

**OLDER JAPANESE ADULTS' RELIGIOSITY:
RELATIONSHIP WITH AGE; GENDER;
PHYSICAL, MENTAL, AND COGNITIVE HEALTH;
SUBJECTIVE FEELINGS ABOUT HEALTH;
SOCIAL SUPPORT/INTEGRATION;
AND
HEALTH PROMOTION BEHAVIORS**

by

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DEDICATION

To Ichio Imamura, my father, my inspiration,
and who has been the source of my spirituality theory.

To Kazuko Imamura, my mother, my soul mate,
the Sun Goddess of my family,
and who continues to support me
throughout my academic and professional endeavor.

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TABLE OF CONTENTS

DEDICATION	ii
ACKNOWLEDGEMENT	iii
LISTS OF FIGURES	vii
LISTS OF TABLES	viii
ABSTRACT	x
CHAPTER 1	
INTRODUCTION	1
Statement of the Problem	1
Purpose	1
Background and Significance	2
Specific Aims and Hypotheses	11
Definitions of Variables	14
Format of the Dissertation	23
CHAPTER 2	
REVIEW OF THE LITERATURE	25
Japanese Religions	26
Review of Empirical Studies Regarding Religiosity	31
Conceptual Model of Religiosity for Elderly Japanese	62
CHAPTER 3	
METHODOLOGY	65
Research Design	65
Research Sample	65
Measurements	72
Data Analysis.....	84
Path Diagram.....	85
Human Subjects Protection.....	85
CHAPTER 4	
STUDY RESULTS.....	87
Section 1: Descriptive Statistics.....	88
Section 2: Specific Aims and Hypotheses Testing.....	95
CHAPTER 5	
DISCUSSION.....	117
Introduction	117
Summary and Discussion of the Results.....	118
Limitations of the Study.....	137

	Implications	139
	Summary	141
REFERENCES	.....	176

LIST OF FIGURES

Figure

2.1 Conceptual Model	144
3.1 Path Model (Initial Model)	156
4.1 Path Model (Final Model)	173

LIST OF TABLES

Table

3.1	Potential Sample for Wave 5 in 1999.....	67
3.2	Number of Study Participants by Age Groups for Un-Weighted and Weighted	69
3.3	Missing Data for Study Variables	71
3.4	Descriptive Statistics and Distributions of Study Variables.....	72
3.5	Measures of Study Variables	145
4.1	Demographic Characteristics of Study Subjects	89
4.2	Descriptive Statistics of Study Variables	157
4.3	One-Way Analysis of Variance Summary for Age-Group Differences in Religiosity	96
4.4	Multiple Comparison of Religiosity among Three Age Groups (Weighted Data)	97
4.5	Means and Standard Deviations for Religiosity across Age and Gender Groups	98
4.6	Gender Differences in Each Age Group	98
4.7	Analysis of Variance Results with Religiosity being the Dependent Variable and Age-by-Gender Interaction	99
4.8	Analysis of Variance Results with Religiosity being the Dependent Variable and Main Effects Only	100
4.9	Multiple Comparison of Religiosity among Three Age	

	Groups (Un-Weighted Data)	100
4.10	Summary of Logistic Regression Analyses for Religiosity Predicting Health Status, Social Support/Integration, and Health Promotion Behaviors in Elderly Japanese	101
4.11	Multiple Linear Regression Analyses Summary for Religiosity Predicting Health Status, Social Support/Integration, and Health Promotion Behaviors in Elderly Japanese	102
4.12	Mediating Effects of Religiosity on the Relationships between Age/Gender and Health/ Health Promotion Behaviors	161
4.13	Mediating Effects of Health Variables on the Relationships between Religiosity and Health Promotion Behaviors	165
4.14	Pearson's Correlations among Study Variables	171
4.15	Goodness-of-Fit Indicators of the Full Model	172
4.16	Estimates of Path Coefficients	174
4.17	Direct, Indirect, and Total Effects of Demographics and Religiosity on Health and Health Promotion Behaviors	175

ABSTRACT

The purpose of this study was to identify predictors of older Japanese adults' health promotion behaviors by examining relationships between their religiosity and age; gender; physical, mental, and cognitive health status; subjective feelings about health; social support/integration; and health promotion behaviors, including physical activity and alcohol and tobacco use through a cross-sectional secondary analysis of a data set from a study of Japanese elders (Liang et al., 1999).

A weighted sample of 1,897 community-dwelling Japanese men and women age 65 and older were divided into three age groups: 65 to 74 years ($n = 1,054$), 75 to 84 years ($n = 721$), and 85 years and older ($n = 122$). ANOVA models identified that the group 75-84 and 85+ had a significantly higher level of religiosity than did the group 65-74. For all the three age groups, women had greater levels of religiosity than did men.

Multiple linear regression and logistic regression analyses revealed that religiosity was associated with chronic health problems, depressive symptoms, being employed, satisfaction with health status, greater perception of social support, greater number of children, more physical activity, less memory impairment, being unmarried or widowed, and less

tobacco use. Results of the Sobel test also identified that religiosity partially mediated gender effects on chronic diseases, depressive symptoms, marital status, and tobacco use. Religiosity also partially mediated age effects on memory impairment, marital status, and the number of children. Mobility partially mediated religiosity effects on alcohol use and tobacco use, and marital status partially mediated religiosity effects on alcohol use and tobacco use.

The path model fit the data well [e.g., $\chi^2=368.309$, $df=114$, $\chi^2/df=3.231$, RMSEA = .046 (90% CI= .041, .051), PCLOSE = .899, CFI = .916] after removing insignificant paths and performing modification indices. The model explained 21.5% of the variance in physical activity, 17.8% in alcohol use, and 14.0% in tobacco use. Religiosity was positively related to physical activity and negatively related to tobacco use, but was not associated with alcohol use. To more holistically understand Japanese elders' health promotion behaviors, studies that include additional variables, such as *ikigai*, are recommended.

CHAPTER 1

INTRODUCTION

Statement of the Problem

The growth of the aging portion of the population is a major public health concern in Japan. The increasing number of older people with acute and chronic health conditions burdens both citizens and the nation with the provision of care for these elders and with health care expenditures. This burden will continue to grow as the number of older people is expected to increase in the future (Health and Welfare Statistics Association, 2004b). Therefore, promoting health and preventing illnesses for senior citizens focusing on their *Kokoro*, *spirit*, or *religiosity* is an urgent component of the public health agenda in Japan in order to improve the quality of life of elders and to prevent economic crisis of individuals and of the nation.

Purpose

The overall purpose of this dissertation research was to identify predictors of older Japanese adults' health promotion behaviors by examining relationships between their religiosity and their demographic characteristics of age and gender; physical, mental, and cognitive health status; subjective feelings about health; social support/integration; and health promotion

behaviors, including physical activity and alcohol and cigarette consumption through a secondary analysis of an existing data set from a study of Japanese elders (Liang et al., 1999).

Background and Significance

Aging in Japan

Japan enjoys the highest longevity in the world, with expected life expectancies for both females (85.23 years) and males (78.32 years) well above international averages in 2002 (Health and Welfare Statistics Association, 2004b). This long life expectancy in Japan has been achieved by several factors, including a decreased death rate resulting from the improvement of public health conditions and the nations' dietary patterns, breakthroughs in medical technology, and a declining birth-rate (i.e., on average 1.29 children per reproductive Japanese woman 15-49 years old in 2003 (Health and Welfare Statistics Association, 1999)).

Because of these factors, Japan experienced a remarkable and rapid increase in its elderly population. While the percentage of Japanese people 65 years of age or older was only 4.9 in 1950, it rose to 7.1 in 1970 and to 18.5 in 2002. The percentage of people over the age of 65 increased from 7% to 14% of the total population in Japan in only 25 years. In other countries, such as England and France, these kinds of increases happened over 45 years and 115 years, respectively (Health and Welfare Statistics Association, 1999). By

2030, the number of people 65 years or older is estimated to be 34.8 million, or approximately 30% of the total population of Japan (Health and Welfare Statistics Association, 2004a).

Increasing Elders with Health Problems

Despite the fact that Japan has the greatest longevity in the world, elders' health continues to be threatened by chronic and acute health conditions, such as cancer, cerebral- and cardio-vascular diseases (which are major causes of morbidity and mortality in Japan) as well as hypertension, diabetes, respiratory diseases, osteoporosis, arthritis, back pain, and being bedridden (Health and Welfare Statistics Association, 2004a).

In the Japanese census in 2001 (Health and Welfare Statistics Association, 2004a), cancer and cerebral- and cardio-vascular diseases were reported as the three major causes of death for Japanese people. The reported prevalence of each of these conditions for younger people (i.e., age 64 years and younger) was 3.7, 10.6, and 14.6 per 1,000 population, while for older people (i.e., age 65 years and older) the prevalence was 7.7, 41.0, and 55.3 per same population, respectively. Compared to younger people, older people were reported to have a higher prevalence of hypertension (71.7 versus 224.3) and diabetes (24.7 versus 68.3); these conditions contribute to the three major causes of death. Further, compared to younger people, older people also had a higher prevalence of other acute and chronic health

conditions, such as respiratory diseases (7.7 versus 20.6), osteoporosis (10.3 versus 46.8), arthritis (18.4 versus 62.0), and back pain (40.1 versus 110.0).

In addition to these physical health problems, older people also are reported to suffer more from mental illness, such as depression and schizophrenia, than do younger people (5.0 versus 3.3) (Health and Welfare Statistics Association, 2004a). Further, prevalence of memory impairment or dementia also increases along with aging (0.3 / 1,000 for younger people while 9.7 / 1,000 for older people).

Because of the increasing number of older people with acute and chronic health problems, deteriorated health status, limited functional abilities, including being bedridden, large numbers of facilities to provide care for these older people have been built in Japan. The number of these care facilities for elders grew from 4,610 in 1985 to 33,419 in 2002, a seven-fold-increment during that 17-year period (Health and Welfare Statistics Association, 2004b). Currently in Japan, about one half of older adults (52.2%) live with their children or other family members (Ministry of Health Statistics and Information Department, 1998). Institutionalization may not only limit elders' usual daily activities but may also disconnect them from their family and other people in the community. This can decrease their quality-of-life.

Japanese Health Policies

In 2000, the Ministry of Health, Labor, and Welfare of Japan announced *Healthy Japan 21*, a health promotion policy within the national health promotion movement in the 21st century. In fact, this new measure follows the First-Phase Measures for National Health Promotion implemented from 1978 to 1988 and *Active 80 Health Plan*, the Second-Phase Measures for a National Health Promotion launched in 1988 (Health and Welfare Statistics Association, 2004a). The former measures contributed to achieving a certain level of health promotion and disease prevention for Japanese citizens. For instance, a high percentage of the population received health examinations and screening. Under these policies, health promotion centers also were established in local communities, and health promotion professionals, such as nurses, public health nurses, dieticians, and dental hygienists, were assigned to these health promotion centers to provide and facilitate effective health-promotion and disease-prevention activities for individuals in the community.

Further, under the Elderly Health Act established in 1983, health professionals at community centers provide several health-promotion and disease-prevention programs to residents age 40 years or older. The programs include health education and consultation, annual health checks and several mass screenings (e.g., cancers, osteoporosis, diabetes,

hypertension, and others), delivering a health notebook, rehabilitation, and home visit care. An annual chest X-ray for TB screening is also provided under the responsibility of the local government.

In spite of these efforts by the Japanese government, the number of older adults with acute and chronic health conditions continues to rise year by year. Thus, in addition to these traditional provisions of early disease detection and health protection within prior health policies, the current health movement, *Healthy Japan 21*, further emphasizes health promotion by aiming at promoting citizens' health holistically. This focus is intended to decrease premature deaths and extend *health expectancy*, or the duration in which people can live free from being demented or bedridden (Health and Welfare Statistics Association, 2004a). The areas to be addressed include improving healthy dietary habits and physical activity; controlling smoking and alcohol habits; maintaining good oral health; preventing diabetes, circulatory organ diseases, and cancer; and promoting appropriate relaxation and *Kokoro-no-Kenkou*, which can be interpreted as well-being of mind and spirit. Along with the National Long-Term Care Act launched in 2000, *Healthy Japan 21* also enhances community-based health education programs for the elderly to prevent falls so as to avoid becoming bedridden. Unlike former Japanese health policies, Healthy Japan 21 set numerical targets for each health promotion program. This should be done in order to

evaluate the success of each program in meeting its goals by 2010 (Health and Welfare Statistics Association, 2004a).

Kokoro, Spirit, or Religiosity: A Significant Predictor for Older Adults'

Health Promotion

Indeed, the health-promotion or disease-prevention measures emphasized by *Healthy Japan 21* relate to people's morbidity, mortality, and quality of life. These measures also are acknowledged in the health policy of the United States [US] (U.S. Department of Health and Human Services, 2000), where similar health concerns for its aging citizens are emerging. In addition to these health-promotion measures, U.S. scientific studies acknowledge *religiosity* as a significant predictor of people's health.

Religiosity, or religious beliefs and practices, may be an important factor in maintaining and promoting people's health and healthy behaviors. This notion especially may be true for those who have deteriorated health conditions (Bearon & Koenig, 1990; Reed, 1987), such as older individuals. In fact, studies have reported positive influences of religiosity on older individuals' health and health promotion behaviors. For example, older adults' greater religiosity has been found to be associated with their improved physical and mental health status (Nelson, 1990) and their lowered mortality (Omen & Reed, 1998; Strawbridge, Cohen, Shema, & Kaplan, 1997). In addition, older adults' greater religiosity has also been found to contribute to

reduced tobacco consumption (Roff, Klemmack, Koenig, Sawyer-Baker, & Allman, 2005; Strawbridge et al., 1997), decreased alcohol intake (Pascucci & Loving, 1997), and increased physical activities (Roff et al., 2005).

Japanese health administrators and policy makers also have recognized the importance of spiritual or religious dimension of health, as *Healthy Japan 21* emphasizes health promotion based on *kokoro*, mind, and spirit. Actually, the inclusion of *koroko*, or a spiritual dimension, is the prime strategy of the new Japanese health policy, *Healthy Japan 21*. By including *kokoro*, or spiritual dimension, the Japanese government attempted to holistically promote people's health and well-being.

Kokoro is a Japanese term that generically expresses the state of a person's spirit (*ki*), inner deeper mind (*seishin*), will (*ishi*), and feelings/emotions (*kanjou*) (Hisamatsu, Hayashi, & Itakura, 1973). In fact, *kokoro* embraces spirit, and the term is often used in relation to religion. For example, a Japanese sentiment *Kokoro-no-Shuuyou*, or training or discipline of mind, is associated with religious practices. Based on this notion, for the purpose of the dissertation research, the investigator proposes that *kokoro* is related to people's religiosity.

Since *kokoro* signifies spirit, the spiritual or religious aspects of Japanese elders should be considered and included in the scope of health promotion. To holistically assess their client's well-being and to care for and

heal their client as a whole person, nurses acknowledge spiritual aspects of their client and integrate the spiritual environment of their client in curative elements of practices along with mental, physical, and social factors (Lancaster, 1996; Morris, 1996). To provide Japanese elders with a holistic health care program, nurses and health care professionals should address elders' health-promotion behaviors not only from physical, mental, and social points-of-view but also from spiritual or religious viewpoints.

Lack of Study Regarding Japanese Elders' Religiosity for their Health Promotion

Nevertheless, in the Japanese health policy, a clear-cut definition of the term *kokoro* is not provided. The important roles of religion or religiosity—religious beliefs and practices—to promote elders' health also are not explicated in the health policy. This gap may be because of lack of scientific evidence regarding the effects of *kokoro*, or religiosity, in promoting Japanese elders' health. To date, the majority of studies regarding religiosity and health have been carried out in the US. (Krause, Liang, Bennett, & Kobayashi, 2008). Few scientific studies have been undertaken to explore relationships among older Japanese adults' religiosity, health factors, and demographic characteristics, such as age and gender (Krause et al., 2008). Due to a lack of scientific studies, the significance of religiosity in predicting older adults' health promotion behaviors also has not been recognized widely.

