Sleep Patterns in Relation to Aging, Culture, and Social Environment in Chinese Elderly

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Abstract

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Sleep problems are among the most common concerns of elderly people. Although up to 50 % of elderly people in the US complain about sleep problems, the prevalence rate of sleep complaints is lower in Taiwan. Sleep is viewed as a biologically driven behavior, whereas it is shaped by culture and social environments. Could the lower prevalence of sleep complaints in Chinese elderly in Taiwan be explained, in part, on the influences of culture and social environment? Undoubtedly, variations in sleep practices and patterns exist, but the literature of cross-cultural variations in sleep is limited, and data about the association of sleep patterns, social environments, and cultural practices is not well documented. In recent decades, the

investigation of sleep patterns has generally focused on cross-sectional surveys that examine sleep variables in relation to demographic characteristics, socioeconomic and health status. In addition, investigations have quantified changes in sleep with aging across the lifespan and among the elderly. These types of data are important, but they do not provide insight into the relationship among self-perception of aging, culture, social environments, and sleep.

The purpose of this study was to describe self-reported sleep patterns and related correlates including perceptions of aging, culture, and social environments among Chinese elderly in Taiwan. A mixed-method design was used, and naturalistic inquiry served as the philosophical framework. The techniques for gathering data included in-depth interviews and questionnaires (demographic survey, Chinese version of the Pittsburgh Sleep Quality Index [CPQSI]). Twenty-three Chinese men and 27 Chinese women were studied in Taiwan. The mean age of the participants was 76.3 (11). Themes emerged from the interview data and were assessed in relation to data from the CPSQI.

Self-perceptions about aging and demographic characteristics (e.g., gender, employed status) were associated with variations of sleep patterns. In the interviews, most participants reported sleeping fewer hours and had ‘shallow’ sleep compared to what they experienced in their youth. The CPSQI derived sleep efficiency for the entire sample was > 85% and mean sleep duration was 6.7 (1.4) hours. Women reported worse sleep quality (p = .02) and sleep efficiency (p = .03), compared to men: 56% of them reported negative aging experiences. Living with offspring on a different floor, but in the same building, was reported as a favorable living arrangement that benefited sleep quality. However, there was no significant difference in sleep quality between the group who did not live with their offspring (n = 22) and the group they did (n = 28) (p > .05). Almost a third of the participants reported that worry and unhappiness about their children’s unfilial behaviors disturbed their sleep. The vast majority of the participants did not report a sleep disruption due to their commitments to carrying out familial roles and responsibilities (e.g., housekeeping and caregiving) or effects of social activities on their sleep.

Watching television was the most common pre-sleep evening activity that was perceived as promoting sleep.

In conclusion, this study is the first to integrate both qualitative and quantitative data to understand the influence of self-perception about aging, culture, and social environments on Chinese elderly sleep patterns. Complaints about poor sleep quality expressed in the interviews were not supported by the findings from a standardized and well-established questionnaire. Living arrangements, family relationships, types and intensity of social activities had minimal effects on sleep. Aging, culture, and social environment may impact self-perception about sleep rather than actual sleep patterns per se.

TABLE OF CONTENTS

LIST OF FIGURES

Figure Number Page

LIST OF TABLES

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CHAPTER I: INTRODUCTION

Statement of the Problem

Sleep complaints are among the most common concerns of elderly people. These complaints encompass difficulty falling asleep, difficulty remaining asleep, daytime sleepiness, and not feeling rested upon arising in the morning (Phelan, Love, Ryff, Brown, & Heidrich, 2010). Up to 50 % of elderly people in the US complain about sleep problems (Vitiello, 2006). The prevalence rate of sleep complaints in Chinese elderly includes 38.2% in Hong Kong (Chiu et al., 1999), 32.9% in China (Liu & Liu, 2005), and 6% in Taiwan (Su, Huang, & Chou, 2004). What explains such a difference in the prevalence of sleep complaints among Chinese elderly in different countries? Could the low prevalence of sleep complaints in Taiwan be explained, in part, on the basis of culture and social environment rather than physiological differences?

Sleep is viewed as a biological behavior, but it is shaped by cultural values and social environments of the individual (Owens, 2005). Undoubtedly, human variations in sleep practices and patterns exist, but research on cross-cultural variations in sleep is limited (Knutson, 2013), and information about the association of sleep patterns, social environments, and cultural practices is not well-documented. In recent decades, the investigation of sleep patterns has generally focused on population-based surveys that examine sleep duration and relationships between sleep patterns and demographic characteristics, socioeconomic status, physical illness, and health habits to name a few. In addition, investigations have shed light on how aging impacts elderly sleep patterns by using quantitative assessments of sleep variables (e.g. sleep duration, frequency and duration of nighttime awakenings, early morning awakenings, etc) and daytime sleepiness (Bliwise, 2008). These types of data are important but do not provide sufficient information about how self-perception about aging impacts sleep patterns and how culture and social environments interplay with sleep patterns. Up till now, no

sleep studies have examined both qualitative and quantitative data in elderly people living in the community. Bliwise (2008) suggested that due to the complexity of sleep, quantitative investigations about sleep patterns require supplementation with types of data that are both novel and comprehensive. Therefore, both quantitative and qualitative approaches can be used to better understand sleep patterns and relevant correlates that influence sleep and sleep complaints.

Thus far, no researchers specifically have explored how culture and social environments affect sleep patterns among Chinese elderly. Only 14 studies have investigated sleep in Chinese elderly residing in different geographic regions and published their results in English (Chiu et al., 1999; Gu, Sautter, Pipkin, & Zeng, 2010; Hsu, 2001; Lai, 2005; Lan, Lan, Wen, Lin, & Chuang, 2007; Li et al., 2013; Liu & Liu, 2005; Su et al., 2004; Tu et al., 2012; Wong & Fielding, 2011; Wu, Su, Fang, & Yeh Chang, 2012; Xu et al., 2011; Yang & Chiou, 2012) . The researchers of these aforementioned studies used similar cross-sectional research designs to measure different outcome variables relevant to sleep. The researchers have consistently found that daytime napping is prevalent among Chinese elderly, but the prevalence of insomnia is quite varied. However, the findings did not include how self-perception about aging, social environments, and culture influence such findings.

This study has generated new data to enhance understanding of how self-perception about aging, culture, and social environments influence Chinese elderly sleep patterns and to help move inquiry toward more meaningful explanations. This is particularly valuable in the development of culturally relevant interventions to improve elderly sleep quality and the creation of a deeper and more comprehensive picture of Chinese elderly sleep patterns that serve as a knowledge base that can be used for educational and instructional purposes in gerontology.

There were several reasons for selecting Chinese elderly to be the participants of this study. First, Chinese elderly are one of the fastest growing groups of elderly population in the

world (Chiang-Hanisko, 2010). The results of this study have the potential to help nurses and other health care practitioners to provide culturally sensitive care to this growing population. Second, Chinese elderly may be more vulnerable to changes in social environments than younger people because they are more likely to adhere to traditional cultural values and norms. Given this background information, it is important to expand our knowledge to better understand the effects of self-perception about aging, social environments, and culture on sleep patterns in Chinese elderly. Third, family relationships and the family configurations (e.g. size and hierarchy) are two significant elements of the social environment. Jenni and O'Connor (2005) found that bedtime routines usually take place within the core family and culturally determined values (e.g., family roles and responsibilities) that can have an impact on sleep patterns. It has been noted that family roles and responsibilities play a significant role in regulating the timing of sleep-wake cycles (Wu et al., 2010). Finally, Chinese elderly are family-oriented and have a unique culture. Cultures are inherently dynamic, changing as new ecologic or political conditions emerge, or old demands fade, and elements from other cultures are adopted or adapted (Owens, 2005). Cultural preferences such as a high value placed on familial interdependence (collectivism of Chinese society) have been proposed as "driving forces" for choosing sleeping arrangements (Jenni & O'Connor, 2005). Thus, studying Chinese elderly can provide a model to better understand how culture and social environments interact with sleep patterns.

Research Purposes and Questions

The primary purpose of this study was to describe self-reported sleep patterns and related correlates among Chinese elderly in Taiwan. A mixed methods design was used to generate both qualitative and quantitative data.

Research questions that were addressed by qualitative approaches were as follows:

- What is the self-perception about aging as a part of life among Chinese elderly and do their perceptions affect their appraisal of sleep? Is there a difference

between men and women?

- What is the relation between napping and nocturnal sleep patterns and what are the factors that influence napping among Chinese elderly?
- Do family configurations, relationships, responsibilities, and living arrangements affect sleep patterns of Chinese elderly?
- What is the influence of filial piety on sleep patterns from the viewpoints of Chinese elderly?
- Does the belief of Chinese elderly in Chinese Medicine affect their sleep patterns?
- What are the effects of participation in activities on Chinese elderly sleep patterns?

Research questions guiding the quantitative investigation of this study include:

- What is the relationship between demographic characteristics and sleep patterns in Chinese elderly?
- What is the napping status of Chinese elderly?

CHAPTER II: REVIEW OF LITERATURE

In this chapter research and descriptive articles that have been published in PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO databases are reviewed. The keywords used separately or in combination to search the literature included: “culture,” “Chinese culture,” “aging,” “elderly people,” “Chinese elderly,” “filial piety,” “family,” “sleep patterns,” “social environment,” and “demographic characteristics.” The reference lists from relevant publications also were reviewed. To be included in this review, articles had to be published in Chinese or English after 1950 and to focus on sleep, aging, culture, family situations, or social environments. This chapter is divided into four sections. The first section provides a summary what is known from previous research about sleep and aging. The second section discusses culture, especially filial piety, and its connection to sleep patterns for Chinese elderly in particular. The third section describes the importance of social environments and how the elements of social environments (e,g., family configurations, social relationships) are associated with sleep patterns of the elderly. The last section depicts the association between demographic characteristics, especially socioeconomic status and marital status, and sleep patterns.

Aging and Sleep

The aging population has been rapidly increasing for decades due to increased longevity. In 2007, people aged 65 or older accounted for 7.5 % of the total world population. This number is estimated to rise to 12% by 2030 (Kinsella, 2009). According to the 2010 census results, approximately 40 million people were 65 years old or older, accounting for 13% of the total population in the US (Wern, 2011). As of January 2013, the percentage of the elderly population in Taiwan was approximately 11% (Department of Statistics, Ministry of the Interior, 2013).

A disruption of an individual’s daily sleep-wake cycle is one of the significant changes that commonly occurs with aging (Bahammam & Pandi-Perumal, 2010). Changes in both

sleep quantity and quality occur with healthy aging, including alterations in both circadian rhythm and sleep homeostasis (Dijk, Duffy, & Czeisler, 2000; Monk et al., 2006; Ohayon, Carskadon, Guilleminault, & Vitiello, 2004).The changes have been documented both by subjective (e.g., diary, interview, questionnaire) and objective measurements, such as polysomonography (PSG) and actigraphy (Naylor & Zee, 2006).

Circadian Rhythms in Aging

Circadian rhythms, controlled by the suprachiasmatic nucleus (SCN) in the anterior hypothalamus, are 24-hour biological rhythms of most physiological systems including endogenous hormone secretions (e.g., melatonin, cortisol), core body temperature (CBT), and the sleep-wake cycle (Ancoli-Israel, Ayalon, & Salzman, 2008). Changes of circadian rhythms in healthy elderly people include an advance in circadian timing and a decrease in circadian amplitude (Czeisler et al., 1992; Monk et al., 2006). These changes may be associated with degeneration of cells in the SCN of the hypothalamus and/or a dysfunction in the input and output pathways of the SCN (Wright & Frey, 2008). A number of sleep researchers have found that elderly people tend to have an advanced circadian phase, characterized by falling asleep and waking up earlier, with a corresponding tendency to an advance of the CBT rhythm (Dijk & Duffy, 1999; Duffy, Dijk, Hall, & Czeisler, 1999; Monk, Buysse, Reynolds, Kupfer, & Houck, 1995), and the rhythms of melatonin (Dijk, Duffy, Riel, Shanahan, & Czeisler, 1999) and cortisol (Monk, 2005; Niggemyer, Begley, Monk, & Buysse, 2004; Zeitzer et al., 1999). Some researchers (Czeisler et al., 1992; Monk et al., 2006; Van Coevorden et al., 1991) reported that the circadian phase was several hours earlier in the elderly compared to that of younger adults. Specifically, Van Coevorden et al. (1991) found that the rhythms of cortisol, thyroid-stimulating hormone, and melatonin all occurred 1 to 1.5 hours earlier in older than younger people; however, no phase advance of CBT or melatonin was reported in elderly people by other investigators (Monk et al., 1995). The findings of two studies (Carrier, Monk, Reynolds, Buysse, & Kupfer, 1999; Czeisler et al., 1992) indicated that there was no difference in the relationship

between CBT rhythm and awakening time between younger and elderly people. In both studies elderly and young subjects had a similar interval between the time occurrence of the fitted temperature minimum and habitual wake time. They woke up on average three hours after the temperature minimum.

Sleep Homeostasis in Aging

Sleep homeostasis refers to the compensatory response to sleep loss and the tendency to sleep longer and more deeply after sleep deprivation (Naylor & Zee, 2006). Slow-wave sleep (SWS) and slow-wave activity are viewed as the primary markers of sleep homeostasis (Dijk et al., 2000). It has been hypothesized that age-related changes in sleep reflect a reduced efficiency of sleep homeostasis (Stanley, 2005). However, there is a gap in understanding how reduced efficiency of sleep homeostasis contributes to sleep disruption in elderly people (Cajochen, Munch, Knoblauch, Blatter, & Wirz-Justice, 2006). Although a number of hypotheses about the mechanisms underlying sleep homeostasis have been proposed, there is no sufficient experimental evidence to support these hypotheses. The most obvious evidence relevant to sleep homeostasis is a simple observation, indicating that sleep loss results in an increased propensity to sleep and that sleep lasts longer following a period of sleep deprivation (Benington, 2000). Stanley (2005) reported that the longer the sleep deprivation lasts, the stronger the drive to sleep becomes. Nonetheless, this assumption contradicts the findings of a researcher who investigated age-related changes in capacity for sleep and in daytime sleep propensity (Klerman & Dijk, 2008). By recruiting 18 older subjects and 35 younger subjects, Klerman and Dijk (2008) found that older subjects had less deep stage 4 sleep and underwent more awakenings during nighttime sleep than younger subjects, but their daytime sleep propensity was lower than young subjects who had better sleep quality determined by polysomnographical data.

Objective Sleep Measurements and Aging

Objectively measured sleep architecture parameters change with age (Hoch et al., 1994; Hoch et al., 1997; Lauer, Riemann, Wiegand, & Berger, 1991; Ohayon et al., 2004; Redline et

al., 2004; Reynolds et al., 1991; Rowe et al., 2008; Wauquier, Van Sweden, Lagaay, Kemp, & Kamphuisen, 1992). These changes are summarized in Table 1. Of the changes in objective parameters, only sleep efficiency and REM sleep latency are consistently reported to decrease with age. The other parameters listed on Table 1 are not consistently supported. For example, sleep latency was reported to increase with age in several studies (Hoch et al., 1994; Ohayon et al., 2004), whereas the results of two studies showed an increase in men, but a decline in women (Lauer et al., 1991; Reynolds et al., 1991).

Many researchers reported no significant differences among elderly people aged 60- 86 years for SWS (Hoch et al., 1994; Hoch et al., 1997; Hoch, Reynolds, Kupfer, & Berman, 1988; Reynolds et al., 1991), wakefulness after sleep onset (WASO) (Reynolds et al., 1991), percentage of stage 2 sleep (Hoch et al., 1994; Lauer et al., 1991), REM sleep (Lauer et al., 1991; Reynolds et al., 1991), and sleep latency (Wauquier et al., 1992). Others have reported an increase with age for percentage of stage 1 (Hoch et al., 1994; Lauer et al., 1991; Ohayon et al., 2004; Redline et al., 2004) and stage 2 sleep (Ohayon et al., 2004; Redline et al., 2004), and a decrease with age for REM sleep (Hoch et al., 1994; Ohayon et al., 2004; Reynolds et al., 1991; Wauquier et al., 1992). In an extensive meta-analysis of a sample of 3,577 subjects aged 5 - 102 years, Ohayon et al. (2004) summarized that after 60 years of age, only sleep efficiency continued to significantly decrease, with all the other sleep parameters showing no further changes. This finding could imply that elderly people spend more time in bed trying to sleep such that sleep efficiency, a ratio of total sleep time to the amount of time in bed, is reduced.

These contradictory findings may result from a combination of factors including for example, different recording techniques and interpretations, inter-individual variability, and lack of consistent selection criteria of samples (Ohayon et al., 2004; Wauquier et al., 1992). The findings of Ohayon et al.'s (2004) meta-analysis indicated that diverse recording techniques were likely to give different results, and these techniques included in-laboratory PSG recording, ambulatory monitoring system and actigraphy. In a comparison of objective and subjective

measurements of sleep parameters in patients with a variety of sleep disorders, Kushia et al. (2001) found that actigraphy significantly overestimated total sleep time (TST) and sleep efficiency (Kushia et al., 2001). The researchers also observed that the subjects who were studied in a sleep laboratory had lower sleep efficiency due to the "first-night effect", mainly because of the new environment and discomfort from recording instrumentation. By contrast, no "first night effect" was observed in a study that used an ambulatory monitoring system to compare sleep-wake patterns in 14 elderly people aged 88-102 years in their homes (Wauquier et al., 1992).

Table 1

Typical Changes of Sleep in Elderly People

Objective Measurements		Self-report Measurements	
Increase	Decline	Increase	Decline
Sleep latency (> 30)	TST	Sleep latency (> 30)	TST
	Sleep efficiency		Sleep efficiency
WASO, %	SWS, %	Difficulty initiating sleep	
Stage 1 sleep, %	REM sleep, %	Difficulty maintaining sleep	
Stage 2 sleep, %	REM latency	Nocturnal awakenings	
		Early morning awakenings	
		Diurnal sleepiness	
		Daytime napping	

Note. TST = total sleep time; WASO = wakefulness after sleep onset; SWS = slow wave sleep, often referred as a deep sleep. REM = rapid eye movement; Sleep efficiency = ratio of total sleep time to the amount of time spent in bed; REM sleep latency = amount of time from sleep onset to the first occurrence of REM.

Subjective Sleep Measurements and Aging

Self-reported sleep disruption is one of the most frequently expressed health complaints among elderly people (BaHammam & Pandi-Perumal, 2010). As Middelkoop et al. (1996) points out, measures of subjective sleep were usually population-based surveys that investigated self-reported characteristics of sleep and sleep complaints. In a number of cross-sectional studies that investigated sleep status of middle-aged and elderly men and women, the researchers have

consistently found that the prevalence of self-reported sleep disruption increases with age, and the characteristics of sleep disruption in elderly people are diverse (see Table 1) (Bliwise, King, Harris, & Haskell, 1992; Foley et al., 1995; Habte-Gabr et al., 1991; Middelkoop, Smilde-Van Den Doel, Neven, Kamphuisen, & Spring, 1996; Ohayon et al., 2004; Unruh et al., 2008). For example, in the analysis of a National Institute on Aging's multicenter study that surveyed over 9,000 participants aged 65 years and older, Foley et al. (1995) found that over 50% of elderly people reported at least one of the following five common sleep complaints, such as trouble falling asleep, waking up, awaking too early, needing to nap, and not feeling rested. In an analysis of the data generated from 5407 dwelling adults (mean age 63) who participated in the Sleep Heart Health Study, Unruh et al. (2008) found that old age was associated with shorter sleep time, diminished sleep efficiency, and more arousals in men and women. Findings from a cross-sectional study in which self-report measures were administered showed that there are increases in fragmented sleep and in difficulty falling asleep with increasing age (Middelkoop et al., 1996). The discrepancy in the characteristics of sleep disruptions may partly results from different methodological approaches (e.g., sampling strategies, multidimensional instruments) and different interpretations of the disturbed sleep under investigation (Englert & Linden, 1998).

Gender Differences in Sleep Measurements

Differences in sleep patterns between men and women have also been observed (Knutson, 2013). One striking difference is that the subjective reports of sleep quality tend to be lower and sleep complaints higher in women than men, which is opposed to the results of objective sleep measurements (Foley et al., 1995; Knutson, 2013; Middelkoop et al., 1996; van den Berg et al., 2009). Evidence from a wide range of sleep studies reveals that females predominately complain of poor sleep quality, with older women experiencing prolonged sleep latency (greater than 30 minutes), difficulty initiating, maintaining sleep (three or more nocturnal awakenings), and early morning awakenings (Baldwin, Kapur, Holber, Rosen, & Nieto, 2004; Habte-Gabr et al., 1991; Unruh et al., 2008). Men predominately complain of excessive daytime

sleepiness and frequent daytime napping (Baldwin et al., 2004; Bliwise et al., 1992; Middelkoop et al., 1996; Picarsic et al., 2008). However, the findings of objective measurements actually showed that elderly men suffered from more fragmented sleep, evidenced by higher percentage of stage 1 and 2 sleep, less SWS, lower REM sleep, and less sleep efficiency (Buysse et al., 1991; Ohayon et al., 2004). Unruh et al. (2008) also found that poor subjective sleep quality was not correlated with old age in men, but older women had more trouble falling asleep and had more problems with waking up during the night and waking up too early in the morning. The researchers concluded that old age was more significantly associated with poorer sleep according to PSG in men than women, whereas the subjective report of poor sleep with advanced age was stronger in women.

The difference in total sleep time between men and women is inconclusive. The findings of some studies that explored gender differences in sleep indicated that women reported longer TST than men (Jung, Song, Ancoli-Israel, & Barrett-Connor, 2013; Ohayon et al., 2004; Reyner & Horne, 1995; Unruh et al., 2008). For instance, Unruh et al. (2008) found that the average amount of sleep for men was about 30 minutes shorter than for women across the lifespan. In a current analysis of data generated from 889 men and 1112 women (aged > 60 years), Jung and colleagues (2013) found that mean reported nocturnal sleep duration and diurnal nap duration were significantly longer in men than women. These findings are not consistent with the results that women slept shorter than men (Habte-Gabr et al., 1991; Van den Berg et al., 2009) and that there was no gender difference in self-reported TST (Hale, 2005; Middelkoop et al., 1996). According to a current systematic review (Knutson, 2013), the disparity among the aforementioned data may be associated with potentially unmeasured confounders (e.g., culture, gender roles and expectations, self-perception about aging, adaptation of laboratory environments) that affect sleep measurements.

Napping and Aging

Afternoon naps or “siesta” are common among elderly people. In a compilation of napping studies from a number of countries, afternoon napping is prevalent among elderly people and its frequency (at least once a week) varies from 24% to 79%, with a wide range of nap duration (0 - 240 mins) (Buysse et al., 1992; Hsu, 2001; Jung et al., 2013; Lai, 2005; Lan et al., 2007;Liu & Liu, 2005; Picarsic et al., 2008; Yoon, Kripke, Youngstedt, & Elliott, 2003). Napping prevalence and napping duration increase with age (Buysse et al., 1992; Metz & Bunnell, 1990; Yoon et al. (2003). Metz and Bunnell (1990) reported that ‘‘older old’’ participants (mean age 80 years) took one more nap per week than did ‘‘younger old’’ participants (mean age 65 years). The ‘‘older old’’ participants also napped for a longer mean duration (67.5 minutes), compared with ‘‘younger old’’ participants (51.3 minutes). By contrast, the finding of a cross-sectional study that investigated a 414 sample of elderly people aged 70 to 89 years failed to show a clear association between age and napping (Picarsic et al., 2008). However, Picarsic et al. (2008) described narrower age ranges, focusing on the ‘‘oldest’’ old (70 - 89), whereas others have compared napping behavior between ‘‘younger’’ old (50 - 59) and ‘‘older’’ old (70 - 79) participants.

The relation between daytime napping and nocturnal sleep disruption is not well defined. There is still disagreement as to whether daytime napping should be an encouraged or discouraged practice in healthy elderly people (Picarsic et al., 2008). The findings of most studies that examined the effect of diurnal napping on subsequent night’s sleep in elderly people have shown that diurnal napping not only reduces sleep efficiency and total nocturnal sleep time but also decreases sleep quality (Bliwise, Bevier, Bliwise, Edgar, & Dement, 1990; Chen & Wang, 1995; Evans & Rogers, 1994; Monk, Buysse, Carrier, Billy, & Rose, 2001). However, researchers of few studies reported no association between napping and the aforementioned sleep parameters (Hsu, 2001; Campbell, Stanchina, Schlang, & Murphy, 2011; Metz & Bunnell, 1990; Piscarsic et al., 2008).

The relation between daytime napping and nocturnal sleep could be bi-directional, with napping contributing to poor sleep, and poor sleep in turn leading to napping. Frequent night-time awakenings or sleep fragmentation in elderly people contribute to daytime sleepiness and napping (Asplund, 1999). Goldman et al.(2008) administered actigraphy and sleep diaries to measure nocturnal and daytime sleep in a sample of 235 elderly people aged 80 (2.9) years. They found that the odds ratios (95% CI) for napping were higher for the elderly with higher levels of nocturnal sleep fragmentation (2.1 [0.8, 5.7]). Similarly, in a current analysis of data generated from 889 men and 1112 women (aged > 60 years), Jung and colleagues (2013) reported that men sleeping less than 6 hours at night napped longer during the day.

In summary, this section provided insights into the association among circadian rhythm, sleep homeostasis, and age-related changes in sleep patterns. Evidence from a wide range of sleep studies has indicated that elderly people have an advanced circadian phase that is characterized by falling asleep and waking up earlier. Aging contributes to self-reported sleep disruption and objective sleep measurements alter with age across the human life span. Elderly women complain of poor sleep more than elderly men. However, there is insufficient evidence to support the hypothesis that sleep homeostasis, e.g. the compensatory response to sleep loss, is reduced in the elderly. Notably, there are several contradictory findings between subjective and objective measurements of sleep parameters (e.g., habitual sleep duration and sleep efficiency). There is no consensus about the relation between afternoon napping and nighttime sleep patterns. Most of the studies that are discussed in this section utilized cross-sectional study designs. These studies neither generated detailed information about sleep in healthy elderly nor explored disturbed sleep from the subject's own perception about sleep patterns. Important unanswered questions remain: does self-perception about aging as a part of life affect one's appraisal of sleep; how does self-perception influence or perhaps shape an elderly person's self-reported sleep patterns and are these perceptions different between men and women?

Culture and Sleep

Concept of Sleep Patterns

Bliwise (2008) stated that “apart from the sheer biologic inevitability of sleep, the cultural, social, and broadly defined environment factors that affect this biobehavioral state are fascinating” (p.1365). Sleep is viewed as an “inherently biopsychosocial phenomenon” that is embedded in its sociocultural context and influenced by such correlates as cultural beliefs about the meaning of sleep, cultural norms, and rituals for sleep practices, social interactions as well as relationships (Owens, 2005). For this study sleep patterns are defined as the sleep–wake cycle, including the time an individual goes to bed, sleep duration, latency to fall asleep, the time an individual wakes and gets up, and sleep quality. It was assumed that sleep patterns interact with cultural beliefs (e.g., Chinese medicine), cultural values (e.g., filial piety, family roles, responsibilities), elements of social environments (e.g., family configurations, family relationships), and demographic characteristics (e.g., age, gender, educational levels, living arrangements). In addition, sleep patterns were thought to be influenced by sleep habits. Sleep habits refer to sleep hygiene behaviors acquired by frequent repetition.

Culture and Sleep Patterns

Sleep comprises both biological and cultural elements (Ohayon, 2004). Culture is viewed as a complex set of behaviors, beliefs, attitudes, as well as practices, and all of which can have a substantial impact on human life. Since sleep is a behavior in some respects, its patterns will be shaped by culture (Knutson, 2013). Whether one interprets a sleep pattern as “problematic” or “normal” can be influenced by cultural beliefs and values (Ohayon, 2004). The interpretation also depends on the extent to which individuals conform to sleep-schedule and sleep-behavior expectations (Jenni & O'Connor, 2005). In two cross-sectional studies that investigated racial differences in elderly sleep complaints, the researchers (Blazer, Hays, & Foley, 1995; Jean-Louis et al., 2001) found that Black subjects were characterized by objectively less optimal sleep patterns, but they reported lower rates of sleep complaints than White subjects. This

result can be explained by an acceptance of sleep disturbances as a part of the aging process and a unique cultural background, which provides a positive context for reframing changes in sleep among Black elderly. Notably, a cross-sectional study that investigated sleep habits and insomnia in a sample of the elderly in China suggested that Chinese elderly are less likely to use sleeping pills than Western elderly because many Chinese elderly may consider insomnia an age-related change and because they believe that sleep medications may cause serious side effects (Liu & Liu, 2005). Moreover, another similar study that took place in Hong Kong implies that Chinese elderly are more likely to underestimate their actual sleep time than Western elderly (Chiu et al., 1999).

Numerous aspects of sleep are affected by culture. Cultural practices pertinent to sleep, including when, where, and with whom one sleeps, can all impact sleep patterns (Jenni & O'Connor, 2005; Knutson, 2013). Cultural norms and rituals play a role in shaping sleeping habits (Bliwise, 2008) and variability among cultures in regard to sleep-patterns (Jenni & O'Connor, 2005). For instance, in an analysis of data generated from a sample of 8101 White women (mean age 77), Stone et al. (2009) suggested that afternoon napping ought to be discouraged because it increased a risk of mortality. Conversely, an afternoon nap is a traditional practice common in many countries, such as China and Mediterranean countries, to name a few. Chinese view an afternoon nap as complementary sleep and a healthy activity that is especially beneficial to elderly people who may have nocturnal sleep problems (Lan et al., 2007).

Chinese daily life has been dominated by the theory and practice of Chinese medicine, particular in the balance of Yin (cold) and Yang (hot) forces. Many Chinese elderly believe that it is important to maintain wholeness and congruity among all parts of the human body by balancing Yin and Yang forces, and that regular daily sleep is a significant method to maintain the balance of the two forces (Lee, 1995). It has been postulated that the factors that balance Yin and Yang forces may influence sleep patterns. Traditional Chinese medicine suggests that

people go to bed when the Yin force becomes stronger than the Yang force, and awaken when the reverse occurs. In addition, the timing of sleep should be adjusted according to the change of seasons. Daytime napping between 11 AM to 1 PM and going to bed by 11 PM are encouraged to benefit human health because these two periods are considered critical for the exchange of Yin and Yang forces (Wang, Lin, & Chen, 2010). In the old days, agriculture was a central practice in southern China and Taiwan where the heat and humidity are very high in the summer. Working on agricultural lands in the afternoon was discouraged because heat and humidity are thought to be harmful to the harmony of human organs (Hsu, 2001). For these reasons, afternoon napping has been encouraged in Chinese culture (Lan et al., 2007). This cultural belief is echoed in several studies that investigated the prevalence and importance of daytime napping among Chinese elderly. Lai (2005) found that 64% of 60 Taiwanese elderly (mean age 67.1) usually took a nap after lunch and the mean of frequency of napping was 5.6 naps per week. Similarly, napping during the day was also prevalent in Liu and Liu's study (2005), which showed 50% of mainland Chinese elderly napping at least three times a week and 35% napping almost every day or daily during the past month. The given information suggests the following research questions: What is the prevalence of daytime napping among Chinese elderly in Taiwan? How does the belief in Chinese Medicine affect Chinese elderly nighttime sleep patterns and daytime napping?

Filial Piety and Sleep Patterns

In Chinese society, filial piety has served as an important principle for patterns of Chinese socialization and intergenerational interaction for centuries (Yue & Ng, 1999). Filial piety, a Chinese social virtue and family-focused concept, originates from Confucian teaching and is taken from the Chinese expression "Xiao Tao", which entails complex responsibilities of children to their parents (Laidlaw, Wang, Coelho, & Power, 2010). Filial piety is learned through socialization and is often modified continuously throughout an individual's developmental or acculturation process (Dai & Dimond, 1998). This concept has a wide range of demands for

support from materials to emotions. The practice of filial piety encompasses: (1) the behaviorally-focused, measured by sacrifice, responsibility, and repayment; and (2) the emotionally-focused, measured by harmony, love, affection, and respect (Sung, 1995). There are two perspectives of filial piety: reciprocal and authoritarian. Reciprocal filial piety expects emotional, spiritual, physical, and financial support for one's parents to repay their efforts in rearing and caring. Authoritarian filial piety stresses absolute parental authority over children and children's compliance with and deference to parental wishes (Wang, Laidlaw, Power, & Shen, 2010).

