover, as much as 70% of total disease burden, as measured by premature deaths and years of potential life lost, can be traced back to illnesses that are preventable.

Obesity is one such condition that is preventable. Goetzel and Ozminkowski (2008) feel obesity has been increasing at an alarming rate in the US and tackling that problem alone can be a dramatic cost savings for Medicare. Research cited by Goetzel and his colleagues in 2007 found that Medicare will spend 35% more caring for an obese 70 year old man over his lifetime than for a normal weight person. Thus, prevention and health promotion programs are critical to extending lives and saving Medicare money.

**Aging Population in Hawai’i**

Yuan, Karel, and Yuen (2007) also determined that people in Hawai’i have a longer life expectancy than those across the nation—79.8 years vs. 76.9 years—and women tend to live longer than men—82.5 years vs. 77.1 years. Hawai’i is also a popular retirement destination, possibly because of those previous benefits. In 2007, there were about 238,000 Hawai’i residents aged 60 and over. They constitute 18.7% of Hawai’i’s total population, slightly higher than 16.8% in the nation as a whole (Yuan, Karel, & Yuen, 2007).

Older adults in Hawai’i, although they may have longer life expectancies than their national peers, also face serious health issues. Obesity is a problem nationally, and it is also a condition that affects many older adults in Hawai’i. Over 40% of older adults in this state are overweight or obese (State of Hawai’i Executive Office on Aging, 2007). Diabetes is another problem for many people and is currently on the rise in the state of Hawai’i.
Hawai‘i. From 1998-2003, the proportion of older adults with diabetes increased from 11% to 17% (Executive Office on Aging, 2007).

Hypertension/High blood pressure is a problem among older adults in Hawai‘i. Fifty-six percent of native Hawaiians, 53% of Japanese, 49% of Filipinos and 41% of Caucasians have this condition (Executive Office on Aging, 2007). Approximately 30% of older adults have high cholesterol, although the prevalence of this varies widely by race.

**Risks of a Walking Regimen**

One serious risk to older adults beginning a walking program is the risk of falling. In their study of 10,615 participants aged 20–87 years reported falling during the past year, Mertz et al. (2010) determined that the activities people are engaged in at the time of falling vary significantly depending on age. Adults 65 years old and older are more likely to fall while walking, whereas adults between the ages of 20 and 44 are more likely to fall during sports or exercise (Mertz et al., 2010). However, periodic walking increases strength and mobility, and helps individuals of all ages prevent falls (Stevens et al., 2006). Lohr (2009) also believes walking helps prevent falls, which helps minimize the costs of and occurrence of osteoporosis-related fractures and allows people to live independently longer and in their own homes.

Falling may also causes injuries or deaths. Mertz, Lee, Sui, Powell, and Blair (2010), in their study of over 10,000 falls by adults of all ages, report that unintentional falls account for approximately 19,000 deaths each year in the US alone. The Centers for Disease Control and Prevention (CDC) put that number at 22,631 in 2008. Another 500,000 people are hospitalized from such falls and about eight million are treated in
emergency rooms. Low fitness levels and physical inactivity may increase the risk of falls. Stevens et al. (2006) claim community dwelling older adults with muscle weakness or gait and balance disorders are three to four times more likely to fall than someone who is fit. Fall prevention programs can help. They reduce the risk of falling by 11% for people at high risk, individuals who have fallen before. If employed with a clinical assessment, an individualized fall risk reduction program, and subsequent follow-up, such a strategy can reduce the risk by 18% (Stevens, Corso, Finkelstein, & Miller, 2006).

In the study by Mertz and her colleagues (2010), the prevalence for falling was not statistically significant for either of three age groups, 20-44, 45-64 or ≥65 in the 12 previous months. However, roughly 8% of all people who fell fractured a bone and fractures were more common in the oldest age category. Women were 1.2 times more likely to fall than men and 40% of those who fell, fell multiple times and women who fell were 1.5 times more likely to report a fracture than men.

Reducing falls is definitely beneficial. Stevens, Corso, Finkelstein and Miller (2006) report from a meta-analysis that 10-20% of falls result in fractures or head traumas. When combined, those two injuries (fractures and head traumas) account for almost 80% of fall-related costs (CDC, 2011). Falls are the most frequent mechanism of Traumatic Brain Injuries (TBIs) and falls are also the leading cause of hospital admissions for TBI (Stevens et al., 2006). Fatality rates of TBI from falls are highest in the “oldest of the old,” those aged 85 years or older.

Stevens and others (2006) believe the most frequent non-fatal fall injuries are those to upper and lower extremities. Specifically, fractures are the most frequent and also the most expensive. The second most frequent type is superficial injuries/contusions.
Fractures, together with superficial injuries account for three-fourths of nonfatal injury costs. However, fractures alone account for 61% of non-fatal injury care costs.

One factor that increases risk of falls in older adults is arthritis. However, Buchner and Campbell (2010) determined that men with low fitness were 80% more likely to report walking-related falls and inactive men were 70% more likely. The findings of this study were less clear for women; however, in their article, Hall and McAuley (2010) identify other barriers specifically for older women in their article. They (2010) claim that a lack of perceived and actual environmental supports for walking, more functional limitations and lower self-efficacy are all barriers women have in achieving 10,000 steps per day, the number of steps they recommend.

Injuries to internal organs are also possible from falling and, when those injuries are grouped together, they are responsible for 29% of costs for fatal falls and 28% of deaths (Stevens et al., 2006). Regardless of the grouping procedure utilized, falls among older adults cost the US healthcare system over $19 billion in 2000, or $28.2 billion in 2010 dollars (CDC, 2011).

The costs from falls or any other condition, however, can be direct or indirect. Direct medical costs are typically seen as payments to doctors and other providers, treatment facilities- hospitals or nursing homes, rehabilitation services, use of medical equipment, prescription medications, and home modifications, whereas indirect costs as measured by productivity losses and dependence on others (CDC, 2011 and Stevens et al., 2006). Working-aged adults, therefore, account for much of the indirect medical costs and many direct medical costs can be attributed to older adults. As expected, non-fatal injury care costs varied depending on the location of treatment (Stevens et al., 2006).
Patients who were hospitalized incurred the highest costs, followed by injuries treated in emergency departments and in outpatient settings. Either way, reducing direct medical costs to providers or increasing individuals’ productivity can save money.

Moreover, an average of 32 pedestrians are killed on Hawaii’s roads each year and more than 600 others require medical treatment for non-fatal injuries (AARP Hawai‘i, 2006). Hawai‘i has the 11th highest pedestrian fatality rate in the country, and the highest among older residents (those aged 65 and older). AARP Hawai‘i (2006) believes making pedestrian safety is a top priority and it increases the safety of the roadways for all users, encourages walking for transportation purposes and also encourages physical activity with proven life-saving health benefits.

AARP Hawai‘i (2006) conducted its Walk Audit Report on Oahu, Maui, Hawai‘i and Kauai. In roughly a third (37%) of crosswalks, the pedestrian signal did not allow enough time for a person of normal abilities to cross, and almost half (48%) did not allow enough time for pedestrians with limited physical abilities. Twenty-six percent of sidewalks were blocked by various things, and one fifth (20%) were cracked or broken. Moreover, over half of the drivers in the observed locations were speeding or stopped their vehicles in the crosswalk.

The previous discussion of health and safety risks illustrates a few of the reasons why living with similarly aged peers may not be a lifestyle appreciated by older adults. Not only do some dislike that lifestyle, an 87 year-old ALF resident confided to Dorfman (1994), “I think God is punishing me by allowing me to live so long” (p. 5). When pressed to elaborate, she only said that “nobody likes old people,” but her characterization may be the predominant feeling of many older adults. This resident was
describing her experience with ageism. Ageism is most often expressed in stereotypes and myths, outright disdain and dislike, or subtle avoidance of contact with older individuals. Ageism is also evident when older adults are intentionally excluded from or discriminated against in housing, employment and services of all kinds; and even in ridiculing cartoons and jokes about older adults (Nelson, 2002).

Ageism is detrimental to the self-confidence of the recipient as well as the broader society in which we all live. To imply that individuals who are physically disabled or older have a poorer quality of life and are somehow less valuable than younger or able-bodied individuals is a reinforcement of stereotypes that underlie discriminatory practices (Nelson, 2002).

This section covered the experience of aging in Hawai‘i. The benefits of the weather and climate and the numerous health risks as well as a brief discussion of ageism were all presented.

**Assisted Living**

Residential facilities for older adults exist on a continuum, ranging from independent living to facilities where residents receive round-the-clock supervised care. A loss of independence may be felt if an older adult must move into any kind of facility, or if they move on that continuum needing more assistance (Shippee, 2009). Shippee (2009) determined most older adults prefer to “age in place,” staying in familiar locations. Based on research conducted in a facility in the Midwest, residents were most concerned with the irreversibility of any kind of move. Once they move into a facility or to a level where they need more care, they can never go back. They may perceive any move as a move down in status, a loss of space and possessions, and a loss of freedom.
and independence that can never be regained (Shippee, 2009). Many pleasurable activities older adults have are lost when they move into a facility. They typically complete a grieving process and make coping adjustments. Although there are many opportunities to gain social support, the social peer group is not self-selected and does not have the same benefit as choosing one’s own friends. This transition is difficult and resisted by many older adults. The higher rates of depression and resistance by individuals living in a facility versus those living in the community are surely related to undesired residential resettlement.

Walking may be particularly valuable for older adults who live with similarly-aged peers, either in an ALF or any other kind of facility. The American Senior Housing Association (ASHA) claims ALFs provide 24-hour protective oversight and assistance for individuals with functional limitations. Those ALFs are residential dwellings, typical with less than 100 apartment units and many resemble large single-family homes and house 30 to 60 residents. Most offer private rooms with kitchenettes and common living and dining areas. Services vary but often include: assistance with activities of daily living; administration of medicine; first-aid and medical care for minor ailments; and round-the-clock protective oversight (Hunter, 2003). Nationally, Hunter (2003) reported that the ASHA, in October of 2002, estimated the existence of 7,150 ALFs in the US with a total of 531,265 residents.

Although the ASHA defines ALFs; there is no national definition of assisted living. Instead, ALFs are licensed and regulated by each state, and the definition varies widely (Hunter, 2003). In Florida, ALFs provide housing, meals, and one or more 'personal services' (e.g., assistance with activities of daily living [ADLs] and self-
administered medication) (National Center for Assisted Living, 2010). In Hawai‘i, however, ALFs consist of a building complex offering dwelling units to individuals and services to allow residents to maintain an independent assisted living lifestyle (National Center for Assisted Living, 2010).