Furthermore, in the U.S., nurses and other health care professionals have developed and provided effective health promotion programs incorporating the religiosity of elders and other age groups of people (Flynn, 2001; Lasater, Carleton, & Wells, 1991; Weis, Matheus, & Schank, 1997). In contrast, in Japan, religiosity has rarely been reflected or encompassed in health promotion programs for older adults. The shortage of research findings and a lack of understanding regarding the significance of religiosity in promoting health may discourage nurses and health care professionals from creating evidence-based health care programs on religiosity for their older clients.

If associations among elders' *kokoro*, spirit, or religiosity, health factors, and health promotion behaviors are not clarified, and important predictors of health promotion for Japanese elders are not identified, effective and comprehensive health promotion programs for these elders cannot be developed, and goals of the national health policy cannot be achieved. Therefore, examining the significance of religiosity, health measures/dimensions, and demographic characteristics in predicting Japanese elders' health promotion behaviors is essential. Because the relationships between older Japanese adults' religiosity and their health and health promoting behaviors have not adequately been studied in current health sciences, this dissertation research aims to examine these relationships.

Specific Aims and Hypotheses

In order to understand the relationship of religiosity to these health factors (i.e., physical, mental, and cognitive health; subjective feelings about health; and social support/integration) and health promoting behaviors (physical activity and alcohol and tobacco use), the specific aims and corresponding hypotheses of this research are developed as follows:

Specific Aim 1:

Determine the relationships between demographic factors of age and gender and level of religiosity in elderly Japanese.

Hypothesis 1.1:

Among three age groups of Japanese elders (i.e., 65 to 74 years old, 75 to 84 years old, and 85 years old and over), those who are in oldest age group report greater religiosity than those in younger age groups.

Hypothesis 1.2:

Elderly Japanese women report greater religiosity than elderly Japanese men across all age groups and within each age group.

Specific Aim 2:

Determine the relationships between religiosity, and health factors and health promotion behaviors in elderly Japanese.

Hypothesis 2.1:

In elderly Japanese, religiosity is positively related to physical health

status (i.e., ADL/IADL [Activity of Daily Living/Instrumental ADL], mobility, and presence of chronic disease), subjective feelings about health (i.e., satisfaction about health status and health comparison to other people with the same age), social support and social integration (i.e., the perception about support, marital status, working status, number of children, living condition with children) and is negatively related to mental health status (i.e., depressive symptoms) and cognitive health status (i.e., memory impairment), controlling for age and gender.

Hypothesis 2.2

In elderly Japanese, religiosity is positively related to a health promotion behavior of physical activity and is negatively related to alcohol use and tobacco use, controlling for age and gender.

Specific Aim 3:

Determine

if religiosity mediates the effects of demographic factors on health factors and health promotion behaviors in elderly Japanese.

Hypothesis 3.1:

Elderly Japanese adults' religiosity mediates the effects of age and gender on physical, mental, and cognitive health; subjective feelings about health; social support/integration; and health promotion

behaviors of physical activities and alcohol and tobacco use.

Specific Aim 4:

Determine whether the effects of religiosity on health promotion behaviors in elderly Japanese are mediated by the health factors of the elderly.

Hypothesis 4.1:

Elderly Japanese adults' physical, mental, and cognitive health status; subjective feelings about health; and state of social support/integration mediate the effect of religiosity on health promotion behaviors of physical activities and alcohol and tobacco use.

Specific Aim 5:

Determine the ability of the proposed model to explain health promotion behaviors in Japanese elderly.

Hypothesis 5.1:

The proposed model will explain significant variance in the health promotion behaviors in Japanese elderly.

The findings from this dissertation research will clarify important predictors for Japanese elders' health promotion. To date, the evidence concerning the relationship of religiosity to maintenance and promotion of health and healthy behaviors of older Japanese adults is absent from the health science literature. However, if through this research religiosity is

found to be significantly related to Japanese elders' health and health promotion behaviors, then inclusion of religiosity in health promotion programs for older people becomes significant for Japan. If it is significant, then the investigator can assist development of a conceptual framework that better accounts for the relationships between religiosity, health, and health promotion behaviors.

The findings of this research can provide the scientific foundation for including in the development of intervention strategies. The research findings also can help nurses and other health care professionals develop culturally sensitive, effective health promotion programs encompassing older Japanese adults' religiosity.

Definitions of Variables

Religiosity

Theoretical Definition

For the purpose of this study, the investigator defines *religiosity* as a person's religious coping and his/her using private religious practices to express his/her religious beliefs. *Kokoro*, which the investigator interprets as religiosity, is inherent in the definition of religiosity for this dissertation.

In current health science literature, a universal definition for the concept of *religious coping* has not been identified. However, in their article, Pargament and colleagues (1992, p.505) explain religious coping as "coping

activity” and “coping process” using religious sources to deal with “stressful events” and “difficult moments” of life. Referring to this explanation, for this dissertation the investigator defines *religious coping* as a person’s stress coping strategies generated by his/her religious beliefs.

According to Krause, Liang, Bennett, and Kobayashi (unpublished manuscript) one’s religious practices can be explained by private and organizational religious practices. *Private religious practices* reflect non-organizational religiosity which has to do with religious activities that typically take place in private, while *organizational religious practices* refer to organizational religiosity or religious practices performed at a formal religious organization (Krause, Liang, Bennett & Kobayashi, unpublished manuscript). Unlike U.S. elders, the majority of Japanese elders engage more in private religious practices at home than in organizational religious practices in external settings (Krause et al., 2008). Based on this information, in the current study the investigator will focus on exploring Japanese elders’ private religious practices rather than their organizational practices. To holistically address the religiosity of older Japanese adults, in this study the investigator defines *religiosity* as including both a person’s *religious coping* and his/her using *private religious practices* to express his/her religious beliefs.

Operational Definition

Indicators of religiosity include three religious coping strategies and the frequency of private religious practices. In other words, *religiosity* is explained as the integration of a person's religious coping (i.e., stress coping strategies generated by his/her religious beliefs) and his/her private religious practices to express his/her religious beliefs. Religiosity is measured in terms of 1) a person's way to cope with stressful or difficult life events generated by his/her religious beliefs and 2) a person's religious practices and activities at home.

Age

Theoretical Definition

Age is theoretically defined as the duration, or the measure of time of the existence of a person (Miller & Brackman-Keane, 1983). In addition, age also refers to the degree of mental mutuality or social senility of a person (Miller & Brackman-Keane, 1983).

Operational Definition

Age is operationally defined as the physical period of time of life, and is calculated by subtracting date of birth from the reference date (National Center for Health Statistics, 2004). In this dissertation, the terms *elderly individuals*, *older adults/persons*, and *elders* are defined by their age being 65 years or older and are interchangeably used. Based on the age classification

of the U.S. Census Bureau (1996), in this dissertation the age of older adults are categorized into three age groups: young-old (i.e., persons age 65 to 74 years old), old-old (age 75 to 84 years old), and oldest-old (age 85 years and over) (U.S. Bureau of the Census, 1996).

Gender

Theoretical Definition

Gender is theoretically defined as the biological character or quality that distinguishes male and female from one another as expressed by individual's genetic information (Pugh, 2000).

Operational Definition

Gender is operationally defined as genetic categories, or phenotypic information, as either male or female, and is determined by self-report.

Physical Health

Theoretical Definition

The theoretical definition of *physical health* refers to the conditions of the functioning of a living organism and its parts, and of the physical and chemical factors and processes involved (Miller & Brackman-Keane, 1983).

Operational Definition

The operational definition of physical health refers to a person's bodily functional capacities and presence of chronic conditions (Wan, 1985).

In other words, the physical health status of Japanese elders is assessed by 1)

limitations in performance of self-care, 2) mobility, and 3) the presence of chronic diseases (Ware, Snow, Kosinski, & Gandek, 1993).

Mental Health

Theoretical Definition

Mental health is theoretically defined as “the state of successful mental functioning, resulting in productive activities, fulfilling relationships, and the ability to adapt to change and cope with adversity” (U.S. Department of Health and Human Services, 2000).

Operational Definition

The operational definition of mental health refers to the absence of behavioral dysfunction and psychological distress (Ware, 1987). Older Japanese adults’ mental health is measured by asking them about 1) the absence or presence of depressive symptoms, 2) their ability of controlling their behavior, thoughts, and feelings during a specific period, and 3) the frequency and intensity of general affect (Ware, 1987).

Cognitive Health

Theoretical Definition

Cognitive health is theoretically defined as the state of a person’s functional ability to engage in conscious intellectual activities such as thinking, reasoning, remembering, imagining, or learning (Gave, 1985).

Operational Definition

Cognitive health is operationally defined as the cognitive conditions of mental functions regarding assessing orientation, attention, recall and memory, language, and construction (Folstein, Folstein, & McHugh, 1975). In this regard, Japanese elders' cognitive health status is determined by the total points of their correct verbal- and written- responses to cognitive questions or commands regarding 1) orientations to time and place, 2) memory, and 3) attention span (Folstein et al., 1975) .

Subjective Feelings about Health

Theoretical Definition

The definition of *subjective feelings about health* is not clearly stated in the literature. However, scholars interchangeably use this concept with other concepts, such as general health perception, self-assessment of health, self-evaluated health, self-rated health, and subjective or perceived health status (see Cockerham, Sharp & Wilcox, 1983; Fillenbaum, 1979; Idler, Kasl & Leke, 1990; Johnson & Wolinsky, 1993; Kaplan & Camacho, 1983; Murry & Tarnopolsky, 1982; Parkatti, Deeg, Bosscher & Launer, 1998; Ware, 1987). Meanwhile, a dictionary defines the noun *perception*, which refers to subjective feelings, as 1) the process, act, result, or faculty of perceiving or recognizing and 2) insight, intuition, or knowledge gained by perceiving, and 3) the capacity for such insight (Berude, 1994). Given these notions, the

investigator theoretically defines subjective feelings about health as a person's faculty to intuit and assess his/her state of health.

Operational Definition

An operational definition of subjective feelings about health is also not described in the literature. However, scholars of health sciences commonly measure subjective feelings about health in terms of a person's subjective self-assessment of their general health (Cockerham, Sharp & Wilcox, 1983; Fillenbaum, 1979; Idler, Kasl & Leke, 1990; Johnson & Wolinsky, 1993; Kaplan & Camacho, 1983; Mossey & Shapiro, 1982; Murry & Tarnopolsky, 1982; Parkatti, Deeg, Bosscher & Launer, 1998). The scholars also point out the tendency for older adults to evaluate their health status by comparing themselves to their peers (Fillenbaum, 1979; Cockerham, Sharp & Wilcox, 1983). Based on the information above, the investigator operationally defines *subjective feelings about health* as the state of a person's feelings about their current health status and about the condition of their health as compared to their peers. An elderly individual's subjective feelings about health is measured in terms of his/her 1) evaluations of his/her overall health status, 2) satisfaction of his/her present health status, and 3) comparison of his/her health to others of the same age.

Social Support/Integration

Theoretical Definition

In this dissertation, the investigator addressed Japanese elders' social support systems extensively from different viewpoints of social support and social integration.

Social support is theoretically defined as a perception of supportive interpersonal interactions with spouses, family members, friends, and other people (Boland, 2000). For the purpose of this dissertation, the investigator theoretically defines *social integration* as a person's basic characteristics or family structure, such as marital status, working condition, number of children, and living status with children, which can promote the person's social interactions with other people. While *social support* focuses on Japanese elders' perception or subjective evaluation about their supportive relationships with other people, *social integration* attempts to objectively or systematically measure elders' support systems, structures, or conditions based on their marital status, working condition, number of children, and living status with their children.

Operational Definition

Social support/integration is measured in terms of 1) the extent to which a person perceives emotional and instrumental support from other people, 2) marital status, 3) working status, 4) number of children, and 5)

living condition with his/her children.

Health Promotion Behaviors

Theoretical Definition

A *health promotion behavior* is theoretically defined as an expression of the human-actualizing tendency that is directed towards optimal well-being, personal fulfillment, and productive living (Pender, Murdaugh, & Parsons, 2001). Different from *disease prevention*, which is concerned with the prevention of a specific disease or health problem of an individual, *health promotion* focuses on increasing the well-being and quality of life of an individual relevant to the goals he/she identified (Loveland-Cherry, 1996).

Operational Definition

A clear operational definition of health promotion behaviors is not identified in the literature. Thus, for the dissertation, the investigator refers to common indicators of health promotion identified in the current Japanese health policy, *Healthy Japan 21*. These indicators of health promotion behaviors include: frequency of three physical activities (i.e., engagement in yard work, exercise/sports, and taking a stroll or walk) and alcohol and tobacco use.

Using these indicators or variables identified in Japanese religions and literature, in the next section the investigator reviews health sciences literature. Significant relationships among religiosity and these health

indicators are examined.

Format of the Dissertation

This dissertation consists of five chapters. Chapter 1 describes the background, significance, purpose, specific aims, and conceptual and operational definitions for this dissertation research. The importance of examining and identifying relationships between Japanese elders' religiosity, *kokoro*, or spirit, and their demographic characteristics of age and gender; health status; subjective feelings about health; social support/integration; and health promotion behaviors is explained. Five specific aims and their corresponding hypotheses are developed to determine 1) the relationships between elderly Japanese adults' age and gender and their religiosity, 2) the associations between these elders' religiosity and their health factors of physical, mental, and cognitive health status; subjective feelings about health; social support/integration; and health promotion behaviors, 3) the mediating effects of elders' religiosity on the relationships between their age and gender, and their health factors and health promotion behaviors, 4) the mediating effects of elders' health factors on the relationships between their religiosity and health promotion behaviors, and 5) the predicting ability of the proposed model which addresses religiosity, age, gender, and health factors for health promotion behaviors in elderly Japanese.

Chapter 2 provides the theoretical and empirical bases for the research.

First, the tenets of the major Japanese religions of Shinto and Buddhism are reviewed to identify the relationships described above within the context of these religious belief systems. U.S. and Japanese health empirical literature is then reviewed to explore and support the relationships among the concepts of religiosity, age and gender, health, subjective feelings about health, social support, and health-promotion behaviors. As a result, a general idea regarding older people's religiosity is understood, and positive and negative relationships between religiosity and other variables are captured. Based upon the findings from the literature review, Chapter 2 concludes by developing a conceptual model for the study.

Chapter 3 describes the methodology used to test hypotheses proposed within the conceptual model. The study design, study sample, measures, and data analyses are described. Chapter 4 presents the results of the data analyses organized by the specific aims. The interpretation and discussion of these findings are presented in Chapter 5.

CHAPTER 2

REVIEW OF THE LITERATURE

In this chapter, the investigator first reviews major Japanese religions of Shinto and Buddhism in order to provide the theoretical basis of elders' religiosity. It is important to understand the religious belief systems of Shinto and Buddhism as a basis for the dissertation research. A unique feature of these Japanese religions is to embrace concepts of *Jiriki*, which represents self-empowerment or self-determination, and *Tariki*, which represents other power, either in divinities or in other people.

Compared to other religions, such as Christianity, which emphasize a person's entire reliance on divine power, the Japanese religions explain the mutual reliance between the self (*jiriki*) and higher powers (*tariki*) (Suzuki, 1970, 1972). These unique concepts of Japanese religions may influence Japanese elders' health status and health promoting behaviors. Further, reviewing these Japanese religious belief systems also identified important health concepts or variables relating to Japanese religiosity. Variables identified were used to structure the conceptual model for this dissertation research.