There is a growing evidence that the tradition of Confucian filial piety and family obligations may be eroding because of changes in social environments, family configurations, living arrangements, and expectations for family support that have greatly affected children's incentives and motivations to perform filial obligations to elderly parents (Cheung & Kwan, 2009; Fu & Chiu, 2007; Lam, 2006; Ng, Phillips, & Lee, 2002; Sheng & Settles, 2006; Sung, 1998). Due to globalization, there has been a gradual transformation in families from a focus on traditional Chinese values (e.g., collectivism, extended families, a preference for living with adult children, and parent centeredness) to an emphasis on Western values (e.g., individualism, nuclear families, a preference for living without adult children, and child centeredness in the socialization process)(Shek, 2006). The reduction of family size, economic independence, changing employment structures, limited physical space in most modern housing, prolonged life expectancy, geographic proximity, and intergenerational relationships are likely to affect not only the types of living arrangements for elderly people, but also the ability of the new generation to practice the traditional filial piety (Cheung & Kwan, 2009; Lam, 2006; Ng et al., 2002; Wang et al., 2010).

To adapt to the differences between Chinese and Western culture, the practice of filial piety may appear in a selective form, which differs from the traditional Confucian teachings (Wang et al., 2010). Wilmoth (2001) suggested that acculturation generally decreases the

likelihood of family living arrangements as well as filial behaviors, which may cause elderly people to live apart from their children. It has been found that long sleepers are more likely to live alone (Lan et al., 2007). Gu and colleagues (2010) observed that compared to those living alone, Chinese elderly residing with a spouse or family member increased the likelihood of having good sleep quality by 11%.

Family Roles and Responsibilities Related to Sleep Patterns

Family roles and responsibilities are associated with sleep patterns in different cultural groups. The decline in the filial obligations may alter elderly family roles and responsibilities, leading to psychological disturbances, such as anxiety and worry. These psychological disturbances can interfere with elderly sleep patterns including sleep duration, latency, and quality (Hsu, 2001). Traditionally, Chinese elderly were in charge of household decision-making, and young women (e.g., daughter-in-laws) were primarily responsible for doing housework. Currently, as an increasing number of young women work outside the home to help support the family, they have become more involved in household decision-making but less involved in doing house tasks. Under these circumstances, Chinese elderly, especially elderly women, are increasingly helping their daughters-in-law or daughters with household tasks. Chinese elderly women tend to wake up earlier than elderly men due to their family responsibilities and roles because they may be usually responsible for making breakfast (Hsu, 2001; Liu & Liu, 2005). Ng et al. (2002) interviewed 50 elderly people dwelling in Hong Kong and discovered that elderly parents, especially women, usually helped their children with housework, such as cooking.

Worry has been thought to be embedded within family roles and responsibilities, particularly associated with the gendered role of women as mothers or wives, and their concern for the well-being of family members (Arber, Bote, & Meadows, 2009). Family matters, particularly children's affairs (e.g., marriage, behaviors, business, and health) are the major source of worry. Family matters, especially children well-beings, were reported as one of the three most common sources of worrying in three Taiwanese studies (Hsu, 2001; Hsu, 2007; Liu

& Liu, 2005), an Irish study (Golden et al., 2011), and a Spanish study (Izal, Nuevo, Montorio, & Pérez-Rojo, 2009). In the aforementioned two studies (Hsu, 2001; Liu & Liu, 2005), researchers found that Chinese elderly were more likely to worry about their offspring and awaken earlier, compared to other cultural groups. Worry plays a significant role in sleep disruption and is a primary factor in insomnia. One of the most robust findings generated from three cross-sectional studies is that insomniacs report that they have difficulties initiating and maintaining sleep owing to excessive and uncontrollable worries during the pre-sleep period (Arber, Bote, & Meadows, 2009; Jansson & Linton, 2006; Tang & Harvey, 2004). According to Harvey's cognitive model of insomnia (2002), worry is viewed as a form of cognitive arousal that is often negatively toned and contributes to sleep disruption. The possible effect of worrying on disturbed sleep patterns is that unpleasant intrusive thoughts and excessive and uncontrollable worry during the pre-sleep period triggers both autonomic arousal and emotional distress, which results in distorted self-interpretations of sleep and deficits in sleep. Given the information, family roles and responsibilities may contribute to worry and thereby affect sleep patterns.

In summary, cultural values, beliefs, and practices are correlated with sleep patterns in general, but the specifics of the relations are complex. Filial piety, a family centered value, is an important part of Chinese culture. The effect of culture in shaping elderly perceptions and interpretation of sleep patterns are significant. Cultural beliefs, such as Ying and Yang beliefs, may influence Chinese elderly sleep patterns. Afternoon napping is common in Chinese elderly. Family roles and responsibilities play important roles in shaping sleep patterns. How do cultural values shape sleep patterns? It has been reported that the changes in family roles and responsibilities can result in the adjustment of a sleep-wake cycle and psychological disturbances, such as anxiety and worry that can affect elderly sleep patterns. Additional questions surround relationships among family roles, responsibilities, and sleep patterns: What are the family roles and responsibilities in a Chinese family? What type of filial piety practice exists in the contemporary Chinese family? Are there new components being added into filial

piety expectations? How does the alteration in family roles, responsibilities, and the practice of filial piety influence the sleep patterns in Chinese elderly? Given the aforementioned information, it is important to understand cultural expectations and practices regarding sleep because it can help discern the difference in normal and problematic sleep (Bliwise, 2008). Furthermore, it is crucial to discover the magnitude and etiological factors of the sleep problems and to delineate the interaction among various, cultural, demographic as well as biological variations (Owens, 2005).

Social Environment and Sleep

Concept of Social Environment

Sleep in humans, like eating, is a biological imperative that is expressed in a manner influenced by social factors, such as social environments (Grandner et al., 2010). The social environment is not bounded by geography or by the degree of interaction between people in the local community (Barnett & Casper, 2001). The social environment also changes over time. Social environments involve “the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact” (Barnett & Casper, 2001, p.465). The definition of social environment is diverse, but it is commonly viewed as the consequence of ongoing social processes and the relationships between individuals and groups (Barnett & Casper, 2001; Yen & Syme, 1999). Social relationships, social interactions, and family function are considered significant aspects of the social environment (McNeill, Kreuter, & Subramanian, 2006), which is significantly associated with sleep patterns. Humans are social, and social units (e.g., families) define the contexts of daily life (Worthman & Brown, 2013). Given the previous information, we defined “social environment” as an environment in which elderly individuals interact with social groups, such as family members and friends. The environment includes family, neighborhood, and community. We assumed that social environment shapes elderly sleep patterns, family configurations, as well as the relationships between elderly individuals and social groups. Two important elements of the social

environment, family configurations and social relationships (including family relationships), will be discussed in the following section.

Family Configurations and Sleep Patterns

Family configuration in this study refers to family size and family structure. From a social-ecological perspective, the family configuration has often determined living arrangements (Jenni & O'Connor, 2005). The economic opportunities that result from rapid industrialization have encouraged young adults to migrate to urban areas or foreign countries to achieve economic autonomy from their parents at an earlier age. Economic independence frequently enables young adults to have a dominant position in the family or to form their own nuclear families (Lam, 2006). Consequently, the traditional Chinese family configurations are increasingly fragmented into nuclear or even single-generation households, and elderly people tend to live alone or with their spouses (Yue & Ng, 1999). The findings of a case study, exploring the relationship between filial piety and informal support, indicated that Chinese elderly residing with adult children received better psychological support and daily care than those living without adult children. Furthermore, Chinese elderly living alone tended to express the least sense of security and a feeling of anxiety about daily life because they were anxious about not being taken care of and being left alone by their children (Ng, et al., 2002). Difficulties with sleep are among the most common symptoms of emotional disorders, and anxiety is one of the emotional disorders that can interfere with elderly sleep patterns (Van Cauter & Spiegel, 1999). The results of several studies showed that persistent insomnia is a harbinger of anxiety (Rao et al., 1999), and the presence of anxiety links with long sleep latency (90 minutes or more) (Ohayon, 2004) and short sleep duration (McCann & Stewin, 1988). Anxiety increases the risks of having short sleep and has either a neutral or inverse correlation with long sleep (Krueger & Friedman, 2009). In addition, Wu and colleagues (2010) found that 81% of Chinese elderly who experienced a family configuration change of an “empty nest” had a moderate to high level of loneliness. The findings of a study that examined the correlation between loneliness and health revealed that

lonely elderly were characterized by lower subjective sleep quality, lower sleep efficiency, and greater sleep dysfunction than non lonely elderly (Cacioppo, Hawkley, Crawford, et al., 2002).

Social Relationships and Sleep Patterns

Aspects of social relationships consist of social integration, social support and social interaction (Cohen, 2004). It has been reported that positive social relationships may benefit sleep patterns through increased social interactions and social support (Hale, 2010). Aging may bring about changes in social relationships, especially as it concerns family relationships. Family relationships are thought to play a significant role in regulating sleep-wake cycles (Wu et al., 2010). For example, the transition from active life to retirement, the departure of children from their family home, and the loss of a spouse are all life adjustments that are associated with the changes in social relationships in later adult life. These changes can pose a great impact on sleep patterns in the elderly (Cacioppo, Hawkley, Crawford, et al., 2002; Minors, Rabbitt, Worthingtonz, & Waterhouse, 1989; Naylor et al., 2000). Ohayon (2004) reported that a negative social relationship in elderly people was associated with short nighttime sleep duration (5 hours or less) and long daytime naps (55 minutes or longer). One important cause of negative social relationships is the lack of social interactions, which may result in erratic sleep behaviors including prolonged sleep episodes in the daytime, and thus the nighttime sleep duration becomes shortened since the homeostatic sleep drive is reduced.

Sleep duration, timing, and quality, awakenings, and rapid eye movement (REM) latency are associated with changes in social interactions (Totterdell, Reynolds, Parkinson, & Briner, 1994). In an experimental study that investigated an activity group of 14 elderly residents and a control group of 9 elderly residents from retirement facilities, Naylor et al. (2000) reported that daily low-intensity exercise paired with structured social interactions could significantly benefit slow-wave sleep and had positive effects on sleep and daytime functioning in elderly people. In Totterdell et al.'s study (1994), 30 adults (mean age 32) used pocket computers to complete a daily sleep diary and self-rating scales of mood and social interaction experience. The

researchers found that sleep patterns were linked with social interaction experiences, and the amount of time spent alone predicted the number of subsequent awakening episodes. In addition, an earlier onset of sleep was associated with better mood and social interaction experience the following day.

In summary, social environment, including the family and social relationships/ interactions are correlated with sleep patterns. The family configuration has been changed by rapid industrialization. The change is associated with the increase of nuclear or single-generation households. Elderly people who live alone are more likely to have anxiety and loneliness. These emotional reactions are correlated with poor subjective sleep quality and insufficient sleep efficiency. What type of family configuration exists in a contemporary Chinese family? How do family relationships and family support affect Chinese elderly sleep patterns? How do social activities influence Chinese elderly sleep patterns?

Demographic Characteristics and Sleep Patterns

Research on the association between sleep patterns and socioeconomic status (SES) has shown that SES predicts patterns of nightly sleep. Socioeconomically disadvantaged people have a higher likelihood of disturbed sleep patterns (e.g., less sleep) as well as poorer sleep quality than more advantaged people (Adams, 2006; Arber et al., 2009; Friedman et al., 2007; Grandner et al., 2010; Hale, 2005; Hall, Bromberger, & Matthews, 1999; Moore, Adler, Williams, & Jackson, 2002). Specifically, people with low occupational status are more likely to report difficulty falling and maintaining sleep, frequent awakenings in the early morning, increased daytime sleepiness (Friedman et al., 2007), but also long sleep duration (greater than 8.5 hours per day), relative to those with high occupational status (Hale, 2005). It is possible that people with low occupational status tend to have an insufficient amount of sleep because of dwelling in adverse environmental conditions, including crowded living quarters, which may directly compromise sleep patterns (Arber et al., 2009; Van Cauter & Spiegel, 1999). Another possibility is that people with low occupational status may need to work more than one job and work during

the night, which can disrupt sleep-wake cycles, make sleeping difficult, and decrease the amount of sleep (Hale, 2005).

There is some evidence of positive associations among years of education, income, and sleep patterns. Higher income (Friedman et al., 2007; Grandner et al., 2010; Krueger & Friedman, 2009; Moore et al., 2002) and more years of education (Friedman et al., 2007; Grandner et al., 2010; Hale, 2005; Krueger & Friedman, 2009; Moore et al., 2002) are associated with decreased sleep latency, enhanced sleep efficiency, better self-rating sleep quality, and reporting 6.5 - 8.5 hours of sleep per night (Adams, 2006). However, Moore and colleagues (2002) argued that more education and higher income only related to better sleep quality rather than sleep quantity. Individuals with low income are likely to experience greater levels of psychosocial stress (such as uncertainty about the future and financial problems) or depression that make it difficult to fall or stay asleep (Hale & Do, 2007), and to use late hours of the night to address their needs, which in turn impacts sleep patterns. In addition, higher educational qualifications may relate to greater knowledge about sleep hygiene practices and more awareness of the strategies that can be used to improve sleep (Arber et al., 2009; Hale, 2005).

Marital status is a cross-cultural variable that is measured to determine the relation between family relationships and sleep patterns. Hale (2005) found that the separated/ divorced and widowed were more likely to experience short sleep, and being single (or unmarried) increased the risk of both short and long sleep, compared to married people. Likewise, Grandner et al. (2010) observed that there was a significant link between sleep complaints and marital status such that the highest likelihood of complaining about sleep occurred in unmarried people. It is possible that the sleep schedule of unmarried people may be more flexible since they are less likely to share a bedroom with another person. They may make use of this flexibility to either sleep longer or to do other things. Furthermore, unmarried people are likely to have less social support, which may increase the likelihood of sleep complaints (Hale, 2005).

In summary, the socioeconomically disadvantaged elderly (low occupational status, low income, and lack of education) tend to have higher likelihood of disturbed sleep patterns (e.g., less sleep) and lower sleep quality than the more advantaged elderly. There is a significant relationship between sleep complaints and marital status. The research question is what are relations between demographic characteristics and sleep patterns in Chinese elderly?

CHAPTER III: METHOD

Mixed Method Design

This study was primarily designed to understand how culture and social environments affect sleep patterns in Chinese elderly. A mixed-method design suggested by (Sandelowski, 2000) was used. Sandelowski (2000) describes that a mixed-method study design involves both qualitative and quantitative research approaches together in the same study either as individual design components, or integrated throughout the study. The rationale for selecting a mixed-method design for this study was to pursue "complementarity," in which the strengths of one method are used to enhance the other method, yielding enriched and elaborated data (Morgan, 1998) regarding sleep patterns and experiences in Chinese elderly.

The "concurrent" approach described by Crewell and Zhang (2009) were utilized to gather qualitative and quantitative data at the same time and to bring both types of data together in the interpretation of the results. The qualitative approach (Lincoln & Guba, 1985) was the primary method used for data collection in this study. The qualitative inquiry addressed the sleep experience of Chinese elderly. The quantitative investigation included sleep patterns (e.g., sleep duration, sleep efficiency, sleep latency), sleep habits, and demographic characteristics. The findings generated from the quantitative investigation provided reference information to interpret the participant-generated data. For example, when a participant described his or her sleep duration as "inadequate", not only were the differences in both the numeric and text data compared, but also additional variables derived from quantitative data (e.g., living status, sleep habits, nighttime awakenings, to name several) were used as reference information to interpret the participant's perception of sleep duration. This process also generated helpful information for developing interview questions for further qualitative inquiries.

Sleep research has traditionally emphasized quantitative data collection. A majority of studies on sleep patterns did not generate detailed information about sleep in healthy elderly

from the participants' own descriptions about their sleep. It has been questioned whether quantified measurement alone can provide sufficient information to better understand sleep patterns under various circumstances (Middelkoop et al., 1996). If research is focused only on what can be quantified, researchers may ignore data that can enhance understanding of sleep patterns in the elderly. As discussed in Chapter 2, culture and social environment are believed to affect elderly sleep patterns. Measuring the aforementioned two concepts involves participants' self-perception along with interpretation that is optimally studied using qualitative approaches. Culture refers to "the acquired knowledge that people use to interpret experience and generate social behavior" (Spradley, 1979, p. 5). Spradley (1979) has found that culture is encoded in linguistic form, and culture can be defined, interpreted, and described from more than one perspective. The concept of social environment is complex and involves a dynamic social process and many important elements, such as social relationships and family situations, which may influence elderly sleep patterns (Barnett & Casper, 2001; Yen & Syme, 1999). In short, to better understand how social environments and culture affect sleep patterns, the best way is to use a qualitative approach.

Philosophical Framework

"Naturalistic inquiry" proposed by Herbert Blumer (1969) served as a philosophical framework to guide qualitative inquiry. This philosophical framework provided the researcher not only with a lens that discerns what is important and that suggests crucial things for which one should keep an eye open during data collection, but also with a logical procedure to follow in gathering and analyzing information. The relevance of naturalistic inquiry to this study was threefold. First, in this study sleep is considered a natural human phenomenon, the data relevant to sleep should be collected using a natural method in a natural setting (e.g., participants' homes). Based on Blumer's (1969) tenets, Athens (2010) summarized that naturalistic inquiry is "a special form of inquiry" that respects the natural integrity of a phenomenon under study, and the phenomenon needs to be studied in its "natural ongoing

character without imposing a fixed preconceived order on it" (p. 94). The information relevant to the phenomenon is gathered naturalistically by utilizing an approach that does not violate the phenomenon's natural integrity. Given these notions, "naturalistic inquiry" was well suited for the qualitative inquiry of this study.

Second, sleep is viewed as a daily life experience and is a vital process with important functions (Wolkove, Elkholy, Baltzan, & Palayew, 2007). The main purpose of this study was to appreciate the holistic context of elderly sleep patterns and to find meanings in what elderly say about their sleep. Naturalistic inquiry is considered an in-depth study of people, phenomena, and events (Mellon, 1990). The primary goal of naturalistic inquiry is to "remain true to the nature of the phenomena under study or scrutiny" (Matza, 1969, pp. 5). The naturalistic researcher is viewed as "one committed to the primacy of natural context" (Lincoln & Guba, 1985, pp. 226). Erlandson and colleagues (1993) contended that the design in a naturalistic study does not impose arbitrarily on the context but takes into consideration the full richness of the context. Mellon (1990) stressed that naturalistic inquiry focuses on viewing experiences from the perspectives of those involved, and it attempts to capture the natural setting in which it is conducted. The methods of naturalistic inquiry are well suited for studies where in-depth understanding of human phenomena is the primary focus.

Finally, sleep is viewed as an "inherently bio-psychosocial phenomenon" that is embedded in its socio-cultural context and influenced by such correlates as cultural beliefs, cultural norms, and rituals for sleep practices, social interactions, and social relationships (Owens, 2005). For example, culture may affect sleeping and waking times, including a specific "bedtime" (Jenni & O'Connor, 2005; Liu & Liu, 2005). Humans are embedded in their world to such an extent that subjective experiences are inextricably linked with social and cultural contexts (Heidegger, 1962). Two of the specific aims of this study were to understand how self-perception about aging as a part of life affects one's appraisal of sleep and to explore the meaning that is associated with changes in sleep as people age. We assumed that the Chinese elderly

interpretation of sleep patterns, and aging depends on what they mean to elderly. Chinese elderly are considered unique individuals who have specific culture and interact with the social environments in which they live. The self-perception of elderly is shaped by their personal characteristics and social environment along with interaction, and culture. These assumptions are in line with the three basic premises of naturalistic inquiry. The first premise is that people's attitudes toward things change depending on what those things mean to them. The "things" can be everything that human beings may encounter in their daily lives (Mellon, 1990, pp. 14). The second premise is that what things mean to a person develops out of social interaction. As an individual interacts with other people around some "thing" in his or her life, the interaction defines the thing for the individual. The third premise is that individuals act toward people, objects, and events not only on the basis of meanings that have developed through past interactions, but also on interpretations made by the individual at the moment of new interaction (Athens, 2010). These premises imply that individuals are inseparable from their society and that naturalistic inquiry cannot take place in isolation of the individuals' culture and social context in which individuals live. As Blumer (1969) noted, "naturalistic inquiry" can be a "life study" and has the virtue of remaining close and of continuing relations with a natural world. Given this information, naturalistic inquiry was well suited as the philosophical framework for conducting this study.

Sample

Twenty-four Chinese men and 27 Chinese women aged 60 to 104 years were studied between January and May of 2012 in Taiwan. One interview was dropped because the participant had a hearing problem and as a result, one of his family members became too involved in the interview. Of the entire available sample (N = 50), 35 participants were recruited from northern Taiwan, and 15 were recruited from southern Taiwan. All but four were born in Taiwan. The city parks in the Taipei region were initially selected as the major settings for this study to recruit Chinese elderly participants. The parks are places that Chinese elderly frequent

for exercising, playing Chinese chess, and socializing with people. However, cold temperature and frequent rain rendered this sampling plan not completely practical as Chinese elderly tended to stay at home rather than congregating in city parks under these weather conditions. For this reason, we added new research sites including city or town parks in other areas of northern Taiwan as well as southern Taiwan where there was sunnier weather.

Purposive sampling is central to naturalistic inquiry. Naturalistic inquiry attempts to maximize the range of specific information that can be obtained from and about that context. This requires a sampling procedure that is guided by emerging insights about what is relevant to the research and purposively searches for the data that the insights indicate (Erlandson et al., 1993). Given the information, purposive sampling was mainly used to recruit the participants based on the research questions and the insights gathered from each interview and field observation.

At the beginning of this study, the recruitment flyers (see Appendix A) were distributed in the city parks of Taiwan. Questions asked by the potential participants were answered at the site. The study information was also explained by using a Chinese 'consent form' (see Appendix B). The inclusion criteria and a 'phone screening script' (see Appendix C) guided the phone screening interview. The recruitment efforts were supplemented by snowball sampling. The participants were asked to distribute recruitment flyers to their spouses and friends. If the potential participants were interested in taking part in the study, they could contact the phone number and email address shown in the flyers. Then, the information related to the study was explained to the potential participants. Friends and colleagues were also asked to recommend potential participants as well as seek permission for the researcher to contact them by phone.

The criteria for inclusion were: Chinese men and women aged 60 years or older who could speak or read in Chinese and reflected on their lives. The exclusion criteria included: (1) Chinese who were not from China, Hong Kong, or Taiwan; (2) individuals who were receiving oxygen treatment (e.g., the use of portable oxygen); (3) wheelchair bound individuals; (4)

individuals with serious medical problems, including congestive heart failure, Parkinson's disease, multiple sclerosis, chronic obstructive pulmonary disease, stroke, cancer under treatment; and (5) psychiatric disorders that influenced cognitive functions and the ability in making sound judgment, including depression and dementia.

Design of naturalistic inquiry means "planning for certain broad contingencies without, however, indicating exactly what will be done in relation to each" (Lincoln & Guba, 1985, pp. 226). As a result, the design of a naturalistic inquiry is usually not fully established before the study starts but emerges as data are collected (Erlandson et al., 1993). Given this notion, this study sample evolved during the interview process as meanings and concerns emerged from varied perspectives. Based upon Benner's (1994) suggestion, the sample of this study was expanded until redundancy with respect to information was reached, at which point sampling was terminated. The sample size was viewed as "saturation" when interpretations were visible and clear, no new findings were discovered from new participants, and meanings from all previous texts became redundant. As 35 participants had been interviewed in northern Taiwan, the data already had generated a cluster of significant themes and rich findings. To understand the difference in the results among the different regions, the researcher of this study continued to interview participants in southern Taiwan until the sample size (N= 50) became saturated.

Phone Screening Interview

When potential participants gave their verbal consent to be screened, a 5-minute phone screening interview were arranged to determine if they were eligible for this study. All telephone conversations were held in completely private circumstances.

Data Collection Procedures

The researcher met the participants at a convenient time and natural setting, such as their home, or a private room in their building. The participants read the information pertinent to this study shown on the consent form and asked questions. The researcher confirmed their understanding by asking them a few questions about this study. When they agreed to

participate in this study, they were asked to sign the written consent form. Each participant was requested to fill out three questionnaires prior to an in-depth interview**.** When the participants had difficulty reading the questionnaires by themselves, the questionnaires were read to them. After the completion of the questionnaires, each interview was conducted subsequently or at a different time that was more convenient to the participant.

In-Depth Interview

In a naturalistic inquiry study, in-depth interview is often viewed as a useful and primary approach by which to understand the subjective view that participants hold of a particular situation or event (Lincoln & Guba, 1985). Thus, an in-depth interview, lasting no longer than 60 minutes was selected as a major method to collect data in this study. The interview was digitally audio-recorded and written in field notes. Because naturalistic inquiry is directed by the data when it emerges, researchers often conduct initial interviews directed by a simple interview guide and then expand the guide as more is learned about the research topic (Mellon, 1990). The interview of this study was primarily guided by an 'in-depth interview script' (see appendix D) that was developed based on Spradley's (1979) interview approaches. The interviews were initiated with a "grand tour" question, "Tell me about how you spend your day." Mellon (1990) suggested that regardless of the complexity of the interview guide, the interview guide for naturalistic inquiry needs to be rearranged, altered or even discarded altogether in response to the interview situation. Therefore, an ongoing assessment and revision of the interview guide **was** conducted based on the interviews that had been completed in this study. The interview guide was also rearranged in an interview setting in response to participants' characteristics or interview situations. For example, some of the elderly participants in this study were hesitant to share their true feelings to a person whom they were not familiar with. Their answers sometimes skirted the questions, or they answered the questions in a way that was not topic-focused. For this matter, several close-ended questions were used to guide the participants to better answer the questions.

According to Lincoln and Guba (1985), a skilled interviewer is adept in the use of “probes” that are directed cues for more or extended information and that may take the form of silence. In addition, an experienced interviewer may also utilize “pumps” that are sounds such as “uh-huh or “umm” or encouraging waves of the hand, to facilitate an interview. In this study probing questions and follow-up questions were asked to expand upon specific topics (e.g., self perception about aging and sleep, napping status, the influence of family situations on sleep patterns, correlates that affect sleep patterns, and the effect of culture belief and practice on sleep patterns). Examples of probing questions used were: In your opinion, how is your sleep as you grow old? What do you usually do in the middle of day and before you go to bed? Tell me about your family? Tell me about your social activities? To what extent do your children demonstrate filial piety to you? Examples of follow-up questions include: What is the difference in your sleep between your younger years and your later life? How would you compare the sleep quality of your peers with your own sleep quality? Why do you take a nap? How do family relationships influence your sleep? How does your participation in social activities influence your sleep? How are sleep and filial piety related? In this study, silence, “uh-huh or “umm” sounds, nodding head, waving hand were utilized to help the flow of the interviews as well.

It is emphasized that the best strategy of naturalistic interview is to be natural, or be oneself during the interview. In other words, being natural is much more convincing than any performance (Erlandson et al., 1993). Thus, the researcher of this study avoided asking inferential questions, and a dialogue with a participant was developed, based on the line of inquiry. As suggested by Benner (1994), this study employed active listening skills, the participants’ responses were paraphrased and repeated back to them to ensure that their communication was totally understood. Also, the participants were provided ample time to clarify or refine aspects that might cause confusion or dissatisfaction. Throughout the interview process, vocal intonations, physical expressions, and gestures that could not be audible in the

recorded interview were included in field notes and then were incorporated into the transcribed narrative texts.

Questionnaire Survey

Cognitive function. The mini-mental status exam (MMSE) (Folstein, Folstein, & McHugh, 1975), 30-item test, was administered at participants' homes or in private rooms selected by the participants at the beginning of this study. The purpose of administering this questionnaire (see Appendix E) was to understand the participants' cognitive function regarding their orientation, registration, attention and calculation, recall, and language. The scores were utilized to describe the participants more fully and assisted in the interpretation of the findings of this study. According to Folstein and colleagues (1975), the MMSE measures the degree of cognitive impairment using a short interview and yields a range of scores from 0 – 30, with a higher score indicating better cognitive functioning. A score at or below 24 is indicative of cognitive impairment. In a study that administered the MMSE to 206 patients with mental disorders or cognitive impairment or both and 63 normal adults, Folstein et al. (1975) found that the product moment correlations of the MMSE on 24 hour- or 28-day retest by single or multiple examiners range from .82 to .99. The scale has been found to have good reliability with internal consistency ranging from .73 to .85 (Pruchno & Rose, 2000). Similar findings were found in a study, indicating that the Chinese version of MMSE had an internal consistency of .86 and a test-retest reliability of .78 to healthy and demented elderly (Chiu, Lee, Chung, & Kwong, 1994). Internal consistency for the scale as measured by Cronbach's alpha in this study sample was .80.

Sleep quality. The Chinese version of the Pittsburgh Sleep Quality Index (CPSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) was utilized to measure sleep patterns of Chinese elderly in this study (see Appendix F). The questionnaire comprises 19 total items representing seven components, including sleep quality, sleep latency, sleep duration, habitual sleep efficiency daytime dysfunction, sleep disturbances, and use of sleep medications. Each

item is scored on a 0 *(no difficulty)* - 3 *(severe difficulty)* Likert scale. The maximum total global score is 21, and a score at or above 5 indicates poor sleep (Chang, Tsai, Chang, & Tsao, 2007; Yu, 2010). In a Taiwanese study that recruited 87 Taiwanese with primary insomnia and 157 healthy adults to evaluate psychometric components of the CPSQI, Tsai et al. (2005) found that Cronbach's alpha of the CPSQI was .83 - .82 in all participants and .72 - .71 in primary insomniacs, and the test–retest reliability over a 14 to 21-day interval had a coefficient of .85 for all participants and .77 for primary insomniacs. In addition, the global score greater than five on the CPSQI yielded a sensitivity and specificity of 98% and 55% respectively. In the English version of Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989), the overall internal consistency (Cronbach's alpha) for the seven component scores of the scale was .83, and the correlation coefficients of test-retest reliability for global PSQI scores was .85. A global PSQI score greater than five yielded a sensitivity of 89.6% and specificity of 86.5% in distinguishing poor and good sleepers. The Chronbach's alpha of the CPSQI in this study sample was .71.

Demographic characteristics and sleep habits. A 15-item 'demographic and sleep habit questionnaire' was developed specific for this study to collect data including gender, age, marital status, level of education, race, employment status, current living arrangement, household income, medical conditions, use of medications, beverage and alcohol consumption, and napping status (see Appendix G).

Data Analysis

Phases of Data Analysis

A naturalistic inquiry involves not only an inseparable relation between data collection and data analysis but also the co-construction of meaning between researchers and participants (Erlandson et al., 1993). Naturalistic analysis includes two phases: initial analysis and intensive analysis. All naturalistic researchers begin coding data in the field and alternate data collection with initial analysis (Erlandson et al., 1993; Mellon, 1990). Given this information, the data generation and analyses were ongoing throughout this study. The researcher highlighted

meaningful sections of the transcript, asked questions of it, proposed ideas about its meaning, pondered on what really stood out from the descriptions, and contemplated what might be absent. The findings from the initial coded interviews guided subsequent interviews. When data became redundant, data collection ended and then the intensive analysis started. The intensive analysis of this study began with reviewing and pondering the text of transcripts, field notes, and process notes interchangeably. To integrate the data into a general pattern or explanation of findings, the researcher of this study carefully read through the intact set of field notes and interview transcripts in chronological order, underlining as well as adding marginal notes, and following up ideas with reflective notes and diagrams.

Qualitative Content Analysis

Analyzing naturalistic data is viewed as a process of reducing considerable raw data into progressively smaller and more meaningful blocks of information by doing coding. Coding is the heart of naturalistic analysis (Mellon, 1990). As suggested by Mellon (1990), the researcher of this study used the basic techniques of naturalistic analysis, codes, memos, and diagrams, to help analyze its data. In addition, content analysis approach was utilized to help develop a coding scheme and analyze the content of interview texts.

Content analysis is “a research technique for making replicable and valid inferences from texts to the context of their use” (Krippendorff, 2004, pp. 18). These inferences include the message itself or the audience of the message. A conventional approach (Hsieh & Shannon, 2005), one type of content analysis, was used to guide the qualitative data analysis. The coding categories and themes of this study were derived from the content of text data, and the interpretation was based on the meaning from those yielded themes. This corresponds to the notion that conventional content analysis adheres to the naturalistic paradigm and interprets meaning from the content of text data (Hsieh & Shannon, 2005).

According to the strategies of content analysis described by Graneheim and Lundman

(2004), the interview texts of this study were sorted into four content areas based on the research questions: (1) demographic characteristics and sleep patterns; (2) self-perception about aging, sleep patterns, and naps; (3) culture and social environment in relation to sleep patterns; and (4) activities and sleep patterns. The data texts were read line by line many times to obtain a sense of the interview texts as a whole. Then, the texts of all 50 interviews in this study were extracted and brought together into one text, which constituted the unit of analysis. The texts were divided into meaning units that were condensed. The condensed meaning unit was abstracted and labeled with a code. The various codes were compared based on differences and similarities and sorted into 11 categories, which constitute the manifest content. The tentative categories and codes were discussed by the researcher and two experts of qualitative research in her dissertation supervisory committee. The reflection of the discussion resulted in agreement about how to sort the codes. The significant codes with similar meanings were grouped together in a Microsoft Word file and then were sorted into 11 categories that were broken into 43 subcategories. The number of the emergent categories in this study was consistent with the recommendation that the legitimate number of categories need to keep clusters broad enough to sort a large number of codes (Morse & Field, 1995). Each category and code was defined, and the underlying meanings of the categories were linked together to create themes. Consequently, all codes, categories, themes, and meaning units (the constellation of statements associated with themes), were merged to complete the development of a codebook.