Moreover, the National Center for Assisted Living (2010) states that in Florida, facilities may provide assistance with personal services including medications. Facilities may hold one of three special licenses: an extended congregate care license allows facilities to provide more extensive ADL assistance and nursing services to frail residents; a limited nursing services license allows certain nursing services defined in the regulations; and a limited mental health license allows facilities to serve low-income, chronically mentally ill residents. In Hawai‘i, however, the regulations state that a facility must provide 24-hour on-site direct care staff to meet the needs of the residents; services to assist residents in performing all activities of daily living; and nursing assessment, health monitoring, and routine nursing tasks (National Center for Assisted Living, 2010).

Older adults who live in an ALF, a Social Welfare Facility, or even an Independent Living Facility are expected to follow a predetermined schedule to some extent. A predetermined schedule leaves them little individuality in how they spend their time (Voelkl, 1993). While independent living facilities such as the facility in this study, may allow residents more freedom than ALFs, they still have predetermined mealtimes and limited menu choices. If they want to utilize the shuttle service, they must be available at a certain time and are further bound by a predetermined destination. If their particular facility happens to allow very little freedom, residents may feel like they have very little control. Things that most people find important, like deciding when and what
to eat, where to go and when, who to associate with and when to socialize, are not always possible for residents of a facility. This practice contradicts evidence that by being able to control specific life activities, an older adult can be happier, healthier, and live longer (Krause & Shaw, 2000). In a book about age-associated changes in human motivation, Furchgott (1999) states that a lack of control is one of the factors affecting emotional well-being, physical health, and an individual’s ability to cope with stress. By not being in control of meaningful activities, older adults may find losses that accompany aging stressful and hard to handle.

Those individuals residing in any kind of facility, since they have the option to have so much done for them, may not receive an adequate amount of physical activity. Residents of facilities may not want to walk unless their facility provides safe paths. AARP Hawai’i (2006) provides the following list to promote older adults’ walking, regardless of where they reside. Their suggested changes for making paths comfortable and appealing to walkers, which would not only benefit older adults, but could benefit everyone, include:

• Providing benches
• Adding shade trees
• Filling pot holes
• Cleaning the street
• Removing graffiti
• Removing low hanging branches

Monitoring participant health, even if only by inquiring how they are currently feeling, is necessary. That strategy ensures participants never over-exert themselves. This particular study evaluates the benefit of casual walking on improving nighttime sleep
Model Programs for Improving the Health of Older Adults

Programs have previously been implemented and/or studied. In a large-scale, community-based health promotion program known as the Study of Exercise and Nutrition in Older Rhode Islanders (SENIOR Project), Clark, Rossi, Greaney, Riebe, Greene, Saunders, Lees, and Nigg (2005) promote physical activity for older adults as well as concurrently increasing their daily consumption of fruits and vegetables. The SENIOR project employed tailored intervention approach ‘custom-fits’ message content to each individual within a targeted group based on individualized assessment along variables believed to be important in the behavior change process (p. 555). Their individual tailoring consists of individualized feedback supplied for all salient constructs at each stage.

The SENIOR project (Clark et al., 2005) employs a 2x2 experimental design with the following groups: (1) exercise intervention only, (2) nutrition intervention focusing on fruits and vegetables only, (3) combined exercise and nutrition, and (4) a control group receiving fall prevention materials. In that study, a combination of walking and nutrition had an even greater impact than solely implementing a casual walking program.

Another program is the Senior Wellness Program (SWP), developed and implemented by the University of Washington and Group Health Cooperative of Puget Sound (Holland et al., 2005). The SWP was designed to promote the health and functioning of older adults at risk for functional decline and who reside in the community. It utilized a senior-center-based physical and social activity program, health
education classes, and a geriatric nurse practitioner health coach. SWP program elements emphasize patient empowerment and self-efficacy as complements to primary care in improving the self-management of chronic conditions among those aged 70 or older. The SWP participants were shown in a randomized controlled trial program to have higher physical activity, lower psychotropic medication use, and fewer hospital days over 12 months among those with prior year hospital stays compared to a control group.

After analyzing data collected from 1,021 study participants at six months and again at 12 months, an evaluation team from the University of Washington found that in the first six months after enrollment, the percentage of participating seniors with depressed mood (29.6 percent) and the percentage with physical inactivity (45.7 percent) decreased significantly (to 21.7 percent and to 27.9 percent, respectively). The pattern of decrease continued from six to 12 months. Moreover, at six months, when compared with baseline figures, 82 percent of participating seniors reported that their health was the same or better than one year prior. Almost three-quarters (72 percent) rated their health as good or better, a significant increase from 67 percent at baseline.

Cyarto, Brown, Marshall, & Trost (2008) conducted a quasi-experimental study of 167 retirement village residents between the ages of 65 and 96 years. Residents were placed in one of three groups: home-based resistance training, group-based resistance training, or group-based walking. In their study, the group-based walkers did not improve on a Senior Fitness Test, whereas both resistance training groups improved. They concluded that encouraging retirement village residents to adopt and maintain a resistance training program is important, more important than just casually walking.
It seems that interventions are best if they include multi-component strategies. Strategies might include risk factor screening; exercise and physical therapy to improve gait, balance, and strength; medication management; education about fall risk factors; referral to health care providers for treatment of chronic conditions; vision assessment and possible correction; and home hazard reduction (Stevens et al., 2006).

Programs should be individualized and tailored to the needs, concerns, and learning styles of each particular older adult. Goetzel et al. (2007) believe changing older adults’ behavior is important, as well as providing individualized counseling for those at high risk. Changing behavior can be important. In the study cited by Holland and his colleagues (2005), intervention group members maintained their activity level, whereas those in the control group decreased their weekly activity by an average of almost 40 min.

**Summary**

This chapter began with a section on what is referred to as healthy aging, which is similar to successful aging, and provided some statistics that illustrate how rapidly the nation of the United States is aging. A lack of physical activity is blamed for most of the physiological degeneration of older adults. Following that, this chapter presented the literature regarding numerous losses that can be expected with age and how they can be minimized through activity and quality sleep. The experience of assisted living was covered next and how that affects older adults and their sleep.

The importance of individuals’ sleep quality was also covered. Evidence suggests that poor quality sleep is frequently an indicator of other health problems. The importance of motivation, as well as strategies for keeping older adults motivated was
covered and strategies aimed at increasing internal motivation were described. When the motivation to exercise is not maintained, exercise attrition results. This chapter concluded with a section on exercise attrition, as well as ways to minimize it.

Finally, several model programs for improving the health of older adults were detailed. Specifically, the SENIOR project in Rhode Island, the Senior Wellness Program in the state of Washington and some research comparing of the effects home-based and group-based resistance training program on functional ability in older adults were all described, including the outcome of each.
CHAPTER 3

METHODS

This chapter presents the research methods used in the preliminary studies that occurred in Tallahassee and Kathmandu, as well as the study in Hawai‘i. It begins with a description of the instrumentation used for data collection, follows with an explanation of the participants, and procedures, and explains the data analysis.

Instrumentation

The primary instrument used in all three studies was the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989). The PSQI used for the preliminary research conducted in Kathmandu was translated into Nepali by Dr. Hom Nath Chalise. In Florida and Hawai‘i, two additional research instruments were administered; a demographic questionnaire, and a post-walking questionnaire were administered for the purpose of obtaining more information from the participants (Appendices F and H). These were not used in the Nepalese study as Dr. Chalise, the researcher on site there felt they were not applicable and would not yield particularly useful information.

The Pittsburgh Sleep Quality Index

The PSQI assesses sleep quality during the previous month and was developed from three sources: the authors’ clinical intuition and experience working with sleep disorder patients; a review of sleep quality questionnaires previously cited in the literature; and clinical experience with the instrument during 18 months of field testing (Buysse et al., 1989). The PSQI was developed with several goals: (1) to provide a reliable, valid, and standardized measure of sleep quality; (2) to discriminate between “good” and “poor” sleepers; (3) to provide an index that is easy for participants to use.
and for clinicians and researchers to interpret; and (4) to provide a brief, clinically useful assessment of a variety of sleep disturbances that might affect sleep quality (Buysse et al., 1989).

The PSQI has 19 self-rated questions and 5 questions to be rated by a roommate or bed partner, if one is available. Only the self-rated questions are included in the scoring. The 19 items are grouped into seven component scores, each weighted evenly on a 0-3 scale. The seven component scores are then summed to yield a global PSQI score. Numerous studies cited by Carpenter and Andrykowski (1998) using the PSQI have supported its reliability and validity. Moreover, the PSQI has internal consistency, meaning that all items assess the same thing (sleep quality) and it has a high reliability coefficient of 0.83 for each of the seven components (Smyth, 1999).

Each component of the global PSQI score relates to an aspect of sleep quality. The seven components are: (1) subjective sleep quality, (2) sleep latency, (3) sleep duration, (4) habitual sleep efficiency, (5) sleep disturbances, (6) use of sleeping medications and (7) daytime dysfunction (Buysse et al., 1989). The PSQI requires only 5-10 minutes for participants to complete and assure positive participation and five minutes to score; lower scores indicate better sleep quality (Buysse et al., 1989). Due to the fact that many of the Nepalese participants were illiterate, all questions had to be read to them and their responses recorded by volunteers, which increased completion times in that country.

The authors of the PSQI believe it is necessary to have an instrument that measures the quality of a person’s sleep because sleep quality is an important part of wellness (Buysse et al., 1989). Since “quality” of sleep is largely a subjective experience,
the PSQI is believed to be sufficient for measuring this construct (Youngstedt, 2000). The PSQI assigns ordinal scores to quantitative and qualitative information; which makes the generation of component scores and a single global score possible (Buysse et al., 1989). Analyses can be made by comparing the pre- and post-walk component scores and also by comparing the global scores (Buysse et al., 1989).

The participants in Tallahassee and Kaneohe were also surveyed with a demographic survey (Appendix F) and a post-walking questionnaire (Appendix H) to assess levels of participation/number of days skipped and to determine whether those individuals planned to continue walking; both created specifically for this research.

**Participants**

Participants in this research and in the preliminary studies were all older adults who were residents in an independent/assisted living facility in either Tallahassee, Florida; Kathmandu, Nepal; or Kaneohe, Hawai‘i. However, the three facilities differed in several ways, including the services and amount of assistance they provided. In all three instances, total control was given to the residents to respond to the invitation to participate in the walking exercise. With that invitation, the residents also had a free choice in deciding whether or not to participate in this study. This process was intended to be empowering, because when older adults are empowered, they feel personally fulfilled, energized, socially meaningful and effective (Meddaugh & Peterson, 1997). A sense of personal agency or control is vital for physical and psychological health (Mazzeo et al., 1998).
Tallahassee, Florida

Participants in the preliminary study in Tallahassee, Florida represented a convenience sample of older adults who all volunteered to walk. They were all residents of an Assisted Living Facility (ALF) in a mid-sized city in North Central Florida. The executive director of that facility fully endorsed this research (Appendix B). However, due to the urban setting of the ALF, and considering there were no suitable walking paths, the decision was made to walk in the halls. Fifteen residents attended each of two advertised informational sessions to recruit participants and each time, all 15 volunteered to walk. In other words, all (100%) of the informed older residents choose voluntarily to participate in that research. The thirty residents who participated represented 25% of the total population of 120 residents in that facility.