Second, a review of the scientific literature that examines and

supports the relationships among the concepts of religiosity, health status, subjective feelings about health, social support, and health promotion behaviors is presented. Also other concepts relevant to elderly Japanese adults' religiosity, such as the demographic characteristics of age and gender, are examined. As mentioned in Chapter 1, to date, few studies have been conducted and little is known about Japanese elders' religiosity. To address this gap in the knowledge base, studies carried out in the U.S. along with those conducted in Japan are reviewed. Reviewing empirical studies in these countries contributed to the articulation of the associations among the above concepts and to the development of hypotheses regarding older Japanese adults' religiosity.

Finally, based on the literature review, the conceptual model which delineates hypotheses for the study is developed.

Japanese Religions

Shinto and Buddhism: Predominant Religions in Japan

In Japan, Shinto and Buddhism are considered the major religions. "The Japanese Constitution states citizens' religious freedom, and the Japanese government does not conduct statistical surveys on religion" (Japan Almanac Asahi Shimbun, 1999). One survey conducted by a private company estimates that about 92% of the total population in Japan reported that they were Shinto, while 71% of those said they practice Buddhism (Travel

Company, 2004). This section describes each of these two traditional belief systems of Japanese people.

Shinto

Since ancient times, Shinto has been a unique indigenous Japanese belief system with animistic and shamanistic qualities (Ono, 1962; Picken, 1980). Different from Western monotheistic religions such as Christianity, *Shinto* is a pantheistic belief system honoring collective divines that attribute every entity (Picken, 1994). Shinto believers hold multiple gods, or *kami*. In the archaic Japanese culture, the world was viewed to be full of *kami*, or sacred presences in the form of awe-inspiring natural entities, such as the sun, mountains, trees, rivers, and waterfalls; personal deities; ghosts; guardian spirits; and divine humans (Ono, 1962). In the ancient rituals of the Japanese, it is believed that humans lived in harmony with these natural entities and benefited from the higher powers in their lives through these internal relationship with *kami* (Ono, 1962). This gentle, optimistic, and universal concept of Shinto represents one enduring aspect in the Japanese belief system. Further, Japanese people have merged this aspect of the Shinto belief system into the pessimistic and rigorous doctrine of Buddhism (Picken, 1980).

Buddhism

Introduced to Japan from India through China in the 6th century,

Buddhism is another major religious belief system of the Japanese people (Suzuki, 1972). In Buddhism, a person is considered to possess *shiku*, or the four fundamental griefs of birth, aging, illness, and death (Inoue, 1947). In the doctrine of Buddhism, it is suggested that, while good people will die in peace, go to *Jodo* or heaven, and reincarnate as a human, sinful people will get serious illness, go to hell to be punished, and are never able to be born again as humans, but only as beasts (Inoue, 1947). Thus, to escape these griefs and go to *jodo*, Buddhism guides people to adhere to such life principles as engaging in *Nenbutsu*, or praying to Buddha, confessing their wrongdoings, paying filial piety and respects to seniors and mentors, and living in honesty, gratitude, and righteousness (Inoue, 1947).

Japanese people, however, have softened the rigidity of traditional Buddhism dogma by creating other Buddhism denominations, such as *Jodo Shin Shu* (Suzuki, 1972). *Jodo Shin Shu* represents True Pure Land or Paradise (Suzuki, 1972). *Jodo Shin Shu* describes that the universe is realized by a mutual reliance between *jiriki*, self-power, and *tariki*, other-power (Suzuki, 1970, 1972). *Tariki* refers to the higher, greater entities of Buddha, *kami* (gods), and ancestral spirits in the other world—the Pure Land—and to humans in this world (Hisamatsu et al., 1973). Further, traditional Japanese people believe that *ki*, life energy or will power, dwells in every living being of *jiriki* (the self) and *tariki* (the soul and all natural

entities). *Tariki* energizes a person's *ki*, will power or spirit, and enhances and heals the person's whole being, including their physical, mental, emotional, and spiritual elements (Suzuki, 1972). Traditional Japanese people believed that by relying on and connecting to the higher power sources of *tariki*, they could alleviate stress and fear of illness and death, and obtain *Anjin*, or a stabilized, serene, and peaceful mind (Suzuki, 1972).

Japanese Religions, Health Factors, and Health Promotion Behaviors

In the context of Japanese religions, it is possible to identify the concepts of health, subjective feelings about health, social support, and health promotion behaviors. That is, in Buddhism, *jiriki*, or one's will power, and health status are thought to be enhanced by *tariki*, other power. *Tariki* is explained as the empowering and healing source of Japanese people's physical, mental, and emotional status (Suzuki, 1972). Based on this description, Japanese elders' religiosity is considered to relate to their health status.

Further, Buddhism is also thought to influence Japanese elders' states of mind and subjective feelings or perspectives regarding their health. In other words, by relying on and connecting to religious and nonreligious empowering sources, older Japanese adults could obtain *anjin* or stabilize their mental states, alleviate stresses, and get rid of fear of illness and death (Suzuki, 1972). This benefit could then promote positive and optimistic

feelings regarding their health, even if their actual health status deteriorated. Based on these assumptions, to address Japanese elders' religiosity, the variables of health status and subjective feelings about health were included in the current study and relationships among religiosity, health, and subjective feelings about health were examined.

In Shinto, these energizing sources are explained not only as religious entities but also as nonreligious entities, such as humans (Ono, 1962). Based on this notion, the investigator assumes that Japanese elders' religiosity is associated not only with empowering relationships with religious entities such as Buddha, *kami*, or ancestors, but also with supporting relationships with other people. Thus, this study included the variable of social support to examine Japanese elders' religiosity.

Indeed, Buddhism and Shinto govern life philosophies, disciplines, and practices to believers and teach people the way to live in the relationships with natural and supernatural entities and other people. For example, to cope with and overcome health and life difficulties, Buddhism guides Japanese people to engage in *nenbutsu* (i.e., prayer) and to perform righteous and good behaviors (Inoue, 1947). These disciplines and practices of daily lives may influence, control, and shape Japanese elders' health promotion behaviors. Japanese elders' health behaviors deriving from their religiosity could be maintained regardless of their actual health status. The

intent of the current study was to explore the effects of older Japanese adults' religiosity on their health promotion behaviors given their health status, and other variables, such as elders' age and gender, social support, and subjective feelings about health, that may influence their health promotion behaviors.

Review of Empirical Studies Regarding Religiosity

1. Religiosity and Demographics

Empirical studies in the U.S. and Japan have identified significant relationships between older adults' religiosity and demographics such as age, gender, and ethnicity. Levin and Taylor (1993) found a positive association between U.S. elders' age and their religiosity. Krause and colleagues (2008) report that, compared to U.S. elders, Japanese elders are less likely to participate in external organizational religious practices. Further, compared to younger Japanese elders, older Japanese elders tended to perform more private religious practices at home on a daily basis, rather than joining external religious group practices. Krause and colleagues (2008) point out that the decline of Japanese elders' attendance at external religious organizations is related to the deterioration of their functional ability. Indeed, in Japan, older adults tend to have a greater level of difficulty in mobility because of their deteriorated health conditions than do younger adults (Health and Welfare Statistics Association, 2004a). In addition, older

Japanese women are likely to have more adverse health conditions than are older Japanese men (Health and Welfare Statistics Association, 2004a).

U.S. studies also compared the religiosity of different ethnic and gender groups. According to these studies (Levin, Taylor, & Chatters, 1994; Nelson, 1990), African Americans are likely to be more religious and pray more than Caucasians. Furthermore, in each of these ethnic groups, women generally demonstrate greater religiosity than do men (Levin et al., 1994; McCaffrey, Eisenberg, Legedza, Davis, & Phillips, 2004). This gender difference also was observed in older Japanese adults. In fact, older Japanese women were found to be more involved in religious practices and more likely to have stronger religious beliefs than older Japanese men (Krause, Ingersoll-Dayton, Liang, & Sugisawa, 1999). Studies have revealed relationships between older people's religiosity and their age, gender, and ethnicity. Yet, so far, studies that examine age and gender differences among Japanese elders are scarce, and common knowledge regarding the relationships between Japanese elders' religiosity, age, and gender has been underdeveloped (Krause et al., 1999). Thus, in this dissertation these relationships were examined in order to identify the influence of Japanese elders' age and gender on their religiosity.

Summary

In both Japan and the U.S., older elders tend to have greater

religiosity than younger elders. In addition, in these countries, older women are likely to show greater religiosity than do older men.

Further, as Krause and colleagues (2008) described, along with aging, Japanese elders tend to participate less in organizational religious practices, yet become more spontaneous in their private religious practices at home. In Japan, this tendency becomes greater in older elders than younger seniors. This decline in participation in organizational religious practices among Japanese elders in their later lives is probably associated with their deteriorated health status or functional ability (Krause et al., 2008). In addition to these physiological factors, psychological factors as well as socio-environmental factors may relate to this phenomenon.

For psychological factors, it was hypothesized that the establishment of an individualized deeper-and-stronger relationship with a religious entity could prevent an elderly adult from engaging in organizational religious practices. That is, along with aging, older adults tend to suffer more deteriorated health status and limited functional abilities than do younger adults (Health and Welfare Statistics Association, 2004a). To overcome these difficulties, in their later lives, Japanese elders' beliefs in and reliance on a religious entity may become greater and more manifest. As a result, these elders desire to more individually and deeply connect with their religious entity. As their individual connections to a religious entity grow stronger,

Japanese elders may prefer not to gather with other people to pray, or to put less value on attending an organizational religious practice. It is possible that, even though an older Japanese adult has a good health status and is physically able to attend religious organizational practices, if he/she establishes strong private spiritual and religious connections with a religious entity and is content with these individual connections, then he/she may not feel the necessity of participating in organizational religious practices with other people. Older elders may develop a greater, deeper connection with a religious entity than younger elders. The hypothesis that religiosity and age are related was examined in the current research.

Along with these psychological factors, it was assumed that socio-environmental factors, such as having a Buddhist altar and/or a family altar at home, may relate to Japanese elders' less frequent participation in organizational religious practices. Traditionally, Japanese households have a Buddhist altar (*butsudan*) and/or a family altar (*kami-dana*) in which the souls of ancestors, gods, and Buddha dwell. This enables Japanese people to worship, hold a service for, and connect to their ancestors, gods, and/or Buddha everyday at home. While worshiping and holding a service to these souls and divinities based in their homes, Japanese people occasionally go to a Buddhist temple, their ancestors' graves, and/or a shrine for memorial services and celebrations. This tradition, or Japanese elders' individualized

and private religious practices at home, may be related to their less frequent participation in regular organizational religious practices. Although the current study did not intend to explore these socio-environmental factors for Japanese elders' decreased participation in organizational religious practices, future studies can examine these socio-environmental, psychological, and physiological factors to understand more holistically the constructs of Japanese elders' religiosity.

2. Religiosity and Age, Gender, Health, Subjective Feelings about Health, and Health Promotion Behaviors

A number of U.S. studies have reported the positive influences of religiosity on older individuals' health, subjective feelings about health, and health promotion behaviors. Meanwhile, other studies have found negative associations between older adults' religiosity and their health status.

For example, older adults' greater religious beliefs, frequent prayer, and/or frequent church attendance are related to increased self-esteem (Nelson, 1990), enhanced stress coping mechanisms (Stolley, Buckwalter, & Koenig, 1999), lessened depressive symptoms (Koenig et al., 1992; Nelson, 1990), slower rates of cognitive decline (Hill, Burdette, Angel, & Angel, 2006), and increased subjective health and self-reported health (Ellison, 1991). In addition, these studies included Caucasian men and women (Stolley et al., 1999), African American and Caucasians (Ellison, 1991; Koenig et al., 1992;

Nelson, 1990), and Mexican Americans (Hill et al., 2006) as well as those aged 60 years or older (Hill et al., 2006; Koenig et al., 1992; Nelson, 1990; Stolley et al., 1999). Although the current study focused on Japanese samples, the age and gender of the samples these studies employed are similar to those for the current study. For these reasons, the current study adapted these markers, or variables, and attempted to examine the relationships between Japanese elders' religiosity and their health status, subjective feelings about health, and health promotion behaviors.

Further, older adults' greater religiosity has been identified as pertaining not only to psychological health status, but also to their physical health status. U.S. studies report that older adults' religiosity contributed to lowered mortality (Omen & Reed, 1998; Strawbridge et al., 1997) and controlled blood values associated with diabetes (King, Mainous, & Pearson, 2002). Similarly, a study regarding Japanese elders' religiosity reported that older Japanese adults who believed in a good afterlife were less likely to complain of hypertensive symptoms when they experienced the loss of significant persons than those who did not believe in a good afterlife (Krause et al., 2008). Thus, Japanese elders' religiosity may improve their physical and mental health status. This assumption was examined in this dissertation research.

In addition, religiosity has also been found to promote American elders'

healthy behaviors. These healthy behaviors include reduced tobacco consumption (Roff et al., 2005; Strawbridge et al., 1997), stopping alcohol intake (Pascucci & Loving, 1997), increased physical activities (Roff et al., 2005), and increased preventive health care, such as taking flu shots, blood exams, and cancer screenings (Benamins & Brown, 2004). Adverse relationships between religiosity and health promotion behaviors were, however, not indicated in these scientific studies. These positive relationships between religiosity and health promotion behaviors may or may not be identified in Japanese elders. To address this inquiry, the health promotion measures of physical activity, alcohol-use, and tobacco-use were used in this dissertation and their relationships to religiosity were examined in elderly Japanese.

Although majority of empirical studies support positive relationships between older adults' religiosity and their health status, some studies found negative relationships between them. These studies suggest that religiosity becomes greater when people experience deterioration of health and that religiosity is greater among frail people than among healthy robust people. An innovative U.S study in nursing (Reed, 1987) compared adults with three different levels of health: terminally ill hospitalized patients, non-terminally ill hospitalized patients, and healthy community dwellers (n=100 in each group; range 20-85 years old; mean age 61). Terminally ill hospitalized

patients indicated significantly greater levels of religiosity (or spiritual perspectives) than the other two healthier groups of people. Furthermore, another study (Bearon & Koenig, 1990) reported that older adults were less likely to pray over symptoms that they did not feel to be serious than over those which they felt were severe. As reviewed, studies examined the associations between the religiosity, health status, subjective feelings about health, and health promotion behaviors of older American adults. Yet, these associations have not fully been examined for Japanese elders. Thus, this dissertation included exploration of these associations.

Summary

Many U.S. studies (Hill et al., 2006; Koenig et al., 1992; Nelson, 1990; Stolley et al., 1999) support the positive relationships between older adults' religiosity and their health status, subjective feelings about health, and health promotion behaviors. Yet, the associations between elders' religiosity and their health status have scarcely been explored for Japanese elders (Krause et al., 1999). Relationships between older adults' religiosity and their subjective feelings about health and health promotion behaviors have also not been addressed in current Japanese studies. Thus, the current study examined these relationships for older Japanese adults.

In contrast to the above studies, other empirical studies (Bearon & Koenig, 1990; Reed, 1987) found negative relationships between older adults'

religiosity and their health status. These studies (Reed, 1987) mention that elders' religiosity is more likely to manifest and become greater when elders experience difficult life events, such as illness, than when they do not experience these events. This phenomenon can also be observed in Japanese elders, as a Japanese literature (Togenuki-jizou, 2002) reported that, to overcome fear for illness, death, or physical discomfort and pain, Japanese elderly pray to gods, Buddha, and ancestors for help in healing pain, recovering from illness, and promoting their health. To cope with and overcome health difficulties, older adults may need to connect more closely with transcendental religious entities. In personal experiences as a public health nurse working for older Japanese adults' health promotion, the investigator also acknowledges Reed's findings (1987).