Quantitative Analysis

Quantitative data was analyzed using SPSS for Window version 19 (SPSS, Inc, Chicago, IL, USA) and .05 of alpha was selected as the level of statistical significance. The first set of analyses was conducted to yield descriptive statistics including demographic characteristics of the participants and mean, standard deviation, and frequency of sleep variables. The statistical tables were established to summarize the descriptive statistics. The second set of analyses was

to determine group differences in sleep variables. In this set, the Independent *t* test was used to test the following hypotheses. The first hypothesis was that demographic characteristics (e.g., gender, age, marriage status, education, and caffeinated beverage consumption) have an effect on nocturnal sleep quality in Chinese elderly. Each variable of the demographic characteristics was dichotomized into two groups, and it was individually analyzed for its effect on sleep quality. Age was dichotomized into "young old" (60 - 79 years) and "old old" (80 -104 years). Marital status was categorized as "currently single (never married/widowed/ widowered) and "married." Educational level was categorized into "low" (less than elementary school) and "high" (elementary school, junior high school, high school, and college). Beverage consumption (coffee and tea) were categorized into "non-caffeine drinkers" and "caffeine drinkers." Although each demographic variable was analyzed for its effect on sleep quality separately, there might be an interplay effect among those demographic variables. To adjust for this potential effect, the level of statistical significance was defined for this particular analysis as $\alpha = .01$ ($.05/5 = .01$). The Independent *t* test with $\alpha = .05$ as the criterion for significance was computed to test the second hypothesis that living arrangements contribute to the change of self-reported sleep quality, and third hypothesis that there are differences in sleep quality, sleep efficiency, and sleep hours between the participants of social activities and the non-participants.

In the third set of analyses, linear regression was conducted to determine the effect of napping status on nocturnal sleep quality when gender was controlled. The regression equation model was: $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$, where X_1 represented napping status (napping vs. not napping), and X_2 was gender. β_0 was constant, and β_1 and β_2 were the coefficients on napping status as well as gender respectively. ε was the error term. Finally, the Chronbach's alpha of the MMSE and CPSQI were computed using this study sample.

Data Integration

A central component of mixed method design is the integration (or combination) of qualitative and quantitative data. This procedure is called "mixing"(Creswell & Zhang, 2009).

The quantitative and qualitative datasets were independently analyzed during this study. At the endpoint of this study, two “mixing” approaches identified by Creswell and Zhang (2009) were employed to integrate both forms of datasets. The first approach of “mixing” is “merging,” indicating that the distinctiveness of each database dissolves. For example, the themes and significant quotes of the interview data were reported based on the research questions of this study, and relevant statistical results of questionnaire data were provided to confirm or contradict the findings of this study’s qualitative data. This process is called a “side by side comparison”(Creswell & Zhang, 2009). As suggested by Creswell and Zhang (2009), qualitative themes and codes were counted, and then this converted qualitative database was merged with the quantitative data. Another approach of “mixing” is “embedding,” (Creswell & Zhang, 2009), which means that a researcher nests a supportive database within a key database to augment the latter. For example, the interview texts were the major data source of this study, and the quantitative data (e.g., scores of CPSQI, demographic characteristics, napping status) were embedded into the interview data. In other words, when the codebook of the qualitative inquiry was established, the statistical data of the questionnaires were integrated into the codebook if they were applicable. Finally, the researcher of this study determined if there was a convergence or a divergence of results and then interpreted the results. For the concrete procedure of data integration, please refer to this study protocol that is diagrammatically illustrated in Figure 1.

Trustworthiness of the Qualitative Data

According to Lincoln & Guba (1985), trustworthiness is the term that is usually used to substitute for validity and reliability in quantitative research. Four criteria (e.g., credibility, dependability, confirmability, and transferability) were utilized to assess the trustworthiness of the qualitative inquiry in this study. Five techniques were used to help assess the trustworthiness of this study; peer debriefing, member checking, inter-coder agreement, audit trail, and thick description (Lincoln & Guba,1985).

Peer Debriefing

Peer debriefing is a process in which the researcher steps out of the context of the study to review perceptions, insights, and analyses with experts who are not involved but understand the nature of the study well to debrief and provide feedback to the researcher (Erlandson et al., 1993). Peer debriefing can provide an opportunity to evaluate the researcher's bias and to determine that the interpretation of the data is not arbitrary and is understandable to others (Lincoln & Guba, 1985). Debriefing sessions with the experts in this study were conducted, based on discussions about the use of interview techniques, translation of the interview texts, the newly emerged codes and categories from the interview data, and the integration of data across interviews. The members of the researcher's dissertation committee supervised this study at various time points to evaluate the adequacy of data collection and the accuracy of data interpretation. The researcher periodically reported the progress of this study to her committee members and sent each interview transcript and other relevant information to her committee members to receive feedback and advice. Feedback from the committee members was helpful in checking the researcher's bias and adding new perspectives on the collection, analysis, and interpretation of the data. At the beginning of this study, the researcher coded the first four interviews with a member of her dissertation supervisory committee to ensure the accuracy of the coding scheme used in this study. The difficulties and repeated patterns of the findings were discussed. They coded the interview texts individually and compared the differences and similarities. This committee member also reviewed and commented on the interview questions that were used for collecting data, which helped the researcher avoid arbitrary implementation of research procedures and interpretation of data.

During the period of data collection, the researcher consulted with several well-educated elderly in Taiwan for transcribing the interview recordings. At the end of this study, an English-speaking anthropology professor served as a debriefer to read through the report of the findings and give the researcher feedback regarding the findings. The debriefer is knowledgeable about

Chinese culture and proficient in speaking both Taiwanese and Chinese. The debriefer and the researcher discussed the issues of the findings along with the interpretation and translation of the interview texts in person. The debriefer also reviewed the raw data to ensure the accuracy of the Chinese-to-English translation. Based on the debriefer's advice, the researcher consulted with a Taiwanese professor for translating Taiwanese colloquialisms into Chinese as well. Other members of the researcher's committee also served as peer debriefers to evaluate if the analyses and interpretations were confirmable.

Member Checking

Member checking refers to the evaluation of data, analytic categories, interpretations, and conclusions with members from whom the data were originally collected (Erlandson et al., 1993; Lincoln & Guba, 1985). As described by Lincoln and Guba (1985), there are two ways to do member checking. First, a summary of an interview can be "played back" to the person who provided it for reflection. Second, the output and insights derived from one interview can be examined with another informant who can be asked to comment. As a result of time and budget constraints, the participants of this study were not re-contacted for the member checking. However, the insights or meaningful findings derived from one interview were tested with subsequent interviewees because the data collection and analyses occurred at the same time in this study. New interview questions, which were created based on the output of previous interviews, were applied to subsequent interviews. For instance, an interview question for a new interviewee who was a farmer was: "Some farmers that I have talked to described that they only napped in the summer afternoon because it was too hot to work on their agricultural lands. What is your viewpoint on this notion?"

Inter-Coder Agreement

Inter-coder agreement refers to "the degree to which two coders, operating independently, agree on coding decisions" (Polit & Beck, 2008, pp. 756). In the existing literature on qualitative research, there is no consensus on the portion of samples that should be chosen to test inter-

coder reliability. In this study, 20% (n = 10) of the interview transcripts were randomly selected and independently coded by the researcher and a nursing PhD candidate who was not involved in this study. Before the interview text was coded, a coding worksheet was developed. The researcher next provided the PhD candidate with the relevant information, such as research questions and the coding scheme. The researcher then answered the questions raised by the PhD candidate regarding the relevant information. All codes were then compared to assess agreement on the codes assigned to the texts. The inter-coder agreement of this study was 86%. A good percentage of inter-coder agreement is considered 85% or greater (Macqueen, Mclellan-Lemal, Bartholow, & Milstein, 2008).

Audit Trail

An audit trail was used to assess the stability of data over time (Lincoln & Guba, 1985), as an external check on the processes by which the study was conducted (Erlandson et al., 1993) and to assess data accuracy, relevance, or meaning (Lincoln & Guba, 1985). An audit trail, a systematic collection of materials and documentation, is provided by the original researcher to an independent auditor, permitting the latter to scrutinize the research process and the authenticity of the data (Lincoln & Guba, 1985). In this study, relevant materials were provided by the researcher, and a worksheet, entitled “Audit Trail of Qualitative Inquiry,” was developed to help the auditor review the materials (see Appendix H).

A nursing PhD candidate, who is a person with proficiency in both Chinese and English and familiar with conducting qualitative research, was asked to evaluate the confirmability of this study. The researcher also explained the process of the audit trail, and materials to the auditor and answered the questions raised by the auditor. The major audit trail categories which were reviewed included: (1) raw data (e.g., audio recordings, interview transcripts, written field notes, written questionnaire data, quantitative data in SPSS); (2) data analysis and synthesis products (e.g., data analysis plan, coding scheme, summaries of significant codes and themes, codebook, quantitative data output in SPSS); (3) process information (e.g., initial **s**tatistical tables, initial

coding results, approved IRB modification materials, emails and notes for consulting with experts in statistics, translation, and EndNote software); (4) information of instrument development (e.g., pilot forms and preliminary schedule); and (5) other relevant materials (e.g., proposal, reading materials in EndNote). At the end of the audit trail, the auditor signed the aforementioned worksheet when she agreed that all the data she had reviewed were authentic and relevant to the inquiry of this study.

Thick Description

"Thick description," an important and common approach suggested by Erlandson et al. (1993), was employed to achieve transferability of this study. Qualitative researchers need to provide as much detailed information about the research context as possible, which was referred to as "thick description" by Lincoln and Guba (1985). To facilitate transferability, it is important to provide a clear and distinct description of culture and context, selection and characteristics of participants, data collection, and process of analysis (Graneheim & Lundman, 2004). The researcher of this study presented a rich and vigorous description of the findings accompanied with meaningful quotations. Because the results of this study involved culture, self-perception, and languages used by the older generation, the researcher of this study translated the interview text line by line and in the participants' intonation. The researcher also kept the meaningful cultural colloquialisms and terms to enhance the richness and authenticity of the information about the interview context. In addition to the descriptive information, tables and figures were included in the results of this study. More importantly, the researcher concurrently integrated the findings of questionnaire data into the qualitative data if they were compatible, and compared both forms of the data. The "thick description" of the results generated from this study allowed its readers to make their own interpretations compared to those presented by the researcher.

CHAPTER IV: RESULTS

The results in this chapter are divided into two main sections. The first section describes participant demographic characteristics, self-perception about aging, sleep patterns, and naps. The second section focuses on culture, social environments, and activities in relation to sleep patterns. Research questions (RQ) pertinent to each section were used to organize presentation of the findings. If appropriate to the questions, information gathered from interviews along with field notes and the data derived from the questionnaires were used concurrently. Findings from the questionnaire data were compared to themes identified and synthesized from the interviews. The research questions of Section 1 include:

- RQ1: What is the relationship between demographic characteristics and sleep patterns in Chinese elderly?
- RQ2: What is the self-perception about aging as a part of life among Chinese elderly and do their perceptions affect their appraisal of sleep? Is there a difference between men and women?
- RQ3: What is the relation between napping and nocturnal sleep patterns and what are the factors that influence napping among Chinese elderly?

Section 2 constitutes the following research questions:

- RQ4: Do family configurations, relationships, responsibilities, and living arrangements affect sleep patterns of Chinese elderly?
- RQ5: What is the influence of filial piety on sleep patterns from the viewpoints of Chinese elderly?
- RQ6: Does the belief of Chinese elderly in Chinese Medicine affect their sleep patterns?
- RQ7: What are the effects of participation in activities on Chinese elderly sleep patterns?

SECTION 1: Participant Demographic Characteristics, Self-Perception about Aging, Sleep Patterns, and Naps

RQ 1: What is the relationship between demographic characteristics and sleep patterns in Chinese elderly?

Twenty-three Chinese men and 27 Chinese women were studied. Table 2 summarizes the socio-demographic profile, cognitive status, and sleep-related characteristics of the

participants. A majority of the participants were married or widowed, and their educational levels were lower than middle school. In terms of sleep related characteristics, the mean global score of the Chinese version of the Pittsburgh Sleep Quality Index (GCPSQI) was $>$ 5. The mean GCPSQI above 5 is the threshold for indicating, “poor sleep.”

Educational Levels

The highest educational level reported for 72% of the participants was less than junior high school. Over a third of the participants had never gone to school or had not completed elementary school education. The six educational levels shown in Table 2 were categorized into two groups: “higher education” (elementary school or higher) (n = 32) and “lower education” (not completing elementary school) (n = 18). The descriptive statistics of questionnaires showed that the participants who had obtained higher education had slightly lower GCPSQI scores (5.7 vs. 6.7) and higher usual sleep efficiency (88.7% vs. 83.1%) compared to those who had never gone to school or did not complete elementary school.

Employment Status

Seventy-two percent of the participants were retired, and 28% of them were still employed working full time or part time. Their occupations consisted of farmers, gatekeeper, administrator, janitor, self-employed business (e.g., restaurant), funeral director, nanny, and shaman (乩童) (Spirit Medium; a person who interacts with the physical and spiritual world). Surprisingly, not all participants over age 80 years (n = 20) were retired. For example, one woman who was 80 years old still ran a business and raised 10,000 chicks in her chicken farm located near her house. She sometimes needed to get up at 4 AM or so because a truck delivered chicks and chicken feed to her farm. She told the researcher that her sleep on that day was not affected because she had gotten used to it. She needed to take care of her chickens and to scrutinize them to see if they had enough water to drink and scraps to eat. She went to her chicken farm every morning after breakfast until 11 AM**.** When fruit in her son’s orchard was harvested, she

helped with categorizing fruits based on their sizes. She was healthy and looked much younger than her chronological age.

The vast majority of those participants (90%) stated that they slept better in their younger years than when they grew older because they usually felt tired after working, which made it easier to fall asleep. They assumed that elderly people need to sleep less than youth because they do not work and the more they work, the better they sleep. They viewed “nothing to do” as the main reason for them to not sleep well as they grew older. That is, they did not sleep well at night as they did not tax their brains or their bodies as much as they did when they were younger. They also reported that if people work, they will “fall asleep quickly”, “fall asleep as soon as they lie down on the bed”, “sleep well”, and “sleep deeply” due to tiredness. For example, Paul stated:

> I slept better when I was younger than now because I worked before. I sometimes felt sleepy, and I fell asleep as soon as I lay down on my bed. Now I do not work, and thus sleep is not that important for me. Compared to young people, it is less important for elderly to sleep because elderly do not work and feel less sleepy. When I was young, I felt tired after coming back from my work. I went to sleep right after I took a shower.

However, a few participants (5/50) did not agree with the aforementioned notion that employment improved sleep patterns. Based on their experience, they maintained that their work often created extreme tiredness, stress, and worries, which made it difficult to fall asleep, prolonging sleep latency. Moreover, their work forced them to change their sleep schedules, often hindering their preferred nocturnal sleep patterns. For example, Lisa, the chicken farmer, described that when she had lots of work to do and was too exhausted, she usually had difficulty falling asleep at night and was listless during the daytime. During the interview, she lay on her sofa and yawned very often. Bill is another example of how his business affects sleep patterns negatively. Bill is a self-employed funeral director. He grumbled about how stressful and demanding his business is and how his heavy workload and a sense of responsibility

interrupted his sleep patterns. He looked very tired and tense when he was interviewed as he had just come back from a client's home. He articulated:

> If I have clients who need funeral services, I need to be on standby for 24 hours. I do not know when people will die. I am in charge of setting up the entire process for sending the deceased home from hospital and arranging the funeral…My business definitely disturbs my sleep at night. For example, during the Chinese New Year I worked for one client at about 8 PM, and then I received a phone call that required me to provide services to another client at about 12 AM…I worked for this client until 4 AM or so. I could not go to sleep while I was working. I sometimes receive phone calls from my clients to urge me to provide services to them, such as sending the dying person back to his/her home as soon as possible. The workload for being in charge of setting up a funeral is heavy, especially as Chinese people focus on traditional rituals and need to pick an auspicious date and time to send a dying family member home, have a funeral, and bury the deceased. If I have a client in the middle of the day, I cannot sleep that night. Even though I would like to make up for my insufficient sleep, it is difficult to do so... I went out to work in the early morning until noon. I came back to try to nap in the afternoon, but I could not fall asleep because I still needed to deal with some chores related to my clients. If I do not have a client, I will sleep well. I sleep at least 8 hours…People need an alarm clock to wake them up in the morning, but I do not need it. If I need to do something that is related to my business the next morning, I cannot fall asleep. The things that I need to do the next morning affect my sleep at night.

Economic Status

Fifty-four percent of all participants declined to answer the questions regarding their annual household income. Among those four household income groups shown in Table 2, the participants who had higher (NT$ 600,000 -1,500,000) annual household income reported lower mean GCPSQI scores (4.6 ± 1.1) and had the highest sleep efficiency (95% ± 2.5). Those who reported lower annual household income (NT$300,000 - 599,999) had the highest mean GCPSQI scores (7.8 ± 6.6) and the lowest sleep efficiency (83.5% ± 19.7).

Caffeinated Beverage and Alcohol Consumption

In this study 42% of the participants (n = 21) regularly drank caffeinated beverages (referring to tea, coffee, or both). Those who drank caffeinated beverages reported lower mean of sleep efficiency (85.2% ± 14.4) and higher GCPSQI (6.4 ± 3.5), compared to non-caffeine

beverage drinkers' sleep efficiency (88.9% ± 13.0) and GCPSQI score (5.6 ± 3.6). Participants who reported drinking tea or coffee consistently maintained that such beverages did not have an obvious effect on their sleep because they had gotten accustomed to this habit. They maintained that their sleep patterns did not measurably change no matter how much caffeinated beverages they consumed in the middle of the day or the evening. For instance, a tea farmer who made tea and accompanied her customers in tasting the tea she grew, said that although she drank a substantial amount of tea per day, her sleep patterns were not disrupted. She was skeptical about the research finding that tea may release caffeine and some substances that may disturb sleep at night and that people who do not drink tea at night sleep better than tea drinkers. She stressed that drinking tea benefited her overall health that could improve her sleep.

Five participants who drank hard liquor or wine before going to sleep reported sleeping well (95 -100% of sleep efficiency; GCPSQI score < 5). These participants believed that drinking small amounts of hard liquor or wine before going to sleep helped them fall asleep easily and decrease wakefulness after sleep onset. They reported that after consuming alcohol they felt sleepy and were almost in "an unconscious state" helping them avoid being cranky and vexed.

Table 2

Socio-demographic, Cognitive, and Sleep-related Characteristics of Participants

Characteristics	*Mean (SD)*	Frequency (*n*; percent %)
Age (N = 50)	76.3 (11.0)	
60-69		18 (36)
70-79		12 (24)
80-89		13 (26)
90-99		5 (10)
100-104		2 (4)
Gender		
males		23 (46)
females		27 (54)
Marital Status		
never married		2 (4)
married		28 (56)

widowed		20 (40)
Highest educational level		
less than elementary school		18 (36)
elementary school		18 (36)
junior high school		5 (10)
high school		5(10)
associate degree		2 (4)
bachelor's degree		2 (4)
Employed status		
retired		36 (72)
full time (≧ 40 hours/week)		10 (20)
part time (< 40 hours/week)		4 (8)
Annual Household income (NT$)		
＜ $300,000		14 (28)
$300,000 - 599,999		4 (8)
$600, 000 - 1,500,000		5 (10)
declined		27(54)
Caffeinated beverage consumption		
tea		10 (20)
coffee		4 (8)
tea & coffee		7 (14)
none of above		29 (58)
Alcohol consumption		
yes		5 (10)
no		45 (90)
Sleep-related characteristics		
GCPSQI	6.1(3.5)	
Sleep duration (hours)	6.7 (1.4)	
Sleep efficiency (%)	86.7(13.8)	
Cognitive function		
MMSE	26.5 (4.2)	

Note. GCPSQI = global score of the Chinese version of the Pittsburgh Sleep Quality Index; CPSQI = Chinese version of the Pittsburgh Sleep Quality Index; MMSE = Mini Mental Status Examination; SD = standard deviation.

As shown in Table 3, the relationship between sleep quality and demographic characteristics, women and currently single participants reported worse sleep quality, although these differences were not robust enough to reach statistical significance at $p < .01$. Group differences based on age and education did not affect sleep quality.

Table 3

Summary of Means and Standard Deviation of GCPSQI and Comparative Independent t Tests by Age, Gender, Marital Status, Educational Level, and Caffeinated Beverage Consumption.

Dichotomous Groups	*n*	GCPSQI *Mean (SD)*	*t* test	
			t	*p* value
Males	23	4.8 (1.6)	-2.55	.02
Females	27	7.1 (4.3)		
Young old	20	6.4 (3.8)	.84	.85
Old old	30	5.6 (3.0)		
Never married /widowed	22	7.3 (4.4)	-2.25	.03
Married	28	5.1 (2.2)		
Lower education	18	6.7 (4.8)	.85	.40
Higher education	32	5.7 (2.6)		
Non caffeinated beverage drinkers	29	6.4 (3.5)	.83	.41
Caffeinated beverage drinkers	21	5.6 (3.6)		

Note: GCPSQI = global score of the Chinese version of the Pittsburgh Sleep Quality Index; SD = standard deviation; Young old = individuals with ages of 60 - 79 years; Old old = individuals with ages of 80 - 104 years; Lower education = not completing elementary school including informal education; Higher education = elementary school or higher; Caffeinated beverage = tea or coffee.

In summary, the participants who had received more education reported slightly better sleep quality and sleep efficiency than those who had never gone to school or did not complete elementary school. The content analysis of the interview data showed that employed status affected sleep patterns of the participants in two ways. On one hand, employment could facilitate sleep onset by taxing brains and bodies. On the other hand, employment prolonged sleep latency because it produced remarkable tiredness as well as stress/worries, and influenced bedtime schedule. The participants who had higher annual household incomes reported better sleep quality and sleep efficiency than those who had lower annual incomes. The descriptive analysis found that caffeinated beverage drinkers had lower sleep efficiency and sleep quality than non-drinkers. However, the content analysis only showed that consuming alcohol before going to sleep helped sleep onset and maintained sleep by creating “an unconscious state.”

RQ2: What is the self-perception about aging as a part of life among Chinese elderly and do their perceptions affect their appraisal of sleep? Is there a difference between men and women?

"Perceptions of aging" is used here to reflect ways elderly people conceive the aging process and, by extension, experience their own transition to old age. According to content analysis of the interview data, 70% of the participants perceived aging as a negative experience, and only 8% experienced it positively. For most of the participants, aging was not a pleasant experience because of physical, mental, social, and economic deterioration. When they reported their experiences about aging, they sighed often and looked serious. The participants reported that aging affected them mentally and physically, which may influence their sleep patterns. This section constitutes three foci: (1) self-perception about aging; (2) self-perception of the effects of aging on sleep patterns; and (3) gender differences in self-perception about aging and sleep patterns. The significant themes of self-perception about aging include powerlessness, life gratification, and physical change. The theme, powerlessness, is divided into two sub-themes: "worthlessness" and "counting days." The sub-themes of physical changes consist of "hindering sleep onset," "changes in sleep duration," "sleep quality alteration," "habitual sleeping schedule," and "odd sleep patterns."

Powerlessness

Powerlessness emerged as a dominant theme regarding self-perception about aging in this study. Fourteen participants felt powerless about growing old. They articulated that "there is no way to avoid growing old," and thus "Let things to take their own course" (順其自然). In addition, they complained that "When a baby is born, we are happy for that, but we are not delighted about growing old." Their perceptions about powerlessness included that they were "worthless persons" (n = 4), and were "counting their days" (n = 10). They asked themselves about the following questions: "Why do people need to experience birth, growing old, illness, and death"? "Why do people need to be sick or to have suffering before they die"?

Worthlessness: Four female participants viewed themselves as “worthless persons” who were not sensitive to things (e.g., techniques) and incapable of doing much of anything. Their GCPSQI was 6 -16, sleep efficiency 61% - 85%, and sleep hours 5 - 9 hours. They felt sad about their inability to make a contribution to their family’s wellbeing, as well as their dependence on their family members in dealing with an increasing number of mundane tasks that they were no longer capable of dealing with. They believed in an old Chinese saying that “rearing children to protect against aging ” (養兒防老: yǎngérfánglǎo), because they worried that they might become worthless as they grew old. They expected their children, especially sons, to support them when they become disabled. They complained that their minds were tumultuous when they thought about how worthless they were and when they worried about being dependent on their children. Under these circumstances, they tossed and turned in the middle of night. Jane’s example can expand on these points. Jane was a poor sleeper whose GCPSQI was 16, sleep efficiency 61%, and sleep hours 5. She, a single mother with two children, had requested her son to set up telecommunications for her to stay in contact with her daughter who studied in the US. Her son was not very enthusiastic about doing that. Thus, she tried to learn how to use the internet and send emails to her daughter, but she only knew how to turn her computer on and off after taking a computer class. She was extremely upset with herself for not being sharp enough to learn something new. She also felt terrible about not realizing that she had taken the wrong medication to treat her insomnia until the researcher pointed this out to her. That is, she misused Ibuprofen, an analgesic, thinking it was a sleeping pill. She reported that she was disappointed about her life as she had become a dependent and worthless person, and these thoughts of worthlessness at night caused her to have trouble falling asleep and sleeping deeply.

Counting days: On the basis of 10 participants’ perspectives on aging, “human life is like a circle” and “it is passing by day by day”, as well as “the elderly are counting their days

regardless of what their life is like." Even though elderly people's physical functions obviously degenerate as they grow old, they cannot predict the date they will "go" (die) because it is their fate, and elderly life events are unpredictable. No matter what will happen to them and no matter how bad their sleep is, their days continue to fly by until they die. If elderly people who have lots of health problems could live one more day, they should appreciate it. They believed that it is normal for elderly people to count their days, especially when they do not feel well. However, they felt helpless because they could not stop becoming older. They murmured that they sometimes tossed and turned before falling asleep because they were thinking about counting days. The mean GCPSQI, sleep efficiency, and sleep hours of those 10 participants were 6.7 (3.7), 82.7% (15.4), and 6.6 (1.4) hours respectively. Linda's statement can further explain the foregoing notions. Linda, a 77-year old retired farmer who lived with her husband in southern Taiwan, had a GCPSQI score of 10, sleep efficiency 73%, and 5.5 hrs sleep duration. She articulated:

> I agree with this notion that elderly life is flying by day by day, and they are counting their days. I am going to be 80 years old. Like other people, I am counting my days. It is inevitable for everyone to have their days pass by. Everyone experiences the similar situation. So, how can we complain about our life?...I tossed and turned from time to time because of thinking…my days are passing by and I am becoming a dependent person.

Life Gratification

Life gratification was another important theme of self-perception of aging. According to the responses of four participants, "contentment", "happiness", "peace of mind", and "sound sleep" are very related. The elderly need to be satisfied with their lives without comparing themselves to others because everyone's life is different, and each has his or her own destiny. To sleep well, elderly people should enjoy their lives if their lives are not worse than most others, and their offspring behave well without committing crimes, using illegal drugs, or engaging in other illicit behavior. It is better to put things aside and look at things in an optimistic way. Two participants used a Taiwanese slang, "bo huan bo le, ai kun ga dou" (無煩無惱，愛睏嘎倒) to explain how

easy it was for them to fall asleep when they had a peaceful state of mind which resulted from a grateful life. The median GCPSQI, sleep efficiency, and sleep hours of those four participants were 3.0, 98.0%, and 7.5 hours, respectively. William, who had GCPSQI score of 6, 94% of sleep efficiency, and 8 hours of sleep, commented thus:

> If we are content and happy with our life, our mood is good. When I was young, I did not understand what "happiness lies in contentment" (知足常樂) meant. I have realized what it means to me now. I have also learned lessons from my life. I am more accepting of what I have in my life. I don't desire more things. In this way I can sleep well.

Physical Changes

Almost all participants reported that physical change was an inevitable aging process that had happened to them. Of those participants, seventeen female and male participants viewed their bodies as "an old machine" that did not function well. As the "machine" was used over a long period of time, damage and wear to the machine was inevitable. This indicated that one's stamina and physical function deteriorates as one grows old and that it is unavoidable for the elderly to suffer from illness. The age-related physical changes reported by the participants included forgetfulness, poor appetite, clumsiness, low energy level, and knee degeneration to name a few. Three participants described how the age-related physical changes, especially low energy level, influenced their sleep patterns. They perceived that as they grew old, they were more likely to feel tired and needed to nap in the middle of the day. Furthermore, they could not stay up to do things like what they did in their younger years. For example, Cindy, a 67-year old housekeeper, said:

> When I was young, I was energetic. It did not matter that I did not nap in the afternoon. It was okay for me to go to sleep late. However, now if I do not nap in the afternoon, I will feel listless and cannot tolerate going to sleep late like what I did when I was young. I need to take a rest during the afternoon. If I do not complete my work at that time, I will stop doing it, and I will do it next day… I think it is because growing old results in physical changes, and I do not have as much energy as my younger years to do things.

Although the interview data revealed that approximately 90% of the all participants noted that their sleep patterns had changed as they grew old, no one knew what exactly caused such changes in sleep patterns. The majority of them assumed that the possible effects of age-related physical changes on sleep patterns included hindrance of sleep onset and maintenance of sleep, changes in sleep duration, sleep quality alteration, odd sleep patterns, and biological sleep schedule. Only five participants felt that their sleep patterns had not changed much since their younger years even though they perceived the changes in their physical conditions since they grew old.

Hindering sleep onset: Eleven participants admitted that they tossed and turned before falling asleep, but they could not exactly identify how long they tossed and turned on their beds. It was estimated to be from 30 minutes to two hours. They conjectured that it was a common problem for most elderly to toss and turn before falling asleep, and that "irritated brain nerve" contributed to the problem. Regarding this issue, Linda reported:

> I fell asleep as soon as I lay down on my bed. Now I am old… It takes about 1 hour before I can fall asleep. I sometimes toss and turn, and I need a long period of time to fall asleep. I cannot fall asleep as soon as I lie on my bed. I do not have the ability to do that. I need to toss and turn before falling asleep. I do not sleep well... I have had this problem since I grew old. When I was young, I slept well and did not have such a problem. So, I think it is because I grew old.

Seven participants reported that when they were young, they fell asleep as soon as they lay down on their bed. Nevertheless, they were more likely to have difficulties falling asleep after they grew old. They assumed that their problems were associated with age-related changes in energy level. Nancy, an 84-year old poor sleeper, lived alone in a village bungalow. Her GCPSQI was 11, and sleep efficiency was 61%. She complained that she usually did not feel sleepy and was annoyed about her sleep problem. She teased herself that she patrolled the neighborhood for her neighbors when she was awake in the middle of night.

> As I grow old, I am less likely to fall asleep quickly…I have scattered thoughts, but I am not sure about what I think about… I have trouble falling asleep. How can I know why I have a sleep problem? I am old, and thus I have such a problem. If I cannot fall asleep, I will get up to walk around my neighborhood and then go back to sleep…I am usually

> awake for the rest of night after waking up from my sleep. I cannot fall back to sleep. I lie on my bed until dawn, and then I get up to exercise.

Changes in sleep duration: Forty-two percent of the participants consistently reported that compared to their younger years, they slept about 1-2 hours less as they grew old. However, what shortened their sleep duration was still a puzzle for them. They had various assumptions regarding this matter. For example, they assumed that sleep accounted for a smaller proportion of their life and was not very important to them because their physical needs had decreased, and they did not consume as much energy. They used a Taiwanese slang, ”kun mi: i kun ziet bo lo ying” (睏眠睏日無錄用), to imply that it is not necessary for an old person to sleep too much. John teased himself by saying that “I might have slept too much when I was young, so I do not need to sleep too much when I became older.” The aforementioned assumptions are expanded by Doris’s statement:

> When I was young, I slept longer than I do now...it is probably because I worked before. I ran a business and my life schedule was regular at that time, but now I am old. I do not have many things to do.” Compared to my younger years, I sleep 2 hours less as I grow old. My sleep schedule is habitual. My biological clock has been fixed. I do not know why I do not need to sleep long. Elderly sleep duration is not long. For example, young people may need to sleep for more than 5-6 hours, but it is enough for elderly to sleep only for 4-5 hours. It is probably because elderly do not do brainstorming and work. Under these circumstances, they cannot sleep too long.

In contrast, four participants stated that the amount of their sleep had increased since they grew old. They slept 2-3 hours longer than they had in their younger years. They explained that it was probably because they had been in good shape and had enormous energy to do things in their younger years. However, their physical conditions had become worse since they grew old, which demanded them to sleep more. They teased themselves that sleeping longer was to compensate for their insufficient sleep in their younger years. In accordance with these notions, Phyllis said:

> My sleep duration now is longer than before. When I was young, I went to sleep at about 12 AM and got up at 6 AM… We worked at home until 11:30 PM every day. My husband helped with my work. We got up by 6:30 AM. I cooked for my children and

> helped them go to school… It was enough for me to sleep for 6 hours at night. I had such a sleep pattern until my 40s. It is in recent years that I get up late… Maybe, it is because my physical condition has changed...