Due to activities previously arranged for residents during the month the study took place, mornings were the only time to schedule walks for the first group of fifteen. The second group of fifteen walked after lunch. Henceforth, to distinguish between the two groups, they are referred to as the AM Group and PM Group; however, both groups together comprised the entire sample since they performed the same tasks.

Even though all the residents who attended each of the two information sessions agreed to participate, their participation was not guaranteed. Before the completion of the study, four residents dropped out of the walking program – two from the AM group and two from the PM group. Three of these individuals withdrew for unrelated health problems and one lost interest. The loss of four of thirty volunteers, 11%, was small and likely did not affect the research results. Thus, twenty-six residents participated in the
intervention activity, walked for one month, and then completed the PSQI again after that month.

**Kathmandu, Nepal**

A replication of the Tallahassee study was conducted by a colleague in Kathmandu, Nepal. A quasi-experimental design was again utilized. In Nepal, individuals over the age of 60 are considered elderly (Chalise, 2006). This number is not arbitrary, but is based on the fact that the life expectancy in Nepal is currently about 58.5 years, that is 58 years for males and 59 for females (Nepal Country Review, 2007). In the 1950s, largely due to high infant mortality, the life expectancy in Nepal was about 27 years (Chalise & Brightman, 2006). Moreover, Nepal is a somewhat unusual country where men frequently live longer than women (Chalise, 2006). A lack of adequate nutrition or access to healthcare, socio-cultural values, and male child preference in the country are all possible reasons for women not always having the longest life expectancy in that country.

In 2009, 43 older Nepalese adults were recruited in a volunteer convenience sample at Pashupati Briddaashram, a social welfare facility in Kathmandu, to walk there with Dr. Chalise, one of the directors of Geriatric Center Nepal, and several volunteers. The older residents of Pashupati Briddaashram receive meals and all sleep communally, on the floor, in rooms separated by gender. That facility is the only old age home run by the Ministry of Women, Children and Social Welfare Council in Nepal (Pokharel, n. d.). Since 1938, that facility has sheltered approximately 230 elderly people. Most of the elderly people living there say they are happy; they have no problems, no tensions and have a relatively easy life; however, Dr. Chalise and Pokharel, n.d., report that in reality,
these elderly people are often frail and frequently sick. They are also reportedly frequently deprived of care and love. That facility’s reputation is marred by an acute shortage of everything from a basic water supply to regular care-givers. Pokharel (n.d., p. 3) also claims that some residents feel, “When you reach there, you feel as if you were inside a hell.” Despite that, there is still a long waiting list to become a resident there (Chalise, 2011) and Pokharel (n. d.) feels getting admitted is an Herculean task. Most of the older residents have no formal education and many are illiterate, even to the use of a clock. In fact, 36 of 43, almost 87% of the older adults participating in the Kathmandu study, indicated they were illiterate.

Every attempt was made to recreate the research conducted in Tallahassee since the research in Kathmandu was based on that preliminary research; however, because Pashupati Briddaashram does not have hallways conducive to walking, walks took place early in the morning, when Dr. Chalise and the volunteers were available, and walks occurred outside. Due to the relatively high number of illiterate participants in Kathmandu, their answers had to be recorded by a volunteer after questions were read to them.

Kaneohe, Hawai‘i

As a further extension of this study, and in an effort to improve the research design, 24 individuals were recruited from a facility in Kaneohe, Hawai‘i. Of the participants, 19 walked daily with the researcher and five served as a control group by not otherwise changing their activity or walking behavior. The demographics of both the intervention and control groups were collected and residents were surveyed with the PSQI prior to and following one month. Utilizing a treatment and control group increase
the ability to make generalizations from this research and comparisons between the three different locations, their cultures, and their participants is also meaningful.

Prior to walking, the participants did a ten-minute warm-up exercise that included stretching. This prepared the heart and lungs for the increased demands of activity, as well as improved flexibility and strength. Stretching is especially emphasized as a warm-up activity for older adults because, with age, tissue losses elasticity and loosening muscles is important prior to walking (Fenton, 2000; Herbert & Gabriel, 2002). Stretching after physical activity is also important (Herbert & Gabriel, 2002) in order to give muscles time to relax and cool down. While walking, periodic reminders of the dangers involved with walking were given to prevent the older adults from overexerting themselves.

During stretching activities, as well as during the walks, the residents were questioned about their lives and encouraged to socialize. This helped maintain interest and kept the stretching and walking activities enjoyable. After walking, a cool-down period of five to ten minutes was conducted. During this time, residents were further encouraged to socialize and talk about their walking. Stretching, during this period, was also done because the muscles are loosest at this time and this process should help maintain muscle elasticity (Herbert & Gabriel, 2002). The cool-down period also allows the heart to settle back down to normal, because a too rapid reduction in rate can result in dangerous irregular heartbeats (Gingbold, 1992).

All participants of this research were surveyed by the researcher, his colleague, or a Nepalese volunteer. Participants’ responses to the Pittsburgh Sleep Quality Index (PSQI) prior to and following one month of walking assessed the quality of their sleep
during the previous month. The control group completed the PSQI at a one-month interval without receiving the intervention.

The treatment in this study was the walking by institutionalized older adults who live a long-term care facility. The time spent walking gradually increased over time from 15 to 30 minutes. The dependent variable was overall sleep quality, measured by the PSQI. The PSQI was given two times, before beginning the intervention, and again, after the volunteers participated in walking. Since the sample was given a pretest before walking, this design is stronger than if the sample was tested only after participation (Borg, 1987).

The researcher or volunteers administered the questionnaires directly to the participants in order to establish rapport with them, to explain the purpose of the study, and/or so the meaning of difficult or tricky questions could be clarified (Best and Kahn, 1986). Several questions included in the PSQI are designed in a forced choice format. Although this format may frustrate some respondents, those who have a tendency to respond in the middle category every time are prevented from doing so (Dhar & Simonson, 2003).

In the preliminary studies conducted in Tallahassee and Kathmandu, a quasi-experimental design was utilized. These quasi-experimental studies used the study population as its own control group, comparing base line data collected for a period, with data gathered after an intervention (Bale, 2004). Bale (2004) cites numerous authors who refer to this design as a pretest post-test or as an interrupted time series. Since individuals’ scores on the PSQI could not be compared with either group, the global
scores were calculated to determine the aggregate improvement for each group pre and post treatment.

Participants completed the PSQI, walked 3 times/week for one month, then completed the PSQI again. This procedure evaluated the improvement casual walking has on sleep.

The research design differed from the first two preliminary studies in that it included both a treatment and a control group. Also, the PSQI scores for each group could be tracked pre and post treatment. Because of the small sample size, data were analyzed using a nonparametric test that did not rely on the normal distributions that are commonly found in larger samples. Changes in individuals’ scores from pretest to posttest were recorded as ordinal outcome. A chi-square test was also used to determine expected versus actual outcomes in each group before and after treatment. The results of the data analysis in all three studies is presented and discussed in Chapter 4.
CHAPTER 4
RESULTS AND DISCUSSION

Overview

This chapter presents the results of the two preliminary studies that preceded the research conducted in Hawai‘i, as well as the results of the Hawai‘i study. It follows with a discussion of the differences among the three studies, including design changes that were made, particularly in the Hawai‘i study.

Preliminary Study #1 in Tallahassee, Florida

Research was conducted in Tallahassee in two groups of 15, one group that walked in the AM, before lunch, and one group that walked in the PM, after lunch. A statistical test was conducted to assure that the AM Group and the PM Group were similar enough to be combined and analyzed as a single group. A t test value of 0.1936 was calculated, which is well above the statistical t value of 0.05.

When the AM Group was combined with the PM Group in Tallahassee, twenty-nine of the thirty residents (96.7%) attending the information session, consenting to walk, and casually walking with the researcher were female. Of the 26 residents who completed the study and were assessed with the PSQI a second time, all 26 (100%) were female. Those 26 women had a mean age of 78.81 years with a standard deviation of 10.76 years. The minimum age was 55 and the maximum age was 91.

Demographically, the Bureau of Census reports that 17.6% of Florida’s population is 65 years-old or older and the population of Florida is 78% Caucasian, 14.6% had African American, .3% American Indian and Alaska Native and 1.7% are of
Asian descent. The population of Florida is .1 Native Hawaiian or Other Pacific Islander and only 2.4% of Florida’s population reports being of two or more races.

However, in terms of the race or ethnicity of the participants in this particular sample, a large majority were Caucasian. Specifically, 23 of the 26 residents who completed the study were Caucasian (88.5%) and three were of African descent (11.5%). Marital status can influence older adults’ sleep and married individuals usually have a better sleep experience. Since the vast majority (over 96%) were not married, it was not practical to use marital status to measure sleep quality in this research.

Since “felt age,” the age one feels, is a relevant indicator of many health criteria, the question, “How old do you feel?” was also asked. The result of the mean felt age question was 66.53 years old, which was more than 12 years younger than the mean chronological age. The lowest reported felt age was 40 and the highest was 84. The standard deviation of felt age was 12.83 years.

The participants had an average of 11.25 years of schooling with a standard deviation of 3.14 years. Responses ranged from having completed the third grade to one year of graduate school. Educational attainment can be an important criterion because differences found in sleep quality are in many ways related to individuals’ schooling. The conventional premise is that individuals with more education are able to see more relationships between their behavior and the response those behaviors have on their functioning (Meyers, 1997).

Two other descriptive demographic factors in this particular study were self-perception of being physically active and mood state. Most residents classified themselves as physically active (69%) and not depressed (73%).
Maintaining motivation of this sample to continue to walk over a month’s time was sometimes challenging. While ALF residents were initially eager to walk – 100% participation from residents attending an informational session - they participated more haphazardly as the study progressed. One resident completely stopped participating due to a loss of interest, while three others could no longer participate due to unrelated health problems. Two residents dropped out of each the AM group and PM group. Since each group contained 15 individuals, it was encouraging that only two stopped participating altogether.