Religiosity, or religious beliefs and practices, may be a significant factor for elderly individuals to overcome illness, maintain a good health status, and promote healthy behaviors. In this context, it was hypothesized that if elderly adults have greater religiosity, even if they suffer deteriorated health conditions, they can cope with and overcome these adverse health conditions, feel better about their health, and have the courage and confidence to engage in health promotion activities, despite their actual health status. To date, empirical studies have not examined this hypothesis regarding the mediating effects of Japanese elders' health-status and health perception on the

relationships between their religiosity and health promotion behaviors. To identify the significance of religiosity, or the predicting ability of religiosity, in promoting Japanese elders' healthy behaviors, such mediating effects of their health conditions and subjective feelings about health were also addressed within the current study.

In addition, it was also hypothesized that religiosity mediates the relationships between elderly Japanese adults' age and gender, and their health status, subjective feelings about health, and health promotion behaviors. Indeed, empirical studies support the influence of elders' religiosity on their health status, subjective feelings about health, and health promotion behaviors. Yet, elderly adults' age and gender are also considered to be related to their health status, subjective feelings about health, and health promotion behaviors. For example, older elders and elderly women are likely to have more deteriorated health status, perceive poorer health conditions, and engage less in health promotion behaviors than younger elders and elderly men (Health and Welfare Statistics Association, 2004a). Nevertheless, it is possible for elderly adults' religiosity to mediate these relationships between their age and gender, and their health status, health perception, and health promotion behaviors. In other words, despite their advanced age or being women, if elderly adults have greater religiosity, they could have better health status, perceive better health, and engage more in

health promotion behaviors. If religiosity's mediating effects on these relationships is identified through this proposed study, religiosity will become a significant factor for the health promotion of Japanese elders. Therefore, the mediating effects of religiosity were examined in the current study.

3. Religiosity, Social Support/Integration, Age, Gender, and Health Promotion Behaviors

Studies report that religion and social support are the two major sources in promoting older adults' health and well-being. In their phenomenological study, Pascucci and Loving (1997) explicated religiosity and social support as the primary factors for the health and longevity of 12 U.S. centenarians (age 100 to 109 years old; ten Caucasians, one African American, one Native American). For these centenarians, especially for those who have lost their family members, believing in God and praying to God were necessary for coping with difficult times of loss and for helping to find peace of mind. Having good relationships with other people were also important for them to promote their sense of connection, prevent them from isolation, and maintain good physical and mental health status. In addition to religion and social support, certain health behaviors, such as gardening, eating vegetables and fruits, and not drinking alcohol, were also revealed to be important in promoting these centenarians' healthy aging.

In their cross-sectional study, Yoon and Lee (2007) examined the

influences of religiosity—elders’ trust in God to watch over them and their feelings of togetherness with God—and social support—emotional support from people outside of church such as family members and friends—on the life satisfaction and depressive symptoms of 215 elders living in rural areas. Of 215 elders, 85 (39%) were Caucasian, 75 (35%) were African American, and 55 were Native Americans (26%). About 86% of Caucasian, 90% of African American, and 84% of Native American elders were Christian. While 33% were married, 41% were widowed; 83% (n=77) of 215 elders were below or near the poverty line for their economic status. Hierarchical multiple regression analyses revealed both religiosity and social support as significant predictors of these elders’ life satisfaction. However, only religiosity appeared to be significant for lowered depressive symptoms among these rural elders, and social support outside the church did not have significant association with lowered depressive symptoms among these rural elders.

Another study by Oxman, Freeman, and Mantheimer (1995) examined relationships between social support and religion and mortality among 232 older adults 6 months after elective cardiac surgery. Logistic regression analyses revealed that absence of strength and comfort from religion and lack of community group participations were significantly associated with an increased death risk among older patients. In other words, lack of social interactions and insufficient beliefs in and connection to God appeared to

relate to increased death rates. Religion and social support had, however, independent effects on elders' increased death risk. No interaction effects of the two dimensions were identified in the study.

Krause and colleagues (1999) explored relationships among religiosity (i.e., private religious practices), social support (i.e., providing emotional support to others, not being provided support from others), and self-rated health in older Japanese men and women. Employing ANCOVA, the authors of this study reported that elderly Japanese women engaged more in religious practices than elderly Japanese men. Through structural equation modeling, they also reported that older women tended to provide more support to others than did older men when older men did not perform religious practices. However, provision of support became greater for older men than older women when older men had a greater level of religious practices. Further, both elderly Japanese men and women who provided support to other people tended to rate their health better than did those who less provided support to others. These findings supported positive relationships between religiosity and perceived health and the partial effects of social support on these relationships.

Summary

Studies (Oxman, Freeman, & Mantheimer, 1995; Pascucci & Loving, 1997) report religion and social support as significant factors for promoting

older adults' health and well-being. Based on this information, social support was included as a variable in the current study, and the effects of social support and religiosity on health promotion of Japanese elders were examined.

While Yoon and Lee (2007) reported the independent effects of religiosity and social support on elderly adults' health, Krause and colleagues (1999) found a causal relationship between religiosity and social support in elderly Japanese. In their study, however, Krause and colleagues (1999) looked at social support *provided to other people*, not social support *being provided by others*, or the focus of the current study. To address this gap, the relationships between Japanese elders' religiosity and their states of social support provided by other people were examined in the current study. In addition, in their study, Kraus and colleagues (1999) did not include the variable of health promotion behaviors. In the current study, however, the *mediating effects of social support* on the relationships between religiosity and health promotion behaviors, as well as the *mediating effects of religiosity* on the relationships between age and gender, and social support, or social integration, in elderly Japanese adults were examined.

In the earlier sections, studies reporting that elderly adults' religiosity helped promote their healthy behaviors, such as reduced tobacco use (Roff et al., 2005; Strawbridge et al., 1997), stopping alcohol intake (Pascucci &

Loving, 1997), and increased physical activities (Roff et al., 2005) were examined. Yet, these effects of elders' religiosity on their health promoting behaviors can be mediated by their states or perceptions about social support. Indeed, a descriptive study (Pattillo-MacCoy, 2001) acknowledges the significant role of church or religion-related practices and activities in promoting physical, psychological, and social well-being of American elderly individuals. Through church attendance and religious practices, these elderly Americans received emotional, instrumental, and informational supports from other people (Pattillo-MacCoy, 2001). The authors of the study (Pattillo-MacCoy, 2001) implied that the supportive environment of church may promote American elders' psychological well-being, positive feeling, and action towards physical activities.

Different from American elders, however, Japanese elders are not likely to regularly participate in organizational religious activities (Krause et al., 2008). Unlike American elders, Japanese elders may have other unique sources or systems of social support than religion-based social support systems. Nevertheless, the mediating roles of Japanese elders' social support on the relationships between their religiosity and health promotion behaviors have not been explored in current scientific studies. Thus, this mechanism was examined in the current study.

Furthermore, the *mediating effects of Japanese elders' religiosity on*

the relationships between their age and gender, and their social support and *social integration* were examined. As described in Chapter 1, *social support* was defined as a perception of supportive interpersonal interactions with spouses, family members, friends, and other people (Boland, 2000). For the purpose of the current study, *social integration* was defined as a person's basic characteristics or family structure—such as marital status, working condition, number of children, and living status with children—that can promote the person's social interactions with other people. While *social support* was used to measure Japanese elders' perception or subjective evaluation about their supportive relationships with other people, *social integration* was used to objectively or systematically measure elders' support systems, structures, or conditions based on their marital status, working condition, number of children, and living status with their children.

Ultimately, the social conditions of elderly adults are associated with their age and gender. In Japan, compared to younger elders, greater numbers of older elders tend to become *single* or widowed, and live alone (Health and Welfare Statistics Association, 2004a). The number of Japanese elders living alone has increased from 8.5 (per 1,000 populations) in 1980 to 13.8 in 2003. Along with aging as well as the decreasing number of children in Japan, the family structure of Japanese society has moved from multi-generational to core families. As the number of children in a household has

declined, younger people tend to have fewer children than do older people. Further, in both Japan and the U.S., women tend to live longer than men (Tokyo Metropolitan Institute of Gerontology, the University of Tokyo, & the University of Michigan, 2004; U.S. Department of Health and Human Services, 2000). After losing their spouses, a greater number of elderly Japanese women live alone compared to elderly Japanese men. In their later life, greater numbers of elderly Japanese women also are likely to live with their children than are elderly Japanese men.

Generally, in Japan younger elders and elderly men tend to engage more in labor, such as independent business, agriculture, and part-time work, than older elders and elderly women (Tokyo Metropolitan Institute of Gerontology et al., 2004). Even after becoming 70 years old, 26 % of Japanese men and 11.9% of Japanese women continued to work. In addition, about 29.5% of Japanese people age 65 to 74 years old and 20.2% of those 75 years or older also engage in volunteer work, usually at home.

These social conditions, or social integration, may affect elderly adults' perception, evaluation, or satisfaction about their social support from other people. In the family-oriented society of Japan, having spouses or children as well as living with these family members is a significant factor in promoting elderly adults' mental health status (Sugisawa, Shibata, Hougham, Sugihara, & Liang, 2002). In their later life, however, elderly adults tend to lose these

significant people who are the core of their emotional support. A study (Honda, Saitoh, Kanagawa, & Murashima, 2003) reported that Japanese elderly adults who lost their spouses recently and who live alone are likely to have more depressive symptoms and felt less about *ikigai* than those who have spouses and who live with families. *Ikigai* is a Japanese concept that embraces such meanings as encouraging life values and purposes and fulfillment of life (Hisamatsu et al., 1973). Sources of Japanese elders' *ikigai* can be work; hobbies; helping other people; children, family members, and other significant people; and materials. After retiring from the main stream of society, elderly adults may also lose *ikigai* by leaving their jobs, roles, and responsibility to their society and to their families.

Nonetheless, elderly adults' religiosity may mediate these relationships between age and gender, and social support/integration. It can be proposed that, if elderly Japanese adults have greater religiosity and pray to, or connect with, divinities, they could have greater feelings and confidence of being watched and supported. In addition, to cope with and overcome health and life difficulties, Buddhism guides Japanese people to engage in *nenbutsu*, or prayer, and to perform righteous and good behaviors (Inoue, 1947). These religious disciplines and practices of daily living can influence, control, and shape Japanese elders' life style and behaviors. For instance, if elders commit more to these disciplines taught in Buddhism, they may continue to

engage in labor, despite their advanced age and/or being women. Since these mediating effects of Japanese elders' religiosity on the relationships between their age and gender, and their social support/integration have not been understood to date, the current study examined these effects.

4. Relationships between Age and Gender, and Health Status, Subjective Feelings about Health, Social Support/Integration, and Health Promotion Behaviors

The current study examined the mediating effects of religiosity on the relationships between age and gender, and health factors of physical, mental, and cognitive health; subjective feelings about health; and social support/integration and health promotion behaviors in elderly Japanese. The current study also attempted to identify the mediating effects of these health factors on the relationships between religiosity and health promotion behaviors. Studies have reported the relationships among elderly adults' age, gender, health status, subjective feelings about health, social support/integration, and health promotion behaviors of alcohol use, tobacco use, and physical activities. Prior to exploring the mediating effects of religiosity and health measures, it was essential to understand the relationships among the study variables in order to predict these mediating effects. Therefore, in this section general information regarding the relationships among elderly adults' age, gender, health status, subjective

feelings about health, social support/integration, and health promotion behaviors of alcohol use, tobacco use, and physical activities is reviewed.

Age, Gender, and Health Status

In Chapter 1, the physical, mental, and cognitive health status of elderly Japanese adults were described. In this section, Japanese elders' health status in relation to their age and gender is examined. In Japan, older people tend to have more deteriorated health conditions than do younger people (Health and Welfare Statistics Association, 2004a; Tokyo Metropolitan Institute of Gerontology, 2000). Specifically, oldest-old persons (i.e., individuals aged 85 and over) are more likely to have a decline in their overall health status and more limitations in physical, mental, and cognitive functional abilities than are middle-old (those aged 75 to 84 years old) and young-old (those aged 65 to 74 years old) persons. Also, in Japan, elderly women tend to have greater problems in their physical, mental, and cognitive health status than do elderly men (Tokyo Metropolitan Institute of Gerontology, 2000).

Age, Gender, Health, Social Support/Integration, and Alcohol Use

Japanese elders' drinking behaviors are considered to be associated with their health beliefs. Traditionally, Japanese people view alcohol as *good for health*, describing alcohol (e.g., *Sake*, or Japanese rice wine) as "the best of all medicine" (Takagi, 1990). Elderly Japanese adults believe that taking a

moderate amount of alcohol is a health tip (Tomita, Omori, Mizuno, Inaba, & Iwata, 1997).

Historically, Japanese people use and drink *sake*, or rice wine, in sacred ritual ceremonies, celebrations, and important social events, such as marriage, festivals, and the building of a new house (the ceremony of *Jichinsai*) in order to serve to divinities, cleanse the body and soul of a human, and purify the site of a new building (Picken, 1980). Because of the sacred role and pleasant image of *sake*, Japanese people may generally see *sake* as a positive agent in their religious and daily lives and drink *sake* to promote their health and recover from illness (Takagi, 1990). Japanese elders' beliefs in the sacred or religious role of *sake* can increase their alcohol consumption.

Meanwhile, along with their health beliefs in *sake*, Japanese elders' drinking behaviors may also relate to the states of their work and family status, or the factors of social support/integration. Noguchi and colleagues (1989) reported that, in general, amount and frequency of alcohol use are greater in elderly Japanese men than that in elderly Japanese women. In Japan, elderly Japanese men tend to engage more in labor than do elderly Japanese women even after retirement (Tokyo Metropolitan Institute of Gerontology, 1996). Elderly Japanese adults see alcohol as an important agent in their social activities, such as work (Noguchi et al., 1989). Because

of their higher ratios of employment, elderly Japanese men may tend to report a greater amount and frequency of alcohol consumption than do elderly Japanese women.

In addition, Noguchi and colleagues (1989) also reported that the frequency and amount of alcohol consumption are positively associated with the feeling of loneliness and isolation for Japanese elderly, especially for elderly women. In Japan, elderly women live longer than elderly men; in their later life, they tend to live alone after the loss of their spouses (Health and Welfare Statistics Association, 2004a). After losing their spouses, who are the main source of their emotional and financial support, elderly Japanese women may feel increased loneliness and worry about their life. To alleviate and cope with their feelings of loneliness and worry, elderly Japanese women may increase their consumption of alcohol. However, it is assumed that, if elderly women have greater religiosity and frequently and strongly connect to higher powers, they could alleviate their feelings of loneliness without relying on alcohol. Thus, religiosity may help elderly Japanese adults reduce their alcohol consumption.

As described, Japanese elders' drinking behaviors, or alcohol consumption, seem to be associated with their age, gender, health beliefs, and social support/integration status (work, family status). Their religiosity may help Japanese elders increase, or reduce, their alcohol consumption, and their

health status and social support status may mediate the relationships between their religiosity and alcohol consumption. The current study examined these relationships.

Age, Gender, Health, Social Support/Integration, and Tobacco Use

Similar to alcohol use, in Japan, men and younger people tend to engage more in smoking than do women and older people. In 2001, the smoking ratios of Japanese people age 20 to 59 years old were about 58 to 62% for men and 10 to 23% for women, while those of Japanese elderly adults (i.e., age 65 years or older) were 34.4% for men and 5.9% for women, respectively (Tokyo Metropolitan Institute of Gerontology et al., 2004).