As indicated previously, a majority of the participants reported that as they grew old, the number of hours they tended to sleep declined. Nevertheless, there was no consensus about quantifying sleep duration as being appropriate or ample for Chinese elderly. When the participants were asked, "how many sleep hours do you think are adequate for you?" The answers for this question ranged widely, from 4 to 8 hours, depending on individual needs. Interestingly, the aforementioned result of the content analysis of the interview data is incongruent with the quantitative analysis of the questionnaire data. There was no significant correlation between age and sleep hours in this sample ($r = .20$, $p = .17$). It was also found that the mean of sleep hours for the "young old" group (60 - 79 years) ($n = 30$, 6.4 ± 1.2) was not strikingly different from the mean for the "old old" group (80 - 104 years) ($n = 20$, 7.2 ± 1.6). The results indicate that age may not be associated with the change in sleep duration.

Sleep quality alteration: The theme, sleep quality, is defined as subjective feelings about how good one's sleep is. Twenty-seven participants believed in the stereotype that aging made people lose their ability to sleep well. For instance, Marilyn, a 64-year old amateur writer, thought that there is no way to improve age-related poor quality of sleep and everyone knows that elderly sleep quality is worse than young people's. She said, "When I was young, I slept very well every day even though I had a heavy workload. However, I do not have lots of things to do now, but I cannot sleep well. I think it is because I grow old…and my physical condition has changed." The participants complained that their sleep quality had become worse since they grew old, which was associated with what participants labeled "chen min" (Taiwanese;淺眠). "Chen min" referred to shallow sleep, "to not sleep soundly" and "to wake up from sleep" due to environmental (e.g., noise) and physical (e.g., pain) factors. They assumed that age-related physical changes might

contribute to “Chen min.” The feelings of “chen min” were described as “si shui fei shui” (Chinese;似睡非睡), “ban shui ban xing” (Chinese;半睡半醒), and “bua kun bua tsian” (Taiwanese;半睏半醒) (half asleep and half awake**)**. These feelings can best be explained by Sandra, a 100-year old widow who lived alone.

> During the night…I do not sleep deeply. I seem to feel “bua kun bua tsian” because I do not totally fall asleep. I can hear people talking when they are passing through the street in front of my room as well as engine noises produced by motorbikes. I am usually aware of the different noises…I am so old that I cannot sleep well. I am a light sleeper… I slept more soundly when I was young. I could fall asleep whenever I wanted to sleep and woke up at the right time. However, I sleep lightly as I grow old…

Interestingly, three healthy participants in this study reported better sleep compared to their younger years. These participants reported that they were so worried about their business and family affairs that they could not sleep well when they were young. However, their retired lives were laid back, and they had better health than their younger years. Thus, it was easy for them to sleep well in their current lives. For example, Joseph uttered:

> I feel that my sleep now is better than before. As I grow old, I sleep better...When I was young, my brain was agitated while I went to sleep. I thought about what I wanted to do, what I needed to do the next day, what I wanted to grow on my agricultural lands…I felt too exhausted to sleep well… As I grow old, I do not have such a problem. I fall asleep as soon as I lie on my bed.

Odd sleep patterns: Three participants noticed that elderly perception about their sleep patterns is “odd”, and many old people are not satisfied with their sleep and tend to complain about their sleep even though they have slept a lot. They conjectured that this problem might be caused by age-related changes in brain functions. For example, Helen stated:

> … Elderly sleep patterns are odd. My mother-in-law used to complain about how she could not sleep at night. In fact, she slept a lot. At the time, I was young and could not understand why she complained about her sleep problem very much. I thought she was a whiny old woman. However, I was fearful to criticize her to her face…I wondered why some people could not fall asleep; on the contrary, I felt sleepy, but I did not have time to sleep. I really did not understand why she had such a problem until I grew old. Now I

> totally realize that it is a common problem of old people…it is probably an elderly physical reaction.

Habitual sleeping schedule: Surprisingly, the descriptive statistics of the Demographic /Sleep Habit questionnaire data showed that 66% (n = 33) of the participants went to sleep after 10 PM, and eight participants often went to sleep even after midnight. Seventy-two percent of the participants got up by 6:30 AM. Even though they went to sleep late, they still got up at the same time after they grew old. They viewed themselves as "early birds" because they tended to get up in the early morning. They did not need an alarm clock to wake them up in the morning because the time for them to get up was habitual. They postulated that it was because their physical states had changed and their biological clock had been fixed since they grew old. Whitney described:

> In the morning I get up to wash my face and burn incense to worship Buddha and Bodhisattvas. Afterwards, I go to my vegetable garden and do weeding there… I go there at 5 AM or so. I go there in the early morning because old people are early birds. I grow a variety of vegetables there…It is habitual for me to get up very early in the morning. I usually get up at 3 - 4 AM or so. I have become accustomed to it…

Gender Differences in Self- Perception about Aging and Sleep Patterns

Although the interview data showed various dimensions of self-perceived aging in this study, both females and males perceived aging in a similar and consistent ways. Not only did they perceive powerlessness, negative physical changes, and age-related sleep changes as they grew older, they also felt that there was no way to mitigate the effects of aging. In this study females accounted for 56% of the participants who felt powerless about their aging. Sixty-seven percent of those who perceived negative physical changes and complained about at least one physical symptom were also females. A slight gender difference in the perception of aging was that approximately 90% of women's perspectives on aging were more likely to be negative while they underwent difficult family events. Take a couple, Susan and Roger, as an example. Susan and Roger had a son who had suffered from mental illness for decades. Susan identified herself as "a worthless old person" who could not take good care of her ill son and make contributions

to her family. She was extremely pessimistic about her life and growing old and tossed and turned in the middle of the night. Her GCPSQI and sleep efficiency were 10 and 65% respectively. By contrast, most of the time in the interview, Roger excitedly told the researcher about his activities that he had taken part in rather than complaining about his ill son. He slept soundly and had 4 of GCPSQI along with 98% of sleep efficiency. He did not report a significant change in his life and sleep patterns as he grew old. The only discrepancy in the change was that he felt less energetic as he grew old.

As indicated in Table 3, male participants' self-reported sleep quality was better, and they had less difficulty falling asleep and shorter sleep latency than their female counterparts. Male participants had a lower GCPSQI mean score (4.6 ± 1.6) than their female counterparts (7.1 ± 4.3), but these group differences were not statistically significant, t (48) = -2.55, p = .02 (p >.01). In addition, male participants had higher sleep efficiency (91.4% ± 7.3) than their female counterparts (82.7% ± 16.7), but these differences were not statistically significant, t (48) = 2.32, p = .03 (p >.01).

In summary, according to the content analysis of the interview data presented previously, a vast majority of the participants viewed their aging experience in a negative way, particularly female participants. They assumed that age played an important role for the change in sleep efficiency, sleep duration, sleep quality, as well as bedtime schedules. However, the GCPSQI mean for "young old" participants (6.4 ± 3.8) was not distinctively different from that of "old old" participants (5.6 ± 3.0). Taking the qualitative and quantitative data together, it is conceivable that age *per se* does not affect sleep patterns, but self-perception about aging is associated with the change of sleep patterns. As discussed above, the female participants had worse sleep quality and sleep efficiency than their male counterparts, and they perceived their aging experiences in more negative way than men.

RQ3: What is the relation between napping and nocturnal sleep patterns and what are the factors that influence napping among Chinese elderly?

This section describes the participants' viewpoints about napping, napping status, how napping influences nocturnal sleep patterns, nap promoting factors, and nap hindering factors. The quotes and findings generated from the interview and questionnaire data are utilized to support or contrast the descriptions.

Viewpoints about Napping

From five participants' viewpoints, napping is a "habit," "policy," and "cultural tradition." William used his own experience to explain why napping is habitual. He said, he usually felt sleepy and needed to nap between 12 PM and 1 PM. Nevertheless, the feeling of sleepiness usually disappeared after 1 PM if he did not nap. Thus, he presumed that napping was associated with a personal habit. Furthermore, Steven claimed that napping depends on individual situations and needs. One day, he and his friend participated in a luncheon party. Even though the party was not over, his friend went to nap because he felt sleepy. He claimed that napping was a cultural tradition in former times and is a policy for younger students nowadays in Taiwan.

> Napping is a cultural tradition. Look back at people in the olden days in Taiwan. The older generation took a nap in the afternoon. People that worked for the government napped in their offices after lunch. It was a social and cultural tradition. This is different from American culture. I worked for a company in the US when I was young. I only had a 45 minute break at noon. So, I did not have time to nap…I have become accustomed to their lifestyle, so I have not established a napping habit even though I have moved back to Taiwan…In Taiwan students are asked to nap after lunch in their schools…The schools have their reasons for this policy…I think the policy is not doable. Some students may feel dizzy after napping, and they may not concentrate on study in the afternoon particularly when it is nippy in the winter…

Napping Status of Chinese Elderly

As shown in Table 4, the prevalence rate of napping was 54% (n = 27) in all participants, 56% in the young-old group, and 44% in the old-old group. The prevalence rate in men (48%)

was lower than that in women (59%). Forty-four percent of the nappers took a nap for 1-2 hour (41% < 1 hr; 15% > 2 hrs) in the afternoon, most often between 12 PM and 3 PM. Taiwanese call napping “kun dao” (Kun means “sleep” and “dao” refers to “afternoon”. Taken together, the term stands for sleeping in the afternoon).

Napping and Nocturnal Sleep Patterns

Disturbed sleep patterns: The content analysis of the interview data revealed that the most significant effect of napping on nocturnal sleep patterns was the impediment of sleep onset. That is, napping too much prolonged sleep latency at night. Half to one hour was considered the best napping duration. Sixteen participants reported that they would “toss and turn”, “have difficulty falling asleep,” and “not fall asleep easily” at night if they took a nap for more than one hour in the afternoon. In other words, they needed to spend an additional 20-30 minutes to fall asleep that night. For instance, Cindy usually napped for about 30 minutes in the afternoon. She said:

> If I do not nap in the afternoon, I fall asleep easily. If I take a nap in the afternoon, I will have difficulty falling asleep… I need an additional 20 minutes to fall asleep that night…At night after I take an afternoon nap, I wake up to go to the bathroom after I sleep for 3 hours. If I do not nap, I go to the bathroom after I sleep for 4-5 hours…There is not a big difference in my bedtime time regardless of napping. I go to sleep at the same time. I go to sleep at 9 PM…

According to eight participants’ perspectives, napping disturbed nocturnal sleep patterns and resulted in light sleep. In other words, if the participants napped in the afternoon, they could not sleep soundly at night and “felt half asleep and half awake”. If they napped, they were more likely to sleep less at night and went to sleep half to one hour later than that night they did not take an afternoon nap. That is, napping shortened the participants’ sleep duration and postponed their bedtime. In addition, their wakefulness after sleep onset increased, and it was easier for them to dream during their sleep. Brenda did not nap regularly, and she only napped when it rained heavily and was cool. Her napping duration was about 2 hours, GCPSQI was 9, and sleep efficiency was 56%. She said:

> If I “kun dao”, I will not fall asleep easily at night. I feel that I seem to be awake during my sleep. If I nap in the afternoon, I will be more likely to have dreams... I have diverse dreams…If I do not work in my store, and I nap too long during the day time, I will not feel sleepy and go to sleep later than that night I do not nap. If I work at my business in the middle of the day, I will watch TV programs until 10 PM or so and go to sleep. I am less likely to have dreams that night.

No change in nocturnal sleep patterns: As opposed to the aforementioned result, seven participants reported that their sleep patterns had nothing to do with napping status. Their sleep patterns were the same whether or not they napped in the afternoon because they believed that the elderly biological clock was fixed and sleep was habitual. For instance, Joseph napped for about 30 minutes almost every day. His GCPSQI and sleep efficiency were 5 and 95% respectively. He stated:

> I do not have special feelings about my sleep quality. I do not have such a situation that I will not fall asleep easily if I nap in the afternoon. My sleep at night is the same whether or not I nap in the afternoon…Some people told me that they will not be able to fall asleep if they drink tea at night and if they go to sleep after their bedtime. One of my friends can not fall asleep if he goes to sleep after 9 PM. If I wake him up at about 10 PM, he will not be able to fall back to sleep. I am different from him. If someone comes to visit me and wakes me up suddenly. I will fall back to sleep easily after the visitor goes home. Then I also get up at 4:30 AM - 5:30 AM. Even though I work hard and am too tired, I still get up at the same time.

Integration of Qualitative and Quantitative Data

The content analysis indicated above for the interview data appears contradictory to data that were derived from the CPSQI. The participants (n = 16) reported that nighttime napping affected their nocturnal sleep, but there was no significant difference between nappers and non-nappers on the sleep efficiency (%) and the GCPSQI. As presented in Table 4, the mean sleep efficiency of nappers (n = 27) and non-nappers (n = 23) were 85.7% and 87.8%, respectively. We used multiple regression to investigate the effects of napping on nocturnal sleep quality (global PSQI score) controlling for gender. Results indicated that napping status had a small, negative, but not statistically significant effect on sleep quality, $\beta_1 = -.11$; $R^2 = .05$, $F(3, 49) = 1.92$, $p = .14$.

Table 4

Napping by Sleep Quality, Sleep Efficiency, and Sleep Hours

Napping status		GCPSQI	S E (%)	SHR
	n	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*
No napping	23	6.0 (3.1)	87.8 (11.7)	6.9 (1.5)
Napping	27	6.2 (3.9)	85.7(15.6)	6.6 (1.4)
$<$ 1 hour	11	7.1 (4.9)	81.0 (17.5)	6.6 (1.5)
1 - 2 hours	12	4.8 (2.2)	92.3 (9.4)	6.7 (1.2)
$>$ 2 hours	4	5.7(0.6)	89.3 (10.1)	6.5 (1.8)

Note: GCPSQI= global score of the Chinese version of the Pittsburgh Sleep Quality Index; SE = sleep efficiency; SHR = sleep hours; SD = standard deviation.

Nap Promoting Factors

Belief in napping benefits: Thirty-seven percent of the participants took an afternoon nap because they believed that afternoon napping could improve their energy level (n = 10) or benefit their health (n = 5). They felt refreshed without a feeling of tiredness, and their brain became sharp after napping. In addition, they assumed that they needed to take a rest in the afternoon as they got up in the early morning. For example, Cindy explained why she napped in the afternoon.

> After lunch…12:30 PM, I nap for one hour. It does not matter whether or not I fall asleep…I feel sleepy after lunch, and thus I need a break. It is good to take a nap at 12:30 -1:00 PM because I get up at 5 AM, and I feel tired and sleepy in the afternoon. If I take a nap in the afternoon, I will be refreshed and energetic. If I do not nap in the afternoon, I will be listless. If your energy level is high, you can exercise and do some activities. In this way, you can maintain your health.

On the other hand, two participants' did not believe that napping has a positive effect. Henry viewed this belief as "nonsense" used his experience to explain his position. He stated:

> I have never napped in the afternoon. I have plenty of time to sleep at night. So, I cannot nap in the middle of the day. If I nap in the middle of the day, I will have difficulty falling asleep, and I may sit in my room all night. It is not good. Many people nap, but I do not do that…It is nonsense that napping in the afternoon can benefit one's health. I do not nap in the afternoon, and I live a poor life. However, I am still alive and my longevity is long.

Nothing to do: Five participants napped due to nothing to do after lunch. They dozed off most of the time when they were watching TV programs. “I think that it is a habit that I snooze when I have nothing to do. I feel “ban shui ban xing” (Chinese: 半睡半醒；half asleep and half awake) when I watch television programs,” Cindy said. In addition, Nancy reported that if she did not have something to do or no one could keep her company, she would take a nap after her lunch. However, if she saw her neighbors sitting in their yards, she would go to chat with them and did not nap in that afternoon.

Low energy level: Eight participants reported that they needed to nap due to the feelings of sleepiness and tiredness in the afternoon. For instance, Doris went to swim almost every early morning and napped in the afternoon because she felt tired easily owing to swimming. However, she did not nap if she did not go swimming. Bill added:

> Of course...it is ideal to nap for one hour when I feel sleepy. I go to nap when I feel sleepy. It is between 1 PM and 2 PM after my lunch. It is easy for me to feel sleepy at 1 - 2 PM or so. I sometimes feel sleepy when I drive my car at about 12 PM - 1 PM, but I do not fall asleep while I am driving my car. I do not feel sleepy after 2 PM.

Compensation of disturbed sleep: Four participants stated that the reason they took a nap in the middle of the day was to compensate for poor sleep at night. They described that they only napped if they did not sleep well or when they went to work during the previous night. For instance, Kevin ran a funeral business that required him to work either at midnight or in the very early morning. He only napped when his sleep was deprived due to his business. James is another example.

> If I do not sleep well at night, I will catch up on sleep the next day. I will take a nap in the afternoon. I have lots of time. I sometimes fall asleep when I watch TV programs or read newspapers. Even though I only nap for 10 - 20 minutes, it helps me catch up on sleep that I have lost… In this way, my sleep is enough…I think napping helps one catch up on sleep that one has lost at night. I sometimes think about things, which makes it difficult to fall asleep. When I think about unhappy family things and the problems that I face, I cannot fall asleep, but I will catch up on my sleep the next day.

Weather: Seven participants reported that weather was associated with napping behaviors, and they were more likely to nap when the weather was extreme, either when it was very hot or when it was very chilly. For example, Brenda ran a tofu pudding store in a popular tourist region. Only if it rained or the weather was cool, would she not work in her store and take a nap in the afternoon. George, an orchardist who grew peaches and apples in a mountain area, worked all day long. He only napped in the afternoon during the summer as he could not tolerate working in very hot weather. He explained his napping habit:

> In the summer, the daytime is longer. If the sun is too bright, I sometimes take a rest for a while until it is not too hot. I am afraid to go out to work in the summer…I eat my lunch based on my schedule. I finish my lunch at about 12:30 PM. After lunch, I nap about 10 minutes and at most up to 20 minutes. I rarely do it. I nap only if the sunlight is too strong. I nap because it is too hot.

In contrast to George's case, five retired farmers disagreed with the notion that farmers tend to nap or nap longer in the summer because it is too hot to work. These five farmers had worked on their lands no matter how strong the sun was. They went to their fields at noon if they had something to do there. If they did not work on their lands, they would still do a number of chores at home, such as preparing pig slop and doing housekeeping. This indicated that in those cases napping behaviors depended on workload rather than weather. Paul's experience further highlights this point.

> My napping habit is the same no matter how long the daylight is. I do not care about the weather. Even when the daytime is longer than the nighttime, my napping habit does not change…There is no difference in my napping duration. The amount of time that I nap is similar, but I used a fan in the summer… I worked on my land at any time, but I do not work now. Working on the land is different from other work. I sometimes had to take care of my crops on my land at noon even it was hot… If I could not finish my work, I would come back home to have my lunch and then go back to work.

Nap Hindering Factors

Belief in napping disadvantages: The forenamed notion that taking a nap in the afternoon disturbed sleep patterns and prolonged sleep onset at night discouraged eight participants from establishing napping habits. They used to nap in the afternoon, but they had

trouble falling asleep at night. Therefore, they stopped napping in the afternoon in order to fall asleep easily. For instance, Thomas described:

> If I take a nap, I will toss and turn all night until dawn. It is suffering. It is okay for me to not nap in the middle of the day, but it matters to me to not sleep well during the night…It may be okay to nap after lunch. However, I avoid doing that. I rest on my bed if I feel tired, but I do not fall asleep…Now I am old and have lots of free time for napping, but I do not want to nap because I may not fall asleep that night after I nap in the middle of the day. I only take a rest and watch TV programs in the afternoon.

Activity participation: Based on four participants' experience, participating in activities was one of the factors that impeded elderly napping behaviors. These activities included family reunion activities, TV viewing, and community activities. Ruth, who lived alone in southern Taiwan, napped almost every afternoon, but she did not nap when her children visited her because she chatted with her children and cooked for her children that afternoon. Roger had stopped napping for one month as he attended an activity every weekday. He told the researcher that he felt energetic while taking part in the activity. He articulated:

> I used to nap every afternoon, but I do not nap in the afternoon now… I go to a store to watch salespeople selling items and making advertisements…They start to host an activity and to sell items at 8 AM, 10 AM, and 2 PM every weekday. I go there at 10 AM or 2 PM every weekday…They usually introduce new products to their customers, which is informative to me... It is very interesting. They only allow me to go there once a day. I go there for one hour each time. I do not do anything there, but I only stay there to kill time… I can buy whatever I want to buy, but it is not necessary for me buy any product there. I can give them NT$10 before I go home, then they will give me a gift… It is because of participating in this activity that I have not napped in the afternoon recently. I have not taken a nap for more than one month. However, it is okay. If I take a nap in the afternoon, it is not easy for me to fall asleep at night. If I nap for too long in the afternoon, I will not sleep well at night.

As shown in Table 2, 14 participants still worked during the data collection period. Nine out of them did not nap because their job responsibilities prohibited them from taking a nap in the afternoon. For instance, John, a gatekeeper, did not nap when he worked a day shift or evening shift because he had to go to work at 4 AM and 12 PM respectively. He only napped in the afternoon when he worked a night shift and had a day off. Tom, an administrator in a test

preparation center, only took an afternoon nap for 2 - 3 hours on weekends and holidays because his position was demanding on weekdays. Another typical example of how employment status affected napping status was David's case. David was a janitor at an elementary school in a mountain area. He did not have time to nap in the afternoon because he helped the pupils deal with compostable garbage and ran errands that the school principal and directors assigned to him. If the school hosted activities for the community on weekends, he needed to help with the chores related to the activities. These examples implied that napping behaviors depends on working schedule. The given information is further expanded by Bill's statement.

> Napping…I nap for a little bit, but I do not nap every day because my funeral business limits the time that I can nap in the afternoon. I nap for only 30 minutes. I do not nap for more than 30 minutes…I do not have a fixed napping schedule. I sometimes nap at about 3 PM…, depending on my working schedule. If I do not have business to deal with, I will lie on a sofa after my lunch...

No sleepiness: Six of those 23 participants who did not nap reported that in their younger years they used to take a nap in the afternoon due to sleepiness. Nonetheless, as they grew old, their napping habit had changed because they did not feel sleepy anymore. Even though they tried to nap, they could not fall asleep. Jessica said:

> I do not nap because I do not feel sleepy. I go to sleep early at night. It is a long night. I always go to sleep at 7:30 PM and get up at 4 - 5 AM. I sleep for many hours, thus I do not feel sleepy in the afternoon. I am old now and do not need too much sleep.

In summary, the prevalence rate of napping in this study was 54%; the most frequent nap duration was 1 - 2 hours. The influence of napping on Chinese elderly nocturnal sleep patterns included two aspects. It was reported that there was a remarkable effect of napping on nocturnal sleep patterns. The effects included hindrance of sleep onset, bedtime postponement, reduction of sleep duration, and light sleep. Factors that promoted naps were: belief in the merits of napping, extreme weather, nothing to do, low energy level, and compensation of sleep

deprivation. Factors that discouraged naps included: employed status, belief of the drawbacks of napping, attendance of an activity, and high energy level.

SECTION 2: Culture, Social Environments, and Activities in Relation to Sleep Patterns

RQ4: Do family configurations, relationships, responsibilities, and living arrangements affect sleep patterns of Chinese elderly?

This section includes three foci: (1) family configuration and living arrangements of the participants and perceptions of impact on sleep patterns; (2) effect of family relationships on sleep patterns; and (3) associations between family roles and accountabilities. Text examples and statistical findings are used to support the presentation of the interview data.

Family Configurations and Living Arrangements

The most common family configuration (46%) was the extended family, a unit including at least three different generations. From the viewpoints of 23 participants, the extended family living in the same household was a function of traditional cultural norm. They did not think that there is a significant effect of the extended family configuration on sleep patterns. These findings are further illustrated by Mark's example:

> There are 19 people in my family. We all live together. Only two old people are at home in the middle of the day. We do not have so many things to do. My children take turns caring for me and my wife. Young people go to work, grandchildren go to school. I have four great grandchildren. People of four generations in my family live together… I do not think such a family configuration affects my sleep…

Living with offspring in the same building but on a different floor appears to satisfy elderly needs but also has less disturbing effects on their sleep patterns. In this study 13 participants who lived in such a household reported that they enjoyed it. As shown in Table 5, they had the best sleep quality and sleep efficiency. The means of GCPSQI and sleep efficiency of the participants who had an extended family household were 5.6 (3.5) and 90.5% (11.7) respectively. A majority (n = 28) of the participants lived with their offspring either on the same floor or on the different floor of a building. Their mean GCPSQI was 6.0 (3.8) and sleep

efficiency 88.3% (12.6). Phyllis was a good sleeper (sleep efficiency = 89%; GCPSQI = 5). She built a three-floor building in which her two sons and their families lived on the upper floors. She proposed that such a living arrangement helped her not only establish a close relationship with her children but also maintain her own lifestyle and privacy, which benefited her sleep. Such a living arrangement provided a reciprocal benefit to each family member of hers as well. For instance, her two sons and daughters-in-law helped her care for her blind brother-in-law when she and her husband were out of town. She babysat her grandchildren when her sons and their wives attended business parties at night. Her life exemplified her notions about family living arrangements. She said:

> I lived with my husband's five brothers and their families… More than 20 people lived together under the same roof… My life was so difficult that I was extremely bummed out… I really stressed out and was unhappy about living in such a family household… One day, my husband saw I was bullied by his siblings and sisters-in-law… Even though I had a very tough and suffering life, my sleep was not disturbed by the alienated family relationship and stress because I worked very hard and was too exhausted to moan about my life. I did not have enough time to sleep. How could I not fall asleep? I totally understand the difficulty of living with parents-in-law and sisters-in-law under the same roof. To decrease the stress of living together, I let my sons and daughters-in-law live on their own floors. In this way my family relationship is peaceful, and we do not have conflicts between family members… So, I can sleep well.

Contrary to living in the same building, but on a separate floor, living with offspring on the same floor may adversely affect elderly sleep patterns because incompatible life style and worries about the affairs of family members. For instance, Helen used an example of another person to explain her thoughts about this matter:

> Generally speaking, old people sleep more lightly and get up earlier than young people do. Young people usually go to sleep later than the elderly do. Besides, old people get up early in the morning and may open their steel door to take a walk outdoors. Under this circumstance, young people may be woken up by the noises from rolling up the steel door, and they may be unhappy about being interrupted during their sleep. Consequently, they wind up having conflicts with their younger family members...

Jane, a 64-year old widow, lived with her son, had trouble falling asleep at night. Her sleep efficiency and GCPSQI were 61% and 16 respectively. She reported that her sleep was disrupted by her living arrangement because her brain was preoccupied by her family events and chores, and she worried about his son's marriage.

On the contrary, four out of eight participants who lived alone reported that they felt relaxed when they lived alone because they did not have too many family chores to deal with, and they did not need to care for their family members. They said they feel free to sleep whenever they would like to sleep without interrupting other family members or being interrupted. This finding is contradictory to the questionnaire data. As indicated in Table 5, as a group participants who lived alone had worst sleep quality and sleep efficiency, but they had the longest sleep duration among the different household groupings. We hypothesized that living arrangement contributes to self-reported sleep quality. However, the mean of sleep quality was similar for 22 participants who did not live with their offspring (6.1 ± 3.3) and 28 participants who did (6.0 ± 3.8), and these differences were not statistically significant, t (48) = .05, p = .96. These results revealed that living arrangement did not have an effect on the participants' self-reported sleep quality.

Table 5

Means of GCPSQI, Sleep Efficiency, and Sleep Duration of the Participants by Living Arrangements

Living arrangements	N 50	GCPSQI *Mean (SD)*	S E (%) *Mean (SD)*	SDR *Mean (SD)*
Live alone	8	7.5 (3.8)	75.9 (17.9)	7.2 (2.1)
Live with spouse	14	5.5 (2.8)	88.9 (11.8)	6.8 (1.4)
Live with offspring on a different floor or in different courtyard house	13	4.9 (1.3)	93.1 (4.8)	6.9 (1.0)
Live with offspring on the same floor	15	6.9 (4.9)	84.8 (15.7)	6.4 (1.3)

Note. GCPSQI = global scores of the Chinese version of Pittsburgh Sleep Quality Index; SE = sleep efficiency; SDR = sleep duration; SD = standard deviation.

Family Relationships

Family relationship refers to the relatedness or connection of family members that is influenced by family interactions. This section includes two parts: (1) participants' experiences of how their own family relationship impacted sleep patterns; and (2) participants' overall viewpoints on how family relationships affect sleep patterns.

Participants' own experiences: The content analysis of the interview data indicated that 12 participants were disappointed about their family relationships and admitted their family relationships were "alienated" or "not good." Of those participants, eight participants reported that their sleep patterns were not disturbed because they did not care about their family relationships and were not involved in their family members' lives. For instance, Frank, a 92-year old man, had a poor relationship with his daughter-in-law. However, he was a good sleeper (sleep quality = 4; sleep efficiency = 90%). By contrast, four out of the 12 participants stressed that negative family relationships disrupted their sleep patterns at night. This is expanded by Susan's experience. Susan was a poor sleeper (sleep quality = 10; sleep efficiency = 65%). She had numerous complaints about her family relationships, and how she was disappointed with her daughter-in-law and older son.

> My family relationship disturbs my sleep a little bit…. My older son and his family visit me every other week. They usually keep me busy when they visit me. I need to cook for them. My life is still moving on without them *(sighing)*…I used to live with my son and his family….but only two old people live here *(she looked upset)*. She *(daughter-in-law)* does not want to live with me. She thinks I am dirty *(sighing)*…We have different lifestyles as well as diet habits…

Fifteen percent of the entire participants reported that they had positive relationships with their family members and their sleep had nothing to do with their family relationships. For example, despite living alone, Brenda had a close relationship with her children and grandchildren. During the interview, her son, daughter-in-law, and their two children came to visit her. She smiled and waved to them. She touched her grandson's head and gave him NT$100. She looked excessively happy and enthusiastic when she talked about her children.

She was a poor sleeper (sleep quality = 9; sleep efficiency = 56%), but she reported that her sleep patterns were not influenced by her family relationships. She stated:

> My family is simple. I have one son and four daughters who are married and have their own families. My son lives near here and his house is located a few blocks away. If my son tells me that he and his family would like to come over for dinner, I will cook for them or order food from a restaurant. Look! Speak of the devil! Here they are. They are coming to visit me…Sleep certainly will be disturbed by an unhappy relationship. Fortunately, I do not have that kind of problem. I have a harmonious family and there are no quarrels in my family.

Overall viewpoints: Most (> 60%) of the participants tended to avoid talking about their family relationships and often used a general pronoun "you" to explain their thoughts regarding this matter. Some of them described: "My family relationship is not complex. It is nothing special. It is hard to tell you about how good my family relationship is," and "My life is passing by day by day. I am too old to be involved in my children's business. So, how can I tell you whether or not my family relationship is good." Although Marilyn agreed that there is a strong association between sleep, family relationships, and mood, she used "you" instead of "I" in describing her thoughts. She articulated:

> When you argue with your family, you will feel unhappy. The unhappy mood may disturb your sleep. So, family relationships absolutely influence one's sleep a lot. Your mood will be influenced by how your children behave, and the mood affects your sleep. It is absolutely true that thinking about things disturbs one's sleep… It can be worry or unhappy mood, such as anger...all negative moods.

When the researcher asked Susan's husband, Roger, about how his family relationship was, he seemed to avoid answering the question by saying that his family relationship was "okay". His response was in sharp contrast to Susan's statement above. Later, as the researcher asked him to tell her more about his family relationship, he was silent for a while and then tried to use another person's example to change the subject matter. He said, "elderly may sleep well if they can establish a good family relationship with their family members."

More than 60% of the participants supported the notion that negative family relationships may irritate old people and give them trouble falling asleep. In other words,

elderly mood may be disturbed by family negative relationships, and then the ensuing turmoil that they experience negatively affects their sleep at night. Therefore, keeping a "harmonious family relationship" can benefit elderly sleep.

Family Roles and Responsibility

This section presents two main themes: family roles and responsibility. Family roles refer to the recurrent patterns of behavior by which individuals fulfill family functions and needs. The roles described by many participants were that of housekeeper and family caregiver. According to the perceptions of 90% of the participants, family roles and responsibility have been changing in the contemporary Taiwanese society due to industrialization. Family roles and responsibility are no longer based on authority and obligations that are used to keep the males in positions of power. The majority of the participants, especially females, still tried to play their perceived traditional roles in the family but their roles varied depending on their living circumstances.