The more frequent scenario was that of skipping walks. An average of one resident skipped a walk each day, despite being given daily encouragement by the researcher, who would remind residents of the walk as they were finishing breakfast or lunch. Abstaining from a walking session was mostly attributed to an obligation to keep a scheduled medical appointment; however, some absences were by choice. On average, having one absence out of 15 per walking session (7.5%) seems low and also seems to indicates that casual walking in a group appeals to older adults.

Prior to the month of hallway walking, all thirty residents had a combined global PSQI score of 193. After one month of walking, the combined global PSQI score of the 26 older adults who completed the study was132. Since 30 residents completed the pre-test and only 26 completed the post-test, the post-test global score was multiplied by 30/26 to make the two global scores comparable. Graphically, that comparison appears in Figure 1.
Because the residents who stopped participating caused the pre- and post-walk sample sizes to be different, two procedures were used to make the aggregate PSQI global scores comparable. First, since 30 residents completed the pre-test and only 26 completed the post-test, the post-test global score was multiplied by 30/26 to make the two global scores comparable.

Conducting a t test on the pre- and post-walk comparison enabled the statistical significance of this intervention to be determined. By dividing 193 by 152.37 (132*30/26), the resulting number equals 1.267. With 28 degrees of freedom (15 + 15 – 2),
2) and a 95% confidence interval to compare this number to a number on the t table, the derived number of 1.267 is less than the t table value of 2.048 for significance. Thus, the results of the benefit in nighttime sleep quality from hallway walking in this particular study were not statistically significant and may have occurred by chance.

Alternatively, by removing the dropouts’ global scores from the combined pre-walking global score, the numbers are again comparable (193-30=163 compared to 132). Graphically, this comparison can be seen in Figure 2.

![Graphical representation](image)

**Figure 2**

PSQI Comparison #2 from Tallahassee
Calculating a t test on the pre- and post-walk score comparison when the data are used this way, by dividing 163 by 132, the resulting number equals 1.235. With 24 degrees of freedom (13+13-2) and a 95% confidence interval to compare this number to the t table, the derived number is less than the t table value of 2.064.

In the preliminary study in Tallahassee, four residents from that sample stopped participating altogether. Even though a total of 26 residents continued to participate in walks, approximately one resident per walk would decide not to walk that day. Consequently, towards the conclusion of that study, the researcher developed a post-walking questionnaire to assess levels of participation.

Although walking appears to improve nighttime sleep quality, the fact that the results of this particular research were not statistically significant indicated that the improvement that occurred could have been due to chance. Therefore, this research could not confirm the results of previous research (Buchner, 1997; Butler et al., 2000; Ebersole & Hess, 1994; Ford, 1995; King et al., 1997; Kligman et al., 1999; Mazzeo et al., 1998; McAuley, 1993; O’Connor et al., 1997; Pinkowish, 1998; Voelkl, 1993; & Youngstedt, O’Connor, & Dishman, 1997) that suggests walking improves nighttime sleep quality for older adults. Although this study indicated residents of an ALF can improve their nighttime sleep quality simply by casual walking several days per week up and down the halls of their ALF, it is unclear by how much or exactly why. Mild exercise might serve as a sleep aide, but casual walking alone that took place in the study was insufficient to make a statistically significant difference.

Both AM walkers and PM walkers scored highest and had the most trouble with the sleep latency and sleep disturbance components of the PSQI. People having difficulty
falling asleep may correctly assume that they have insomnia; however, staying asleep is not commonly thought of as being insomnia. To reiterate, insomnia not only affects those people that cannot fall asleep at night, but also refers to the perception or experience of inadequate or poor-quality sleep. People with insomnia may have difficulty falling asleep or may awaken too early; they may not feel refreshed; or, they may wake frequently during the night with difficulty returning to sleep (National Institutes of Health (NIH), 1995).

Thirteen of 26, or 50% of the participants who walked for one month experienced an improvement in their nighttime sleep quality, while 5 of the 26 (19%) experienced no change, and 8 of the 26 (30%) experienced a decrease in their sleep quality after one month of walking. Considering that age and sleep difficulties are positively correlated, 69% of this sample had no change or actually improved their sleep. Thus, for the ALF residents in this sample, the activity of walking appears to have improved their nighttime sleep quality.

Analyzing each component improvement individually is also noteworthy. Four levels of participation were possible; on the Post-Walking Questionnaire (Appendix H); residents were asked to indicate if they had participated in 75-100% of walks, 50-75%, 25-50% or 0-25%. Residents who participated, even those that participated sporadically, experienced benefit. Six of the eight residents who participated in only 25% of walks or less improved their sleep. The most reasonable assumption is that by participating only occasionally, at least the residents were engaging in some activity. Another possibility is the occurrence of the Hawthorne Effect, which states that almost regardless of the experimental manipulation employed, a benefit occurs (Murray, Swan, Kiryluk, & Clark,
One possible explanation for the benefit is that the sample was pleased to receive attention from the researcher and peers expressing interest in them.

By continuing with the technique of removing the dropouts’ scores from the scores of the 30 residents originally surveyed, comparisons between pre- and post-walk component scores are possible, as can be seen in Table 1.

Table 1
Pre- and Post-Walk Component Score Comparison from Tallahassee

<table>
<thead>
<tr>
<th>Component</th>
<th>Subj. Sleep Quality</th>
<th>Sleep Latency</th>
<th>Sleep Duration</th>
<th>Habitual Sleep Efficiency</th>
<th>Sleep Disturbance</th>
<th>Use of Sleep Meds</th>
<th>Daytime Dysfunction</th>
<th>Global PSQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-walk</td>
<td>15</td>
<td>53</td>
<td>12</td>
<td>17</td>
<td>32</td>
<td>16</td>
<td>18</td>
<td>163</td>
</tr>
<tr>
<td>Post-walk</td>
<td>15</td>
<td>28</td>
<td>6</td>
<td>15</td>
<td>22</td>
<td>22</td>
<td>24</td>
<td>132</td>
</tr>
<tr>
<td>Percent improvement</td>
<td>0%</td>
<td>89.3%</td>
<td>100%</td>
<td>13.3%</td>
<td>45.5%</td>
<td>(27.2%)</td>
<td>(25%)</td>
<td>23.4%</td>
</tr>
</tbody>
</table>

Pre-walk score = the combined component scores for the 30 residents originally surveyed minus the scores of the four dropouts.

Post-walk score = the combined component scores for the 26 residents able to walk for one month and then surveyed after that month.

* = Sleep components that improved significantly after frequent walking in an ALF.

Using 24 degrees of freedom (13+13-2) and a 95% confidence interval, three of the differences between pre- and post-walk component scores were significant when compared to the t table value of 1.711. These significant components were: the experience of sleep disturbance, which improved by 45.5%; sleep latency, the ability to fall asleep, which improved by 89.3%; and sleep duration, the ability to stay asleep,
which improved by 100%. The other changes in scores, both increases and decreases, may have been due to chance. However, the lack of significance was possibly caused by residents already being active hallway walkers and casual hallway walking did not move them to a higher activity level, as Kligman et al. (1999) recommend.

In Tallahassee, five of seven components improved and there was an improvement in the combined global sleep quality score following one month of casual hallway walking. There was no change in the aggregate subjective sleep quality for older adults that reside in an ALF after one month of walking (component number one of the PSQI). As evidenced by component number two of the PSQI, there was a perceived 89.3% improvement in sleep latency or the initiation of sleep by the participants after one month of walking. Basically, this means that the older adults felt a substantial improvement in their ability to fall asleep following participation in walking. Conversely, there was a 27.2% increase in the use of over-the-counter medications, component number six, to help with the initiation or maintenance of sleep. The authors of the PSQI acknowledge that the exact elements that compose sleep quality, as well as their relative importance, may vary between individuals (Buysse et al., 1989). Improved overall quality of sleep was the goal of this study, not an improvement in every component on the PSQI.

The data indicate that there was a perceived improvement in the maintenance of sleep for the participants after one month of walking. The third PSQI component demonstrates a perceived 100% improvement in sleep duration and a 13.3% improvement in habitual sleep efficiency after one month of walking.

While the residents’ aggregate subjective sleep quality did not change, their Daytime Dysfunction increased by 25% and their use of medication to help them sleep
increased by 27.2%, four component scores decreased, meaning that those aspects of sleep quality improved. The increase in the use of over-the-counter medications to help residents with their sleep can be attributed to only four residents increasing their use; however, daytime dysfunction increased randomly with some residents and decreased just as randomly with other residents.

Statistically significant gains occurred in three of the seven components measured by the PSQI. Improvements were evident in less sleep disturbances, which improved by 45.5%, sleep latency, which improved by 89.3%, and sleep duration, which improved by 100%. Although the overall gain was not statistically significant, it is noteworthy that the global PSQI score improved from 163 to 132 or by 23.4%.

**Preliminary Study #2 in Kathmandu, Nepal**

Subsequent to the Tallahassee research, the researcher became a visiting scholar at the Department of Social Gerontology at Tokyo University and met Hom Nath Chalise, a Nepalese gerontology scholar who expressed an interest in conducting comparative research with older adults in Kathmandu. The replication study was arranged and completed in 2010. Although it was a replication study in that it used the PSQI to analyze the effect of casual daily walking on the participants’ nighttime sleep quality, the Kathmandu study differed in that the walking occurred outdoors rather than within the confines of the residential facility. The grounds where residents walked is a natural, uneven path and Kathmandu is closer to the Himalayan mountain range than the plains, so its climate has cool summers and severe winters. Moreover, the demographic and post-walking surveys were not administered to the Kathmandu participants.
There is only one residential facility run by the government housing older adults in Nepal. Forty-three individuals from that facility agreed to participate in the study and engage in one month of casual walking in an effort to improve their nighttime sleep quality. Thirty participants (70%) were female and 13 participants (30%) were male. Those 43 individuals had an average age of 75.67 years with a standard deviation of 6.61 years. The minimum age was 60 and the maximum age was 86.

Dr. Chalise thought the felt age question was not an appropriate question to ask of the elderly in an Asian society, so he instructed the volunteers not to ask that question. Maintaining motivation among the Nepalese participants was not as difficult as it was maintaining motivation in Tallahassee. None of the 43 Nepalese participants who started the walking treatment completely stopped participating, and Dr. Chalise (2010) reported that several other residents inquired about joining the intervention after it began.

Thirteen individuals were still married; however, considering that all residents of Pashupati Bridaashram sleep on the floor in rooms separated by gender, even the married residents do not have a bed partner. The participants in Kathmandu also had substantially less formal education than the Tallahassee sample. A more pertinent question for this particular sample was whether or not they were literate. Six of 43 (14%) were literate while 37 of 43 (86%) were illiterate and some were not even able to tell time.