The smoking behaviors of elderly Japanese may relate to work, or an aspect of social integration. In fact, the major reason for Japanese' high smoking rates can be stress, or the high social pressure, as most Japanese smokers claim that they engage in tobacco when they feel restless, agitated, anxious, or gloomy, and when they lose their concentration at work (Ministry of Health Labor and Welfare, 1999). In the male-dominated society of Japan, work-related stress can be greater among men than among women. Indeed, about 70% of Japanese men age 25 to 54 years old suggest that the greatest source of stress is work-related, while only 38% of Japanese women in the same age group mention the same issue (Health and Welfare Statistics Association, 2004a).

Among women, tobacco consumption is greatest in their twenties and thirties when they engage more in labor than in other age groups (Ministry of Health Labor and Welfare, 1999). However, Japanese woman smokers tend to quit cigarette smoking by taking the opportunities of marriage or pregnancy (Nishimura, Nakayama, Nakayama, Tsuguma, & Suzuki, 1996). After retiring from the front lines of society, Japanese men also quit or reduce their tobacco consumption and, consequently, their smoking ratios decline after their sixties (Ministry of Health Labor and Welfare, 1999; Tokyo Metropolitan Institute of Gerontology et al., 2004). Nevertheless, 33.4% of elderly Japanese men as well as 5.9% elderly Japanese women continue to smoke tobacco even after retirement.

A possible reason for the high smoking ratio among Japanese elders can also be stress associated with their higher engagement in work after retirement. Along with work-related stress, the smoking behavior of elderly Japanese adults also is associated with their knowledge about, and interest in, the health risk of smoking (Ministry of Health Labor and Welfare, 1999). A study (Nishimura et al., 1996) reported that elderly Japanese adults who have a greater interest in their health tend to engage in disease prevention by attending more frequently to lung cancer screenings than do those who have less interest in their health. In addition, another study (Ministry of Health Labor and Welfare, 1999) reported that Japanese former smokers

were likely to quit smoking because of an increased recognition of the health risk of tobacco (64.7%), deteriorating their health conditions (41.0%), or thinking about the effect on their family's health (21.5%). Furthermore, the study (Ministry of Health Labor and Welfare, 1999) suggested that a recommendation of health authorities or caring bodies such as physicians and nurses (17.7%) and that of trusting family members and friends (11.1%) also influence Japanese smokers to stop smoking.

Based on these findings, Japanese elders' age, gender, health status, marital status, working condition, and informational and emotional support from other people were all considered to relate to their tobacco consumption. The relationships between Japanese elders' smoking behaviors and their religiosity were, however, not identified in the reviewed literature. Yet, *religiosity* is a stress-coping-activity using religious sources to deal with stressful events and difficult moments of life. The level of religious coping may affect that of smoking, another activity of stress coping. It was assumed that, if Japanese elders engage more in religious coping and can deal with most of their stress by religious coping strategies, they may not need another strategy, such as smoking, to deal with their stress. However, these relationships may be mediated by their work status: even if Japanese elders practice religious coping methods, if they have greater work-related stress, they may engage in smoking as a supplement to religious coping. The

current study examined these mediating mechanisms.

Age, Gender, Health Status, Subjective Feelings about Health, Social Support/Integration, and Physical Activities.

Generally, elderly Japanese individuals actively engage in various physical activities, such as traveling, playing sports, singing in a chorus, and attending health education programs at a community center (Tokyo Metropolitan Institute of Gerontology, 1996). On average, about 44.9% of Japanese people aged 65 years or older also engage in some vigorous sports or exercise, such as walking, jogging, stretching exercise, hiking, golf, swimming, dance, or croquet, more than once a month.

A significant characteristic of elderly Japanese adults is that they engage in most physical activities through joining community organizations. A national survey in 2003 (Cabinet Office, 2004) found that approximately 53% of Japanese elderly joined at least one community organization, such as neighborhood self-governing committee, hobby, health promotion club, or volunteer group. A Senior Citizen's Club (SCC) is a community organization assisted by municipal governments. In 2003, 26.9% of Japanese aged 60 years or older joined in SCCs and vigorously engaged in a variety of activities (Health and Welfare Statistics Association, 2004b).

The ultimate aim of a SCC is to promote *ikigai* for the elderly. As described in the former section, *ikigai* is a Japanese concept that embraces

such meanings as encouraging life values and purposes and fulfillment of life (Hisamatsu et al., 1973). Through an active participation with SCCs or other community organizations, elderly Japanese adults appreciate *ikigai* by enriching friendship, promoting communication, and cultivating mutual respect with other people; affirming life values; fostering volunteer spirit; preventing social isolation; and promoting health and physical activity (Haga, Matsuzaki, & Hatano, 1982; Iwasaki et al., 1989). *Ikigai* encourages Japanese elders' engagement in healthy behaviors among the elderly (Momose, Asahara, & Okubo, 2001; Tomita et al., 1997). Active participation in a SCC helps elderly individuals maintain a healthier lifestyle (e.g., eating habits, physical activity) and a better mental and ALD status (Arao, Oida, & Nagamatsu, 1998; Haga et al., 1982; Ikeda, Nagata, Kudo, Kiyama, & Naemura, 1993; Iwasaki et al., 1989; Jingu, Egami, Kinukawa, Sano, & Takei, 2003; Nagamatsu et al., 2000) and lower overall mortality rates (Ogawa, Iwasaki, & Yasumura, 1993).

Beyond these social support systems, Japanese elders' physical activities also relate to their age, gender, health status, and subjective feelings about health. Indeed, Japanese elders continue to engage in exercise in order to strengthen their legs, to improve their physical and mental health, to prevent and recover from illness, and to communicate with friends (Ministry of Health, 1993, 1997). However, elderly adults who have greater

functional limitations tend to be less physically active than those who have fewer functional limitations (Ogawa et al., 1993).

As mentioned in the previous sections, Japanese elders' physical and mental functional limitations become greater with increasing age (Health and Welfare Statistics Association, 2004a). Because of their advanced age, physical weakness, or chronic health concerns, about 20% of elderly adults aged 70 years or older were reported to disengage in exercise (Cabinet Office Public Relation Bureau, 1995; Tokinaga et al., 2003). In addition, compared to elderly Japanese men, elderly Japanese women tend to have greater physical, mental, and cognitive functional limitations (Health and Welfare Statistics Association, 2004a). Consequently, older elderly adults and elderly women tend to engage less in exercise than younger elderly adults and elderly men.

In spite of the fact that they have multiple chronic health conditions as described in Chapter 1, 88.2% of Japanese older adults report their health status as *good* or *excellent* (Tokyo Metropolitan Institute of Gerontology, 2000). Most elderly Japanese adults view and accept their chronic health conditions, illnesses, or functional disabilities as a matter of course in the aging process. Further, they tend to assess their health status by looking at their remaining functional abilities, not disabilities (Kakemoto, 2002; Tokinaga et al., 2003).

In their study, Tokinaga and colleagues (2003) reported that Japanese elders evaluate their health as *good* or *fair*, if they are able to control symptoms, feel less fearful of illness, and have *ikigai* by maintaining independence in their life and continuing to engage in labor or housework. In another study, Iwasaki and colleagues (1989) also supported that *ikigai*—satisfaction in being able to work—promotes subjective well-being of the elderly, and that elderly Japanese adults who obtain a better perception of health tend to engage in more physical activity than those who have a lower perception of their health (Haga et al., 1982).

As reviewed, scientific studies supported the dynamic relationships between Japanese elders' age, gender, health status, subjective feelings about health, social support/integration, and their physical activities. Yet, in these studies, the role of religiosity in these relationships is not identified.

However, a descriptive report (Togenuki-jizou, 2002) delineates that, to overcome fear of illness and death and to cope with physical discomfort and pain, Japanese elders pray to gods, Buddha, and ancestors for ask help in healing pain, recovering from illness, and promoting their health. Krause and colleagues (2008) describe that, unlike American elders, Japanese elders tend not to engage in organizational religious activities. Although these Japanese elders may not practice systematic or rigorous rituals in the meetings, they regularly and irregularly gather at Buddhist temples and

shrines, and exchange health and medical information with one another (Togenuki-jizou, 2002). In this respect, it was proposed that Japanese elders' religiosity promotes their healthy behaviors. In addition, it was also hypothesized that these relationships between Japanese elders' religiosity and health promotion behaviors are mediated by their health conditions, subjective feelings about health, and social support/integration status, such as engagement in work and relationships with other people, could positively (e.g., promoting *ikigai*) or negatively (e.g., increasing tobacco and alcohol consumptions) affect elders' health promotion behaviors.

Conclusion

Based on the review of U.S. and Japanese scientific literature, significant relationships among elderly individuals' religiosity, demographic characteristics of age and gender, health status, subjective feelings about health, social support/integration, and health promotion behaviors were identified. A majority of these studies (Hill et al., 2006; Koenig et al., 1992; Nelson, 1990; Stolley et al., 1999) support the positive relationships between older adults' religiosity and their health status, subjective feelings about health, social support/integration, and health promotion behaviors. However, other studies (Bearon & Koenig, 1990; Reed, 1987) identified negative associations between them. These studies suggested that, when elderly adults' health status deteriorates, their religiosity more manifests in

order to help them overcome their physical, mental, and cognitive health conditions. These negative associations point out the significance of religiosity in promoting the health and well-being of elderly people who generally have more deteriorated health conditions than younger people. Yet, most of these studies have been carried out in the U.S.; so far, positive or negative associations regarding Japanese elders' religiosity, health, and health promotion behaviors have not been examined.

Further, in empirical studies, the relationships among elderly Japanese adults' age, gender, health status, subjective feelings about health, social support/integration, and health promotion behaviors were also identified. Still, whether Japanese elders' religiosity can mediate these relationships has not been explored in current scientific studies. Therefore, the goal of the current study was to examine and identify the relationships between elderly Japanese adults' religiosity, and age, gender, health, subjective feelings about health, social support/integration, and health promotion behaviors, as well as the mediating effects of religiosity on the relationships among other variables. Based on the information obtained from the literature review, in the following section a conceptual model was developed to guide the current study.

Conceptual Model of Religiosity for Elderly Japanese

For the current study, the conceptual model (Figure 2.1) was developed to summarize the dynamic relationships among elderly Japanese adults' religiosity; demographic variables of age and gender; health variables of physical, mental, and cognitive health, subjective feelings about health, and social support/integration; and health promotion behaviors of physical activities and alcohol and tobacco use. For a clear visualization of the relationships among the variables, items used in each of these variables are consolidated in the conceptual model (e.g., the variable "physical health" under "HEALTH FACTORS" in the model consists of three items/measures of ADL/IADL, mobility and presence of chronic disease).

In the conceptual model, health promotion behaviors of physical activities, alcohol use, and tobacco use are described as the ultimate outcomes of physical, mental, and cognitive health status. This alignment of health status and health promotion behaviors can be reversed, as empirical studies (Bernet, Smith, Lord, & Baumann, 2003; Frye, Scheinthal, Kemarskaya, & Pruchno, 2007; Lord, Tiedemann, Chapman, Munro, Murray, & Sherrington, 2005) report that elderly adults' healthy behaviors, such as regular exercise, can improve their physical functioning and psychological well-being. In the current study, however, the investigator focused on examining the effects of Japanese elders' religiosity on their health promotion

behaviors, given their actual health status.

As already described in the former sections, along with increasing age, people tend to deteriorate in health status and suffer more from physical, mental, and cognitive functional limitations (Health and Welfare Statistics Association, 2004b). Due to these limitations, elderly adults are likely to disengage in physical activities (Oida, Arao, Nishijima, & Kitabatake, 1996; Taneda, Arao, Nishijima, & Kitabatake, 1996). Despite that, U.S. health studies (Ellison, 1991; Hill et al., 2006; Koenig et al., 1992; Nelson, 1990; Stolley et al., 1999) support that elderly American individuals who have greater religiosity tend to have better physical and mental health status, better perceptions about their health, better conditions about their social relationships, and engage more in physical activities. This can take place in elderly Japanese adults as well.

Japanese elders' religiosity may have a positive effect on their health promotion behaviors. Yet, their actual health status may positively or negatively affect, or mediate, the relationships between their religiosity and health promotion behaviors. To address this mediation mechanism, in the conceptual model, "physical, mental, and cognitive health" were placed between "religiosity" and "health promotion behaviors."

Along with these three health dimensions, in the conceptual model, other dimensions of "subjective feelings about health" and "social

support/integration” were also put in between religiosity and health promotion behaviors. While physical, mental, and cognitive health status were considered objectively-measured dimensions of health, health perceptions were considered subjectively measured dimensions of health. Further, social support/integration was considered dimensions that represent the social health or well-being of the elderly. In the current study, all these objective health status (physical, mental, and cognitive), subjective health status, and social health status were hypothesized to mediate the religiosity’s effects on health promotion behaviors in elderly Japanese.

CHAPTER 3

METHODOLOGY

Research Design

A descriptive, cross-sectional, correlational design was used to examine the hypotheses of the study. The current study was a secondary analysis using a data set drawn from Wave 5 (1999) of a longitudinal cross-cultural survey, entitled: “Health and Well-Being among Older Old in U.S. and Japan,” designed by the University of Michigan (UM), US, the Tokyo Metropolitan Institute of Gerontology (TMIG), and the University of Tokyo, Japan (Principle Investigator: Dr. Jersey Liang, the University of Michigan School of Public Health).

Research Sample

Sampling Methods of the Survey

The longitudinal cross-cultural survey was designed to develop a panel data set regarding the health and lifestyle of older Japanese and American adults. The survey has been conducted every three years since 1987.

For sampling, the first survey or Wave 1 in 1987 chose 192 sampling units (including cities, towns, and villages) stratified by geographical region and city size in Japan. Japanese individuals age 60 years or older were then

systematically selected from the resident register of the 192 sampling units.

As a result, 3,288 subjects were selected; of them, 2,200 (67.2%) responded to the first survey.

Inclusion and Exclusion Criteria of Sample for the Current Study

For the Wave 5 survey, interviews were initially conducted with community-residing Japanese individuals in October 1999. Subjects of the Wave 5 survey included both men and women age 63 or older. In the current study, however, only individuals age 65 years and older were included and those age 63 and 64 years old were excluded in order to meet the age categories of the Japanese health statistics (Health and Welfare Statistics Association, 2004a).

Further, in the Wave 5 survey, proxy interviews were taken to the family members of 508 subjects who were unable to respond to interviews. However, the proxy interviews did not include questions regarding subjects' religiosity. Because of this, data of proxy interviews were not included.

Sample of the Wave 5 Survey

Data for the current study came from the fifth survey, or *Wave 5*, carried out in 1999. For Wave 5 a total of 4,969 Japanese individuals were selected for interviews. The 4,969 consisted of 2,969 subjects, who had participated in at least one of the earlier waves of interviews, and 2,000 supplemental subjects, whose age 70 years old and older and who were newly

selected from 191 of 192 sampling units employed in Wave 1 (Table 3.1).

Of these 4,969 individuals, 1,487 (29.9%) were unable to participate in interviews (Table 3.1). The reasons for this attrition included subjects' or their family members' refusal of interviews ($n=491$; 41%), subjects' death ($n=291$; 19.6%), illness or injury ($n=162$; 10.9%), hospitalization or institutionalization ($n=155$; 10.4%), and cognitive impairment ($n=118$; 7.9%). Excluding these withdrawals, 3,482 (70.1%), including 2,077 initial subjects and 1,405 new subjects, participated in Wave 5 survey.

Weighted Data for the Current Study

The 2,000 supplemental subjects for Wave 5 were Japanese adults aged 70 years old and older (Table 3.1). To address the over-sampling of those age 70 years and older, and to more accurately represent the age structure of Japanese population, the sample was weighted for the current study.