About 95% of the participants considered the role of housekeeper a female responsibility, and this was the most common family role reported by females. Almost all female elderly in this study viewed themselves as being docile and bound to home and hearth. The female participants did not report a significant effect of doing housekeeping on their sleep patterns partly because they did not expend too much energy on housework and partly because doing housekeeping had become part of their daily life. Tom's statement exemplifies this finding:

> My wife cooks for us. She gets up in the morning to prepare breakfast for four of us. After we go to work, she does housekeeping. It is easy for people who expend their energy or do laborious things to fall asleep. However, she does not exert a lot of energy in her daily life. Doing housekeeping takes effort…but not that much…this does not improve her sleep a lot.

In this study, three males had been in charge of housekeeping for their families since their wives had become ill or disabled even though doing housework is stereotyped as a female responsibility. Interestingly, as noted previously, housekeeping was not perceived as remarkably affecting female sleep patterns. However, the three males reported negative effects

of housekeeping on their sleep patterns. For instance, Ben was in charge of all housekeeping in his family as his wife was handicapped with her hands not functioning properly. His major family responsibilities included preparing meals for his family, baby-sitting his 4-month old grandchild, driving his grandchildren to school on weekdays. He murmured that he could not have entertainment because his life was occupied with a series of housekeeping chores. Although he took a sleeping pill every night, he still slept lightly because he worried about not being able to do housekeeping on time or to fulfill his role responsibilities. He reported that there was no significant difference in his sleep quality between weekends and weekdays, but he slept one more hour on weekends than on weekdays (sleep quality = 7; sleep efficiency = 86%)

In addition to the role of housekeeping, family caregiver was another significant family role of the participants**.** Nine participants still played a caregiver role during the interview period, and three of them had hired domestic workers to help them deal with the caregiving chores. Their role responsibilities included caring for ill spouses, aged or sick parents, a brother-in-law, and a son with schizophrenia. The nine participants currently involved in caregiving and the four who had had caregiving experiences claimed that the caregiving burden could vex individuals and disturb their sleep patterns at night. For example, Andrew was the major caregiver for his wife who suffered from Alzheimer's disease and had very troublesome behaviors. Andrew complained about how his demented and grumpy wife was demanding and bombarded him with complaints creating a series of troubles. He articulated:

> My family…uh-huh…*(he sighed and looked upset)*, I am unlucky. My wife's 'brain nerve' is impaired. She has memory impairment. I always cook for her. I am like a domestic worker from a foreign country *(This is self-irony; Taiwanese import lots of domestic workers from foreign countries to help them with housekeeping).* It has been almost half a year since I started to cook for her…If I let her cook, she would put lots of salt in the food. Too salty! She regularly takes medicine. I prepare her drugs and feed her the drugs twice a day. I go to the En Chu Kong Hospital to get the medication for her...She is paranoid off and on. She blames me that I have a "huei-gi" *(an affair)* and live with a woman as soon as she wakes up. She blames me from time to time with not very nice remarks, which makes my mood be bad...I can't sleep as I am annoyed when it happens.

Expectations about the family caregiver role influenced the participants' mood and consequently disrupted sleep patterns. For instance, Susan put an emphasis on a traditional grandmother's role by stating an old Taiwanese saying, "Di ai jia pun, a ma ai chua sun" (豬要吃餿水，阿嬤要娶孫), which stressed that it was as common for a grandmother to care for her grandchildren as it is for pigs to eat leftovers every day. However, she felt disappointed about not being able to play that role, which disturbed her sleep at night. She complained:

> She *(daughter-in-law)* does not have a job now. If she goes to work, I will help care for her children…But she has quit her job to care for her children at home since she gave birth to her first baby…I feel unhappy. To whom should I complain? I do not want to tell my neighbors about my family problems…They *(neighbors)* care for their grandchildren…

Beth, an 82 year old housekeeper, is another typical example to illustrate how family roles and responsibilities affect sleep patterns. Beth had a tremendous sense of family responsibilities and viewed her care taking role as a part of the natural order of things and a priority in her life. Thus, she postponed her bedtime to midnight to prepare snacks for her grandchildren who went to school at night. She also sacrificed her sleep to attend to her sick and fragile husband. She woke up to help her husband go to the bathroom or inhale oxygen when he had trouble breathing. She slept less than 5.5 hours per night (her sleep quality = 5; sleep efficiency = 95%).

As stated previously, the content analysis indicated a strong relationship between caregiving roles/responsibility and sleep patterns reported by these nine participants who were involved in caregiving during the interview period (sleep quality = 5.4 ± 2.3; sleep efficiency = 89.7% ± 10.6). The statistics were not different from those who did not report caregiving (sleep quality = 6.2 ± 3.7; sleep efficiency = 86% ± 14.5). Phyllis's statement can further delineate why caregiving affairs did not impact on her sleep.

> My husband's brother is a deaf person…I cook meals and do laundry for him. We have had to help him take a shower or bath in recent years. I have been in charge of caring for him since he moved in to live with us in1980…My sleep is not disturbed by the caregiving chores because we have lots of free time to help him and have gotten

used to it…We just drove him to see a doctor and cared for him when he was sick during the Chinese New Year. He is okay and does not need special care now.

Summary of the Effect of Family Situations on Sleep Patterns

In the interviews the participants indicated that living with offspring on the same floor disturbed elderly sleep quality and efficiency because of incompatible life style and worries that were pertinent to family members. Only a minority of the participants perceived that their own family relationships affected their sleep patterns. However, the vast majority of the participants opined that negative family relationships could disturb elderly mood and consequently hinder sleep onset. The potential impact on sleep was attributed to attempts to carry out family roles and responsibilities that vexed some participants and thus disturbed their sleep patterns.

RQ5: What is the influence of filial piety on sleep patterns from the viewpoints of Chinese elderly?

This section begins with a description of the concept of filial piety and various types of filial behaviors as described in the interviews. For example, behaviorally and emotionally focused filial behaviors are discussed from the participants' viewpoints. Next, changes in the practice of filial piety in contemporary Taiwanese society, and the effects of filial piety on sleep patterns are presented by using examples.

Filial Piety from Chinese Elderly Viewpoints

According to the interview data, the concept of filial piety was called "xiào shun" (孝順) in Chinese and "yu hao" in Taiwanese. Filial piety includes two parts: one is xiào (孝) meaning to satisfy physical needs and the other is shun (順) meaning to be obedient to parents. Seventy-five percent of the participants reported that the levels of filial behaviors vary, depending on personal perspectives, and every family has its own standard regarding filial behaviors. Filial behaviors expected by the participants included behaviorally- focused and emotionally-focused aspects. It is surprising that about two thirds of the participants anticipated more emotionally-focused support than behaviorally-focused filial piety (see the definitions in Chapter II).

Behaviorally-focused filial behaviors mainly focused on the behaviors of satisfying parental physical needs. On the other hand, “obedience” (n = 14) was considered a most indispensible component of emotionally-focused filial behaviors. Even though most participants perceived that authoritarian filial piety is fading nowadays, they still expected their children to be obedient to them.

Changes in Filial Piety Practice

Even though the participants in this study had a variety of perspectives on filial behaviors, a consensus emerged in the analysis of the interview data about the changes in the practice of filial piety. Approximately 90% of the participants assumed that the youth nowadays are more self-focused and individualized and less filial to their parents than those in olden days. A lack of family discipline was thought to be another important factor that shaped children’s filial behaviors. More than half of the participants agreed that many children nowadays are spoiled because they are the only child in their family, and they are not taught how to be filial to their parents. Instead, their parents try to satisfy whatever the children want and to protect them from being hurt. Some participants joked about this situation as “hao zu” (being “filial” to children) and sarcastically said that people in this contemporary society tended to “hao zu” rather than “yu hao bei bu” (being filial to parents). Furthermore, the young people who are spoiled and cannot cope with the difficulties they have experienced in their life are called the “strawberry generation” (implying that they are vulnerable to their life’s difficulties like a fragile strawberry). Although they felt very disappointed with the change in the practice of filial piety in the younger generation, they tried to accept it and to adapt themselves to such a situation because they perceived there was no way to change it.

Effects of Filial Piety on Sleep Patterns

In this study the most significant terms that were used to describe how filial behaviors affected sleep patterns included: “sleepless”, “disturbed sleep”, “not sleep well,” “toss and turn,” and “cannot fall asleep.” In addition, the behaviors that were considered unfilial behaviors that

disturbed the participants' sleep patterns consisted of "doing something bad", "coming home late", "hanging out with people without informing parents of whereabouts", "offending parents", and "not being obedient". Thirty percent of the participants (n = 15) assumed that elderly sleep patterns, and the practice of filial piety were inextricably related, and the unfilial behaviors of their children could create their worry and unhappy mood. Under these circumstances, their mind was in a tumult, which disrupted their sleep patterns. They noted that if children were obedient to them, informed them of their whereabouts, and behaved well, they would be more likely to sleep soundly. These results can be expanded by Jack's statement.

> Based on my perspective, children need to comply with what their parents have told them. However, young people nowadays are different from those in olden days. Although you tell them what you want them to do, they have their own thoughts. My youngest child is in his 30s. I sometimes assign them to do something and remind them of chores that are needed to be completed now and then, but he sometimes let the remarks go in one ear and out the other. Under these circumstances, I become vexed and cranky**…**and thus I toss and turn at night. I am alert even though my eyes are closed at night. I can hear people talking outdoors… I have such a problem often.

Interestingly, of those participants who claimed an association between filial piety and elderly sleep patterns, two participants postulated that the disturbed sleep pattern is not necessarily related to children's unfilial behaviors, but depends on how individuals are filial to their parents. The participants also assumed that if individuals attempt to be very filial to their parents and to take more responsibilities to take good care for their parents, the individuals' sleep patterns may be disrupted by the stress of being a filial child. For example, the individuals may toss and turn before going to sleep because of thinking about how to please their parents, and they may not sleep soundly because they worry about not being able to be a filial child. The aforementioned notions are echoed by Betty's statement:

> To be a filial child, we need to do things before our parents/parents-in-law tell us to do them. So, I helped my husband's family do lots of things…I married my husband when I was 23 years old and I lived with my parents-in-law since then. I was anxious that I might oversleep in the morning and could not do housekeeping on time. I slept lightly and was sensitive to noises…I ran into the kitchen to cook breakfast for my family as soon as I heard my mother-in-law opening her bedroom door at 5 AM.

It is noted that six participants considered themselves to be filial children as they devoted themselves to caring for and pleasing their parents or parents-in-laws. Their global scores of CPSQI ranged from 3 to 7. They reported that being filial to their parents prolonged sleep onset and increased wakefulness after sleep onset. William, 75-year old owner of a restaurant with 6 on his GCPSQI, complained that it was stressful to be filial to his 95-year old demented mother and that practicing physically-focused filial piety was demanding. He was upset about witnessing his mother's sufferings and being unable to satisfy her needs. As a filial child, he thought that it was his responsibility to take care of his mother, but the sense of responsibility made it difficult to fall asleep and let him easily wake up from sleep when he heard her groaning in the middle of night.

Strikingly different, 54% (n = 27) of the participants in this study did not consider children filial behaviors and sleep patterns were related. Seven of them stressed that filial piety had nothing to do with their sleep patterns because they lived on their own and did not involve themselves in their children lives. For instance, Paul was a retired farmer who lived alone. His sleep efficiency and GCPSQI were 94% and 3, respectively. He complained about his children for not being filial to him, but he had adapted himself to accept it as there was no way to change his children's filial behaviors. He said, "My sleep is my own business. My children have grown up and had their own lives…I do not need to worry about them. I sleep alone here, and my sleep is not disturbed by them." Five participants thought that their children were filial to them, and their mind was peaceful during the night. They reported that their sleep patterns were not associated with their children's filial behaviors because their sleep patterns were identical every day and were also engrained in personal habits. Thus, they contended that whether or not sleep is good depends on individual habits rather than filial piety.

In summary, although the participants in this study had various viewpoints on the practice of filial piety, there was a consensus about the changes in its practice. Two-thirds of the participants anticipated more emotionally-focused support than behaviorally-focused filial piety.

The participants stated that children unfilial behaviors contributed to their sleep disruption (e.g., tossing and turning before falling asleep) by creating worries and unhappy mood. They also reported that stress resulted from being devotedly filial to parents perturbed their mind and consequently prolonged sleep onset and increased wakefulness after sleep. Half of the participants in this study described that there was no remarkable relationship between the practice of filial piety and sleep patterns. It was partly because they believed that sleep is an established habit that cannot be altered easily and partly because they lived alone and did not involve themselves in their children's lives.

RQ6: Does the belief of Chinese elderly in Chinese Medicine affect their sleep patterns?

This section presents the viewpoints of the participants on (1) using Chinese medicine for treating sleep problems; (2) functions of Chinese medicine; and (3) effects of Chinese medicine on sleep patterns.

Using Chinese Medicine for Treating Sleep Problems

The participants' perception about how to use Chinese medicine is various. A significant majority, 84%, claimed that it is very difficult for Chinese medicine to help insomniacs ameliorate their sleep because Chinese medicine rarely has specific herbs that can be used to treat sleep problems, and Chinese herbs function slowly and cannot produce an immediate effect on sleep. On the contrary, the hypnotic medication prescribed by a Western trained doctor can assist insomniacs with falling asleep quickly. For example, three participants, who were insomniacs, had never gone to see a Chinese doctor for treating their insomnia. Instead, they regularly took hypnotic medications prescribed by their Western trained doctors to help them sleep.

In contrast to the forgoing findings, 16% of the participants regarded Chinese medicine as a good method for treating sleep problems because it can "eliminate primary problems." They criticized that although the Western hypnotic medication can bring about an immediate effect on the improvement of sleep, insomniacs need to take it every night and may be addicted to it as the medication cannot deal with the primary problem that contributes to their insomnia. This is

reflected by Helen's statement: "Many people only take half of a sleeping pill at the beginning of the treatment, but later they need to take more dosage…Insomniacs wound up becoming addicted to sleeping pills. If they do not take sleeping pills, they cannot fall asleep." They stressed that Chinese medicine is beneficial to treat sleep problems such as insomnia because it is less likely to distress stomach and impair renal function, compared to Western medicine. In addition, Chinese medicine is beneficial to sleep on some points, but individuals should be patient and compliant with their long-term remedies if they select Chinese medicine as their treatment option. Angela was a 65-year old healthy housekeeper and a sound sleeper (GCPSQI = 5; sleep efficiency = 93%). She strongly believed that utilizing Chinese medicine could maintain her health, which benefited her sleep. She stated:

> Elderly illness is usually chronic, and it develops when people are young. Such illness is more likely to be treated by Chinese medicine…Chinese medicine can be used to treat a primary problem that causes a disease…So, an insomniac can ask for help from a Chinese doctor… A Chinese doctor can prescribe herbs to improve an insomniac's sleep… I have never gone to see a Chinese doctor for that problem, but I have bought and simmered Chinese herbs… All my family members take herbs to maintain their health and clean up our blood… If my blood is clear, I will be less likely to be sick…and thus I can sleep well.

Functions of Chinese Medicine

The content analysis demonstrated that the major purposes for the participants in this study to utilize Chinese medicine were to "Bu Qi" (補氣), "Anshen" (安神), and "adjust physical characteristics". The participants' notions about the administration of Chinese medicine were influenced by older generations and their previous experience. They were told that Chinese doctors diagnose diseases or maintain patient health based on the "Yin-Yang" theory and philosophy of "wǔxíng" (五行). The philosophy of "wǔxíng" refers to five elements of Chinese philosophy: metal, wood, water, fire, and earth. They described that "yin and yang" correspond to cold and warm. When the participants were asked to further explain how the

philosophy of “wǔxíng” and “Yin-Yang” theory correlated with health maintenance and sleep improvement, they said they did not know more about that.

Effects of Chinese Medicine on Sleep Patterns

Sixteen percent of the participants (n = 8) postulated that insomnia may be caused by the “irritation of nerves,” and “a cranky mood”, along with cognitive arousals. For this matter, Chinese medicine may be favorable for individuals with such a sleep problem because Chinese herbs can be utilized as a “sedative” to soothe irritating cerebral nerves and to have a tranquil mind. As stated by Steven, a 65-year old man, this effect can be called “anshen.” Steven said (GCPSQI = 7; sleep efficiency = 80%):

> I have never tried it for my sleep problem, but I believe that it may help one’s sleep…perhaps…Chinese medicine soothes your nerves. Traditional Chinese medicine reminds me of the term, “anshen”(安神) *(it indicates calming nerves)*. “Anshen” makes you feel relaxed. I have never tried it, but I believe in it. I think if you want to maintain the effect of Chinese medicine, you need to continue to take it for a long period of time…it is not just the issue of “slowness”, but because insomnia is a chronic problem.

In addition, based on the eight participants’ perspectives, “deficiency in the flow of Qi and blood,” contributed to insomnia and thus the first step for improving sleep was to maintain health by enhancing Qi and blood circulation. For instance, Cathy, who was a 63-year old housekeeper stated (Sleep efficiency = 77%; GCPSQI = 6):

> If I have an illness, I need to see a Western doctor first and get my illness treated. When my physical status is stable, I can use Chinese medicine to increase my ‘Qi’…I do not know about the theory of Chinese medicine because I only heard my grandmother talking about it. I have tried it and it is beneficial to me…I am using Chinese herbs, and I refill my prescription every month. For example, I drank ‘Four Herbs Soup’ (四物湯) after my menstrual period was over…So, I am healthy, which may benefit my sleep.

In sum, even though the participants’ viewpoints on the use of Chinese medicine varied, the vast majority of them would prefer to see a Western trained doctor rather than a Chinese doctor when they had sleep problems because the immediate effect of Western medicine was

appealing to them. No participant administered Chinese medicine to treat their sleep problems, but a few of them believed in the possible effect of Chinese medicine on insomnia by creating a relaxed brain, a tranquil mind, and good blood circulation.

RQ7: What are the effects of participation in activities on Chinese elderly sleep patterns?

This section describes habitual and social activities that Chinese elderly reported during the interviews. Habitual activities are defined as the activities that are acted upon at least three times per week. Social activities refer to the activities that are hosted on social occasions in which an individual interacts with other people at least once a month. According to the content analysis of the interviews, the most prevalent habitual activities were TV viewing, exercising, gardening, listening to the radio, practicing meditation, and praying to God or Buddha. Fifty-two percent of the participants attended social activities at least once a month. Social activities constituted socializing with people, travelling in a group, playing mahjong games, participating in community-hosted activities, and volunteering.

Habitual Activities

Television (TV) viewing: Watching TV was the most predominant habitual activity of the participants. The TV programs broadcast late in the afternoon and early in the evening, especially TV serials that were broadcast from 8 PM to 10 PM, were by far the most viewed by the participants. The participants reported that TV viewing could help them kill time and have social contacts. For instance, Michael said, “I always watch TV programs, especially TV serials at night. After I watch TV programs, I go to sleep. If I do not do it, what should I do at night?” Sandra, the 100-year old female who lived alone, grumbled about no companionship and nothing to do because she was too weak to go out to participate in social activities. Thus, she lay on her bed to sleep and watch TV programs alternatively all day long.

TV viewing was a bedtime routine of 95% of the participants and an approach they reported facilitated sleep. Interestingly, the participants who watched TV habitually tended to

switch on their TV sets when they napped or sleep because they were more likely to fall asleep while their television sets were on. They teased themselves for that by saying that "the television set watches me when I am sleeping." They were inclined to wait till the end of the TV program they were viewing and then go to sleep.

About 90% of the participants' bedtime schedules were mainly established based around TV program schedules. For example, Tom sometimes stayed up to watch basketball and baseball games until 11 PM. This information is echoed by Barbara's description.

> I watch TV programs before going to sleep. I fall asleep as soon as the TV program that I have watched is over *(It is over at 10 PM on weekdays.)*… When I was young, I did not watch TV programs before going to sleep because I did not have a television set…So, I used to go to sleep earlier than I do now as I had nothing to do at that time…

Exercising: Exercising was one of the most commonly engaged in daytime activities of the participants. The most prevalent modalities of exercise that the participants reported were taking a walk, stretching exercises, and Tai Chi exercise. Nineteen participants who exercised regularly reported that they slept soundly the night after they exercised in the morning. They assumed that exercising could maintain their health along with stamina, which benefited their sleep. They were more likely to nap in the afternoon and got up early during those days they exercised. For example, Doris, a 78 year old victim of the impairment of cardiac valves, is a typical example. When Doris was 60 years old, she considered herself as an "extremely poor sleeper" who woke up often in the middle of the night and felt listless the next day because of her cardiac ailment. She had been swimming every morning since she was diagnosed with the disease. When she filled out the questionnaire, CPSQI, she rated her sleep quality as "fairly good." Her GCPSQI and sleep efficiency were 6 and 92% respectively. Doris's statement explains the effect of exercising on sleep patterns and napping schedule:

> I usually go to swim at 5 AM. I wake up easily on the nights that I do not go swimming in the morning. For example, I went to sleep at 10:30PM or so. I planned to wake up

> at 5AM, but I woke up at about 3AM…I feel tired easily after I come back from swimming. So, I only nap during those afternoons that I went swimming.

Of those 19 participants who exercised regularly, 16 participants believed that exercising was beneficial to their sleep as exercising involved moving their bodies and consuming their energy, which made them feel tired and sleepy at night. In addition, exercising could release their stress and brighten their moods, helping them avoid tossing and turning before falling asleep. As opposed to the previous notion that engaging in exercise could improve sleep patterns due to energy consumption and tiredness, three participants perceived that exercising did not pose any effect on their nocturnal sleep patterns because they thought that their exercise was not vigorous, and sleep was a habit that was established based on an individual schedule rather than exercise. For example, Jack stated: “I only take a walk for 30 minutes in the late afternoon...it does not consume lots of my energy, my energy level is usually high at night, and I cannot fall asleep easily.”

Gardening: Ten participants in this study regarded gardening as a great form of exercise and that offered great advantages to them. In other words, gardening could distract their attention from unpleasant thoughts and take their mind away from turmoil for a while. Furthermore, gardening temporarily moved them away from daily demands and pressure because interacting with nature could ameliorate their mind, body, and soul, which may help them avoid tossing and turning at night. For instance, Susan had a garden on their top floor in which she grew vegetables. She enjoyed gardening every day because gardening distracted her from her constant worrying about her schizophrenic son. She reported that doing gardening could slightly help her fall asleep. “I go water my vegetable plants every day…If I have something to do, I will not think cranky about things… thus I will not toss and turn at night,” she said. Even though all ten participants considered that doing gardening was a salutary activity that could ameliorate their mood, no one reported a remarkable effect of gardening on their

nocturnal sleep patterns because gardening had been incorporated into the participants' daily routine and doing gardening did not consume too much energy.

Listening to the radio: Three participants enjoyed companionship of the radio and listening to the radio when they lay on their bed and when they tossed and turned. They reported that listening to the radio could divert them from stressful things and assist them with falling asleep. Doris who slept alone said, "I turn on the radio before I go to sleep…My radio set is cute. It keeps me company during the night…I unconsciously fall asleep when I listen to the radio."

Meditation: Two participants incorporated the practice of meditation to their nocturnal routine and viewed it as a way to end their day and help them make the transition from their day of activity to a night of sleeping peacefully and soundly. Practicing meditation before bedtime was found by the participants to be effective in shortening their sleep latency and creating a good night's sleep because practicing meditation could clear their mind of the myriad of thoughts and worries that often stopped them from relaxing and falling asleep. In addition, practicing meditation could warm up their body by exchanging Qi (氣) and create a feeling of comfort, making it easier to fall asleep.

Religious prayers: Six participants burned incense to Buddha and Bodhisattvas or prayed to God before going to sleep every night. They repented of what they had done during the day, which relieved their stress and let their mind be at peace. Under these circumstances, they fell asleep easily and soundly. Cathy, a devoted Buddhist, reported her sleep quality was better than her younger years because her mind was peaceful after she prayed to Buddha and Bodhisattva. Her GCPSQI and sleep efficiency were 77% and 6 respectively. Interestingly, two participants who regularly prayed to God before bedtime did not perceive a remarkably salutary effect of the religious player on their sleep patterns because they regarded religious players as a bedtime routine ritual that was required to be

performed. Donna, a Christian, is an example to expand the foregoing finding. She articulated, “I pray to God before going to sleep…The prayers occasionally are helpful for my sleep at night. However, it is useless from time to time, and I wind up taking this (a sleeping pill) to help me sleep…”

Social Activities

Socializing with people: According to the content analysis of the interview data, socializing with others was the most frequent form of social activities that Chinese elderly did. The participants who lived in the countryside and suburban regions were more likely to chat with or hang out with people in their neighborhood than those who dwelled in a metropolitan area in which residents were more estranged from their neighbors. For instance, when the researcher arrived at the traditional courtyard compound of a villager who was scheduled for an interview, a group of aged men including several participants of this study were congregating in the patio of the courtyard compound. Eighteen participants often socialized with their friends and neighbors. Among those participants, only three females shed light on the positive effects of hanging out or chatting with people on their nocturnal sleep. Barbara, an 80 year old villager in southern Taiwan, quite enjoyed socializing with people. She reported that chatting with her neighbors favored her nocturnal sleep because it could improve her mood and help her obtain companionship. She stated:

> If I have free time, I chat with my neighbors. I know most of my neighbors here. If I see them sitting in their courtyards or in front of their houses, I will go chat with them… My neighbors usually come to visit me… If I chat with people, I will sleep better… If I am in a bad mood and if I do not talk to people, I will not sleep well…

In sharp contrast to the statement above, 15 participants did not narrate a substantial change in their sleep patterns that night after socializing with their others, although they very much enjoyed hanging out with their neighbors and friends. They explained why they felt this way: “It is fun to be with my friends. I understand my friends’ characteristics. I avoid arguing and fighting with them. In this way, we can get along with each other... So, my

sleep is not affected…," said Michael. Likewise, even when Henry's contact with one particular friend involved an irreconcilable conflict, his sleep patterns were not immensely affected because he usually did not keep the unpleasant experience pent up inside. These aforementioned notions were further expanded by Nancy:

> I hang out with people in the middle of the day and sleep at night. What other things should I do?... I ride my bike to socialize with people after my breakfast. Often, I do not have company here. I go to another side of this village to visit elderly people…I am more likely to visit them in the morning because I nap a bit after my lunch.…Generally, I have trouble falling asleep. I still cannot fall asleep that night after I chat with my friends because I only hang out with them without doing anything special.

Travelling in a group: Travelling in a group was another form of social activity that the some participants did. Fourteen participants in this study travelled with people in their community or family members from time to time. Their perception about the relationship between travelling in a group and sleep patterns varied. Seven out of them perceived that they slept better during their trip than usual because travelling consumed their energy and demanded substantial physical movement, tiring them, which helped them to fall asleep easily. In addition, the things they did during their trip distracted their focus from their daily chores and helped them get rid of their worries or scattered thoughts. Phyllis's commented:

> We travel with my neighbors and friends…We will travel somewhere this Sunday… My sleep is particularly good when I travel. I walk a lot during my trip, which makes it easy to fall asleep. I have six sisters and one brother. Some of my sisters are poor sleepers, and they are jealous of me because I can fall asleep as soon as I lie down on my bed.... It should be beneficial to my sleep because going out with my friends or relatives consumes energy and makes me feel tired during the night. I feel that it is easy for me to fall asleep if I walk around during a trip…

On the other hand, travelling in a group had a negative effect on the sleep patterns of three participants. They could not sleep soundly or fall asleep easily during their trip because they could not adapt to the new sleeping environment in a hotel. Doris slept alone when she was at home. Her sleep was enormously influenced by sharing a room with her group members

and using an unfamiliar blanket. Hence, even though she enjoyed the daytime activities during her trip, she did not have strong motivation to travel in a group. She articulated:

> We go out for fun and to travel somewhere. We talk a lot and do not feel sleepy… We do not sleep enough at night, but we still get up in the early morning the next day. If I travel in a group, I will have trouble falling asleep in a hotel room. If I change where I sleep, I will have insomnia. Some elderly in my group doze off on the bus, but I cannot... I sleep well the night I come back home from my trip...I have gotten used to sleeping alone. It is easy for me to wake up when I share a room or bed with someone. During a trip, I usually ask a housekeeper in the hotel to give me an extra blanket that helps me sleep on the floor. When my husband was alive, we had our own quilt. I did not want to share a quilt with him because he usually pulled the quilt over to his side. Elderly sleeping habits are worse than young people.

Bill was very close to his siblings, and they had travelled together periodically. All of his siblings took turns to arrange a trip for the other siblings and their families. He reported that he could not sleep soundly when he was in charge of organizing the logistics of the trip. His sense of responsibility made him to toss and turn at night before and during the trip. He said:

> …If I am not in charge of managing the activity, my sleep will not be disturbed because I will not be anxious…Otherwise, I will have difficulty falling asleep one day before or during the trip…because I keep lots of things in my mind…

Four participants claimed that their sleep patterns the night they travelled with a group was the same as usual because they could quickly adjust themselves to share a room with their group members in a hotel, and they could maintain a harmonious mind no matter what they had undergone during the trip. “Some people cannot fall asleep when they sleep in an unfamiliar environment. For me, it is okay. It is not a big deal…I may laugh and be happy when my friends and I talk about something interesting, but my mood is calm and does not change a lot…So, my sleep is not affected,” Cindy said. This finding is echoed by Paul’s narration.

> If people invite me to join their travel groups, I will go with them… I do not perceive remarkable differences in my sleep patterns during the trip… I am more likely to sleep well after I come back from a trip because I am more likely to feel tired after a trip… However, the amount of time I sleep the night that I come back from my trip is the same as my sleep on regular nights. I always sleep until 6 AM and cannot fall back to sleep when I hear noises from the outdoors.

Playing mahjong games: Approximately 50% of the participants agreed with the notion that playing mahjong games is a great social activity for aged people to both tax their brains and to interact with people. Nonetheless, only five participants played mahjong games with others, and they perceived the significant effects of playing the game on their sleep patterns in different ways. For example, William was upset and sleepless the night he lost stakes in a mahjong game. “I had insomnia because of playing a mahjong game before. I could not bear to lose money, but I was happy with winning the game… I think that my insomnia may be induced by my greed…,” said he. By contrast, Henry and Kevin almost always lost their stakes when he played mahjong games, they still reported that their mood the night they lost a game was not strikingly different from the mood when they did not play it. They said that they played “healthy mahjong” and did not indulge themselves in gambling. Thus, their sleep was fine the night they did not win the game. Although Kevin delayed his bedtime the night he played a game, he enjoyed playing mahjong games with his friends and neighbors, and his sleep latency that night was shorter than usual because he taxed his brain during the mahjong game. He explained:

> … After the game, I feel tired easily, and my eyes are sore. I fall asleep quickly. At that time I do not toss and turn before going to sleep…If we play two games, I will go to sleep late… It is about 1 AM but sometimes 12 AM…I fall asleep as soon as I lie down on my bed. It takes me 10 minutes to fall asleep. My wife told me that I sleep deeply that night.

Participating in community-hosted activities: The most common activities hosted by the participants’ communities included a patrol group, dancing group, singing group, and exercise group. Eleven participants periodically took part in the community hosted activities, but only two of them reported a positive impact of the activity on their nocturnal sleep due to mood improvement and the increase in physical movement during an activity. For instance, Kevin, a good sleeper (GCPSQI = 4; sleep efficiency = 93%), said:

> Our community sometimes hosts activities for our residents…Next Monday, there is an activity. I will serve as a DJ to play music for participants… People in the community get together… I think social interaction with people can help my sleep. For

> example, singing can improve my mood and thus benefit my sleep… Although I can sing a song at home, singing a song with people is totally different.

In contrast with the aforementioned finding that social activity attendance could have a positive effect on nocturnal sleep, nine participants reported a negative effect of participating in social activities on their nocturnal sleep, such as delaying bedtime schedule and difficulty in falling asleep due to a restless mind. For instance, George, a 77-year old orchardist, enjoyed attending social activities and often engaged in community-hosted activities. Even though he had good GCPSQI (2), he grumbled about his bedtime schedule postponement caused by attending a community-hosted activity.

> I participate in a social group that is called 'TaYu Community'… We sometimes have activities at night. I sometimes attend a "singing activity." If I join the singing activity, I will come back home a little late because the activity is over at about 10 PM... I think going to sleep at 9 -10 PM is better. Participating in social activities is fun, but I go to sleep later than usual. I also feel tired after the activities.

Similarly, Marilyn was a 64-year old active social person (GCPSQI = 7). She felt like engaging in community-hosted social activities, but she reported that she sometimes tossed and turned that night after the attendance of the activities because she was in high spirits, and her mind was not calm. She described that participating in too many community-hosted social activities might influence elderly bedtime schedule and mood. On the other hand, a lack of attendance of the activities might result in social isolation, which made it difficult to fall asleep. Thus, she concluded that elderly should moderate their participation in the activities in order to improve their nocturnal sleep.