As reported in Table 2, Kathmandu, Nepal, the combined aggregate sleep quality scores increased from 385 to 401. Since casual walking did not have a benefit on the combined aggregate sleep quality score of those 43 individuals, no further analysis was undertaken.
Table 2
Pre- and Post-Walk Component Score Comparison from Kathmandu

<table>
<thead>
<tr>
<th>Component:</th>
<th>Subj. Sleep Quality</th>
<th>Sleep Latency</th>
<th>Sleep Duration</th>
<th>Habitual Sleep Efficiency</th>
<th>Sleep Disturbance</th>
<th>Use of Sleep Meds</th>
<th>Daytime Dysfunction</th>
<th>Global PSQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-walk</td>
<td>51</td>
<td>84</td>
<td>63</td>
<td>91</td>
<td>65</td>
<td>15</td>
<td>16</td>
<td>385</td>
</tr>
<tr>
<td>Post-walk</td>
<td>80</td>
<td>81</td>
<td>61</td>
<td>94</td>
<td>55</td>
<td>14</td>
<td>16</td>
<td>401</td>
</tr>
<tr>
<td>Percent improvement</td>
<td>(57%)</td>
<td>3.6%</td>
<td>3.2%</td>
<td>(3.2)%</td>
<td>15%</td>
<td>6.7%</td>
<td>0%</td>
<td>(4.2)%</td>
</tr>
</tbody>
</table>

Clearly in Kathmandu, since the combined global PSQI scores increased, albeit by only four percent, casual walking among that particular sample did not improve the residents’ nighttime sleep quality. However, the Kathmandu research was also flawed because the individuals’ pre and post test scores were not analyzed.

Research in Kaneohe, Hawai‘i

Following the Kathmandu research, in the summer of 2011, a third study was conducted at an ALF in Kaneohe, Hawai‘i. In an attempt to maximize participation and varied samples, the researcher made inquiries with all of the ALFs on the island of Oahu, however the managers of only one agreed to have residents participate. The residents were informed about the study and invited to an informational meeting. At the meeting, 24 people agreed to participate in the walking, or treatment, group and five agreed to participate in the control group. The treatment group embarked upon a daily walking regime, while the control group members did not change their behavior.

Tables 3 and 4 present, respectively, the results of the pre and post test score of the PSQI for both the treatment group and the control group.
Table 3
Pre- and Post-Walk Component Score Comparison from Kaneohe Treatment Group

<table>
<thead>
<tr>
<th>Component:</th>
<th>Subj. Sleep Quality</th>
<th>Sleep Latency</th>
<th>Sleep Duration</th>
<th>Habitual Sleep Efficiency</th>
<th>Sleep Disturbance</th>
<th>Use of Sleep Meds</th>
<th>Daytime Dysfunction</th>
<th>Global PSQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-walk</td>
<td>18</td>
<td>26</td>
<td>18</td>
<td>20</td>
<td>23</td>
<td>16</td>
<td>12</td>
<td>133</td>
</tr>
<tr>
<td>Post-walk</td>
<td>11</td>
<td>18</td>
<td>15</td>
<td>19</td>
<td>23</td>
<td>15</td>
<td>19</td>
<td>120</td>
</tr>
<tr>
<td>Percent improvement</td>
<td>39%</td>
<td>23%</td>
<td>17%</td>
<td>5%</td>
<td>0%</td>
<td>6%</td>
<td>(58%)</td>
<td>10%</td>
</tr>
</tbody>
</table>

Table 4
Pre- and Post-Walk Component Score Comparison from Kaneohe Control Group

<table>
<thead>
<tr>
<th>Component:</th>
<th>Subj. Sleep Quality</th>
<th>Sleep Latency</th>
<th>Sleep Duration</th>
<th>Habitual Sleep Efficiency</th>
<th>Sleep Disturbance</th>
<th>Use of Sleep Meds</th>
<th>Daytime Dysfunction</th>
<th>Global PSQI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-walk</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Post-walk</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>Percent improvement</td>
<td>0%</td>
<td>(33%)</td>
<td>(50%)</td>
<td>40%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

Because of the small sample size, and because the scores alone did not show any significant benefit to casual walking, further analysis was done. Several nonparametric tests (i.e., tests that do not depend on normal distributions that are commonly encountered in larger sample sizes) were used to analyze the data. Changes in individuals’ scores from the pretest to posttest were recoded as an ordinal outcome (referred to as “change1.” If individuals’ decreased their scores the effect was coded -1. Individuals whose scores increased from pretest to posttest were coded +1, and individuals who were unchanged were coded 0.
Table 5 provides a summary of the distribution of individuals’ change within the control group (coded 0) and treatment (1).

**Table 5**

**Comparison of Individual Change in Treatment and Control Groups**

<table>
<thead>
<tr>
<th>Change</th>
<th>Group</th>
<th>Expected Count</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group</td>
<td></td>
</tr>
<tr>
<td>-1.00</td>
<td>Count</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td>.00</td>
<td>Count</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.9</td>
</tr>
<tr>
<td>1.00</td>
<td>Count</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Group</th>
<th>Expected Count</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.0</td>
</tr>
</tbody>
</table>

**Chi square = 17.657**

The chi-square tests suggests the observed cell counts and expected cell counts are not the same (chi square = 17.657, p < .001). This result suggests that the treatment group had more individuals who decreased their scores (10) than expected (8.6) and fewer individuals who remained the same (0) than expected (3.1). In contrast, the control group had fewer individuals who decreased their scores (1) than expected (2.4) and more who remained unchanged (4) than expected (0.9). It should also be noted, however, that more individuals (8) than expected (6.3) also increased their scores in the treatment.

We can conclude from this first test that the treatment produced more varied types of results on participants than the control group (4 of whom were unchanged, and one who decreased in overall score).
Because of the small group sample sizes, a median test (which examines the point at which 50% of the scores fall above or below) was conducted and is presented in Table 7. In this case, the outcome considered was the rank of the change in scores from pretest to posttest. This type of test takes into consideration individuals who changed the most in lowering their score (rank = 1) to individuals who changed the least (rank = 23).

The hypothesis is that the treatment group would have lower median scores, since we would expect individuals to change more in the negative direction (i.e., lowering their posttest scores). The grouped median for the control group (0) was 12.90 and the grouped median for the treatment (1) was 9.83. This was significant at the p=.089 level, suggesting that the walking intervention did have an effect on the treatment group. Within that group, however, there were extremes, with individuals whose PSQI scores decreased more than would be expected and others whose scores increased more than what would be expected. Given the small sample size of both the treatment and control groups, it is difficult to explain why this occurred.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Variance</th>
<th>Range</th>
<th>Grouped Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>12.9</td>
<td>1.342</td>
<td>1.8</td>
<td>3.0</td>
<td>12.9</td>
</tr>
<tr>
<td>1</td>
<td>11.75</td>
<td>7.837</td>
<td>58.3310</td>
<td>22.0</td>
<td>9.83</td>
</tr>
<tr>
<td>Total</td>
<td>12.0</td>
<td>6.756</td>
<td>45.63</td>
<td>22.0</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Note: Difference in grouped medians is significant at p=.089

Demographically, the treatment group in Hawai‘i consisted of 15 females and 4 males. Two females did not provide their ages; however, the 17 who did had an average
age of over 85 years with a standard deviation of 5.98. Their reported Felt Age was 76.4 years. Interestingly, among all of the participants but one, their Felt Age was either equal to or less than their actual age. One 82 year-old woman reported feeling 50, while a 92 year-old said she felt 91.5. Overall, the group had a fairly high level of formal education. Sixteen members of the treatment group had at least some college, including two with a Ph.D. degree and 5 others with a graduate degree.

The control group consisted of four females and one male. They were all college educated and had an average age of 84.4 years, ranging from 74 to 94 years with a standard deviation of 7.8. Because one’s felt age can be such an important indicator, that question was also asked. Among the five respondents, the replies were 60 (actual age, 82), 60-90, it varies (actual age, 82), “as good as I get” (actual age 94), 85 (actual age 90) and 70 (actual age, 74). All 5 had some college-level education including one who had a master’s degree, three others who had bachelor’s degree.

**DISCUSSION OF THE THREE STUDIES**

Table 7 presents a comparison of the pre and post test results on the PSQI among the three studies. While none of the results were statistically significant, all three studies were informative and yielded interesting results. The experience of daytime walking and its effect on subjective nighttime sleep quality was different in the three study locations. In Florida, the aggregate daytime dysfunction score increased. Specifically, six participants perceived that they experienced less daytime dysfunction and nine participants perceived they experienced the same amount of dysfunction, eleven participants perceived that they experienced more daytime dysfunction. In Nepal, however, the aggregate daytime disturbance for the entire sample remained unchanged.
In Hawai‘i, while the combined daytime disturbance for the control group did not change, which seems to make sense, the combined daytime dysfunction score for the treatment group actually increased. Also in the Hawai‘i group, the difference in the median scores of the treatment and control groups on the PQSI was significant, suggesting that walking did have an effect in changing sleep behavior, although the results could not predict how or why this occurred.

Also in the Hawai‘i group, the difference in the median scores of the treatment and control groups on the PQSI was significant, suggesting that walking did have an effect in changing sleep behavior, although the results could not predict how or why this occurred.

**Table 7**

**Comparison of Pre- and Post-Walk Scores on the PSQI in Tallahassee, Kathmandu and Kaneohe**

Comparison of Pretest and Posttest Results (Tallahassee)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>T-Test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest (N = 25)</td>
<td>6.44</td>
<td>4.81</td>
<td>1.57</td>
<td>.129</td>
</tr>
<tr>
<td>Posttest</td>
<td>5.28</td>
<td>5.28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparison of Pretest and Posttest Results (Kathmandu)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>T-Test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest (N = 43)</td>
<td>8.95</td>
<td>3.89</td>
<td>-1.94</td>
<td>.060</td>
</tr>
<tr>
<td>Posttest</td>
<td>9.33</td>
<td>3.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Comparison of Treatment and Control Groups (Hawai‘i)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>F-Ratio</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (N = 5)</td>
<td>4.04</td>
<td>3.21</td>
<td>1.812</td>
<td>.193</td>
</tr>
<tr>
<td>Treatment (N=18)</td>
<td>6.77</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>6.17</td>
<td>3.89</td>
<td>0.816</td>
<td>.3</td>
</tr>
</tbody>
</table>
CHAPTER 5

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This research sought to examine the relationship between daily casual walking and sleep quality among older adults residing in Assisted Living Facilities. The studies took place over approximately seven years time in Florida, Nepal, and Hawai‘i. Sleep quality was measured using the Pittsburgh Sleep Quality Index, a standardized instrument that examines sleep quality over seven components. In the first study, which took place in Florida, the adults participated in a daily walking program in the hallways of the ALF, and there was no control group to compare walkers with non-walkers. In the second study, which was conducted in Nepal, the participants walked outdoors, however there was not a control group in that study, either.