Table 3.1. Potential Sample for Wave 5 in 1999

	Sample Selected for Wave 5 Interviews	Attrition /Withdrawal	Individuals Participated in the Interviews
Initial: Age 63 and older	2,969	892	2,077
Additional: Age 70 and older	2,000	595	1,405
Total (%)	4,969 (100.0)	1,487 (29.9)	3,482 (70.1)

The 2,077 initial subjects described in Table 3.1 included those age 63 years and older, whereas the current study focused on subjects only age 65 years or older. The number of subjects age 63 or 64 years old accounted for 130 for weighted sample (Table 3.2), and these subjects were excluded from data analyses. As a result of weighting and exclusion of these younger adults, a total of 1,897 subjects age 65 and older were considered for data analyses.

In the Japanese census in 2000 (Health and Welfare Statistics Association, 2004a), the percentage of people in the age group of 65-74 years old, that of 75-84 years old, and that of 85 years and older was reported as 59.4%, 30.6%, and 10.0%, respectively. Weighting variables were created to reflect these approximate proportions of the Japanese population age 60 and older at each age. Of the 1,897 weighted sample in the proposed study, the percentage of people in each of these age groups was 1,054 (55.6%), 721 (38.0%), and 122 (6.4%), respectively (Table 3.2). These percentages are similar to those of the census, although the current study employed a slightly greater percentage of people aged 65-74 years old and a smaller percentage of those aged 85 years or older.

Table 3.2. Number of Study Participants by Age Groups for Un-Weighted and Weighted

Age group	Un-weighted	Weighted	
	Entire Sample for Wave 5	Entire Sample for Wave 5	Sample for the Current Study (%)
63– 64	228	130	Not included
65– 74	1,837	1,054	1,054 (55.6)
75– 84	1,210	721	721 (38.0)
85 +	207	122	122 (6.4)
Total	3,482	2,027	1,897 (100.0)

Sample Size Estimation and Missing Data Management

Power Analysis

To statistically confirm the adequate sample size for the current study, power analysis was conducted using an nQuery Advisor 6.0 Pearson correlation module. With 2-sided test, a power of 80%, and alpha of .05, a minimum sample size of 124 was needed for the current study to detect a weak-to-moderate correlation of 0.25. The required sample size was increased to 194 if a weak correlation of 0.20 was expected. Based on these results, the sample size of 1,879 was considered adequate to conduct the current study.

Listwise Deletion

Among 16 endogenous variables of the current study, three variables of “subjective feelings about health: compared health to other people with the same age (i.e., 2.2% of 1,897 subjects),” “social support (5.2%),” and “living

conditions with children (5.9%)” appeared to have relatively more missing data compared to other variables (Table 3.3). To handle these missing data, listwise deletion was employed. Subjects were included in analyses if they answered all items.

When missing data are present, conventional approaches to address this issue include listwise deletion, pairwise deletion, and imputation. As a result of regression analysis, the greater missingness of the three variables mentioned above appeared to be caused by other independent variables used in the analysis. Although listwise deletion is suggested to yield unbiased estimates under Missing Completely at Random (MCAR) assumption, listwise deletion may generate biased results under Missing at Random (MAR) assumptions (Allison, 2001). Despite that, listwise deletion is still considered the most robust approach compared to other conventional approaches (Allison, 2001). Further, listwise deletion is the default method for SPSS regression modules and, thus, was chosen for the current study.

Table 3.3 Missing Data for Study Variables
(Weighted sample, N=1,897)

	N (Valid)	Missing	%
Religiosity	1887	10	.53
ADL/IADL	1896	1	.05
Mobility	1895	2	.11
Chronic Disease	1894	3	.16
Depressive Sx	1886	11	.58
Memory	1897	0	.00
Satisfaction	1897	0	.00
Comparison	1855	42	2.21
Social Support	1799	98	5.17
Marital Status	1986	1	.05
Working Status	1897	0	.00
N of Children	1897	0	.00
Living w/ Child	1786	111	5.85
Activity	1891	6	.32
Alcohol Use	1897	0	.00
Tobacco Use	1897	0	.00

Under listwise deletion, the valid sample size for each regression model was different, depending on the variables used in the model (Table 3.4).

When all variables were considered, there were 1,061 complete cases, and the 1,061 were used to perform path analysis.

Table 3.4. Descriptive Statistics and Distributions of Study Variables

	N	Range		Mean	SD	Skewness	Kurtosis
		Min	Max				
Age	1897	65	96	74.46	5.90	.528	-.184
Gender	1897					-.315	-1.903
Religiosity	1749	6	24	14.68	4.49	-.018	-.686
ADL/IADL	1868	0	1			2.047	2.192
Mobility	1855	0	1			.592	-1.652
Chronic Disease	1803	0	1			1.213	-.530
Depressive Sx	1586	0	60	6.58	4.75	2.253	8.595
Memory	1897	1	4	1.18	.48	2.878	8.489
Satisfaction	1883	2	10	6.94	1.84	-.471	-.136
Comparison	1855	1	3	2.30	.71	-.509	-.900
Social Support	1510	3	9	8.43	.96	-1.590	1.419
Marital Status	1896	0	1			-.428	-1.819
Working Status	1897	0	1			1.260	-.412
N of Children	1897	0	6	2.43	1.28	.465	.378
Living w/ Child	1786	0	1			-.250	-1.940
Physical Activity	1887	3	12	8.32	2.57	-.329	-.650
Alcohol Use	1897	0	1			.599	-1.643
Tobacco Use	1897	0	1			1.651	.728
Total N (Valid)	1061						

Note. Depressive Sx = depressive symptoms.

Measurements

For the current study, items from the questionnaire used in the Wave 5 survey for the Health & Lifestyles of Older Adults in the Aging Societies of Japan and the U.S. (University of Michigan, Tokyo Metropolitan Institute of Gerontology, and University of Tokyo, 1999) were used. Items from the

questionnaire corresponding to each of the study variables are described as follows.

Religiosity

An older Japanese adult's religiosity—a person's religious coping and his/her use of private religious practices to express his/her religious beliefs—was measured by six items that ask about (1) religious coping and (2) private religious practices (Table 3.5).

The response categories of religiosity are: 1) never think so, 2) don't usually think so, 3) sometimes think so, 4) always think so, or 5) don't know. The scaling level of this item is interval. For response categories 1) to 4), 1 to 4 points are assigned, respectively. Data that indicate 5) don't know were excluded from the analysis. The values of the six items of religiosity were summed; a higher score signifies greater religiosity. The reliability of religiosity scale has a Cronbach's alpha of .783.

Physical Health

Older Japanese adults' *physical health*, or their bodily functional capacities and presence of chronic conditions, were measured in terms of (1) limitations in performance of self-care (i.e., Activities of Daily Living [ADL] and Instrumental ADL [IALD]), (2) mobility, and (3) the presence of chronic diseases (Table 3.5).

Originally, the ADL and IALD were measured by ten items. Study

participants choose one of six response categories: 1) not difficult at all, 2) slightly difficult, 3) fairly difficult, 4) extremely difficult, 5) cannot do at all, or 6) don't know. The scaling level of this item was interval. The response values of these ten items were re-coded; for response categories 1) to 5), 0 to 4 points are assigned, respectively. Data that indicate 6) don't know were excluded from the analysis. Scores of these items of ADL/IADL were summed, and a higher score signifies greater limitations in performance of self-care. The measure has a Cronbach's alpha of .913.

The ADL/IADL scale, however, was found to have a high degree of skewness ($g = 5.057$). To reduce skewness (to 2.047) (see Table 3.4), a dichotomous variable was developed for the ADL/IADL scale. Among the 1,897 total subjects, 85.7% answered "0) not difficult at all" for all the 10 items, while 14.3% reported that they have some extent of difficulty for their ADL/IADL status in these 10 items. Based on this information, the values of ADL/IADL were re-coded into 0) not difficult at all (for the 85.7% of subjects above) or 1) somewhat difficult (for the 14.3% subjects above). Zero or one points were assigned to 0) and 1), respectively. The higher score indicates greater difficulty in ADL/IADL. The scaling level of the new ADL/IADL scale is nominal.

Mobility was measured by seven items (Table 3.5). The mobility scale was originally a four-point-scale and the response values of these seven items

were re-coded as: 0) not difficult at all, 1) slightly difficult, 2) extremely difficult, 3) cannot do at all, or 5) don't know. The scaling level of this item was interval. Data that indicate 5) don't know were not included in the analysis. For response categories 0) to 3), 0 to 3 points are assigned, respectively. Scores for these items were summed, and a higher score signifies greater limitations in mobility. The mobility measure has a Cronbach's alpha of .902.

Like the ADL/IADL scale, the mobility scale appeared to have a high degree of skewness ($g = 2.822$). For all the seven mobility questions, 64.2% of elderly Japanese respondents reported 0) not difficult at all, and 35.8% of them indicated some difficulty. To reduce skewness (to .592) (Table 3.4), the values of the mobility scale were re-coded into 0) not difficult at all or 1) somewhat difficult. To each of these 0) and 1), 0 or 1 points were assigned. A higher score of 1) indicates greater difficulty in mobility. The level of the new mobility scale is nominal.

The presence of chronic diseases was measured by 20 items (Table 3.5). To these questions, older Japanese adults responded 1) Yes, 0) No, or 2) don't know. Originally, this item had dichotomous variables; for Yes and No, 1 and 0 points were assigned, respectively. Data that indicate 2) don't know were excluded in the analysis. Total points were summed, and higher total scores signify a worse state of physical health.

Similar to the ADL/IADL and mobility scales, the chronic disease scale had a high degree of skewness ($g = 2.910$). For the 20 items of chronic diseases, 75.9% of respondents answered that they had zero to two chronic diseases, while 24.1% suggested that they suffered more than three chronic diseases. Based on this threshold, to reduce skewness (to 1.213) (Table 3.4), the values of the chronic disease scale was re-coded into 0) zero to two chronic diseases and 1) three or more chronic diseases. To each of these 0) and 1), 0 and 1 points were assigned. The greater score 1) indicates worse physical health status. The scaling level of the new chronic disease scale is nominal.

Mental Health

Mental health—the absence of behavioral dysfunction and psychological distress—was measured by 20 items of the CES-D Scale that asks: (1) the absence or presence of depressive symptoms, (2) the ability of older adults to control their behaviors, thoughts, and feelings during a specific period, and (3) the frequency and intensity of general affect (Table 3.5).

Of 20 items, 16 items are negatively connoted, while the other four items have positive connotations. The response categories of the 16 negatively-connoted items are: 1) hardly ever (i.e., less than 1 day or 0 days), 2) a little bit of the time (1-2 days), 3) some of the time (3-4 days), 4) most of the time (5-7 days), or 5) don't know. For other four positively-connoted items

[i.e., (8), (12), (16), and (4)], the response categories 1) to 4) are reversed in order to match those of the 16 items (i.e., 1) most of the time (5-7 days), 2) some of the time (3-4 days), 3) a little bit of the time (1-2 days), 4) hardly ever (less than 1 day or 0 days), or 5) don't know). For each of the response categories of 1), 2), 3), and 4) for the 20 items, 0 to 3 points are assigned. Data that indicate 5) don't know were excluded from the analysis.

The scaling level of this item is interval. All the scores were summed up; a higher score signifies worse mental health status. For the current study, the CES-D Scale had a Cronbach's alpha of .709.

Cognitive Health

Older people's cognitive health—the cognitive conditions of mental functions that assess orientation, attention, recall and memory, language, and construction—was measured by nine items that ask about (1) orientations to time and place, (2) memory, and (3) attention span (Table 3.5). The nine items were derived from the Short Profile Mental Status Questionnaire (SPMS) (Pfeiffer, 1975). The SPMS consists of ten items to assess short-term and long-term memory and other cognitive functional ability of a person. The questionnaire of Wave 5 survey in 1999 excluded one of the ten items which asked “the name of this place” because of its inappropriateness for non-institutionalized or community-dwelling elders.

Originally, the responses of an older adult to each of the nine items

were evaluated as either 0) correct or 1) incorrect. Zero points were given to a correct response, and 1 point was assigned to an incorrect response. If a subject answered “I don’t know,” then one point was assigned to the item he/she answered so, as this can indicate the memorizing difficulty of a subject. The values for all items were summed, and the potential range varied from 0 to 9. The greater total scores of these questions indicate worse cognitive health status. This scale had a Cronbach’s alpha of .589.

To yield a more conservative measure of cognitive health status than the original dichotomous variables mentioned above, following the procedure of a study using the same data set to the current study (Liang, Borawski-Clark, Liu, & Sugisawa, 1996), the summed-scores were then collapsed into four categories and values of the Short Profile Mental Status Questionnaire (Pfeiffer, 1975). The four response categories and values are: 1) being intact (0-2 errors), 2) mildly impaired (3-4 errors), 3) moderately impaired (5-7 errors), and 4) severely impaired (8 or more errors). For each of the response categories of 1), 2), 3), and 4), 1 to 4 points are assigned. The new measure was treated as an interval scale.

Subjective Feelings about Health

Older adults’ subjective feelings about health—the state of their feelings about their current health status and about the condition of their health compared to that of their peers—was measured in terms of a person’s

(1) evaluations of his/her overall health status, (2) satisfaction of his/her present health status, and (3) comparison of his/her health to others of the same age (Table 3.5).

Evaluations and satisfaction of his/her present health status was measured by two items, while (2) comparison of his/her health to others of the same age was measured by one item. The response categories of the two items of (1) evaluations of overall health status and (2) satisfaction of present health are similar (see Table 3.5). Because of the similarity, these items' response categories were integrated, renamed, and revalued as: 1) not at all, 2) not very much, 3) cannot say, 4) fairly, 5) very much, and 6) don't know. The scaling level of these items is interval. One to five points were assigned to the responses of 1) to 5), respectively. Data that indicate 6) don't know were not included in the analysis. The scores of these two items were summed, and a greater score indicates a better state of subjective feelings about health. This scale has a Cronbach's alpha of .801.

The response categories of the item for comparison of his/her health to others of the same age were 1) worse, 2) about the same, 3) better, or 4) don't know. The scaling level of this item is ordinal. One to 3 points were assigned to the responses 1) to 3), respectively; data that indicate 4) don't know were excluded from the analysis. A greater item score signifies a better state of subjective feelings about health.

Social Support/Social Integration

Japanese elders' *social support*—one's perception of supportive interpersonal interactions with spouses, family members, friends, and other people—as well as *social integration*—one's basic characteristics or family structure (marital status, working status, number of children, and living condition with children) that can promote the person's social interactions with other people—was measured in terms of (1) the extent to which a person perceives emotional and instrumental support from other people, (2) their marital status, (3) working status, (4) number of children, and (5) living condition with their children (Table 3.5).

The extent to which a person perceives emotional and instrumental support from other people has three items, and their response categories are: 1) not very much/not very well, 2) can't say one way to another, and 3) very much/very well, and 4) don't know. The scaling level of this measure is ordinal. Data that indicate 4) don't know were excluded from the analysis. For response categories 1) to 3), 1 to 3 points were assigned, respectively. Scores of these items were summed; a higher score signifies a greater perception of social support. This scale has a Cronbach's alpha of .724.

Elderly adults' marital status, working status, the number of children, and living condition with his/her children were each measured by a single item. Marital status is indicated as either 1) married or 0) not married;

working condition is scored as either 1) working or 0) not working; and living condition with children is scored as either 1) living together or 0) not living together. For each of these response categories 1) and 0), 1 and 0 points are assigned, respectively. In addition, the number of children is scored as: 0) zero, 1) one, 2) two, 3) three, 4) four, 5) five, and 6) more than six; for the response categories 0) to 6), 0 to 6 points were assigned, respectively. A higher item score signifies a better state of social integration.