Volunteering: In this study three participants periodically engaged in volunteer work. They described that volunteering not only prevented them from worrying about things but also consumed their energy, which made it easy to fall asleep at night. Moreover, it provided them an opportunity to retain social contacts with people and obtain supportive resources. Their mood was more harmonious the day that they worked as a volunteer than on other days. In this matter

being a volunteer helped them live a better life and sleep better than usual. For example, Cathy was a passionate volunteer of the Tzu Chi group, a famous Buddhist group in Taiwan. She was supported by her group members when she experienced difficulties or was in a bad mood. Buddhist scripture educated her on how to put worldly concerns aside and to react to things in an optimistic way. In addition, the volunteering work distracted her from her ongoing concerns regarding her family members. Accordingly, she could maintain a more tranquil mind and sleep soundly.

Integration of qualitative and quantitative data: As discussed previously, participation in the foregoing social activities had an effect on nocturnal sleep patterns of 26 participants. Non-participants (n = 24) of the social activities reported that their sleep patterns were identical as they did not often participate in social activities. As shown in Table 6, there were no differences in the mean of GCPQI, sleep efficiency, and sleep hours between the participants of social activities and the non-participants (all p > .05)

Table 6

Sleep Patterns of Participants and Non-participants by Social Activities.

	Participants (n = 26) *Mean (SD)*	Non-participants (n = 24) *Mean (SD)*	*t* test *t*	*p* value
GCPSQI	6.1 (2.9)	6.0 (4.1)	-.04	.97
Sleep efficiency (%)	87.6 (12.4)	85.7 (15.5)	-.5	.62
Sleep hours	6.5 (1.2)	7.0 (1.6)	1.1	.26

Note. GCPSQI = global scores of the Chinese version of Pittsburgh Sleep Quality Index; SD = standard deviation.

In summary, depending on the type of the activities, the participants reported that attendance of the aforementioned activities had a positive, negative, and no effect on nocturnal sleep patterns. On one hand, after engaging in the activities, some participants reported feeling tired or sleepy, having a tranquil mind that helped them to fall asleep faster and sleep better. On the other hand, negative effects of activity participation on sleep patterns included: (1) delayed

bedtime; (2) prolonged sleep latency; and (3) decreased sleep efficiency, which resulted from temporary change in sleep environment, mood fluctuations due to losing a game and/or animated conversation.

CHAPTER V: DISCUSSION

This study is the first work to integrate both qualitative and quantitative data to analyze the effects of self-perceived aging, culture, social environment, and participation in activities on the appraisal of sleep among Chinese elderly. This chapter interprets the results and suggests implications for future research and clinical practice; limitations are also addressed. The chapter is divided into five sections: (1) aging and sleep; (2) culture, social environments, and sleep; (3) activities and sleep; (4) implications for future research and clinical practice; and (5) limitations.

Aging and Sleep

Relationship between Self Perceived Aging and Sleep Patterns

The vast majority of the Chinese elderly in this study perceived aging in a negative way. This finding is consistent with the results of cross-cultural studies in the United Kingdom, China, and Australia indicating that Chinese elderly have greater negativity in their appraisal of aging compared to the other cultural groups (Laidlaw et al., 2010; Tan, Ward, & Ziaian, 2010). Why were Chinese elderly more likely to have greater negativity in their appraisal of aging in these different regions? It is possible that perception of aging reflects cultural values and judgments about the stages of life and major turning points (Furstenberg, 2002)**.** In addition, internalized age stereotypes based on cultural values may contribute to the formation of Chinese elderly self-perceptions of aging (Moser, Spagnoli, & Santos-Eggimann, 2011). For instance, our participants emphasized a cultural belief in “rearing children to protect against aging,” (養兒防老) indicating that elderly people need to depend on their offspring. The participants also assumed that physical conditions of elderly people, including sleep, degenerate as they grow old.

In this study the participants who viewed aging as a negative experience were more likely to report poorer sleep quality, shorter sleep duration, and lower sleep efficiency than those who did not. One interpretation for this finding is that the negative perception may produce cognitive arousal at bedtime accompanied by a tumultuous mind, which makes it harder to fall asleep

(Morin, Stone, Trinkle, Mercer, & Remsberg, 1993). Another interpretation is that the negative perception of aging, such as feeling of powerlessness, may lead to insecurity and psychological distress, which makes elderly people have less positive outlooks toward their lives, including appraisal of sleep quality. This interpretation is supported by the finding from a phenomenological study about the essence of ill health that described characteristics of powerlessness consisting of worthlessness, emotional suffering, and a feeling of imprisonment in an individual's situation (Strandmark, 2004). The higher an individual's expectation to have control, the greater the perceived feeling of powerlessness, particularly when that control is absent (Giger, 2009). A negative perception may undermine elderly self-identity and discourage them from engaging in outdoor or social activities, which reduces their levels of exposure to synchronizing agents (zeitgebers) for the human circadian rhythm (Naylor et al., 2000). This interpretation is in line with the contention that powerlessness is significantly correlated with a greater number of activity limitations and increased psychological distress (Seeman & Lewis, 1995). Psychological distress is a frequent concomitant of insomnia (Morin et al., 1993). These contentions are in agreement with some studies on insomnia that have shown that good psychological well-being (e.g., environmental mastery, personal growth, and self-acceptance) contributes to the reduction of sleep disruption (Phelan, et al., 2010), and that poor self-reported sleep quality has a significant relationship with psychological distress after controlling for the effects of life stress (Caldwell & Redeker, 2009).

The relationship between sleep complaints and perception about aging could be bi-directional with negative perception about aging contributing to poor sleep, and poor sleep in turn adversely affecting an individual's perception about aging. If elderly people usually do not sleep well, they may feel listless and upset about their lives, and may not have energy to do outdoor activities. Habte-Gabr et al. (1991) describe that poorer life satisfaction is associated with higher levels of sleep problems, possibly because lower levels of life satisfaction link to higher levels of depressive symptoms. Future research should examine this bi-directional

relationship in the hopes that it will provide answers to questions such as: “Does improving sleep quality have a favorable effect on self-perception about aging or upon having a positive aging experience?” Longitudinal studies would be especially useful to elucidate the cause-effect relationship between the appraisal of aging and sleep patterns (Habte-Gabr et al., 1991). Given that culture may shape appraisal of aging (Tan et al., 2010), it is important to define and measure self-perception about aging in cultural and social contexts specific to Chinese elderly.

Aging and Nocturnal Sleep Patterns

Nearly half of the participants in this study reported poor sleep quality (6.1 ± 3.5). This result is in accordance with two recent surveys (6.3 ± 4.4, Wu et al., 2012; 5.5 ± 3.3, Yang & Chiou, 2012) in urban areas of Taiwan but lower than that of a study of 2,416 rural elderly in China (7.7 ± 4.1, Li et al., 2013). Consistent with the study by Yang and Chiou (2012), among the seven components of PSQI, sleep latency (i.e., difficulty falling asleep) was ranked highest by our participants, followed by subjective sleep quality and sleep duration. A possible explanation for differences in PSQI scores between elderly in Taiwan and China could be a lack of medical care service and opportunities of health education in the rural areas of China compared to urban areas in Taiwan. Elderly people in the rural areas of China may be less aware of the importance of sleep hygiene and of consulting a doctor regarding their sleep problems. Possibly, the health status of the rural Chinese elderly might be worse than that of our participants. Health status and sleep quality have been found to be significantly linked to each other (Wu et al., 2012). Stranges et al. (2012) suggested that increased prevalence of sleep complaints among elderly people may be a surrogate marker for poor health status. This interpretation is supported by the finding of a Japanese population-based survey (Hayashino et al., 2010), indicating that the global PSQI score rose as the number of co-morbid conditions increased. Another possible explanation for why the mean PSQI score of the Chinese elderly in Li et al.’s study was higher than that of our participants is that elderly people in rural areas of

China are less likely to live with their offspring due to the migration of younger workers from rural to urban regions (Silverstein, Cong, & Li, 2006), which might cause a feeling of loneliness and thus affect elderly sleep patterns. On the contrary, compared to the rural Chinese elderly, our participants were more likely to live with their offspring. The cultural norms regarding familial obligations in Taiwan have been buttressed by Taiwanese legal regulations that make it mandatory for children to care for their parents (Chattopadhyay & Marsh, 1999). In addition, participants in this study benefited from the Taiwanese National Health Insurance and elderly social welfare programs. They might have fewer worries about their later lives than the rural elderly in China and slept better than the rural Chinese elderly as a result. Despite the difference in the PSQI scores in these studies, the type of sleep complaints, are similar. Elderly consistently report earlier waking times, prolonged sleep onset latency, increased nighttime awakenings, and decreased total sleep compared to their younger years. Those sleep complaints have also been well documented in the literature (Blazer et al., 1995; Vitiello, 2006).

Most participants reported sleeping less than they did in their younger years. However, perception of sleep duration needed ranged widely, from 4 to 8 hours. This finding is similar to the observed reduction of elderly sleep duration in a study conducted in the United States (Buysse, Monk, Carrier, & Begley, 2005). There are two possible explanations. First, the capacity to sleep may be reduced in the elderly. Klerman and Dijk (2008) in a rigorous experimental study found that daytime sleep propensity was lower in elderly adults (aged 60 to 72) compared to young adults (18 - 32). Given the same amount of time in bed at night, elderly people took longer to fall asleep and had reduced total sleep time compared to young adults. These researchers suggested that both daytime sleep propensity and the maximal capacity for sleep may decrease in elderly people, which is observed as difficulties initiating sleep or remaining asleep because of increased arousal or neuroanatomic changes with aging. A second explanation for reduced sleep duration in the elderly may be associated with bedtime procrastination. A majority of participants in this study reported a delayed bedtime until 10 PM

due to habitual TV viewing. They reported that when they were young, they went to sleep right after dinner because they did not have TV sets. The bedtime procrastination of the participants contradicts the conventional wisdom that elderly people tend to have an advanced circadian phase characterized by falling asleep earlier than younger people (Dijk & Duffy, 1999; Duffy et al., 1999; Monk et al., 1995). This indicates that lifestyle factors may contribute to sleep duration in our finding (Saper, Cano, & Scammell, 2005).

Gender Differences in Appraisal of Sleep Patterns

Women and men report differences in sleep quality and duration. Consistent with previous studies (Habte-Gabr et al., 1991; Van den Berg et al., 2009), women in this study reported poorer sleep quality and lower sleep efficiency compared to men. In addition, the women reported later bedtimes, longer sleep latency, and fewer hours of sleep than men. This result is similar with the finding of another Taiwanese study that surveyed a random sample of 100 elderly (Wu et al., 2012). A recent systematic review found that gender roles and expectations contribute to differences in measurements of sleep parameters because women may be more willing to admit to sleep difficulties than men (Knutson, 2013). Taiwan is a patriarchal society in which men might be less willing to admit to sleep difficulties than women because of caring about saving face. In the Taiwanese society, men are traditionally expected to be superior to women. Similar with the finding of Venn, Meadows, and Arber (2013), men might appraise their sleep as insufficient sleep or a problem only if it interfered with their daily activities. Men might be underestimating, and women may be overestimating sleep problems.

Women, as mothers or grandmothers, may be more likely to worry about the well-being of family members (Arber et al., 2009; Hislop & Arber, 2003) that interferes with initiating and maintaining sleep. Compared to men, the majority of women in this study had stronger sense of family responsibilities even though they were too old to make contributions to their family. They often emphasized a higher valuation on their family members' well-being than their own and reported worries about their children's and grandchildren's lives. A possible effect of worry on

the women's nocturnal sleep patterns is that excessive and uncontrollable worry during the pre-sleep period increased agitation and cognitive arousal that resulted in sympathetic nervous system activation and then induced physical arousal. Under these circumstances, the propensity to sleep was eliminated (Carney, Harris, Moss, & Edinger, 2010), and self-interpretations of sleep are distorted (Harvey, 2002).

Women's health status and negative perception of aging may influence perception of sleep quality. Women tend to report more sleep complaints along with health complaints (Habte-Gabr, et al. (1991). For instance, more women than men perceived negative physical changes with aging and complained about at least one physical symptom. Middelkoop et al. (1996) suggested that older individuals in good health might perceive changes in sleep quality as a consequence of aging rather than as related to a sleep problem. Another possibility is that women might be at higher risk for depression than men. A number of researchers have reported that sleep disturbances can be intertwined with depression in elderly women. For example, Voderholzer and associates (2003) found that increased depression among women accounted for increased sleep complaints, and women with sleep problems also had high levels of depressive symptoms.

Napping Prevalence, Duration, Times, and Factors

More than half of the participants reported frequent daytime naps. This finding is in line with two previous studies that indicated 50% of the 1,820 elderly participants in China reported napping at least three times a week (Liu & Liu, 2005), and 50% of 80 elderly Chinese immigrants in the U.S. napped once a day (Hsu, 2001) and also with a 54% napping prevalence rate in a cross-sectional study of 414 community-residing elderly in the U.S. (Picarsic et al., 2008). On the other hand, the napping prevalence rate in the current study was lower than the rate of 64% and 79% reported in two Taiwanese studies (Lai, 2005; Lan et al., 2007). Our participants might not have been aware of unintentional naps, such as dozing off during solitary activities (e.g., watching television), and thus they might underestimate the total number of their

daytime naps. In addition, napping is a cross-cultural phenomenon which occurs throughout the lifespan (Milner & Cote, 2009), and thus cultural beliefs might affect elderly napping behaviors. The discrepancy in the prevalence rates of napping between prior studies and our study may be attributed to different definitions of naps, demographic characteristics of the research population, and methods used to gather information (e.g., self-administered questionnaire, personal interview, sleep logs, and actigraphy) (Martin & Ancoli-Israel, 2006).

Among nappers in our study, the most frequent napping duration was 1-2 hours, which is similar to the napping duration reported in another Taiwanese study (Lan et al., 2007) but is longer than those of three other Taiwanese studies (Hsu, 2001; Lai, 2005; Liu & Liu, 2005) and one U.S. study (Picarsic et al., 2008). In the latter four studies, the average napping duration was between 40 to 55 minutes. One explanation for such a difference in napping duration is that we collected data during the winter season, which might have influenced the participants to nap. Another explanation is that our participants were older than those who were studied in the other aforementioned Taiwanese studies. Our participants might have been too weak to do outdoor activities and taking afternoon naps helped them fill in their days.

Compatible with the findings of foregoing Taiwanese researchers (Lan et al., 2007), all nappers in our study reported that they regularly napped after lunch between 1 PM and 3 PM. Lai (2005) explains that diurnal napping, especially after-lunch napping, is a common lifestyle for the elderly in Taiwan. Our finding contradicts Yoon et al.'s (2003) reported that elderly people are more likely to nap in the evening, especially within two hours before bedtime, compared to their young counterparts. Yoon and colleagues (2003) suggested that evening naps may be associated with advances of circadian rhythms, and evening naps promote early bedtimes and shorten sleep latencies. Lai (2005) claimed that a possible reason for the high preference for afternoon naps in Chinese elderly is that many decades ago Taiwan was an agricultural society where most people were farmers who worked in the early morning and took a long break in the afternoon because they could not tolerate working under the extremely hot

weather conditions. The notion is supported by only one of our participants. On the contrary, five retired farmers in our study reported that they had worked on their lands no matter how hot the weather was. If they did not work in their fields, they would still deal with chores at home rather than take a nap.

The findings of our study suggested that daytime sleepiness and employed status are the two most significant factors that may contribute to the overall likelihood that elderly people nap in the midday. Most of the nappers in our study reported that taking an afternoon nap ameliorated their energy level attributable to daytime sleepiness and helped them fill in their days. Hsu (2001) claimed that diurnal napping is regarded as a salutary way to cultivate a person's capacity for greatness. There are two explanations for why our participants had daytime sleepiness. First, the participants got up in the early morning to attend outdoor exercises or started their daily work, which consumed their energy. Second, participants' daytime sleepiness might result from nocturnal sleep disturbance or deprivation. The findings of several studies (Frisoni, De Leo, Rozzini, & Trabucchi, 1996; Picarsic et al., 2008) have shown that daytime sleepiness occurs from fragmented nighttime sleep, and napping represents an attempt to compensate for nocturnal sleep deficit. Martin and Ancoli-Israel (2006) stated that daytime sleepiness links with elderly diurnal napping and the factors that cause daytime sleepiness, including nocturnal sleep disturbance, age-related changes in underlying circadian rhythms, and medical and psychiatric comorbidities.

The results of our study indicated: (1) the prevalence of napping among the retired participants was higher than that of those who were still employed or others had their own businesses (58% versus 43%); and (2) working status may play a crucial role in establishing napping habits. This different prevalence rate may be explained by the contention of Liu and Liu (2005), indicating that retirement from work generally causes fewer daily scheduled events, which may encourage napping behaviors in the middle of the day. The result of our content analysis, that retired participants were more likely to nap in the afternoon, is in contrast to the

findings from a study of 40 people aged 50 - 70 in the U. S. (Webb & Aber, 1984); 33 % of the retirees did not nap during the two weeks of measurement relative to 18% of the participants who were employed. Possibly, the difference in the aforementioned findings is because the methods that were used to ascertain napping status were discrepant, and cultural differences affected how the participants regarded the age of retirement and how they perceived retirement.

There was a difference in the prevalence rate of napping between men and women. In accordance with a Taiwanese researcher (Lai, 2005), we found that the prevalence rate of napping in women (59%) was higher than men (41%), and women napped about 30 - 60 minutes longer than men did. There are three explanations for this finding. First, for women in our study, poor sleep at night might have resulted in daytime sleepiness which caused more napping. We found that women were more likely to complain about their physical symptoms and worry about their family affairs, which might hinder their sleep onset and maintenance of sleep. Second, women went to bed one hour later and slept 30 minutes less than men did. Under these circumstances, women napped during the day to compensate for their insufficient sleep at night. This explanation is supported by the result of a study that investigated 235 elderly people with a mean age of 80 years in the U.S., indicating that the odds ratio (95% Confidence Interval) for napping was higher for individuals who had higher levels of nocturnal sleep fragmentation (2.1 [0.8, 5.7]), and nappers had more WASO and lower sleep efficiency (Goldman et al., 2008). Third, women were more likely to spent time indoors and to have fewer hobbies than men. Hence, they napped in the middle of the day to kill time. Hartmann, Baekeland, and Zwilling (1972) suggested that the discrepancies in sleep need are probably a response to the differences in life-style and personality.

In contrast to our study, a plethora of research has shown higher rates of napping and napping episodes among elderly men as compared to elderly women. For instance, a cross-sectional survey in a sample of 1,820 elderly people in China indicated that regular napping was more common in men (44%) than in women (28%) (Liu & Liu, 2005). A Swedish study,

surveying a random sample of 876 elderly people also revealed a significantly higher napping prevalence among older men (70%) than among older women (51%) (Mallon & Hetta, 1997). One interpretation for why men nap more frequently than women do is that short and fragmented sleep at night is secondary to nocturia that is more common in men than women (Rembratt, Norgaard, & Andersson, 2003). Nocturia is associated with excessive daytime sleepiness (Bliwise et al., 2009; Foley et al., 2007), which leads to diurnal napping. Another interpretation is that sleep apnea contributes to sleep fragmentation and frequent awakenings, which is associated with daytime sleepiness and diurnal napping. A number of researchers (e.g., Ancoli-Israel et al., 1991; Hoch, et al., 1990) have found that the prevalence of sleep apnea increases with age and is more common in men than women.

Napping and Nocturnal Sleep Patterns

The content analysis of our study indicated that napping for more than one hour prolonged sleep latency and impeded nocturnal sleep onset. The nappers who napped for at least one hour in the midday reported longer times to fall asleep at night. Napping was found to contribute to light sleep, reduction of sleep duration, procrastination of bedtime, and an increase in WASO. Our findings are in agreement with Monk et al.'s study (2001) that investigated effects of a 90-minute afternoon nap on nocturnal sleep. Monk et al. found that diurnal napping caused a reduction of 2.4% in nocturnal sleep efficiency, diminution of 48 minutes in total nocturnal sleep time, and earlier wake times among elderly nappers in the U. S. They also discovered a significant advance in wake time in nights following an afternoon nap in nappers (6:43 AM) and non-nappers (7:19 AM), which resulted in shortening the total sleep time. The difference in the total sleep time between nappers and non-nappers was 51 minutes. Similarly, Chen and Wang (1995) found that poor quality of nocturnal sleep was significantly associated with diurnal napping when they explored sleep quality among 200 elderly women in southern Taiwan. An explanation for the inverse relationship between napping and nocturnal sleep is that diurnal

napping decreases the homeostatic drive to sleep at the usual bedtime, causing delayed sleep onset and a further reduction in nocturnal sleep (Richards, Beck, O'Sullivan, & Shue, 2005).

Notably, 14% of the participants in our study reported no clear relationship between napping and nocturnal sleep patterns. Metz and Bunnell (1990) reported no significant relationship between napping and the number of nocturnal awakenings, sleep latency, total sleep time, or sleep quality in a sample of 132 elderly people, although there was a trend that increased napping duration hindered sleep onset. Hsu (2001) also found no association between naps and sleep quality among 80 elderly Chinese immigrants. In another study that explored the effects of a month-long nap regimen using one of two durations (45 minutes or two hours) on nocturnal sleep and waking function in a sample of 22 healthy elderly, Campbell et al. (2011) found that napping had no effect on subsequent nocturnal sleep quality or duration but resulted in a significant increase in amount of sleep per day. In a cross-sectional study exploring differences between perceived sleep need in nappers and non-nappers in a sample of 112 healthy elderly, Floyd (1995) found that napping did not affect nocturnal sleep but only increased the total amount of sleep per day. These previous studies suggested that it is not necessary for elderly people to avoid napping in the day for fear that doing so will keep them awake at night.

Culture, Social Environment, and Sleep

Living Arrangements and Sleep Patterns

Our finding that the extended family household is prevalent in recent Taiwanese society suggests a function of traditional Chinese cultural norms. Living with descendants in the same building, but on a different floor or in different courtyard houses, is a living arrangement that can satisfy elderly needs, meet cultural expectations and avoid disturbing elderly sleep. Chattopadhyay and Marsh (1999) contended that for centuries, the extended family household has formed the basis for the traditional family support system of elderly people and has manifested in the practice of filial piety. Furthermore, Silverstein et al. (2006) opined that

adherence to the traditional cultural norm of living in a multigenerational household is to fulfill an ideal cultural form of filial piety. Elderly people who are socially embedded within a traditional multigenerational household may have a greater sense of purpose by virtue of occupying a cultural role within the family. Giannotti and Cortesi (2009) postulated that family structure, culturally specific family values, and cultural norm all contribute to the development of sleep patterns because sleep is a bio-psychosocial process that is correlated with complex biologic rhythms.

From the current study, living together, yet separately is an arrangement that is consistent with cultural values, yet does not interfere with sleep in the elderly. The findings from the interview data revealed that 10% of our participants perceived a negative effect of intergenerational co-residence under the same roof on their sleep patterns. It is quite likely that intergenerational co-residence not only increases the chance of contacts and interactions with family members, but also may involve the elderly in more family conflicts. This interpretation is supported by the finding that the extended family household creates intergenerational tension and emotional turmoil (Lo & Russell, 2007). Under these circumstances, elderly members in the household may be cognitively aroused at bedtime and think about how to deal with the conflicts, which may result in tossing and turning and hindering sleep onset. In addition, a secondary data analysis, using a database from a nationally random-digit-dial sample of 2,871 individuals aged 25 - 74 years (Ailshire & Burgard, 2012), revealed that an increase in family contacts links with greater risk of experiencing weekly-daily sleep troubles, and family strain caused by frequent contacts with family members is detrimental to sleep.

Living alone has a negative effect on elderly sleep patterns. Our participants who lived alone reported not only the worst sleep quality and sleep efficiency, but also the longest sleep duration among the different household groupings. In a similar vein, some scholars have noted that elders living alone report markedly higher levels of loneliness compared to those co-residing with others because living alone is often associated with insufficient social interaction in

later life (Gu et al., 2010; Russell, 2009; Yeh & Sing Kai, 2004). Aanes and associates (2011) analyzed the data from a community sample of 7074 Norwegian middle-aged and elderly people and discovered that the feeling of loneliness has significantly negative effects on nocturnal sleep patterns in the elderly people. In published studies, loneliness has been found to be associated with sleep efficiency, subjective sleep quality, and sleep disturbance (Cacioppo, Hawkley, Berntson, et al., 2002; Cacioppo, Hawkley, Crawford, et al., 2002; Hawkley, Preacher, & Cacioppo, 2010; Smith, Kozak, & Sullivan, 2012). Nonetheless, loneliness has not been significantly correlated with sleep latency and sleep duration (Cacioppo, Hawkley, Crawford, et al., 2002; Hawkley et al., 2010). A theoretically plausible mechanism is that when experiencing loneliness, one may have cognitive arousal at bedtime due to the negative feeling of being socially disconnected or ruminate about lack of social relationships. In the process, chronic invasive thoughts about one's interpersonal relationships may disturb one's sleep patterns (e.g., poor sleep quality) (Aanes, Hetland, Pallesen, & Mittelmark, 2011).

Family Relationships and Sleep Patterns

Negative family relationships were associated with and may predict elderly sleep patterns. It is not surprising to find that the participants involving themselves in a strained or demanding family relationship tended to report poor sleep quality and lower sleep efficiency. The authors of existing literature have identified family relationships as some aspects of the most crucial social relationships that are regarded as keys to getting a good night's sleep (Cacioppo, Hawkley, Berntson, et al., 2002). Worthman and Brown (2007) claimed that sleep is construed as a form of social behavior in many societies, and it is embedded in family relationships. Family relationships have been considered with respect to how they interfere with, support, or compete with sleep quality and quantity (Ailshire & Burgard, 2012). In a seconday data analysis that investigated how family contacts and relationships were associated with self-reported sleep problems among U.S. adults, Ailshire and Burgard (2012) delineate that having strained family relationships is associated with more risk of sleep problems.

Three potential mechanisms linking family relationships to sleep patterns are postulated: provision of family support, relational demands and conflicts, and companionship (Thoits, 2011). First, family support has a buffering effect on the relation between family strains and sleep problems. Supportive family relationships could facilitate good sleep habits (Ailshire & Burgard, 2012) and provide emotional comfort that can reduce the harmful effect of stressful events on nocturnal sleep (Thoits, 2011). A secondary data analysis, analyzing a sample of 1,561 parents aged 60 years and older in China, indicated that older parents who received support from their children had better psychological well-being (Silverstein et al., 2006), which could reduce psychological disstress and improve sleep. Moreover, family support can help elderly people cope with stressful situations and decrease elderly emotional distress along with the effects of stressors that may undermine sleep quality (Morin, Rodrigue, & Ivers, 2003). Second, elderly people who are bothered by family conflicts or contemplate how to deal with relationship demands may find it easy to toss and turn. More frequent contacts with stressful family ties may be detrimental for sleep (Ailshire & Burgard, 2012). A prior study result indicated that psychological distress is greatest when relationship demands are high, and emotional support is low (Durden, Hill, & Angel, 2007). Thus, strained and demanding family relationships may be particularly harmful to sleep. Third, companionship that results from family contacts may benefit to sleep, whereas loneliness that arises from lack of companionship may be detrimental to sleep (Thoits, 2011).

Family Roles and Responsibilities related to Sleep Patterns

Approximately 95% of our participants admitted that family roles and responsibilities have been changing in recent Taiwanese society in which family is no longer based on authority and obligations that are used to keep the males in positions of power. However, those participants still tried to play their perceived traditional roles in fulfilling their family responsibilities. Almost all our female participants viewed doing housekeeping and taking good care of their family members as their responsibilities. Nevertheless, a significant relationship between sleep

patterns and family roles/responsibilities was not found in our study. This is not consistent with the contention that sleep is “socially patterned,” and it is expected to embody the social roles (e.g., family roles), responsibilities, and gender relationships inherent in daily lives (Hislop & Arber, 2003). Hislog and Arber (2003) emphasized that the more roles an individual plays in life, the greater the potential for sleep disruption is. They also suggested that sleep quality is structured by the multiplicity of roles and responsibilities they carry out as part of their daily lives.

An emerging body of research suggests that gendered family responsibilities along with roles affect sleep patterns (Ailshire & Burgard, 2012; Burgard, 2011; Hislop & Arber, 2003; Maume, Sebastian, & Bardo, 2009, 2010). However, we failed to determine whether or not men’s and women’s sleep are similarly disrupted by family responsibilities. For example, a group of Japanese researchers analyzed the data from 7,451 adults and reported that 70% of female participants did one hour or more of household tasks per day compared to less than 10% of males did (Yoshioka et al., 2012). These researchers also suggested that compared to men, women share greater household responsibilities, especially time-consuming activities, such as child rearing, food preparation, and cleaning, which may make it difficult to fall asleep or maintain sleep. A recent study of 583 retail food workers in the U. S., Maume, Sebastian, and Bardo (2009) discovered that women had poorer sleep quality than did men because women were more often interrupted by family members and shouldered a greater burden of caregiving responsibilities which produced higher reports of sleep disruption among women. The finding from a qualitative study of 48 midlife British women showed that most women felt and accepted their gendered roles as family caregivers and the related "responsibility" to worry about children and aging parents that caused their sleep disruption (Hislop & Arber, 2003). In a qualitative study of 25 blue-collar U.S. couples living with children, Maume and colleagues (2010) also found that men's sleep was privileged over women's, and women were much more likely to experience sleep procrastination, early awakenings and disturbed sleep to care for household members and to deal with household chores. These foregoing findings that link sleep disruption

with gendered family responsibilities can be explained in two ways. Firstly, traditional beliefs about gender and family responsibilities emphasize men's focus on breadwinning and women's focus on caregiving (Maume et al., 2009). Secondly, regardless of their social role responsibilities, women face "gendered time constraints" and will spend more time than men on female-typed tasks such as housework and childcare (Burgard, 2011). Possibly, a vast majority of our male and female participants did not need to financially support their family or to care for younger children by waking up in the middle of night or delaying their bedtime. Another possibility is that the household tasks which our participants did not demand too much energy, and handling household work probably had become part of their daily lives. A final possibility is that our participants might view their family responsibility as their destinies and thereby adjusted their sleep needs to meet the demand of their family responsibilities.

Filial Piety and Sleep Patterns

Filial piety in the past has been a strong cultural practice among Chinese people. As described by Sung (1995), filial piety is characterized by showing love, affection, and respect to elderly people. Cheng and Chan (2006) found that emotionally focused filial practice, especially respect, is a predictor of elderly psychological well-being. Similarly, in a study that investigated the association between filial piety expectations and elderly psychological states in a convenience sample of 288 individuals with a mean age of 65 years in China, Wang and colleagues (2010) reported that older participants' expectation of filial behaviors were significantly and positively correlated with received emotional supports. Content analysis of the interview data suggested that unfilial behaviors of children were perceived by participants as related to disturbed sleep patterns. To date, there is no empirical evidence available to describe how the practice of filial piety relates to elderly sleep patterns. The most likely interpretation of our findings is that children's unfilial behaviors may cause a strained or alienated child-parent relationship and negative emotions (e.g., worry, unhappiness) or other psychological distress that is associated with disturbed sleep patterns..

Chinese Medicine and Sleep Patterns

No participants in our study used Chinese medicine as a sleep aid. A significant majority of our participants did not consider Chinese medicine as a favorable therapy for sleep problems. Unlike “Western” hypnotic drugs, Chinese medicine cannot facilitate sleep onset quickly and decrease sleep onset latency. A minority of our participants (16%) assumed that “irritation of nerves,” and deficiency in the flow of “Qi” and blood contribute to insomnia. These notions are in accord with the biological theory that insomnia typically invokes central nervous system and/or autonomic nervous system arousal (Huang, Kutner, & Bliwise, 2011) as well as disharmony of Yin-Yang force (Yeung, Chung, Zhang, Yap, & Law, 2009). Likewise, in a survey that assessed physical characteristics of 288 Chinese elderly insomniacs from the perspectives of Chinese medicine, Xia et al. (2012) found that Yang-force deficiency and Qi-deficiency occurred mostly in elderly insomniacs, and female insomniacs were more likely to have “blood stasis” and “Qi-stagnation.” A systematic review summarizes that Qi, blood, fluid, and essence are the indispensible elements of all physiological activity including sleep. Qi vitalizes and warms the human body, which is called Yang in nature. Blood and fluids, the sustenance of human body, nourish and moisten the entire organism and are regarded as Yin in nature (Sok, Erlen, & Kim, 2003).

Our participants claimed that Chinese medicine can “Bu Qi (補氣),” “Anshen (安神),” and “adjust physical characteristics,” which may be a potential effect of Chinese medicine on insomnia by creating a relaxed brain and a tranquil mind. However, they reported that no specific Chinese herbs can be used for treating insomnia. Although there is no consensus about how Chinese medicine plays a role in treating insomnia, the authors of systematic reviews (Cheuk, Yeung, Chung, & Wong, 2012; Sok et al., 2003; Yeung, Chung, Leung, Zhang, & Law, 2009) have identified empirical evidence regarding beneficial effects of acupuncture, one of therapy modes of Chinese medicine, on insomnia. The clinical effects of acupuncture

treatments on insomnia observed in clinical trials constitute prolonged sleep duration (Huang et al., 2011; Hwang, 2007; Lv, 2007 ; Suen, Wong, & Leung, 2002; Yeung et al., 2009), reduced sleep onset latency (Hwang, 2007; Suen et al., 2002; Yeung, Chung, Leung et al., 2009) and WASO (Suen et al., 2002; Yeung, Chung, Leung et al., 2009), increased sleep efficiency (Huang et al., 2011; Hwang, 2007; Yeung, Chung, Leung et al., 2009), and improved sleep quality (Tu, Chung, Yang, & Tzeng, 2012).