The third study, which was the primary focus of this dissertation, took place in Hawai‘i. In this study, participants also walked outdoors, but unlike the two earlier studies, there was a control group of non-walkers against whom to compare the walking group. All three studies were constrained by small sample sizes, and in none of the studies was a significant relationship between casual walking and nighttime sleep quality found. However, in the Hawai‘i study there was a significant difference (at the p=0.089 level) between the median scores of the walking group and the non-walking group, suggesting that walking does have an effect on participants. The results also indicated that among the walking group in Hawai‘i there was a higher than expected set of both positive and negative outcomes, suggesting that while walking did cause change, the change was not primarily directed at improving sleep quality.
There were demographic differences among the three groups. In the Florida and Hawai‘i research, demographic data were collected directly from the participants. In Nepal, the on-site researcher chose not to collect information from individuals, and reported more aggregate information about the residents of the country and of the entire population of the ALF where the study was conducted. The demographic results indicated that the Hawai‘i group had the highest level of formal education, with the majority of participants have education beyond high school, and the Nepalese group had the lowest, with a majority of the participants being illiterate. The Florida group was closer to the Hawai‘i group in education level, but was not as high.

Although this research was statistically inconclusive about the benefits of casual walking and sleep quality in the three groups in the facilities studied, there is a body of research that suggests more strenuous walking among older adults within their own neighborhoods is beneficial (Weiss, Maantay, & Fahs, 2010). Very little research, however, has examined the effect of walking and sleep quality among residents of ALFs. This may be because the percentage of older adults in the United States living in ALFs is relatively small, thus has not warranted much attention from researchers, and/or because a good proportion of ALF residents have very limited mobility or are not ambulatory.

This is likely to change in the future as more adults enter ALFs and because in 2010, the National Survey of Residential Care Facilities (NSRCF) was initiated, beginning the first ever national survey of residential care providers for older adults in the United States (Federal Interagency Forum on Aging, 2010). The facilities that will be surveyed comprehensively and on a regular basis are assisted living facilities, board and care homes, and personal care homes that are licensed, certified or otherwise regulated by
state. The NSRCF will look at costs associated with older adults residing in residential facilities, as well as services provided and needed.

On the basis of the findings of this research, the projections regarding the future growth of the older population of the United States, and the closer scrutiny that will be given to residential facilities and their inhabitants, there are several recommendations for future research and policy, and practice.

Recommendations for Future Research

• Additional studies examining the relationship between casual walking and the sleep quality among older adults in ALFs be conducted with improved design, using larger sample sizes, examining both indoor and outdoor walking, and using treatment and control groups.

• Future studies in this area should also examine data about participants’ overall general health, both physical and mental, and should track this over time to form a better understanding of the larger health effects of regular walking over time among ALF residents.

• Future studies of residents in ALFs should examine their sleep quality, activity levels, and overall health prior to entering the residential care facility and how these variables changed upon entering the ALF.

• Research should be undertaken to examine the public health benefits of regular casual walking among older adults in ALFs, including cost benefits in terms of Medicare and Medicaid expenses, as well as costs associated with injuries and hospitalizations due to losses and complications of inactivity.

Recommendations for Policy and Practice
• Urban ALFs should make every effort to ensure that residents have opportunities to walk safely outdoors on a regular basis, weather permitting. Whether this means constructing walking paths on the premises, or transporting residents to nearby parks or open areas, making daily walking available everyone should be a priority.

• ALFs should have a sufficient number of designated walk leaders to provide residents with support and supervision to walk outdoors on a regular basis. Cost should not be a factor in not doing this. If the ALF does not have funds to employ staff, volunteers should be recruited from the community. The walk leaders should be screened for fitness to work actively with older adults.

• ALFs should encourage walking to take place in the afternoon during the mid-day dip in alertness, since studies have shown this to be the most effective time for improving the relationship with sleep quality. Furthermore, ALF staff members should encourage residents to, whenever possible, schedule medical appointments for mornings so they will not miss their walking time.

• State certification and/or licensure criteria for all residential care facilities for older adults should include a requirement that they offer residents opportunities to walk safely in the company of an approved walk leader on a regular basis, no less than twice a week.
APPENDIX A

Human Subjects Committee approval from the preliminary research conducted in Tallahassee

Office of the Vice President
for Research
Tallahassee, Florida 32306-2763
(850) 644-3260 • FAX (850) 644-4392

APPROVAL MEMORANDUM
from the Human Subjects Committee

Date: September 18, 2002  
From: David Quadagno, Chair  
To: James David Brightman  
1845 Belle Vue Way, Apt. 146  
Tallahassee, FL 32304  
Dept: Special Education and Rehabilitation Counseling Services
Re: Use of Human subjects in Research  
Project entitled: Walking and Sleep Quality Among Older Adults in an Assisted Living Facility

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Human Subjects Committee at its meeting on September 11, 2002. Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If the project has not been completed by September 10, 2003, you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB000000446.

APPLICATION NO. 02.415  
Cc: R.W. English, Ph.D
APPENDIX B

Executive Director’s Endorsement from the preliminary research conducted in Tallahassee

October 31, 2002

It is the opinion of this Executive Director that this study being developed by James Brightman, doctoral student in rehabilitation counseling, will be of great benefit for the residents of The Meadows of Tallahassee. The residents as well as myself look forward to participating in this study. We are equally interested in the results of the study. Whenever an individual takes interest in our senior residents to help better their quality of life as well as the quality of sleep, the outcome will definitely benefit all the following generations.

Mary Claire Shopp
Executive Director

1978 Village Green Way • Tallahassee, Florida 32308 • (904) 385-4533 • 1-800-785-5885
APPENDIX C

Instruction/Participant consent for the preliminary research conducted in Tallahassee

Dear Potential Research Participant:

My name is James Brightman and I am a doctoral student studying Rehabilitation Counseling at the Florida State University under the supervision of Dr. Bill English. Thank you for participating in my research on the effect walking has on sleep quality for older adults. The title of my thesis is, “Walking and Sleep Quality among Older Adults in an Assisted Living Facility.” Participation, at all times, is completely voluntary. You may choose whether you participate in this study.

This program is designed to improve your sleep quality and be fun. In this program, you will walk three times per week for four weeks with the researcher. The speed and time spent walking will increase, at a comfortable pace, to 30 minutes of brisk walking. If you ever experience any discomfort, you are urged to tell the researcher! You will also complete a Demographic Questionnaire and the Pittsburgh Sleep Quality Index (PSQI). The PSQI is a questionnaire that measures the quality of your sleep. The PSQI contains 11 questions and will take less than 15 minutes to complete.

While there is a small risk of injury from participating in this study, walking involves less risk than many other types of activity. From participation in the study, there are benefits to be gained. Information will be provided that will inform you of the benefits you may gain in your sleep quality as well as provide some basic information on successful aging. To assure that it is safe for you to participate in this study, besides you signing the provided consent for walking form, please ask a medical professional to sign it. Your signed consent should be returned by ____________. Persons whose signed forms have been returned will begin walking ____________.

Completion of the questionnaires, retrieving your signed informed consent, and walking indicate that you consent to participate in this study.

Information obtained during the course of the study will remain confidential, to the extent allowed by law. When reporting information, only group information will be used and it will be done in such a way that you cannot be identified. You may obtain a copy of the results by request. If you have questions regarding this study, you may contact the researcher, his major professor, or the Human Subjects Committee at the addresses listed on the following page.

Please provide your consent and obtain your primary care physician’s consent:

________________________________________________________

I give my consent to participate in the above study. I understand that walking involves a minimal amount of risk and there is a risk of injury. The risk of injury is increased if I am not conditioned to walk or if I progress too quickly.

73
Potential research participant

I am a medical professional responsible for the individual listed above and I believe it is safe for that individual to participate in research involving walking, possibly during the midday dip in alertness (after lunch).

Medical professional
APPENDIX D

American Sleep Disorders Association’s recommendations for sleep hygiene

(1) Caffeine should not be consumed within 3-4 hr of bedtime.

(2) Quitting smoking can improve sleep.

(3) Alcoholic beverages should be avoided within 4-6 hr of bedtime.

(4) Regular exercise promotes sleep, but morning exercise has little effect on sleep, and evening exercise (within 6 hrs of bedtime) disrupts sleep.

(5) A dark, quiet, and comfortable environment is ideal for sleep.

(6) Avoid a heavy meal close to bedtime. Light snacks and dairy products may promote sleep.

(7) Sleep only when drowsy.

(8) Maintain a regular arose time.

(9) Use the bedroom only for sleep and sex.

(10) Avoid daytime napping.
APPENDIX E

Benefits of walking and a Walking Club

Physical:

• Strengthens the heart
• Reduces risk of heart attack and stroke
• Improves circulation
• Improves breathing
• Reduces blood fat and cholesterol
• Helps in weight loss and permanent weight control
  o Reduces body fat by burning a large number of calories
  o Increases metabolic rate
• Normalizes blood pressure
• Improves most medical conditions and limitations
• Strengthens bones
• Tones muscles and develops lean tissue
• Improves endocrine functions
• Makes you feel and look better
• Makes you more energetic

Psychological:

• Reduces stress
• Increases well-being
• Improves problem-solving abilities
• Enhances self-esteem

Safety:

• Walking in a group increases safety
• Has minimal risk of injury

Social:

• Socializing takes mind off exercise
• More fun in doing with others
• Lends motivation

Other:
• Requires no special equipment
• Is inexpensive, convenient, and can be done anywhere
• Requires no special skill
• Is a great equalizer, all ages [and abilities] can walk together
• Is easy to do for long periods of time
• Is universally enjoyable and energizing

Note: The source for this material is Rogers, T. M. (1997). Effectiveness of a walking club and a self-directed physical activity program in increasing moderate intensity physical activity among African-American females. Unpublished dissertation. The Ohio State University: Columbus, Ohio.
APPENDIX F

Demographic Questionnaire for the preliminary research conducted in Tallahassee

1. Are you?
   Male____ or Female____

2. How old are you? _______

3. How old do you feel? _______

4. What is your race/ethnicity? __________________

5. What is the highest level of formal education you received? __________________

6. What is your marital status (ex. married, divorced, widowed, etc.)?
   __________________

7. Do you consider yourself physically active?
   Yes___ No___

8. Do you have diabetes?
   Yes___ No___

9. Are you generally depressed or do you suffer from depression?
   Yes___ No___

10. Is your vision impaired more than just having to wear glasses?
    Yes___ No___

11. Do you smoke?
    Yes___ No___
PSQI
Pittsburgh Sleep Quality Index in English (Buysse et al., 1989)

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

1. During the past month, what time have you usually gone to bed at night?
   BED TIME ___________

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?
   NUMBER OF MINUTES ___________

3. During the past month, what time have you usually gotten up in the morning?
   GETTING UP TIME ______________

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.)
   HOURS OF SLEEP PER NIGHT ______________

For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you…

   a) Cannot get to sleep within 30 minutes
      Not during the past month____
      Less than once a week____
      Once or twice a week____
      Three or more times a week____

   b) Wake up in the middle of the night or early morning
Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

c) Have to get up to use the bathroom
Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

d) Cannot breathe comfortably
Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

e) Cough or snore loudly
Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

f) Feel too cold
Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

g) Feel too hot

Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

h) Had bad dreams

Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

i) Have pain

Not during the past month____
Less than once a week____
Once or twice a week____
Three or more times a week____

j) Other reason(s) for trouble sleeping over the past month, please describe-

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

How often during the past month have you had trouble sleeping because of this?