Originally, the item for number of children was considered a continuous variable and the actual number of children was used in data analysis. However, the scale had a high degree of skewness ($g = 23.076$). For Wave 5 survey participants, the mean number of children was 2.44 ($SD = 1.33$), and 1,755 (92.5%) of participants indicated having one to five children. Based on this information, in order to reduce the skewness (to .465) (Table 3.4), a six category response for the number of children was developed.

Further, originally the item marital status was a nominal variable providing six response categories of 1) married, 2) separated, 3) divorces, 4) widowed, 5) never married, and 6) don't know with an acceptable range of skewness ($g = .503$). Among the 1,897 weighted cases, majority ($n = 1,146$ [60.4%]) answered that they were married, and others responded to be widowed ($n = 660$ [34.8%]), divorced ($n = 44$ [2.3%]), never married ($n = 38$ [2.0%]), separated ($n = 8$ [0.4%]), or don't know ($n = 1$ [0.0%]). To be utilized

in data analysis, these not-married-subjects were collapsed, and the variable marital status was re-coded as a dichotomous variable with two response categories of 1) married or 0) no married as mentioned above.

The scaling level of the four items of marital status, working condition, number of children, and living condition with children is nominal. The greater item score for each of these four items indicates a better status of social integration.

Health Promotion Behaviors

An older adult's health promotion behaviors—the frequency of physical activity and the engagement in alcohol and tobacco use—were measured in terms of an older adult's 1) physical activities, 2) alcohol use, and 3) tobacco use (Table 3.5). Physical activities were measured by three items asking about the frequency of an elderly adult's engagement in yard work, exercise, and walking. The response categories of these three items are: 1) not at all, 2) seldom, 3) sometimes, 4) often, or 5) don't know. The scaling level of these measures is interval. Data that indicate 5) don't know were not included in the analysis; otherwise, 1 to 4 point(s) are assigned to 1) to 4), respectively. Scores of these items were summed; a higher score indicates an elder's more frequent engagement in physical activities. This scale has a Cronbach's alpha of .614.

In addition, alcohol use and tobacco use were each measured by a single

item asking an elderly adult's current use of alcohol and tobacco. The response categories of these two items are 1) Yes, 0) No, or 2) don't know, and 1 or 0 points are assigned to 1) and 0), respectively. Data that indicate 2) don't know were not included in the analysis. These measures are dichotomous variables. Each of the scores for alcohol use and tobacco use was separately evaluated. The lower score (zero) indicates an older adult's greater engagement in healthy behaviors.

Age

Age—the duration or the measure of time of the existence of a person—was measured in terms of the category to which a person is assigned as: 1) age 65 to 74 years old, 2) age 75 to 84 years old, or 3) age 85 years and over based on their self-reported age at the time of the survey. These age categories were adopted from the age classification of the U.S. Census Bureau (U.S. Bureau of the Census, 1996). A single item is used to measure the age of elderly Japanese (Table 3.5). The scaling level of age is ordinal.

Gender

Gender, or the category to which an older adult is assigned by sex, is categorized as either 0) male or 1) female based on their self-reported at the time of the survey (Table 3.5). These gender categories were used in the Japanese Census in 2000 (Health and Welfare Statistics Association, 2004a). One item is used to measure the gender of older adults. The scaling level of

gender is nominal.

Data Analysis

For data analysis, study subjects were divided into two gender groups of men or women and into three age groups: 1) 65 to 74 years, 2) 75 to 84 years, and 3) 85 years and older. First, the number and percent of older adults in each gender-age category was calculated. Then, descriptive statistics (e.g., means, standard deviations) for all relevant study variables were calculated for each gender-age group.

Second, to examine the first hypothesis, H1.1, one-way analysis of variance (ANOVA) and multiple comparisons (i.e., Tukey's honestly significant difference test) was used to analyze relationships between Japanese elders' religiosity and their age. To test the second hypothesis, H1.2, 2-way ANOVA was performed for all age groups combined and t-test was used for each age group in order to examine gender differences of religiosity.

Third, to explore hypotheses (H) 2.1 and 2.2, multiple linear regression or logistic regression analyses was performed to analyze relationships between Japanese elders' religiosity and their physical, mental, and cognitive health status; subjective feelings about health; social support/integration; and health promotion variables, controlling for their age and gender effects. Fourth, to examine H3.1 and H4.1, a series of multiple linear regression or binary logistic regression was used to test each mediation

effect following Baron and Kenny's steps and the Sobel test (1986).

Finally, to examine H5.1, a path analysis was performed to test all direct and indirect effects. The path coefficients were obtained. Direct and indirect effects of all factors on health promotion behaviors of physical activities, alcohol use, and tobacco use were estimated. The entire model fit also was assessed. Throughout these hypotheses testing, the acceptable significance level of $p < .05$ was employed. The path analysis was done using Amos version 16.0, and other hypotheses were analyzed using SPSS software version 16.0.

Path Diagram

To examine H5.1, the initial path model was developed (Figure 3.1). The path model depicts all the possible paths among the variables and is used to operationalize the conceptual model (see Figure 2.1). The model fit of this saturated path diagram was examined and modified, and the final model was presented as a result of hypothesis testing.

Human Subjects Protection

Data in this study are the 1999 data from the "Health and Well-Being among Older Old in U.S. and Japan", a five wave panel survey of the elderly in Japan undertaken in 1999 by the University of Michigan (UM), US, the Tokyo Metropolitan Institute of Gerontology (TMIG), and the University of Tokyo, Japan. The survey was funded by the National Institute on Aging

grant R01 AG154124-01 P.I. Dr. Jersey Liang, Professor at the University of Michigan School of Public Health . Additional support was provided by the Japanese Ministry of Health, Labor and Welfare Longevity Foundation, and the Tokyo Metropolitan Institute of Gerontology. The survey was approved by the UM Institute of review Board (IRB) Health Sciences (H03-00002430-R1). The secondary analysis was conducted with the permission and supervision of Dr. Liang. The current study was approved by IRB Health Sciences at the University of Michigan through an expedited review (HUM00020215, July 11, 2008). The investigator accessed and analyzed data at the School of Public Health where the data set resides under the supervision of Dr. Liang and his colleagues.

CHAPTER 4

STUDY RESULTS

This study was conducted to identify predictors of older Japanese adults' health promotion behaviors, including physical activity and alcohol and tobacco use, by examining relationships between their religiosity and other factors: demographic characteristics of age and gender; physical, mental, and cognitive health status; subjective feelings about health; social support/integration; and these health promotion behaviors through a secondary analysis of an existing data set from a study of Japanese elders (Liang et al., 1999). In this chapter, the results of the secondary data analysis are presented in two sections. In the first section, the outcomes of descriptive analyses of study subjects and variables are presented. Before performing hypotheses testing, it was essential to understand the descriptive characteristics of study subjects since little was previously known about Japanese elders' religiosity and its relationships with their health and health promotion behaviors. The results of hypotheses testing are then presented in the second section.

Section 1: Descriptive Statistics

Demographics of Study Subjects

The average age of 1,897 subjects was 74.5 years old ($SD = 5.9$) (Table 4.1). Within this sample, the proportion of participants across the three age groups was: 65 to 74 years ($n = 1,054$, 55.6%), 75 to 84 years ($n = 721$, 38.0%), and 85 years and older ($n = 122$, 6.4%). These proportions were similar to those reported in the Japanese Census in 2000 (59.4%, 30.6%, and 10.0%, respectively) (Health and Welfare Statistics Association, 2004a).

The age distribution of study sample showed a slightly right-skewed shape, because of the over-sampling of Japanese adults age 70 years and older for Wave 5 survey in 1999. However, the sample size of the current study was large; following the statistical inference of the central limit theorem, the distribution was considered approximately normally distributed (Neter, Kutner, Nachtsheim, & Wasserman, 1996).

Table 4.1. Demographic Characteristics of Study Subjects
($N = 1,897$)

Demographics	Weighted		Mean	SD
	N	%		
Age			74.46	5.90
65-74	1054	55.6		
75-84	721	38.0		
85 +	122	6.4		
Gender				
Male	801	42.2		
Female	1096	57.8		
Marital Status				
Married	1146	60.4		
Not married	750	39.5		
Working Status				
Working	443	23.4		
Not working	1454	76.6		
Number of Children			2.43	1.28
Zero	108	5.7		
One	282	14.9		
Two	683	36.0		
Three	505	26.6		
Four	190	10.0		
Five	85	4.5		
More than six	44	2.3		
Living with Children				
Living together	1004	52.9		
Not living together	782	41.2		

Among the study participants 57.8% was women (Table 4.1), and this trend also resembled to 58.1% for the elderly Japanese population in 2000 (Health and Welfare Statistics Association, 2004a). Married subjects comprised 60.4% of the total sample. Within the sample, 23.4% were working. Study subjects reported that the average number of their children was 2.4 ($SD = 1.3$). At the time of the Wave survey in 1999, 52.9% of them lived with

at least one of their children. This percentage also is similar to that of 52.2% reported in the Japanese Census in 2000 (Health and Welfare Statistics Association, 2004a). Based on these resemblances in their demographic characteristics, subjects in the current study were considered to represent the structure of the elderly Japanese population.

Descriptive Data on the Study Variables:

Skewness and Kurtosis of Study Variables

While the skewness of most of the study variables fell within normal ranges, those of the variables of depressive symptoms (skewness = 2.253) and memory impairment (skewness = 2.878) appeared to be outside the normal ranges (Table 3.4). The reason for the prominent skewness of these two measures was that 26.7% ($n = 424$) of 1,897 elderly respondents had 3 scores for the CES-D measure (score range 0-60 [zero scores signify better], Mean score 6.58), and 85.7% ($n = 1626$) of these elders answered “1,” or cognitively being intact for the SPMS scale (score range 1-4, Mean 1.18). Further, the CES-D scale (Radloff, 1977) is a popularly used measure for depressive symptoms (Masood & Okazaki, 2006). The Short Profile Mental Status Questionnaire (SPMS) (Pfeiffer, 1975) is designed to evaluate short- and long-term memory and other cognitive functional ability of the elderly. Nine of the ten items of the SPMS, used in the current study, were also used in the

Established Populations for Epidemiological Studies of the Elderly (EPESSE) conducted by the National Institute of Aging, U.S., while maintaining Pfeiffer's original cut-off points and generating a more conservative measure of memory impairment than the original SPMS (Liang et al., 1996). Because of their robustness and popularity, the CES-D and SPMA were used in the current study.

Religiosity

Table 4.2 shows age-gender group comparisons for each of the study variables. Across the three age groups and within each of these age groups, Japanese women reported having a greater religiosity than did Japanese men. Japanese women increased their degree of religiosity along with their increased age ($M = 15.21$ [$SD = 4.23$], 15.96 [4.08], 16.31 [3.62] for group 65-74, group 75-84, and group 85+, respectively). Japanese men in the group 75-84 reported greater religiosity than other age groups.

Physical, Mental, and Cognitive Health Status

Among the three age groups of Japanese men and women (65-74, 75-84, and 85+), compared to those in younger age groups, those in older age groups tended to report greater declines in ADL/IADL (91.6%, 81.4%, 52.2%) and mobility (76.0%, 52.2%, 28.9%), greater numbers of chronic diseases (20.5%, 28.2%, 31.0%), more depressive symptoms ($M = 6.40$ [$SD = 4.61$], 6.76 [$SD =$

4.83], 7.27 [$SD = 5.55$), and worse memory impairment ($M = 1.10$ [$SD = .34$], 1.25 [$SD = .55$], 1.48 [$SD = .78$]) (Table 4.2). Across age groups, compared to Japanese men, Japanese women were more likely to also report deteriorated ADL/IADL (10.6% versus 17.0%) and mobility (20.6% versus 47.1%), and increased chronic diseases (20.3% versus 26.8%), depressive symptoms ($M = 5.82$ [$SD = 4.32$] versus 7.17 [4.98]), and memory impairment ($M = 1.11$ [$SD = .37$] versus 1.23 [$SD = .54$]). The tendency for Japanese women to have greater deteriorations of physical, mental, and cognitive health status than Japanese men was also found in each of age group (e.g., difficulty in mobility of men and women in group 85+ accounted for 50.0% and 84.3%, respectively) (Table 4.2).

Subjective Feelings about Health

Across age groups and within each age group, Japanese men reported greater satisfaction with their current health status than did Japanese women (e.g., $M = 7.12$ [$SD = 1.87$] versus 6.81 [1.82]) (Table 4.2). Among the three age groups of Japanese women (65-74, 75-84, and 85+), those in younger age groups reported greater satisfactions of health than did those in older age groups ($M = 6.99$ [$SD = 1.72$], 6.64 [1.89], 6.44 [1.93]). In contrast, among these age groups of Japanese men, those in the oldest age group (85+) indicated the greatest satisfactions of health ($M = 7.16$ [$SD = 1.83$], 7.03 [1.93], 7.22 [1.99]).

Similar to health satisfaction mentioned above, across age groups and in each of the age groups, Japanese men than Japanese women reported that their health status was better than other people with the same age (e.g., $M = 2.37$ [$SD = .70$] versus 2.25 [.71]). For both Japanese men and women in group 65-74, 75-84, and 85+, compared to those in younger age groups, those in older age groups reported that they were healthier than other people in the same age ($M = 2.28$ [$SD = .70$], 2.30 [.73], and 2.53 [.66], respectively).

Social Support

Unlike religiosity and other health variables, social support did not show a clear pattern or trend in the mean differences among age and gender groups. However, Japanese women in the group 85+ had a greater variance ($SD = 1.128$) in their social support status than other age and gender groups of people.

Social Integration

Overall, Japanese men and women in older age groups were more likely to report that they did not have a spouse, or that they were widowed, than those in younger age groups (26.4%, 53.2%, 73.8% for age group 65-74, 75-84, and 85+, respectively) (Table 4.2). Across and within each of the three age groups, women (e.g., 58.1%) tended to report that they were not married, or widowed, than did men (14.1%).

Japanese men and women in group 85+ ($M = 3.41$ and 3.28) reported

having a greater number of children than did those in group 65-75 (2.17 and 2.15) and those in group 75-84 (2.54 and 2.74). Both Japanese men and women in older age groups were more likely to live with their children than were those in younger age groups (51.3%, 61.0%, and 69.7% for group 65-74, 75-84, and 85+, respectively). In each age group, compared to Japanese men (48.1%, 55.6%, 63.8%), Japanese women were more likely to live with their children (54.1%, 64.1%, 73.6%).

Across and in each of age groups, Japanese men tended to engage more in work than did Japanese women (e.g., 33.3% versus 16.1%). Both Japanese men and women in younger age groups were more likely to engage in work than did those in older groups (31.8%, 13.7%, and 7.4% for group 65-74, 75-84, and 85+, respectively).

Health Promotion Behaviors

Japanese men and women in the group 65-74 ($M = 8.49$ [$SD = 2.50$] and 8.62 [2.39], respectively) were more likely to engage in physical activities than those in the group 75-84 (8.27 [2.71] and 8.13 [2.66], respectively) and group 85+ (7.58 [2.68] and 6.83 [2.61], respectively) (Table 4.2). In the group 65-74, Japanese women ($M = 8.62$ [$SD = 2.39$]) tended to engage more in physical activities than did Japanese men (8.49 [2.50]). However, Japanese men tended to be more physically active than Japanese women in the group 74-84 ($M = 8.27$ [2.71] versus 8.13 [2.66]) and the 85+ group (7.58 [2.68]

versus 6.83 [2.61]).