Activities and Sleep

TV Viewing and Sleep Patterns

The findings of our study suggest that TV viewing represents a prevalent pre-sleep behavior among Chinese elderly. Many of the participants in this study spent most of the day watching TV. It is possible that prolonged TV viewing is an indicator of loneliness (Östlund, 2010), and elderly people who feel lonely tend to experience nighttime restlessness and disruptions. Television may be a source of social engagement and a lens through which Chinese elderly may look at the outside world and thus reduce loneliness. The aforementioned interpretations are echoed by the contention that TV viewing increases social engagement, which results in higher levels of exposure of elderly people to social stimuli, albeit passive in nature. Our study also found that there was a trend that Chinese elderly switched on their TV sets before they slept. They reported that they watched TV because they had nothing to do, and TV viewing helped them alleviate boredom. This implies that TV plays an important role in companionship replacement, and it may become the social referent for many elderly individuals who have curtailed physical social interaction, and in doing so, it reduces the perception of social isolation (Korzenny & Neuendorf, 1980). This explanation is similar to the findings of an ethnographic study of a retirement community, which reveals that elderly people actively befriend “the tube” and search out faces and voices to help them fill their days (Riggs, 1996). TV is regarded as a “lifeline” and a “window to the outside world” for elderly people to maintain social contact (Grajczyk & Zöllner, 1998) and social engagement at a distance (Östlund, 2010).

Our findings also suggest that TV viewing is a Chinese elderly bedtime routine that acts as a transition from the end of the day to sleep time. It is a significant approach that was perceived to facilitate sleep onset. TV watching could be viewed as a “mood management utility” that helps elderly people distract their attention from a possible negative mood. In fact, TV viewing behavior may be reflective of the mood states elicited by television (Goodwin, Intrieri, & Papini, 2005). In a study that researched 69 elderly people’s affect (mean age = 72 ± 6.4) Goodwin et al. (2005) found that TV viewing was an activity that could be utilized either to augment elderly positive mood or improve negative mood. Thus, TV viewing may help the elderly improve mood and facilitate sleep onset.

Social Activities and Sleep Patterns

Some of the participants reported that attendance at social activitives facilitated their sleep onset and sleep quality. These findings are in accordance with those of other investigators who have reported that attendance of social activities can increase social relations and may assist with physical and mental restoration, thereby sustaining daytime alertness (Richards et al., 20011), improving subjective sleep quality (Benloucif et al., 2004; Naylor et al., 2000) along with sleep efficiency (Richards et al., 2005), and increasing total sleep time (Richards et al., 2011). The higher levels of social engagement would compensate for poor sleep quality and vice versa (Naylor et al., 2000). Researchers, investigating the relations of social engagement, sleep quality, and plasma levels of interleukin-6 in a sample of 74 aged women, found that poor sleep, low sleep efficiency, and increased time awake are associated with low positive social relations (Friedman et al., 2005). In a similar study, assessing the interplay of sleep quality and social well-being in predicting inflammation in a national probability sample of 3,487 middle-aged and elderly people, Friedman (2011) found that social engagement may benefit sleep and buffer against the inflammatory effects of poor sleep. On the other hand, participants in the current study who reported attendance at community-hosted events, also reported delayed bedtimes. In

a similar vein, Habte-Gabr et al. (1991) found that attendance of social activities was associated with later bedtimes, decreased likelihood of long sleep latency and increased likelihood of feeling rested in the morning.

There are several interpretations to explain social activity affects nocturnal sleep patterns among Chinese elderly. First, attendance of social activity may enhance homeostatic sleep drive (Richards et al., 2005) and zeitgebers (synchronizing stimuli) for the circadian variation of the sleep/wake cycle (Benloucif et al., 2004). Second, activity participation may increase blood flow to the brain during the activities and thereby improve neuronal function that is associated with sleep (Naylor et al., 2000). Third, participation in social activities is a form of social engagement. As the number of formal social roles dwindles among elderly people, engagement in social activities may become a more important source of social integration. According to Thomas (2011), those who spend more time socially engaged may have access to more resources, and more motivation to practice health-promoting behaviors that could all contribute to better sleep.

Despite evidence supporting beneficial effects of social activities on sleep, the majority of participants in the current study did not report any effect of participating in social activities on sleep. A possible explanation for this finding is that the intensity and duration of social activities which our participants attended were not robust enough to cause an effect. It is possible that our participants had integrated regular social activities into their routine. In addition, nippy weather and frequent rain at the time the interviews were conducted might have discouraged participants from going outdoors and taking part in social activities. Richards et al. (2011) concluded that effects of social activities on sleep depend on the intensity, duration, and type of the activities, and on elderly physical conditions.

Implications for Future Research

Based upon the findings of the study, comparisons with prior research, and several study limitations, five major directions for future research are discussed: (1) recruitment and sampling; (2) informed consent; (3) data collection; (4) translation and analysis; and (5) napping.

Recruitment and Sampling

At the beginning of this study, purposeful sampling was used to recruit the participants from city parks in Taipei areas. However, bad weather conditions hindered the recruitment. During the recruitment period, a majority of Taiwanese elderly were cautious of releasing personal information to strangers because they were afraid of being scammed. We found that snowball sampling was a useful approach to compensate for weather limitations and improve the recruitment in our study. These complications may result from a tendency that Chinese elderly resist recruitment by strangers; it is essential to develop social relationships among Chinese circles by personal referrals (Lo & Russell, 2007). Given this information, future researchers should take multiple factors into account when they develop their recruitment plan. The use of intermediaries is recommended for future research that targets Chinese elderly.

Informed Consent

Chinese are family-oriented and family members are usually involved in each other's business, particularly business related to the elderly. The majority of our participants asked their family members to help them review the information and ask questions pertinent to our research before the participants decided to take part in the study. Even though our participants were not cognitively impaired and appeared of sound mind, they usually wanted their family members, especially sons, to be with them when they were informed of the research or when they were interviewed. A qualitative study (Lo & Russell, 2007) that explored family care of Chinese elderly in Australia also found that their Chinese elderly participants, especially women, were reluctant to provide informed consent without permission from their sons. These findings reflect that a

Chinese family functions as a “close-knit social unit” from which its members develop inextricable interpersonal relationships and draw on each other’s resources for satisfying physical, psychological, as well as social needs (Cheng & Chan, 2006). Given the information, future researchers should consider the effect of family members on the informed consent. Furthermore, a number of our participants complained about the inconvenience of written consent because of vision impairment and reduction of hand functioning. They grumbled that using a pen to write is like “utilizing a hoe to weed in a field.” Thus, oral consent and use of stamps or fingerprints are recommended for future research that will focus on Chinese elderly.

Data Collection

Some questions of Chinese version of the PSQI may not be appropriate for Chinese elderly. Chinese elderly tended to provide numerical ranges rather than exact numbers when they were asked about their sleep parameters. Thus, there may be a bias for example in estimating sleep duration and sleep efficiency. Moreover, it may not be culturally appropriate to ask Chinese elderly about how often they have had trouble staying awake while driving because it is unusual for Chinese elderly to drive a car. It was difficult to estimate their sleep efficiency because they tended to report activities in bed other than sleep. For instance, two participants of this study went to bed early and listened to the radio in bed. They had a hard time identifying how long they took to fall asleep and how long they stayed in bed. This may have biased the estimation of sleep efficiency for our study. When the participants were asked the question of the CPSQI, “Duration the past month, how would you rate your sleep quality overall,” approximately 10% of the participants did not know how to rate their sleep quality based on the options provided by the questionnaire. They described that their sleep quality was “so-so” and “ordinary.” We also found that several homebound participants could not identify when they went to bed because they lay on the bed most of the day. When scoring sleep duration of the CPSQI, it was difficult to assign scores based on the response of the participants. For example, several participants’ sleep duration was 6 hours, which cannot be assigned to the response

categories in the CPSQI, “6-7 hours” or “5-6 hours”. Given this information, future research that targets Chinese elderly sleep may need to develop more specific and culturally sensitive tools to collect data.

Data Translation and Analysis

There are several implications pertinent to translation and analysis for future research. First, it is a useful approach to do initial translation and analysis of the interview data right after the completion of each interview. In this way, the insights and meaningful findings derived from one interview can be tested with subsequent interviewees. Second, to avoid mistranslating and misinterpreting the interview data, future researchers can restate or summarize information and then question participants to determine accuracy during the interview. In addition, the researchers can consult with linguistic experts and the subsequent interviewees during the interviews when they have a hard time transcribing and translating the phrases or idioms. Finally, after a study, the researchers can share all of the findings with their participants involved and allow the participants to critically analyze the findings and comment on them. The participants can then either affirm that the summaries reflect their views, feelings, and experiences, or that they do not reflect these experiences

Napping

The pros and cons of napping in elderly people are not definitive, and whether elderly people should nap or avoid napping is debatable. Whether fragmented nocturnal sleep affects napping status, or napping status contributes to sleep fragmentation is also uncertain. Martin and Ancoli-Israel (2006) found that it is difficult to determine the direction of the causative relationship, and the direction may vary across individuals. Clarification of these associations may help health care providers determine whether or not to recommend daytime naps to community dwelling elderly individuals (Goldman et al., 2008).

Implications for Clinical Practice

Clinical implications that derived from our study include: (1) using a variety of methods to assess elderly sleep patterns or sleep problems; (2) being aware of potential sleep problem on health; (3) recommendation of short napping in the afternoon; and (4) taking cultural context and multiple family situations into account in assessing and treating sleep problems.

Health providers may need to use a variety of methods and be aware of the effect of social desirability when they assess elderly sleep patterns or problems. In addition, it is important to select a culture-sensitive questionnaire as an assessment tool. Poor sleep is perceived of as an inevitable accompaniment to later life and is expected as part of the 'normal' ageing process. In the face of increasing health problems which require medical treatment, elderly believe that poor sleep per se was not related to poor health. As a consequence, they were not necessarily looking for their sleep problem to be diagnosed (Venn, et al., 2013). It therefore is of great importance for health providers to assess potential sleep problems and be aware of the effects of the problems on elderly health when they care for geriatric patients or when they develop a health promotion program for elderly people.

There is a gap in knowledge as to what specific effect napping has on nocturnal sleep and the recommendation of napping is still unresolved (Ancoli-Israel & Martin, 2006; Picarsic et al., 2008). However, our study provides further evidence that napping is a common practice of Chinese elderly and diurnal napping appears to worsen nocturnal sleep only if Chinese elderly nap more than one hour. We suggest that there is no need to restrict elderly diurnal napping to prevent them from awakening at night. It is crucial for health care providers to assess napping behavior and determine its link with daytime sleepiness and nocturnal sleep before making clinical recommendations.

Our findings revealed that the lack of filial piety practice may play a role in sleep disruption in Chinese elderly. When caring for Chinese elderly, health providers need to take account of modifications of this traditional value when educating elderly people about sleep hygiene and

when developing individual psychotherapeutic interventions to improve sleep patterns (Wang et al., 2010). The previous discussion has indicated that cultural values shape family situations, which could influence whether or not sleeping behavior is perceived as problematic (Giannotti & Cortesi, 2009). The influences of family situations on sleep are complex because family relationships include both positive and negative content, and family roles and responsibilities naturally change over time when family events or crises occur (Ailshire & Burgard, 2012). Thus, it is crucial for health providers to take the cultural context and multiple aspects of family situations into consideration in evaluating and treating sleep problems.

Limitations

Data collection and results of our study were impeded by the following limitations. First the content of the interviews may have been influenced by the presence of family members during the interview. One interview was dropped because the participant's son completely 'took over' the interview, providing answers to the questions. The second limitation is that the sample size was small and included only healthy Chinese elderly. All of the participants were in good physical and mental health although the majority of them reported some degree of age-related sleep disruption (e.g., early morning awakening, disrupted nighttime sleep). Less healthy elderly may have more age-related sleep disruptions than the participants in our study. In addition, most of our participants recruited were from middle and low socioeconomic classes and most of them lived in Northern and Southern Taiwan. Under these circumstances, the findings in our study may not be relevant to all Taiwanese elderly. A third limitation regards transcribing the interview recordings and translating them from Taiwanese into Chinese and into English. Word selection was an issue because there were many expressions that could not be directly translated from Taiwanese to Chinese or from Chinese to English. In particular, a precise translation could not be sometimes made, especially in the cases where phrasal verbs or idioms were used. The participants sometimes articulated archaic terms and very old sayings that are not commonly used in recent Taiwanese society. Because Taiwanese has no uniform written

characters, and 90% of the interviews were conducted in Taiwanese, our study could only do meaning transcription and translation to process the interview data. Even though the researcher consulted with several experts in Taiwanese dialect and historical research and an American anthropologist who was familiar with Taiwanese language and culture, we may still have translation errors with regard to our interpretation. Even worse, some parts of the interview recordings were excluded from the analyses because they were very difficult to understand and translate literally.

The scope of data collection in our study may have been affected by social “desirability” or the “halo effect” when the data were related to negative family situations. That is, many participants were reluctant to provide unpleasant information regarding their family situations because they did not want to “air their dirty laundry” to the public. They tended to use general terms to answer the interview questions or focused on their positive family affairs. Some of them tried to wrap up the conversation on this topic by saying that “My family is fine, nothing to talk about...” This limitation was also found in the study by Lo and Russell (2007), indicating that disclosing negative family matters to an “outsider” is thought to be shameful. Consequently, the interpretation of how family situations affect Chinese elderly may still be hindered by this limitation.

In conclusion, this study is the first to integrate both qualitative and quantitative data to understand the influence of self-perception about aging, culture, and social environments on Chinese elderly sleep patterns. Complaints about poor sleep quality expressed in the interviews were not supported by the findings from a standardized and well-established questionnaire. Living arrangements, family relationships, types and intensity of social activities had minimal effects on sleep. Aging, culture and social environment may impact self-perception about sleep rather than actual sleep patterns per se.

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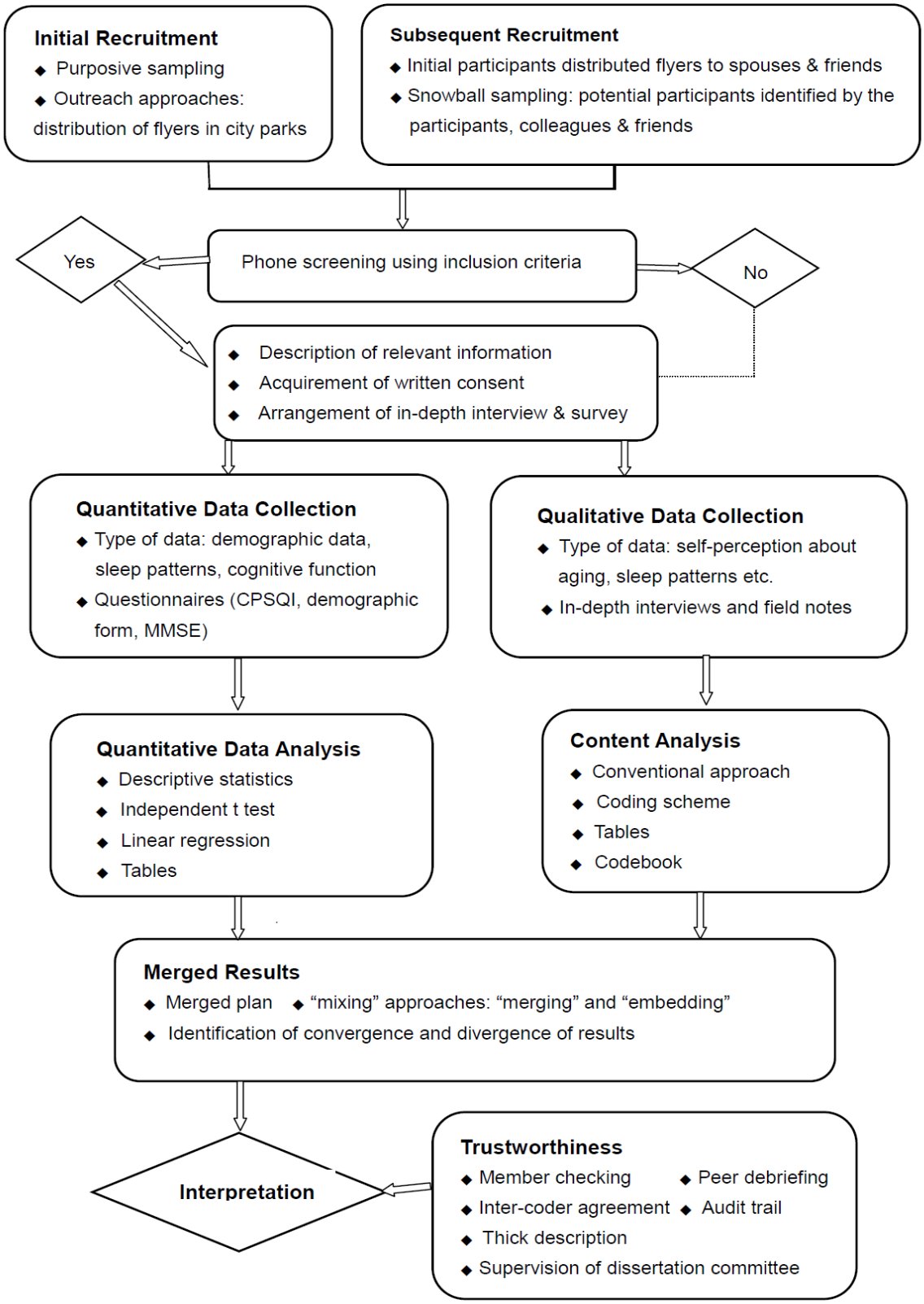
Figure 1: Study Procedure Protocol



Appendix A: Chinese Version of Recruitment Flyers

SCHOOL OF NURSING
UNIVERSITY of WASHINGTON

睡眠研究招募志願者

正在研究的是什麼？

這項研究的主要目的是去了解在台灣的年長華人的睡眠型態以及相關影響因素。

誰可以參加？

- 60 歲或 60 歲以上能說或讀中文且能反映他們的生活狀況的華人男性和女性。
- 整體上，健康的個人。

研究涉及什麼?

- 一項 5 分鐘的電話篩選面談
- 完成二份關於你的睡眠型態(如總睡眠時間、上床睡覺和起床的時間以及睡眠品質)、個人資料(如年齡、教育程度、職業) 和睡眠習慣的問卷調查，這二份問卷需要 10 分鐘來完成。
- 一項 10 分鐘面對面的訪談來回答問卷中的問題，你將會被要求做簡單的計算，依照指示做動作，說出所提供物品的名稱，重複說出你所聽到的話，以及回答與認知能力有關的問題。
- 一項不超過 60 分鐘的深入面談

我將會因參與這項研究而收到任何東西嗎?

你會收到新台幣 200 元的禮卷來做為我對你花時間來協助這項研究的答謝。

如果你對參與本研究感到興趣或需更多關於這項研究的資料，請致電 02-26791101 或 0935187487 或寫電子郵件到 jn12008@uw.edu 與林忠尼聯絡。

謝謝!

Appendix A1: English Version of Recruitment Flyers

SCHOOL OF NURSING
UNIVERSITY of WASHINGTON

Volunteers Needed for Sleep Research

What is being studied?

The main purpose of this study is to understand sleep patterns and correlates that influence sleep patterns in Chinese elderly in Taiwan.

Who can participate?

- Chinese men and women aged 60 years old or older who can speak or read in Chinese and reflect their lives
- Individuals who are generally healthy

What does the study involve?

- One **5-** minute phone interview of recruitment screening
- Completion of filling out two questionnaires about your sleep patterns (e.g., total sleep time, time for going to bed and waking up, and sleep quality), personal information (e.g., age, educational degree, occupation), and sleep habits. It will take you 10 minutes to complete.
- One 10 minute in person interview by using a questionnaire. You will be asked to do a simple calculation, follow the instructions that will be given, name the items demonstrated, repeat what you will be told, and answer questions involving cognitive abilities.
- One in-depth interview lasting no longer than 60 minutes

Will I receive anything for participating?

You will receive a NT$200 gift coupon as a token of my appreciation for your time.

If you are interested in participating in this study or need more information about this study please contact Jong-Ni Lin at 02-26791101 or 0935187487or email address jnl2008@uw.edu

Thank you!

Appendix B: Chinese Version of Consent Form

華盛頓大學

同意書

年長華人的睡眠型態

研究者: 林忠尼、護理學院博士候選人
電話: 02-26791101 or 0935187487, 電子郵件信箱: jn12008@uw.edu
指導教授: Carol Landis, Susan McCurry, Monica Jarrett, Noel Chrisman 等博士

研究者的聲明

我正在邀請你參與一項研究，這項研究是華盛頓大學護理學院博士課程的一部分。本同意書的目的是提供你研究的相關資料來協助您決定是否要參加本研究。請你仔細閱讀這份同意書。你可能會問到研究的目的、可能的研究風險和利益，身為志願者的權利，以及任何其他與研究有關的問題。你也可能會對這份同意書不清楚的部分提出疑問。當我們回答你全部的問題後，你可以決定是否要參加這項研究，這個過程被稱為「知情同意」。如果你同意參加這項研究，請在下面的表格上簽名，你將會收到這份同意書的副本以做為您的記錄。

研究目的

這項研究的主要目的是去了解在台灣年長華人的睡眠型態以及影響其睡眠型態的相關因素。

研究程序

這項研究包括三個部分。第一部分是詢問你一些問題，來看看你是否適合參與這項研究，完成這項篩選面談將花費你大約 5 分鐘的時間。

第二部分是進行問卷調查。你將會被要求花大約 10 分鐘來填寫二份問卷，這二份問卷將詢問你的睡眠狀態（如總睡眠時間、上床睡覺和起床的時間和睡眠品質）、個人基本資料（如年齡、教育程度、職業、婚姻狀況、居住安排狀態等）以及睡眠習慣(如日間小睡情形、含咖啡因飲料的飲用量、和酒精性飲料的飲用量等)。此外，你也將花費另外 10 分鐘來完成一份問卷稱為「簡易心智狀態檢查」量表。你將會被要求做簡單的計算，依照指示做動作，說出所提供物品的名稱，重複說出你所聽到的話，以及回答與認知能力有關的問題。

這項研究的第三部分是深入面談。我將會在你方便的時間和地點私下面對面訪問你，這項面談的時間持續不超過 60 分鐘。我可能會問你的問題包括:你通常如何度過一天？你平時在上床睡覺前做些什麼？您如何評價在過去一個月你的睡眠品質？依你的看法，你怎麼定義良好的睡眠和不好的睡眠? 經過你的准許，這項深入面談將被錄音。

危險、壓力、或不舒適

尚未發現參加這項研究的已知風險。當你回答某些研究的相關問題時，你可能會暫時感到不舒服。為了盡量減少任何不舒服，如果你拒絕回答任何問題，你的意願將會被尊重。

研究的利益

這項研究可能會協助你個別地了解自己的睡眠型態和問題，此外，這項研究在瞭解年長者睡眠型態的情形特別有價值，這個研究結果可作為年長者照護的教育和臨床指導知識基礎。我期望這項研究發現將有助於發展適合文化族群的措施來促進年長者的睡眠品質。

研究資料的保密

你的個人資料將被嚴格保密，沒有任何關於你的個人資料將被散播出去，只有這項研究結果將會在學術會議或在期刊上發表。如果有必要，你的姓名、地址和電話號碼將被記錄下來以安排進行面談。然而，這種識別的資料將被保存在一個只有我可以開啟的上鎖抽屜。你將被分配一組身分識別號碼，這組號碼將被用於問卷和面談的書面抄本。除了我之外，沒有人知道你的確實身分。你的個人識別資料將在西元 2014 年一月被銷毀。因翻譯目的而翻閱你的面談抄本的人以及協助闡釋面談文字資料的教授將無法看得到你的個人識別資料。

拷貝的研究書面資料將被保存在我家中的一個上鎖的文件櫃中。面談和問卷調查的書面抄本將和你的身分識別資料分開存放，並安全地保存在一個安全的文件檔案中。電子數位錄音記錄和研究相關的電子檔案將被一個密碼安全系統保護於我的個人電腦中，只有我知道這個密碼。

其他資料

當然，參加這項研究是自願的，參加這項研究不需花任何費用，在問卷調查和深入面談的過程中，你可以在任何時間拒絕回答任何問題。你可以在任何時候終止面談和問卷調查的進行或將它們延期至以後的時間來進行，你可以要求與你有關的資料被永久刪除。在面談結束時，你將收到新台幣 200 元的禮卷來做為我對你花時間來協助這項研究的答謝。

研究者姓名　　簽名　　日期

被研究者的聲明

研究者已經向我解釋研究的相關資料，我志願參加這項研究，我已經有機會提問問題。之後，如果我有與研究相關的問題，我可以向上面列出的研究者詢問，如果我有關於身為研究對象權利的問題，我可以打(0021)206-543-0098 致電「人類研究對象保護部門」。我會收到此同意書的副本。

我同意被問卷調查和面談

被研究者姓名　　簽名　　日期

我同意被錄音

被研究者姓名　　簽名　　日期

副本: 研究者

被研究者

Appendix B1: English Version of Consent Form

UNIVERSITY OF WASHINGTON

CONSENT FORM

Sleep Patterns in Chinese Elderly

Researcher: Jong-Ni Lin RN. MSN. PhD Candidate
Department of Biobehavioral Nursing and Health Systems, School of Nursing
02-26791101 or 0935187487, jnl2008@uw.edu
Faculty sponsors: Drs. Carol Landis, Susan McCurry, Monica Jarrett, and Noel Chrisman

RESEARCHER'S STATEMENT

I am asking you to participate in a research study that is being conducted as part of doctoral program of the School of Nursing at the University of Washington. The purpose of this consent form is to give you the information to help you decide whether or not to participate in the study. Please read this form carefully. You may ask questions about the purpose of the research, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions, you can decide if you want to participate in the study or not. This process is called "informed consent." If you agree to participate in the study, please sign the form below. You will receive a copy of this form for your records.

PURPOSES OF THE STUDY

The purpose of this study is to understand sleep patterns and related correlates that influence sleep patterns in Chinese elderly in Taiwan.

STUDY PROCEDURES

This study consists of three parts. The first part is to ask you a few questions to see if you are a good match for this study. It will take you about 5 minutes to complete this screening interview.

The second part is to conduct a questionnaire survey. You will be asked to spend about 10 minutes to fill out two questionnaires that will ask you about sleep status (e.g., total sleep time, time for going to bed and getting up, and sleep quality), your personal information (e.g., age, educational degree, occupation, marital status, living arrangement status), and sleep habits (e.g., daytime napping, consumption of beverages containing caffeine, consumption of alcohol). In addition, you will also spend additional 10 minute to complete a questionnaire called "Mini-Mental Status Exam". You will be asked to do a simple calculation, follow the instructions that will be given, name the items demonstrated, repeat what you will be told, and to answer questions involving cognitive abilities.

The third part of the study is an in-depth interview. I will privately interview you in person at a time and place convenient to you. This interview will last no longer than 60 minutes. Examples

of questions I may ask you in your interview include: How do you usually spend your day? What do you usually do before you go to bed? How do you rate your sleep quality during the past month? In your opinion, how do you define good sleep and poor sleep? Contingent upon your approval, the interviews will be audio taped.

RISK, STRESS, OR DISCOMFORT

There are no known risks to participate in this study. You may temporarily feel uncomfortable while answering some questions related to this study. To minimize any discomfort, your wishes will be respected if you decline to answer any questions.

BENEFITS OF THE STUDY

This study may help you individually understand your own sleep patterns and problems. In addition, this study is particularly valuable in understanding of elderly sleep patterns that will serve as a knowledge base that can be used for educational and clinical instructional purposes in elderly care. I expect that the findings of the study will aid the development of culturally relevant interventions to improve elderly sleep quality.

CONFIDENTIALITY OF RESEARCH INFORMATION

Your personal information will be kept strictly confidential. No personal information about you will be disseminated. Only the results of this study in the aggregate will be presented at meetings or published in journals. If necessary, your name, address, and phone number will be recorded for the purposes of scheduling interviews. However, this identifying information will be kept in a locked drawer with access available only to me. An allocated ID number specific to you will be used on the questionnaires and the interview transcripts and known only to me. Your personal identifiers will be destroyed by January 2014. The person who will review the interview transcripts for the purposes of translation and faculty who will assist in the interpretation of the interview text data will not have access to your identifiers.

Hard copies of the written information of the study will be kept in a locked file cabinet in my home. The transcripts of interviews and questionnaire data will be kept in secured files separate from all your identifiers. Digital audio records and electronic files related to the research will be protected in my personal computer by a password security system known only to me.

OTHER INFORMATION

Participation in this study is of course voluntary. There will be no cost for participation in the study. During the questionnaire survey and the in-depth interview, you could refuse to answer any questions at any time. At any time you can terminate the questionnaire survey and the interview or postpone them to be continued at a later time. You may request that the information about you be permanently removed. At the end of the interview you will receive a NT$200 gift coupon as a token of my appreciation for your time.

Printed name of researcher Signature Date

SUBJECT'S STATEMENT

The researcher has explained the relevant information to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later about the research, I can ask the researcher listed above. If I have questions about my rights as a research subject, I can call the Human Subjects Division at (0021) 206-543-0098. I will receive a copy of this consent form.

I give permission to be surveyed and interviewed

Printed name of subject Signature of subject Date

I give permission to be audio-taped

Printed name of subject Signature of subject Date

Copies to: Researcher

Subject

Appendix C: Chinese Version of Phone Screening Script

電話篩選腳本

情 況 1: *可能的研究對象閱讀了招募廣告傳單，且有興趣參加本研究，他們打電話給我來詢問進一步的資料。*

篩 選 者: 嗨!我是林忠尼，謝謝你有興趣瞭解更多關於我的睡眠研究。我想要告訴你一點我的研究。之後，如果你覺得這是你想要參加的研究，我將問你一些問題來看你是否適合參與這項研究。這個篩選過程將花費你大約 5 分鐘的時間， 這樣好嗎?

情 況 2: *可能的研究對象由朋友和同事介紹，且經過許可，我打電話給他們。*

篩 選 者: 嗨! 我是林忠尼，謝謝你讓我打電話給你，並向你介紹我的研究。在我告訴你一點有關於我的研究後，如果你覺得這是你想要參加的研究，我將問你一些問題看你是否適合參與這項研究。這個篩選過程將花費你大約 5 分鐘的時間，這樣好嗎?

被面談者: *是 – 繼續*

否 – 如果有興趣，找是否有較洽當的時間再打一次電話。如果沒興趣，謝謝她/他的時間並停止篩選面談。

篩 選 者: 我正在執行一項研究來了解在台灣年長華人的睡眠型態以及影響其睡眠型態的相關因素。如果你符合這項研究的招募標準，我將請你花費約 10 分鐘來填寫二份問卷，這二份問卷將詢問你的睡眠狀態(如總睡眠時間、上床睡覺和起床的時間和睡眠品質）、你的個人基本資料（如年齡、教育程度、職業、婚姻狀況、居住安排的狀態等）以及睡眠習慣(如日間小睡情形、含咖啡因飲料的飲用量、和酒精性飲料的飲用量等)。然後，在花另外 10 分鐘來完成第三份問卷的過程中，你將會被要求做簡單的計算，依照指示做動作，說出所提供物品的名稱，重複說出你所聽到的話，以及回答與認知能力有關的問題。在你完成所有的問卷調查後，我將會在你方便的時間和地點裡私下面對面訪問你，這項面談的時間持續不超過 60 分鐘。這項研究可能有助於你個別地瞭解自己的睡眠狀況和問題。當然，參加這項研究是自願的，參加這項研究不需花任何費用。

篩 選 者: 你想這是你感興趣的事情嗎? 我可以問你一些問題來看你是否適合參與這項研究嗎?