Not during the past month_____
6. During the past month, how would you rate your sleep quality overall?

   Very good
   Fairly good
   Fairly bad
   Very bad

7. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?

   Not during the past month
   Less than once a week
   Once or twice a week
   Three or more times a week

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

   Not during the past month
   Less than once a week
   Once or twice a week
   Three or more times a week

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

   No problem at all
   Only a very slight problem

82
Somewhat of a problem

A very big problem

10. Do you have a bed partner or roommate?

No bed partner or room mate

Partner/roommate in other room

Partner in same room, but not same bed

Partner in same bed

11. If you have a roommate or bed partner, ask him/her how often in the past month you have had . . .

a) Loud snoring

Not during the past month

Less than once a week

Once or twice a week

Three or more times a week

b) Long pauses between breaths while asleep

Not during the past month

Less than once a week

Once or twice a week

Three or more times a week

c) Legs twitching or jerking while you sleep

Not during the past month

Less than once a week

Once or twice a week

Three or more times a week
d) Episodes of disorientation or confusion during sleep

   Not during the past month____
   Less than once a week____
   Once or twice a week____
   Three or more times a week____

e) Other restlessness while you sleep; please describe______________

______________________________________________________________

How often during the past month have you had trouble sleeping because of this?

   Not during the past month____
   Less than once a week____
   Once or twice a week____
   Three or more times a week____

APPENDIX H

Post-walking questionnaire for the preliminary research conducted in Tallahassee

1. How many walks did you participate in?
   
   75-100% ______
   50-75% ______
   25-50% ______
   0-25% ______

2. Do you use a powered wheelchair?
   
   Yes _____        No _____

3. Are you going to continue walking to improve your sleep?
   
   Yes _____        No _____
APPENDIX I

Committee on Human Studies approval for research in Kathmandu:

UNIVERSITY OF HAWAI‘I
Committee on Human Studies

MEMORANDUM
August 27, 2010

TO: James D. Brightman
   Principal Investigator
   Educational Administration

FROM: Nancy R. King
       Director

SUBJECT: CHS #17463- “Walking and Sleep Quality Among Older Adults: Evidence from Tallahassee, Florida and Kathmandu, Nepal”

Under an expedited review procedure, the research project identified above was approved for one year on August 27, 2010 by the University of Hawaii (UH) Committee on Human Studies (CHS). The application qualified for expedited review under CFR 46.110 and 21 CFR 56.110, Category (4).

This memorandum is your record of CHS approval of this study. Please maintain it with your study records.

CHS approval period for this project will expire on August 26, 2011. If you expect your project to continue beyond this date, you must submit an application for renewal of this CHS approval. CHS approval must be maintained for the entire term of your project.

If, during the course of your project, you intend to make changes to this study, you must obtain CHS approval prior to implementing them. Unanticipated problems that are likely to affect study participants must be promptly reported to the CHS.

You are required to maintain complete records pertaining to the use of humans as participants in your research. This includes all information or materials conveyed to and received from participants as well as signed consent forms, data, analyses, and results. These records must be maintained for at least three years following project completion or termination, and they are subject to inspection and review by CHS and other authorized agencies.

Please notify this office when your project is complete. Upon notification, we will close our files pertaining to your project. Reactivation of CHS approval will require a new CHS application.

Please contact this office if you have any questions or require assistance. We appreciate your cooperation, and wish you success with your research.
APENDIX J

Instruction/Participant consent in Nepali for the research conducted in Kathmandu
Translated from English by Hom Nath Chalise, PhD

पाका नागरिकहरुमा हिंदाइ र निराको गुणस्तर
निर्देशन / सहभागिताको स्वीकृती

पिन सम्मानित अनुसंधानका सहभागिताको

मध्ये नाममा जन्म ब्राह्मण नह। या अभिन्न ह्रान्थलुको भानाका रहेको थिए। अन्य भाषामा निर्देशको साधनमा सहभागिता नगर भानाका रहेको थिए। यस अवस्थामा सहभागिता पूर्णतया स्वीकृत हुनेछ। यसलाई सहभागिता जनाउन बा नजनाउने तपाईंमा नै सिर्फर रहेछ।

यो योग्य व्यक्तिको निर्देशको गुणस्तर भण्डार गर्ने आवश्यक गन नै यसलाई स्वीकृत रहेछ। यसलाई निर्देश अनुसार व्यक्तिको अवस्थामा यसलाई निर्देशको गणना गर्ने आवश्यक गन नै स्वीकृत रहेछ। निर्देशको गणना गर्ने आवश्यक गन नै स्वीकृत रहेछ। यसलाई निर्देश अनुसार व्यक्तिको अवस्थामा यसलाई निर्देशको गणना गर्ने आवश्यक गन नै स्वीकृत रहेछ।

यसलाई निर्देश अनुसार व्यक्तिको अवस्थामा यसलाई निर्देशको गणना गर्ने आवश्यक गन नै स्वीकृत रहेछ।

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अदंते से मनिसमा हिंदौ र निन्दा को स्तर

मैंने एक अनुसंधान को बाबा फर्दें के रूप में सहभागी हुन मी रो मन्जुरी छ।

_________________________   __________________________
   नाम                        दस्तकवाद

_________________________
   मिली
APPENDIX K

PSQI; Pittsburgh Sleep Quality Index in Nepali
Translated from English by Hom Nath Chalise, PhD

पिटस्कर्ग निद्रा को स्वभाव अनु झू ची

निद्रा निम्नहुँ : तलका प्रश्नहुं तपाईको अधिको महिना भरिको निद्रा को ल्याउनु गर्न सक्नु हु। उत्तरहुने अधिको महिनाका अधिका श र रातको सहि तथा सु चित गन्नै पछि। कृपया सबै प्रश्नहरूले जवाभ दिनौ हो ला।

निम्नहुँ प्रश्नहरूको जवाभ दिनौ

1. नाम:
2. लिङ्ग:
3. उमा:
4. जाती:
5. शाक्तिक:
6. रातो स्वास्थ्य:
7. राती अस्तु:
8. नस्ती आफ्नो रातो स्वास्थ्य:
9. के तपाई लाई मृत्यु मे ह (अनिष्टी गरे) को समस्या छ?
10. के तपाई लाई साहाय्यमा उपलब्धिहरू हु। नह
11. के तपाई अस्तु लगाउनु ह न छ?
12. के तपाई खुप मात्र रातो स्वास्थ्य?

1. गएको महिनामा तपाई सामाजिकता कहिने सु ला (विस्तारमा) जानु २ हु, यहो?
2. गएको महिना बे ्लु का नी ह छ यानमा पल्टे परठ सामाजिकता निदानका क्षेत्र हुने द जसित लाभो?
3. अधिको महिनामा तपाई सामाजिकता विदाउन कहिने बजे उन छ न ह न्यो?
4. अधिको महिनामा बालकी तपाई विदाउन धर्मा निदानकै भयो हो ला? (यो तपाई को नी ह छ यानमा विदाउन भयो हो ला?)
5. अधिको महिना तपाईलाई तल उनले खित निद्रा नै ग सामाजिकता समस्या कहिने
हु ने मयोःः?

(क) आधा घटासम्म पूर्व तिरुहुँ तमावोःः।
(अ) गएको महिना थिएःः
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुःः पटक
(ई) हतामा तीन पटक भन्दा बढ़ी

(ख) मध्यरातमा अथवा विहार धे रे छिःः थिुःःःः
(अ) गएको महिना थिएःः
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुःः पटक
(ई) हतामा तीन पटक भन्दा बढ़ी

(ग) श्री चालयःः /द बालगे ट जानको लागिे मध्यरातमा उठ नु पनेःःःः
(अ) गएको महिना थिएःः
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुःः पटक
(ई) हतामा तीन पटक भन्दा बढ़ी

(घ) गएको महिना महसुः व भएर
(अ) गएको महिना थिएःः
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुःः पटक
(ई) हतामा तीन पटक भन्दा बढ़ी

(ङ) ज्यादेदै विस्तीर्ण पाणी भएर
(अ) गएको महिना थिएःः
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुःः पटक
(ई) हतामा तीन पटक भन्दा बढ़ी

(च) नयेमि सिर्फः र ज्यादेदै नसना दे खे र
(अ) गएको महिना थिएःः
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुःः पटक
(ई) हतामा तीन पटक भन्दा बढ़ी

(छ) शरीर दुःः खे र
(अ) गएको महिना थिएःः
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुःः पटक
(ई) हतामा तीन पटक भन्दा बढ़ी
7. गएके एक महिनाको तपाईको समग्र निद्रा एको अवस्थालाई कसरी मू ल्याउन गन्छ् हुनु खतरा?
(क) ऐहै राम रो शिबैके (ख) के हो गाएर (ग) नराम्य रो

8. अगिलोली महिना सु लाई लाभ निद्रार। लाग्ने श्री पक्षीको से वन काँटको गन्छ। भयो?
(अ) गएको महिना शिविन (आ) हन्तमा एक पटक पन्ना कम
(इ) हन्तमा एक वा दुई पटक (ई) हन्तचारा दीन पटक पन्ना वधी।

9. गत महिना खाना खायो, शान्ति भाइसं गु रा गर्दा अवस्था अर्थात् केन्द्रीय सामाजिक वि त्यागलाई नम्न हुँ दा निद्राले काँटको दु:ख दिएको विषय हो?
(क) के हि समस्त नभएको (ख) एकदमै समस्त भएको (ग) के हि ददमम समस्त भएको (घ) दु:ख ले समस्त भएको।

10. गत महिना गर्न लाग्ने को कृपाल बैल विधानकाको लाभ आफ्नो मा उत्साह जारी राख्नको लागि कामी काँटको समस्त विषयो?
(क) के हि समस्त भएको (ख) एकदमै समस्त भएको (ग) के हि ददमम समस्त भएको (घ) दू:ख ले समस्त भएको।

11. तपाईं को खामा एकै सु लानु हु खतरा अर्थात् को हो पाली छ?
(क) एकैले सु लेले (ख) श्रीमान्य/श्रीमाणी/सामी (ग) श्रीमान्य/श्रीमाणी/सामीको को खामा (घ) श्रीमान्य/श्रीमाणी अवस्था सानिध्यमे एउटै को खामा तर अर्थ-अर्थ विरोधारमा
(इ) श्रीमान्य/श्रीमाणी अवस्था सानिध्यमे एउटै विकारारमा

12. तपाईं सो गु लेले को ही भए, वहालाई गत महिनाको तपाईको निद्रा एको अवस्थाको बारे मा सो घनु हो स?
(क) जो डलैर भूत जन?
(अ) गएको महिना शिविन (आ) हन्तमा एक पटक पन्ना कम
(इ) हन्तमा एक वा दुई पटक (ई) हन्तचारा दीन पटक पन्ना वधी।

(ख) निद्रा दमा स्वाभ के द्रा लामो रुकवाट
(अ) गएको महिना शिविन (आ) हन्तमा एक पटक पन्ना कम
(इ) हन्तमा एक वा दुई पटक (ई) हन्तचारा दीन पटक पन्ना वधी।

(ग) सु त्या खु इ फट्ट कारिने , सु छु फालने , खु छु फटारने
(अ) गएको महिना शिविन (आ) हन्तमा एक पटक पन्ना कम
(इ) हन्तमा एक वा दुई पटक (ई) हन्तचारा दीन पटक पन्ना वधी।

(घ) सु लेले झुम्मा माणिसक अर्थात् लन अवस्था द्विविधको समस्त भएको (अ) गएको महिना शिविन (आ) हन्तमा एक पटक पन्ना कम
(इ) हतामा एक वा दुई पटक
(ई) हतामा तीन पटक भन्दा बढी
(उ) अन्य सु ताइमा वे उन भएमा उल्लेख ख गनुहोस्।
(अ) गएको महिना विषेत
(आ) हतामा एक पटक भन्दा कम
(इ) हतामा एक वा दुई पटक
(ई) हतामा तीन पटक भन्दा बढी
पिटसबर्ग स्लीप क्वॉलिटी इन्डेक्स का सक्रिय उपयोग करने का अंतर्गत यह स्टेटस कार्ड का उपयोग करना चाहिए।

### हिडाई सक्रिय प्राप्ति का प्रश्नावली

1. यदि हिडाइमा तपाईहरुलाई कृतिको सहभागी हुनु भयो?
   - (1) ६२-१००%  
   - (2) ५०-६२%  
   - (३) २२-५०%  
   - (४) ०-२२%

2. तपाईहरुलाई काठमाडौं ब्लॉकमा योग्य गराउने निर्देशन का उपयोग गर्नु चाहिन्छ?
   - [ ] चाहिन्छ  
   - [ ] चाहिने नहुने चाहिन्छे

3. तपाईहरुलाई निर्देशनाँमा सु धारा ल्याउन निरन्तर हिडाइ मा बाह्य न पानु हो नहुने चाहिन्छ?
   - [ ] चाहिन्छ  
   - [ ] चाहिने नहुने
APPENDIX L

Committee on Human Studies approval for research conducted in Kaneohe:

UNIVERSITY OF HAWAI‘I
Committee on Human Studies

MEMORANDUM

February 25, 2011

TO: James D. Brightman
Principal Investigator
Educational Administration

FROM: Nancy R. King
Director

SUBJECT: CHS #18839- “Casual Walking and Sleep Quality Among Older Adults: A Comparative Study from Kathmandu, Nepal and Honolulu, Hawaii”

Under an expedited review procedure, the research project identified above was approved for one year on February 25, 2011 by the University of Hawaii (UH) Committee on Human Studies (CHS). The application qualified for expedited review under CFR 46.110 and 21 CFR 56.110, Category (7).

This memorandum is your record of CHS approval of this study. Please maintain it with your study records.

CHS approval for this project will expire on February 24, 2012. If you expect your project to continue beyond this date, you must submit an application for renewal of this CHS approval. CHS approval must be maintained for the entire term of your project.

If, during the course of your project, you intend to make changes to this study, you must obtain CHS approval prior to implementing them. Unanticipated problems that are likely to affect study participants must be promptly reported to the CHS.

You are required to maintain complete records pertaining to the use of humans as participants in your research. This includes all information or materials conveyed to and received from participants as well as signed consent forms, data, analyses, and results. These records must be maintained for at least three years following project completion or termination, and they are subject to inspection and review by CHS and other authorized agencies.

Please notify this office when your project is complete. Upon notification, we will close our files pertaining to your project. Reactivation of CHS approval will require a new CHS application.

Please contact this office if you have any questions or require assistance. We appreciate your cooperation, and wish you success with your research.
APPENDIX M

Instructions/Participant consent for the intervention group in Kaneohe

Dear Potential Research Participant:

My name is James Brightman and I am a doctoral student studying Educational Administration at the University of Hawai‘i at Mānoa in Honolulu under the supervision of Dr. Stacey Roberts. Thank you for participating in my research on the effect walking has on sleep quality for older adults. The title of my research is, “CASUAL WALKING AND SLEEP QUALITY AMONG OLDER ADULTS: A COMPARATIVE STUDY FROM KATHMANDU, NEPAL AND HONOLULU, HAWAI‘I.” Participation, at all times, is completely voluntary. You may choose whether you participate in this study.

This program is designed to improve your sleep quality and be fun. In this program, you will walk three times per week for four weeks with the researcher. The speed and time spent walking will increase, at a comfortable pace, to 30 minutes of walking. If you ever experience any discomfort, you are urged to tell the researcher! You will also complete a Demographic Questionnaire, the Pittsburgh Sleep Quality Index (PSQI), and a Post-Walking Questionnaire. The PSQI is an instrument that measures the quality of your sleep. The PSQI contains 11 questions and will take less than 15 minutes to complete.

While there is a small risk of injury from participating in this study, walking involves less risk than many other types of activity. From participation in the study, there are benefits to be gained. Information will be provided that will inform you of the benefits you may gain in your sleep quality as well as provide some information on successful aging. Moreover, I hope that the findings from this project will contribute to knowledge of the aging process.

Information obtained during the course of the study will remain confidential, to the extent allowed by law. When reporting information, only group information will be used and it will be done in such a way that you cannot be identified. You may obtain a copy of the results by request. If you have questions regarding this study, you may contact the researcher, his major professor, or the Committee on Human Studies at the addresses listed on the following page. Before you begin this program, I will need to collect the final page of this packet, the page that contains your signature.
“WALKING AND SLEEP QUALITY AMONG OLDER ADULTS”

I understand that I am committing to warming-up for ten minutes and then walking for up to 30 minutes three times per week for four weeks; up to a total of 8 hours of warming-up and walking spread out over one month. I also understand that I will complete a demographic questionnaire prior to walking, a post-walking questionnaire after walking, and the Pittsburgh Sleep Quality Index both prior to and following one month of walking. Completion of the questionnaires will take less than 15 minutes on each day. My responses to the questionnaire items will be all the data needed for this research.

I have read the information about the research project and agree to participate.

________________________________________________________________________
Printed name                                      Signature

________________________________________________________________________
Date

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APPENDIX N

Instructions/Participant consent for the control group in Kaneohe

Dear Potential Research Participant:

My name is James Brightman and I am a doctoral student studying Educational Administration at the University of Hawai‘i at Mānoa in Honolulu under the supervision of Dr. Stacey Roberts. Thank you for participating in my research on the effect walking has on sleep quality for older adults. The title of my research is, “CASUAL WALKING AND SLEEP QUALITY AMONG OLDER ADULTS: A COMPARATIVE STUDY FROM KATHMANDU, NEPAL AND HONOLULU, HAWAI’I.” Participation, at all times, is completely voluntary. You may choose whether you participate in this study.

This program is designed to be fun. In this program, you agree to carry on as you normally would for one month. There will be no direct benefit to you from participating in this project. However, your responses to the survey instruments- you will complete a Demographic Questionnaire and the Pittsburgh Sleep Quality Index (PSQI) - will contribute to knowledge of the aging process. The PSQI is an instrument that measures the quality of your sleep. The PSQI contains 11 questions and will take less than 15 minutes to complete.

From participation in the study, there are benefits to be gained. Information will be provided that will inform you of the benefits you may gain in your sleep quality as well as provide some information on successful aging. You will also have the opportunity to socialize with the researcher and other residents that live in your facility.

Information obtained during the course of the study will remain confidential, to the extent allowed by law. When reporting information, only group information will be used and it will be done in such a way that you cannot be identified. You may obtain a copy of the results by request. If you have questions regarding this study, you may contact the researcher, his major professor, or the Committee on Human Studies at the addresses listed on the following page. Before you begin this program, I will need to collect the final page of this packet, the page that contains your signature.
“WALKING AND SLEEP QUALITY AMONG OLDER ADULTS”

I understand that I am committing to not drastically changing the amount of physical activity I engage in for one month. However, I will have an opportunity to socialize for up to 30 minutes three times per week for four weeks; up to a total of 6 hours of socializing spread out over one month. I also understand that I will complete a demographic questionnaire prior to walking and the Pittsburgh Sleep Quality Index both prior to and following that month. Completion of the questionnaires will take less than 15 minutes on each day. My responses to the questionnaire items will be all the data needed for this research.

I have read the information about the research project and agree to participate.

__________________________________________  __________________________
Printed name  Signature

_______________
Date
APPENDIX O

Post-walking questionnaire used in Kaneohe

First name only: _______________________________ Room #: ___________

1. How many walks did you miss or skip either intentionally or unintentionally?
   - All (non-walking group) ______
   - Four or more ______
   - Two or Three ______
   - None or one ______

2. Are you going to continue walking to improve your sleep?
   - Yes ______  No ______
REFERENCES


Harvard University Medical School (December 2005). Exercise and aging: Can you walk away from father time? Harvard Men’s Health Watch, 10(5), 1-5.


Mayo Clinic, Department of Internal Medicine (1999). *Sleep disorders in the elderly* [Online]. Available: [http://www.mayo.edu/geriatrics-rst/Sleep.html#RTFToC3](http://www.mayo.edu/geriatrics-rst/Sleep.html#RTFToC3)