被面談者: *是 – 繼續篩選問題*

否 – 謝謝她/他對這項研究感到興趣並掛斷電話。之後，不再因為這項研究聯絡她/他。

篩選問題

	問題	符合資格	不符合資格
問題 1	你幾歲?	60-110 到問題 2	≦ 59 ≧110 到結束
問題 2	你是華人嗎?	是 到問題 3	否 到結束
問題 3	你從哪裡來? ① 中國大陸 ② 香港 ③ 台灣 ④ 其他	如果選擇 ①、② 或 ③ 到問題 4	如果選擇 ④ 到結束
問題 4	你有下列那一種醫療情況? ① 充血性心衰竭 ② 帕金森氏疾病 ③ 慢性阻塞性肺部疾病 ④ 多發性硬化症 ⑤ 中風 ⑥ 治療中的癌症(如化療、放射線治療) ⑦ 失智症/阿茲海默症 ⑧ 以上皆非	如果選擇 ⑧ 到問題 5	如果選擇①②③④⑤⑥或⑦ 到結束
問題 5	你經常感到悲傷、不快樂和無望嗎?	否 到問題 7	是 到問題 6
問題 6	關於這個問題，你的醫師告訴你什麼?		如果答案是憂鬱症或心理/精神的問題 到結束
問題 7	你完全需要使用輪椅來活動嗎?	否 到問題 8	是 到結束
問題 8	你規則性地接受氧氣治療，如每天使用攜帶式的氧氣嗎?	否 有資格參加這項研究	是 到結束

給那些符合參加資格者

篩 選 者: 根據你已經提供的資料，你可能適合參與這項研究。我想要告訴你更多關於這項究的資料來協助你決定是否參加這項研究 *(在同意書上的資料將被告知)*。

關於你已被告知的資料，你有問題要詢問嗎?

被面談者: *是 – 回答她/他的問題，和確認她/他完全瞭解已被告知的資料。*
否 – 詢問她/他是否完全瞭解已被告知的資料。

篩 選 者: 你想要參加這項研究嗎?

被面談者: *是 – 繼續*
否 – 謝謝她/他的時間。

篩 選 者: 太好了! 在我們進行這項研究前，我需要你簽署一份同意書。在我們第一次見面時，我將攜帶一份書面的同意書給你。我們需要討論你所偏好進行問卷調查和面談的時間和地點。

為了安排這項研究的問卷調查和面談，我將需要你的聯絡資料。

你的全名?

姓 _____ 名_____.

你的電話號碼?

住家: _____ 或行動電話:_____.

你家的住址?*(如果可能研究對象選擇在他們的家中接受面談，他們的家的住址將被記錄)。*

_____

_____

縣/市 郵遞區號

結束: 非常謝謝你對這項研究感興趣，我將在接下來的幾天連絡你來排定問卷調查和面談的時間和地點...

給那些不符合參加資格者

篩 選 者: 抱歉! 你不適合參加這項研究，我非常感謝你的時間和你對這項研究感興趣。你有任何問題嗎?

Appendix C1: English Version of Phone Screening Script

Phone Screening Script

Situtation1: *Potential subjects read the recruitment flyer and are interested in participating in this study. They phone me for further information.*

Screener: Hi, this is Jong-Ni Lin. Thank you for being interested in knowing more about my sleep study. I'd like to tell you a little bit about the study. Then if you think this is something you'd like to take part in, I'll ask you a few questions to see if you are a good match for the study. It will only take you about 5 minutes. Is it okay?

Situation 2: *Potential subjects are identified by friends and colleagues, and I am granted permission to phone them.*

Screener: Hi, this is Jong-Ni Lin. Thank you for letting me phone you and introduce my study to you. After I tell you a little bit about my study, if you think this is something you'd like to take part in, I'll ask you a few questions to see if you are a good match for the study. It will only take you about 5 minutes. Is it okay?

Interviewee: Yes – *Continue*
No – *If interested, find out if there's a better time to call. If not interested, thank you for her/his time and stop the screening interview.*

Screener: I am conducting a study to understand sleep patterns and related correlates that influence sleep patterns in Chinese elderly in Taiwan. If you are a match for this study, you will be asked to spend about 10 minutes to fill out two questionnaires that will ask you about sleep status (e.g., total sleep time, time for going to bed and getting up, and sleep quality), your personal information (e.g., age, educational degree, occupation, marital status, living arrangement status), and sleep habits (e.g., daytime napping, consumption of beverages containing caffeine, consumption of alcohol). Then, in a third questionnaire, taking an additional 10 minutes, you will be asked to do a simple calculation, follow the instructions that will be given, name the items demonstrated, repeat what you are told, and answer questions involving your cognitive abilities. After you complete all survey questionnaires, I will privately interview you in person at a time and place convenient to you. This interview will last no longer than 60 minutes. This study may help you individually understand your own sleep status and problems. Participation in this study is of course voluntary. There will be no cost for participation in the study.

Screener: Do you think this is something that you'd be interested in? Is it okay if I ask you some questions to see if you are a good match for my study?

Interviewee: Yes – *Continue with screening questions*
No – *Thank you for her/his interest and disconnect. Do not re-contact her/him for this study.*

SCREENING QUESTIONS

	QUESTIONS	ELIGIBLE	NOT ELIGIBLE
Q1	How old are you?	60-110 Go to Q2	≦ 59 ≧110 Go to end
Q2	Are you a Chinese?	Yes Go to Q3	No Go to end
Q3	Where are you from? ① China ② Hong Kong ③ Taiwan ④ Other	If select ①, ② or ③, Go to Q4	If select ④ Go to end
Q4	Which of the following medical condition do you have? ① congestive heart failure ② Parkinson's disease ③ chronic obstructive pulmonary disease ④ multiple sclerosis ⑤ stroke ⑥ cancer under treatment (e.g., chemotherapy, radiotherapy) ⑦ dementia/Alzheimer's disease ⑧ none of the above	If select ⑧ Go to Q5	If select either ①②③④⑤⑥ or ⑦ Go to end
Q5	Do you usually feel sad, unhappy, and hopeless?	No Go to Q7	Yes Go to Q6
Q6	What did your doctor tell you about this?		If the answer is depression or mental/psychiatric problems Go to end
Q7	Are you wheelchair bound?	No Go to Q8	Yes Go to end
Q8	Are you regularly receiving oxygen therapy, such as using portable oxygen every day?	No Eligible for the study	Yes Go to end

FOR THOSE WHO ARE ELIGIBLE

Screener: Based on the information you have given, you may be a good match for this study. I'd like to tell you more about the study to help you decide whether or not to participate *(The information on the consent form will be told).*

Do you have any question regarding what you have been told?

Interviewee: Y*es – answer her/his questions and make sure she/he totally understands what she/he has been told.*
No – *ask if she/he totally understands what she/he has been told.*

Screener: Would you like to take part in the study?

Interviewee: Yes – *continue*
No – *thank you for her/his time.*

Screener: Great! I need you to sign a consent form before we proceed with this study. I will bring a hard copy of the form for you when we first meet. We will need to discuss your preferences for the time and place for the survey and interviews to be held.

To arrange the surveys and interviews of the study, I will need your contact information.

What is your full name?

_____
Last name First Name

What is your phone number?

Home: _____ or Cell phone: _____

What is your home address? (If the potential subjects select their homes for the interviews, their home address will be collected).

_____

_____
County/City Zip

Closing: Thank you so much for your interest. I will contact you in the next few days to set up the time and place of surveys and interviews, etc.…

FOR THOSE NOT ELIGIBLE

Screener: I'm sorry that you are not a good match for my study. I am very appreciative of your time and interest. Do you have any questions?

Appendix D: Chinese Version of In-Depth Interview Script

深入面談腳本

研究對象識別號: _____ **地點:** _____ **日期:**_____.

我正在進行深入面談來更了解睡眠型態與文化和社會環境有甚麼相關，以及年長者如何闡釋他們的睡眠型態。你的意見對我非常的重要，它將協助我發展措施方案來以改善年長者的睡眠品質，並提供那些照護老年人的醫療從業人員參考資料。這將花費你約 60 分鐘來完這次的面談。如果你同意，此次訪談內容將被錄音*(如果研究對象拒絕被錄音，將現場做筆記)*。你的參與面談完全是自願的，你可以隨時停止面談的進行或拒絕回答任何問題。

這次面談將開始於“大方向引導”的問題：你通常如何度過你的一天？

探索性的問題和後續的問題將被詢問來擴展下列特定的主題。

睡眠型態:

本節著重於瞭解研究對象如何感受他們自己的睡眠型態（例如，總睡眠時數，夜間覺醒，睡眠的潛伏期，以及睡眠品質）

探索性的問題:

1. 你如何評價在過去一個月你的睡眠品質？
2. 依你的看法，你怎麼定義良好的睡眠和不好的睡眠?

可能的後續問題:

1. 為什麼你覺得這樣？
2. 它是如何影響你的睡眠？
3. 你是如何處理它呢？
4. 在白天，你經常做些甚麼？
5. 你為什麼選擇這些睡覺和起床的時刻？
6. 你如何比較你同年齡者的睡眠品質與你自己的睡眠品質?

睡眠習慣

本節主旨在瞭解研究對象的夜間和日間的例行性常規活動（如穿著典型的睡衣、祈禱、小睡、喝含咖啡因的飲料，飲酒或茶，劇烈運動），在過去一個月，這些常規活動可能會影響他們的睡眠型態。

探討性的問題：

1. 你平時在上床睡覺前做些什麼？

可能的後續問題（舉例):

如果研究對象告訴我他們通常在每天下午小睡，我將會問的後續問題是：

1. 為什麼你需要小睡？
2. 你對小睡有何看法？
3. 白天的小睡如何影響你的夜間睡眠?

文化信念和實踐

本節是去瞭解文化如何塑造老年人對老化和健康的觀感，這些觀感可能影響他們的睡眠型態。

***老化:**

探討性的問題：

1. 你對漸漸變老有何感覺?

可能的後續問題:

1. 你如何因應你的漸漸變老？
2. 在你的社區中，人們如何看待漸漸變老?
3. 漸漸變老如何影響你的睡眠?
4. 還有什麼你要告訴我?

***健康:**

探討性的問題：

1. 你如何評價你自己的健康? 為什麼?

可能的後續問題:

1. 依據你的看法，中醫如何與你的睡眠相關?
2. 你做甚麼來維護你的健康?
3. 甚麼會讓你變得更健康?
4. 依據你的看法，睡眠如何和健康有相關?
5. 你的健康信念如何影響你的睡眠?
6. 在你的社區中，人們如何看待健康?
7. 在你的社區中，人們如何維持健康?

孝順

探討性的問題：

1. 在何種程度上你的孩子表現出孝順你?

可能的後續問題:

1. 你對孝順有什麼期望？

2. 依據你的看法，孝順與睡眠有何相關?

社會環境

本節著重於收集有關家庭結構、家庭關係、社交活動以及居住的安排等資料。

*** 家庭系統和家庭關係**

探討性的問題：

1. 請告訴我你的家庭狀況.

可能的後續問題:

1. 你和誰住在一起？
2. 誰是沒和你住在一起的重要家庭成員？
3. 你如何與每一個家庭成員互動？
4. 根據你的看法，家庭關係如何影響你的睡眠?

***社交活動**

探討性的問題：

1. 告訴我你的社交活動

可能的後續問題:

1. 你通常參加什麼社交活動？
2. 根據你的看法，參與社交活動如何影響你的睡眠？
3. 還有什麼事情你想要告訴我?

Appendix D1: English Version of In-Depth Interview Script

IN-DEPTH INTERVIEW SCRIPT

Subject's ID number #: _____ Location: _____ Date:_____

I am conducting this in-depth interview to better understand how sleep patterns are associated with culture and social environment and how seniors interpret their sleep patterns. Your opinion is very important to me. It will help me develop intervention programs to improve elderly sleep quality and provide information for health providers who care for the elderly. It will take you approximately 60 minutes to complete the interview. Upon on your approval, the interview will be audio recorded *(if the subject refuse to be audio recorded, field notes will be taken).* Your participation in this interview is totally voluntary. You can discontinue the interview at any time or refuse to answer any questions.

The interview will be initiated with a "grand tour" question: How do you usually spend your day? Probing questions and follow-up questions will be asked to expand upon specific themes below.

SLEEP PATTERNS:

This section focuses on understanding how the subjects feel about their sleep patterns (e.g., total sleep hours, nighttime awakenings, sleep latency, and sleep quality)

Probing questions:

1. How do you rate your sleep quality during the past month? Why?
2. In your opinion, how do you define good sleep and poor sleep?

Possible follow-up questions:

1. Why do you feel this way?
2. How did it influence your sleep?
3. How did you deal with it?
4. What did you usually do during the daytime?
5. Why did you choose these times for going to sleep and waking up?
6. How would you compare the sleep quality of your peers with your own sleep quality?

SLEEP HABITS:

This section sheds light on understanding the subjects' sleep hygiene behaviors that may influence their sleep patterns during the past month (e.g., wore typical sleeping cloth, prayed, napping, drank beverages containing caffeine, drank alcohol or exercised strenuously).

Probing questions:

1. What do you usually do before you go to bed?

Examples of possible follow-up questions

If subjects tell me that they usually take naps in the afternoon every day. The follow-up questions that I will ask will be:

1. Why do you take a nap?
2. How do you feel about napping?
3. How does daytime napping impact your sleep during the night?

CULTURAL BELIEFS AND PRACTICES:

This section is to understand how culture shapes the perception of older people about aging and health, which may influence their sleep patterns.

Aging:

Probing question:

How do you feel about getting older?

Possible follow-up questions:

1. How do you cope with it?
2. How do people in your community perceive about getting older?
3. How does getting older influence your sleep?
4. Anything else?

Health

Probing question:

1. How do you rate your health? Why?

Possible follow-up questions:

1. In your opinion, how Chinese medicine is associated with your sleep?
2. What do you do to maintain your health?
3. What would make you healthier?
4. In your opinion, how are sleep and health related?
5. How does your health belief influence your sleep?
6. How do people in your community perceive about health?
7. How do people in your community maintain their health?

FILIAL PIETY

Probing question:

1. To what extent do your children demonstrate filial piety to you?

Possible follow-up questions:

1. What is your expectation about filial piety?
2. In your opinion, how is filial piety and sleep related?

SOCIAL ENVIRONMENTS:

This section emphasizes gathering data that relevant to family configurations, family relationships, social activities, and living arrangements.

Family systems and family relationships

Probing question:

1. Tell me about your family.

Possible follow-up questions:

1. Whom do you live with?
2. Who are your important family members that don't live with you?
3. How do you interact with each of your family members?
4. In your opinion, how do family relationships influence your sleep?

Social activities/relationships

Probing question:

1. Tell me about your social activities?

Possible follow-up questions:

1. What social activities do you usually participate in?
2. In your opinion, how does your participation in social activities influence your sleep?
3. Anything else that you want to tell me?

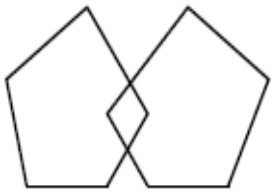
Appendix E: Chinese Version of Mini-Mental Status Exam Questionnaire

簡易心智狀態檢查量表

研究對象身分識別碼: _____ 地點: _____ 日期: _____

謝謝你完成了先前的二份問卷，我正要使用第三份問卷來請你做簡單的計算，依照指示做動作，說出所提供物品的名稱，重複說出你所聽到的話，以及回答與認知能力有關的問題。你將需要花費大約 10 分鐘來完成這第三份問卷。你的參加完全是自願的，你可以在任何時間拒絕回答任何問題。

參數	項目	分數	得分
定向	今年是哪一年?	1	
	現在是哪一季節?	1	
	今天是幾月幾日?	1	
	今天是星期幾?	1	
	現在是幾月?	1	
	我們在哪一個國家?	1	
	我們在哪一個縣?	1	
	我們在哪一個鎮或城市?	1	
	我們在哪一個建築物?	1	
	我們在哪一個街道或樓層?	1	
表達	慢慢和小心地說出以下三項物體名稱，然後請被訪談者覆述這三項物體的名稱。答對一項物體的名稱給一分。 西瓜 鳳梨 香蕉	 1 1 1	
注意力 & 計算能力	由 7 到 35 的 7 系列減法: 35-7=? (28) 28-7=? (21) 21-7=? (15) 15-7=? (8) 8-7=? (1)	 1 1 1 1 1	

回憶	回憶剛才覆述過的三個物體名称，答對一個名稱給一分 西瓜 鳳梨 香蕉	 1 1 1	
語言	請被訪談者辨識一枝鉛筆	1	
	請被訪談者辨識一支手錶	1	
	請被訪談者覆述下列句子: “現在下著傾盆大雨”	1	
	請被訪談者按三個步驟的指令來做動作: “用你的右手拿一張紙” “用兩手將紙對摺” “將紙放在地板上”	 1 1 1	
	閱讀和執行卡片上所顯示的指令：“閉上你的眼睛”	1	
	閱讀和執行卡片上所顯示的指令：“寫下一個句子”	1	
	閱讀和執行卡片上所顯示的指令："複製下列圖形"。圖形中的 10 個角必需被劃出且二個次圖形必須有部分重疊，才可得一分。 	1	

所得總分 = _____

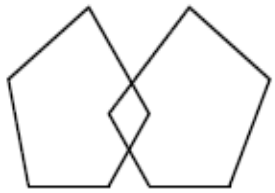
Appendix E1: English Version of Mini-Mental Status Exam Questionnaire

Mini-Mental Status Exam Questionnaire

Subject's ID #: _____ Location: _____ Date: _____

Thank you for completing the previous two questionnaires. I am going to use the third questionnaire to ask you to do a simple calculation, follow the instructions that will be given, name the items demonstrated, repeat what you will be told, and answer questions involving cognitive abilities. It will take approximately 10 minutes to complete. Your participation is totally voluntary. You can refuse to answer questions at any time.

Parameters	**Items**	**Points**	**Points earned**
Orientation	What is the year?	1	
	What is the season?	1	
	What is the date?	1	
	What is the day (of the week)?	1	
	What is the month?	1	
	What state are we in?	1	
	What county are we in?	1	
	What town or city are we in?	1	
	What building are we in?	1	
	Which street or floor are we on?	1	
Registration	Name 3 objects slowly and carefully then ask the interviewee for all 3 items giving 1 point for each correct item named. Watermelon Pineapple Banana	 1 1 1	
Attention & Calculation	Serial 7's from 7 to 35 giving 1 point for each correct. 35-7=28 28-7=21 21-7=15 15-7=8	 1 1 1 1	

	8-7=1	1	
Recall	Ask for names of the 3 objects repeated above giving 1 point for each correct. Watermelon Pineapple Banana	 1 1 1	
Language	Ask the interviewee to identify a pencil.	1	
	Ask the interviewee to identify a watch.	1	
	Ask the interviewee to repeat the following sentence, "it rains cats and dogs."	1	
	Ask the interviewee to follow the 3-stage command: "Take a paper in your right hand" " Fold it in half" "Put it on the floor"	 1 1 1	
	Read and obey a command shown in a card: "Close your eyes.	1	
	Read and obey a command shown in a card: "Write a sentence."	1	
	Read and obey a command shown in a card: "Copy the figure below." To score the point all 10 angles must be present and the two items must p 	1	

Total Scores earned = _____

Appendix F: Chinese Version of Pittsburgh Sleep Quality Index (CPSQI)

研究對象身份識別號：_____ 日期_____ 時間 _____

匹茲堡大學睡眠品質指數

說明：
*下列問題僅與你過去一個月內（過去 **30** 天內）的平常睡眠習慣相關。你的回答應該能最準確反映過去一個月內大多數白天和夜間的情況。請回答所有問題。*

1. 在過去一個月內，你晚上通常什麼時候上床？

上床時間 _____

2. 在過去一個月內，每天晚上通常你需要花多長時間入睡（用分鐘表示）？

分鐘數 _____

3. 在過去一個月內，你通常早上什麼時候起床？

起床時間 _____

4. 在過去一個月內，晚上你實際睡眠時間有幾小時？（這可能與你躺在床上有幾小時不一樣）

每晚睡眠小時數 _____

給下列問題選擇一個最佳答案，請回答所有問題。

5. 在過去一個月內，因以下原因，你有多少次存在睡眠困擾…

a) 無法在 **30** 分鐘內入睡

① 過去一個月內沒有_____	② 一週不到一次_____	③ 一週一至兩次_____	④一週三次以上_____

b) 在半夜或很早醒來

① 過去一個月內沒有_____	② 一週不到一次_____	③ 一週一至兩次_____	④一週三次以上_____

c) 不得不起床上廁所

① 過去一個月內沒有_____	② 一週不到一次_____	③ 一週一至兩次_____	④一週三次以上_____

d) 無法很順暢地呼吸

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

e) 大聲咳嗽或打鼾很響

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

f) 感覺太冷

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

g) 感覺太熱

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

h) 做不好的夢

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

i) 疼痛

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

j) 其它原因，請說明：

_____

_____

在過去一個月內，因這個原因，你有多少次睡眠困擾？

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

6. 在過去一個月內，你如何評價你的整體睡眠品質？

① 很好 _____

② 較好 _____

③較差 _____

④很差 _____

7. 在過去一個月內，你有多少次服用藥物來幫助睡眠（處方或非處方藥）？

① 過去一個月內沒有_____	② 一週不到一次_____	③ 一週一至兩次_____	④一週三次以上_____

8. 在過去一個月內，在開車、吃飯、參加社交活動時，你有多少次覺得保持清醒有困難？

① 過去一個月內沒有_____	② 一週不到一次_____	③ 一週一至兩次_____	④一週三次以上_____

9. 在過去一個月內，要保持足夠的熱情去完成某些事有多困難？

① 一點也不困難 _____

②有輕微的困難 _____

③有些困難 _____

④很困難 _____

10. 有人與你同床或你有室友嗎？

①沒人同床也沒人同住 _____

②夥伴或舍友在其它房間 _____

③夥伴在同一房間但不同床 _____

④有人與我同睡一張床 _____

如果你有室友或同床夥伴，問他/她在過去一個月內，你有多少次…

a) 大聲打鼾

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

b) 在睡眠時長時間的呼吸暫停

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

c) 你睡眠時腿痙攣或抽動

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

d) 夜裡醒來時有短暫的方向感迷失或意識模糊

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

e) 其它在睡眠時不安的事情，請說明：_____

① 過去一個月內沒有_____ ② 一週不到一次_____ ③ 一週一至兩次_____ ④一週三次以上_____

Appendix F1: English Version of Pittsburgh Sleep Quality Index

Pittsburgh Sleep Quality Index (PSQI)

Subject's ID # _____ Date_____ Time_____AM/PM

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, when have you usually gone to bed at night?**
USUAL BED TIME

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

3. **During the past month, when have you usually gotten up in the morning?**
USUAL 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 spend 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**
①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(b) **Wake up in the middle of the night or early morning**
①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(c) **Have to get up to use the bathroom**
①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(d) **Cannot breathe comfortably**
①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(e) **Cough or snore loudly**
①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(f) **Feel too cold**

①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(g) **Feel too hot**

①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(h) **Had bad dreams**

①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(i) **Have pain**

①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week____.

(j) **Other reason(s), please describe: _____.**

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

①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three or more times a week___.

6. **During the past month, how would you rate your sleep quality overall?**

① Very good
② Fairly good
③ Fairly bad
④ Very bad

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

①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three 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?**

①Not during the past month___ ②Less than once a week___ ③Once or twice a week___ ④Three 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?**

① No problem at all _____
② Only a very slight problem _____
③ Somewhat of a problem _____
④ A very big problem _____

10. **Do you have a bed partner or roommate?**

① No bed partner or roommate _____
② Partner/roommate in other room _____
③ Partner in same room, but not same bed _____.
④ Partner in same bed _____.

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

(a) **Loud snoring**

①Not during the past month___ ②Less than once a week__ ③Once or twice a week___ ④Three or more times a week___.

(b) **Long pauses between breaths while asleep**

①Not during the past month___ ②Less than once a week__ ③Once or twice a week___ ④Three or more times a week___.

(c) **Legs twitching or jerking while you sleep**

①Not during the past month___ ②Less than once a week__ ③Once or twice a week___ ④Three or more times a week____.

(d) **Episodes of disorientation or contusion during sleep**

①Not during the past month___ ②Less than once a week__ ③Once or twice a week___ ④Three or more times a week____.

(e) **Other restlessness while you sleep; please describe**

①Not during the past month___ ②Less than once a week__ ③Once or twice a week___ ④Three or more times a week____.

Appendix G: Chinese Version of Demographic and Sleep Habit Questionnaire

人口基本資料/睡眠習慣問卷

研究對象身分識別號: _____ **地點:** _____ **日期:**_____.

下列問題將詢問關於你個人的基本資料，你即將提供的資料將被保密，你可以拒絕回答列在這份問卷的任何問題。這份問卷將花費你 5 分鐘的時間來完成。

1. 種族分類

① 在台灣出生的華人 _____

② 從大陸來的華人 _____

③ 從香港來的華人 _____

2. 性別（請圈選一個）

① 男性 _____

② 女性 _____

3. 出生年月日？ _____年_____月_____日

4. 最高的教育程度(請圈選一個)

① 國中以下(含不識字和未受正式教育) _____

② 國中或同等學歷 _____

③ 高中畢業或同等學歷 _____

④ 副學士或大學肄業 _____

⑤ 學士 _____

⑥ 碩士 _____

⑦ 博士 _____

⑧ 拒絕回答 _____

5. 婚姻狀態（請圈選一個）

① 未婚 _____

② 已婚 _____

③ 同居 _____

④ 喪偶 _____

⑤ 離婚 _____

⑥ 分居 _____

⑦ 拒絕回答 _____

6. 職業狀況

① 退休 _____ 請寫下你以前的工作職稱_____.

② 全職（每週≧40 小時） _____ 請寫下你的工作職稱_____.

③ 非全職（每週< 40 小時） _____ 請寫下你的工作職稱_____.

④ 目前無業 _____.

⑤ 拒絕回答 _____.

7. 目前居住狀況

① 遊民 _____

② 獨居 _____

③ 和配偶/伴侶 _____

④ 和自己的小孩住在一起 _____

⑤ 和親戚(不是自己小孩)住在一起 _____

⑥ 和室友(不是親戚)住在一起 _____

⑦ 和照顧者(不是親戚)住在一起 _____

⑧ 拒絕回答 _____

⑨ 其他：請說明：_____

8.　每年家庭/家戶收入(請圈選一個)

① 少於 NT$300,000 _____

② NT$300,000 ~NT$599,999 _____

③ NT$600,000 ~NT$899,999 _____

④ NT$900,000 ~NT$1199,999 _____

⑤ NT$1200,000 ~NT$1499,999 _____

⑥ NT$1500,000 ~NT$1799,999 _____

⑦ NT$1800,000 ~NT$2099,999 _____

⑧ NT$2100,000 ~NT$23999,999 _____

⑨ NT$2400,000 ~NT$2699,999 _____

⑩ NT$2700,000 ~NT$2999,999 _____

⑪ 多於 NT$3000,000 _____

⑫ 不知道/拒絕回答 _____

9.　你有任何關心的醫療狀況嗎?(請圈選一個)

① 是，請說明狀況: _____.

_____.

_____.

② 否:_____.

10.　你有規則性地服用藥物嗎?(請圈選一個)

① 是，請列出你的藥物名稱: _____.

_____.

② 否:_____.

11.　你每天喝下列哪一種飲料?(請圈選一個)

① 茶:

請說明你喝的茶的名稱:_____.

請說明你每天喝幾杯茶: _____.

② 咖啡：請說明你每天喝幾杯：_____.

③ 以上皆否：_____.

12. 你喝酒嗎？（請圈選一個）

① 是：請說明每天你所喝的酒總量：_____杯/瓶

② 否：_____.

13. 你經常在甚麼時候小睡？（請圈選所有適合的）

① 在早上 _____.

② 在下午 _____.

③ 在晚上 _____.

④ 沒小睡 _____.

如果你圈選 ①、②或③，請回答第 14 題，如果你圈選 ④，你已經完成填寫這份問卷。

14. 你每天小睡幾次？（請圈選一個）

① 每天一次 _____.

② 每天二次 _____.

③ 每天三次 _____.

④ 每天四次 _____.

⑤ 每天五次 _____.

⑥ 每天多於五次 _____.

15. 你小睡的時間平均多久 ？（請圈選一個）

① 少於 30 分鐘 _____.

② 30 分鐘 ~ 1 小時 _____.

③ 1 小時 ~ 2 小時 _____.

④ 多於 2 小時 _____.

問卷到此結束~ 謝謝您 ！

Appendix G1: English Version of Demographic and Sleep Habit Questionnaire

Demographic/Sleep Habit Questionnaire

Subject's ID number #: _____ **Location:** _____ **Date:**____

The following questions will ask you about your personal information. The information you will provide will be kept confidential. You could refuse to answer any questions shown in the form. It will take you about 5 minutes to complete.

1. **Racial Categories** (mark one)
   - ① Chinese born in Taiwan _____
   - ② Chinese from Mainland China _____
   - ③ Chinese from Hong Kong _____

2. **Gender** (mark one)
   - ① Male _____
   - ② Female _____

3. **Date of your birthday?** _____ (Month/Day/Year)

4. **Highest Level of Education** (mark one)
   - ① Less than 9th grade _____
   - ② 9th grade or GED _____
   - ③ 12th grade or GED _____
   - ④ AA degree/some college _____
   - ⑤ Bachelor's degree _____
   - ⑥ Master's degree _____
   - ⑦ Doctorate degree _____
   - ⑧ Declined _____

5. **Marital Status** (mark one)
   - ① Single _____
   - ② Married _____
   - ③ Partnered _____
   - ④ Widow(er) _____
   - ⑤ Divorced _____
   - ⑥ Separated _____
   - ⑦ Declined _____

6. Employment Status (mark one)

① Retired _____ write in past Job Title __

② Full time (≧40 hrs/wk) _____ write in Job Title _____

③ Part time (< 40 hrs/wk) _____ write in Job Title _____

④ Unemployed currently _____

⑤ Declined _____

7. Current Living Arrangement (mark one)

①Homeless _____

②Live alone _____

③With spouse/partner/SO _____

④With Children _____

⑤With relatives (non-children) _____

⑥With roommate(s)(non-relative) _____

⑦With caregiver (non-relative) _____

⑧Declined _____

⑨Other (specify below) :

_____

8. Annual Family/Household Income (mark one)

①Less than NT$300,000 _____

②NT$300,000 ~NT$599,999 _____

③NT$600,000 ~NT$899,999 _____

④NT$900,000 ~NT$1199,999 _____

⑤NT$1200,000 ~NT$1499,999 _____

⑥NT$1500,000 ~NT$1799,999 _____

⑦NT$1800,000 ~NT$2099,999 _____

⑧NT$2100,000 ~NT$23999,999 _____

⑨NT$2400,000 ~NT$2699,999 _____

⑩NT$2700,000 ~NT$2999,999 _____

⑪More than $3000,000 _____

⑫Unknown/Declined _____

9. Do you have any medical conditions that are of concern? (mark one)

① Yes, please specify them : _____

_____

② No _____

10. Do you take medications regularly? (mark one)

① Yes, please specify your medications: _____

② No _____

11. Which of following beverages do you drink every day? (mark one)

① Tea :
specify what kind of tea do you drink: _____
specify how many cups of tea do you drink per day: _____

② Coffee (specify how many cups do you drink per day)_____

③ None of above:_____

12. Do you drink alcohol? (mark one)

① Yes: specify the amount of alcohol you consume per day: _____
glasses/bottles

② No _____

13. **When do you usually take a nap?** (select all that apply)

① In the morning _____

② In the afternoon _____

③ In the evening _____

④ Not napping _____

If you mark either ①, ② or③, please answer Q14. If you mark ④, you have completed this questionnaire.

14. How often do you nap per day? (mark one)

① Once a day _____

② Twice a day _____

③ Three times per day _____

④ Four times per day _____

⑤ Five times per day _____

⑥ More than 5 times per day _____

15. What is the average duration of your nap time ?(mark one)

① Less than 30 minutes _____

② 30 minutes ~1 hour _____

③ 1 hour ~ 2 hours _____

④ More than 2 hours _____

End of the Survey ~ Thank you!

Appendix H: Audit Trail of Qualitative Inquiry

Audit Trail of Qualitative Inquiry

I am helping Jong-Ni Lin ensure the trustworthiness of her study entitled "Sleep Patterns in Relation to Aging, Culture, and Social Environment in Chinese Elderly". I affirm that I have carefully read and asked questions about the documents relevant to her study which was conducted in 2012. I hereby certify the information provided below in this audit trail is true and correct to the best of my knowleadge and belief.

Audit trail categories

1) Raw data

☐ audio recordings ☐ interview transcripts ☐ written field notes

☐ written questionnaire data ☐ quantitative data in SPSS

2) Data analysis and synthesis products

☐ coding scheme and data mixing plan ☐ summaries of significant codes and themes

☐ codebook ☐ quantitative data output in SPSS ☐ draft of research result

3) Process information

☐ process notes ☐ initial **s**tatistical tables ☐ initial coding results ☐ approved IRB modification materials ☐ consultations (emails and notes)

4) Instrument development information: pilot forms and materials

☐ recruitment flyers ☐ recruitment screening scripts ☐ interview script

☐ questionnaires ☐ coding worksheet

5) **Materials relevant to intentions and dispositions**

☐ inquiry proposal ☐ approved IRB application materials ☐ personal notes

……

Name of Auditor: _____ Title:_____.

Signature: _____ Date: _____.

Name of investigator: Jong-Ni Lin Title: PhC, School of Nursing, University of Washington

Signature: _____ Date:_____.