In addition, compared to Japanese men and women in older age groups, those in younger age groups were more likely to drink alcohol (40.7%, 31.2%, and 18.0% for group 65-74, 75-84, and 85+, respectively) and smoke cigarette (21.1%, 14.8%, and 12.3% for the same age groups). Across and in each of the age groups, a greater percentage of Japanese men than Japanese women reported drinking alcohol (e.g., 57.3% versus 19.8%) and smoking cigarette (34.5% versus 6.3%).

Section 2: Specific Aims and Hypotheses Testing

Specific Aim 1:

Determine the relationships between demographic factors of age and gender and level of religiosity in elderly Japanese.

Hypothesis 1.1:

Among three age groups of Japanese elders (i.e., 65 to 74 years old, 75 to 84 years old, and 85 years old and over), those who are in oldest age group report greater religiosity than those in younger age groups.

One-way-ANOVA revealed a significant relationship between elderly Japanese adults' level of religiosity and their age [$F(2, 1745) = 13.381, p < .001$] (Table 4.3).

Table 4.3. One-Way Analysis of Variance Summary for Age-Group Differences in Religiosity

	df	SS	MS	F	p
Between groups	2	532.540	266.270	13.381	.000
Within groups	1,745	34,724.352	19.899		
Total	1,747	35,256.892			

To evaluate the differences between age groups, three possible pairwise comparisons could be made. The overall chance of making a Type 1 error was inflated due to multiple comparisons. Thus, a Post-Hoc comparison between the age groups was performed using the Turkey HSD adjustment method. As a result, Japanese elders in age group 75-84 had a significantly higher degree of religiosity than did those in the group 65-74 ($p < .001$) (Table 4.4). No other comparisons were statistically significant. Japanese adults in the group 85+ also indicated greater religiosity than did those in the group 65-74. However, the mean difference was not statistically significant ($p = .193$). In addition, the level of religiosity between Japanese adults in the group 75-84 and those in the group 85+ was not significantly different ($p = .744$). Thus, Hypothesis 1.1 was partially supported.

Table 4.4. Multiple Comparison of Religiosity among Three Age Groups (Weighted Data)

(I)	(J)	Mean Difference (I-J)	SE	p	95% CI	
					Low	Up
65-74	75-84	-1.148*	.224	.000	-1.67	-.62
	85 +	-.801	.462	.193	-1.89	.28
75-84	65-74	1.148*	.224	.000	.62	1.67
	85 +	.346	.473	.744	-.76	1.46
85 +	65-74	.801	.462	.193	-.28	1.89
	75-84	-.346	.473	.744	-1.46	.76

Hypothesis 1.2:

Elderly Japanese women report greater religiosity than elderly Japanese men across all age groups and within each age group.

Un-weighted analyses were performed in this section. Means, standard deviations, and sample sizes are shown for males and females across all age groups in Table 4.5. Within each age group, females were compared to males using a 2-sample independent t-test. Similar results were observed. In all age groups, greater levels of religiosity were reported by elderly females (Table 4.6). Hypothesis 1.2 was supported.

Table 4.5. Means and Standard Deviations for Religiosity across Age and Gender Groups ($N = 3,254$)

Religiosity	Un-weighted N (%)	Mean	SD
Age group			
65-74	1837 (56.5)	14.13	4.435
75-84	1210 (37.2)	15.27	4.444
85+	207 (6.4)	15.05	4.428
Total	3252 (100.0)	14.60	4.470
Gender			
Male	1373 (42.2)	13.33	4.598
Female	1881 (57.8)	15.55	4.129
Total	3252 (100.0)	14.60	4.470

Table 4.6. Gender Differences in Each Age Group

Age group	Female	Male	p (2-tailed)
65-74	15.21 \pm 4.2	13.05 \pm 4.4	< .001
75-84	15.96 \pm 4.1	14.26 \pm 4.8	< .001
85+	16.13 \pm 3.6	13.17 \pm 5.2	< .001

Further, the mean of religiosity score was evaluated combining age and gender effects. A model with age-by-gender interaction was firstly tested. However, the interaction was not significant ($p = .153$) (Table 4.7). The insignificant interaction term suggests that the gender difference in religiosity does not depend on age categories. In other words, the gap in religiosity between females and males are considered homogenous for the age group of 65-74 years, that of 75-84 years, and that of 85 years and older.

Table 4.7. Analysis of Variance Results with Religiosity being the Dependent Variable and Age-by-Gender Interaction

Religiosity	df	F	p
Intercept	1	13,828.064	.000
Age group	2	16.926	.000
Gender	1	87.547	.000
Age group by gender interaction	2	1.881	.153

An ANOVA model with two main effects was fit (Table 4.8). For all age groups, females had a higher religiosity score than did males ($\beta = 2.129$, $p < .001$). Elderly Japanese also had different religiosity levels between different age groups ($p < .001$). For both gender groups, people in the 75-84 age category had higher religiosity score compared to those in the 65-74 age category ($\beta = .921$, $p < .001$). In addition, the religiosity score of people in the oldest group of 85 years and older was also higher than that in the youngest age group of 65-74 years old ($\beta = .786$, $p < .05$). These age groups were compared to each other using Turkey HSD Post-hoc comparison (Table 4.9). Compared to people in group 65-74, those in group 75-84 ($p < .001$) and those in group 85+ ($p = .021$) had significantly greater religiosity.

Table 4.8. Analysis of Variance Results with Religiosity being the Dependent Variable and Main Effects Only

Religiosity	β	SE	df	F	p
Intercept	12.995	.135	1	14198.289	<.001
Age group 75-84 vs. 65-74 85+ vs. 65-74	.921*** .786*	.167 .342	2	16.024	<.001
Gender Females vs. males	2.129***	.160	1	177.080	<.001

Table 4.9. Multiple Comparison of Religiosity among Three Age Groups (Un-Weighted Data)

(I)	(J)	Mean Difference (I-J)	SE	p-value	95% CI	
					Low	Up
65-74	75-84	-1.13*	.166	.000	-1.52	-.74
	85 +	-.91*	.342	.021	-1.72	-.11
75-84	65-74	1.13*	.166	.000	.74	1.52
	85 +	.22	.351	.806	-.60	1.04
85 +	65-74	.91*	.342	.021	.11	1.72
	75-84	-.22	.351	.806	-1.04	.60

Specific Aim 2:

Determine the relationships between religiosity, and health factors and health promotion behaviors in elderly Japanese.

Hypothesis 2.1:

In elderly Japanese, religiosity is positively related to physical health

status (i.e., ADL/IADL [Activity of Daily Living/Instrumental ADL], mobility, and presence of chronic disease), subjective feelings about health (i.e., satisfaction about health status and health comparison to other people with the same age), social support and social integration (i.e., the perception about support, marital status, working status, number of children, living condition with children) and is negatively related to mental health status (i.e., depressive symptoms) and cognitive health status (i.e., memory impairment), controlling for age and gender.

Table 4.10 and 4.11 report the results of logistic and multiple linear regression analyses for Hypothesis 2.1 and 2.2.

Table 4.10. Summary of Logistic Regression Analyses for Religiosity Predicting Health Status, Social Support/Integration, and Health Promotion Behaviors in Elderly Japanese

DV	β	SE(β)	Wald statistic	P	Odds ratio	95% CI	
						Low	Up
ADL/IADL	-.031	.071	3.175	.075	.970	.938	1.003
Mobility	-.011	.013	.748	.387	.989	.964	1.014
CD	.032	.013	5.831	.016*	1.033	1.006	1.060
Marital	-.029	.013	4.857	.028*	.971	.946	.997
Working	.029	.013	4.540	.033*	1.029	1.002	1.056
Living w/	.022	.012	3.719	.054	1.023	1.000	1.046
Alcohol	-.005	.012	.184	.054	.995	.971	1.019
Tobacco	-.044	.015	8.720	.003**	.957	.929	.985

Note. CD: Chronic diseases; Living w/: Living with children; β : Un-standardized coefficients; Lower limit; Up: Upper limit.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4.11. Multiple Linear Regression Analyses Summary for Religiosity Predicting Health Status, Social Support/Integration, and Health Promotion Behaviors in Elderly Japanese

DV	β (a)	SE(β)	β (b)	P	R ²	95% CI	
						Low	Up
Depressive	.066	.028	.063	.018*	.022	.011	.120
Memory	-.005	.002	-.050	.038*	.048	-.010	.000
Satisfaction	.021	.010	.052	.035*	.020	.001	.041
Comparison	.006	.004	.039	.120	.011	-.002	.014
Social support	.022	.006	.104	.000***	.011	.011	.034
Number of children	.016	.007	.056	.020*	.073	.002	.029
Physical activity	.074	.014	.130	.000***	.033	.047	.101

Note. β (a): Un-standardized coefficients; SE(β): Standard error of un-standardized coefficients; β (b): Standardized coefficients, Low: Lower limit; Up: Upper limit.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Physical Health Status

Response categories of three physical-health items, or ADL/IADL, mobility, and presence of chronic disease, were negatively connoted (see Table 3.5). Greater scores signify greater problems in physical health status.

Performing a logistic regression analysis, relationships between religiosity and ADL/IADL ($\beta = -.031$) and mobility ($\beta = -.011$) were showed to be negative, which indicated that these relationships were substantively positive (Table 4.10). Japanese elders who had greater religiosity had a better ADL/IADL and mobility status. However, these relationships were not statistically significant ($p > .05$). The presence or the number of chronic disease showed a statistically significant *positive* association with religiosity ($\beta = .032$, $p = .016$).

Greater religiosity is associated with greater chronic health problems.

Subjective Feelings about Health

A multiple regression analysis reported a significantly positive relationship between “satisfaction about health status” and religiosity ($\beta = .021$, $p = .035$) (Table 4.11). Elderly Japanese who had greater religiosity indicated higher satisfaction about health. However, no significant association was reported for the relationship between “health compared to other people with age” and religiosity ($\beta = .006$, $p = .120$).

Social Support/Integration

Among social support/integration variables, elders’ perception about social support ($\beta = .022$, $p < .001$), working status ($\beta = .029$, $p = .033$), and the number of children ($\beta = .016$, $p = .020$) had a positive relationship with their level of religiosity (Table 4.10 and 4.11). Greater religiosity was associated with greater social support, engagement in work, and having more children. Japanese elders’ religiosity was reported to have positive relationship with their living condition with children; but the relationship was not significant ($\beta = .022$, $p = .054$).

In addition, marital status was revealed to have a significantly negative association with religiosity ($\beta = -.029$, $p = .028$). Japanese elders who had greater religiosity were more likely to be unmarried or widowed.

Mental Health Status

As explained in the measurement section of Chapter 3, a higher score on the mental health measure signifies greater level depressive symptoms, while a higher score of religiosity indicates greater level religiosity. Since a negative relationship between religiosity and depressive symptoms was hypothesized, a negative coefficient for the relationship was expected as a result of a multiple linear regression analysis. However, the coefficient indicated a significantly positive relationship between religiosity and depressive symptoms ($\beta = .066$, $p = .018$) (Table 4.11). This suggests that Japanese elders who have greater religiosity had greater level depressive symptoms.

Cognitive Health Status

Similar to the measure of depressive symptoms, that of memory impairment was negatively connoted (see Table 3.5); higher scores indicate greater memory impairment among elders. Thus, the negative coefficient for memory variable in Table 4.11 signifies a substantively positive relationship between memory and religiosity ($\beta = -.005$, $p = .038$). Japanese elders who had greater religiosity had better memory or cognitive functional ability.

In sum, Hypothesis 2.1 was supported for the relationships between religiosity, and social support and cognitive health status. The hypothesis also was partially supported for the relationships between religiosity, and

subjective feelings about health and social integration. However, Hypothesis 2.1 was not supported for the relationships between religiosity, and physical health and mental health.

Hypothesis 2.2

In elderly Japanese, religiosity is positively related to a health promotion behavior of physical activity and is negatively related to alcohol use and tobacco use, controlling for age and gender.

As a result of regression analyses, religiosity was identified to be significantly positively related to physical activity ($\beta = .074$, $p < .001$) (Table 4.11) and negatively related to tobacco use ($\beta = -.044$, $p = .003$) (Table 4.10), controlling for age and gender. Elderly Japanese who had greater religiosity also reported being more physically active and less tobacco consumption. Alcohol use also was negatively related to religiosity; however, the relationship was not statistically significant ($\beta = -.005$, $p = .054$). Hypothesis 2.2 was partially supported.

Specific Aim 3:

Determine if religiosity mediates the effects of demographic factors on health factors and health promotion behaviors in elderly Japanese.

Hypothesis 3.1:

Elderly Japanese adults' religiosity mediates the effects of age and gender on physical, mental, and cognitive health; subjective feelings about health; social support/integration; and health promotion behaviors of physical activities and alcohol and tobacco use.

To examine mediation effects of religiosity, a series of multiple regressions and logistic regressions were performed following Baron and Kenny's 4-step approach (Baron & Kenny, 1986; Judd & Kenny, 1981). Sobel test was used to examine the significance of the indirect effect.

In Step 1, the effect of the initial variable(s) (X) on the outcome variable (Y) was examined to confirm a potential effect being mediated. In Step 2, the effect of the initial variable(s) (X) on the mediator (M) was tested, handling the mediator as the outcome variable. In Step 3, the effect of the initial variable(s) (X) on the outcome variable (Y) was examined, controlling for the mediator (M). In Step 4 the coefficients of the initial variables in Step 3 were assessed. In other words, to determine the complete mediation of the mediator (M) on the relationships between the initial (X) and the outcome variables (Y), the coefficients of the initial variables in Step 3 should be zero.

If all these four steps were met, complete mediations were claimed. If the first three steps were met yet Step 4 was not met, or if coefficients in Step

3 were not zero but were reduced to some extent from the total effect estimated in Step 1, partial mediation effects of the mediator were implied. If the coefficients in Step 3 were not reduced or even increased, then no mediation effects were addressed. Finally, for variables that had either complete or partial mediating effects, Sobel z scores and p -values were evaluated to claim the statistical significance for the mediating effects of the variables.

As seen in Table 4.12, no zero-coefficients direct effect for the initial variables were identified after controlling for religiosity; consequently, the hypothesis that religiosity's completely mediate the relationships between age and gender, and health and health promotion variables were not supported. However, partial mediation effects of religiosity were detected. Religiosity mediated gender effects on the presence of chronic diseases (Sobel $z = 2.149$, $p = .031$), on depressive symptoms ($z = 3.996$, $p < .001$), on marital status ($z = -8.326$, $p < .001$), and on tobacco use ($z = -7.761$, $p < .001$) (Table 4.12).

That is, without controlling for religiosity, compared to elderly Japanese men, elderly Japanese women were more likely to suffer increased chronic diseases ($\beta = .323$, $p = .005$) and depressive symptoms ($\beta = 1.319$, $p < .001$). However, after controlling for religiosity, the direct effects of gender on presence of chronic diseases and depressive symptoms were reduced

to .271 and 1.109, respectively. Further, compared to elderly men, elderly women were more likely to be widowed ($\beta = -2.244, p < .001$). After controlling for religiosity, the direct effects of gender on marital status were reduced to -2.165. In addition, religiosity mediated the gender effect on tobacco use by reducing the coefficients from -2.043 to -1.987 ($p < .001$).

Similarly, religiosity was also revealed to partially mediate the age effect (i.e., age group 75-84 compared to age group 65-74) on memory impairment (Sobel $z = 3.539, p < .001$), marital status ($z = -3.884, p < .001$), and the number of children ($z = 3.726, p < .001$) (Table 4.12). Without controlling for religiosity, the difference between the two age groups of 75-84 and 65-74 on memory impairment ($\beta = .147, p < .001$), marital status ($\beta = -1.199, p < .001$), and number of children ($\beta = .503, p < .001$) were identified in Step 1. However, after controlling for religiosity, the difference of age group 75-84 and 65-74 on memory impairment, marital status, and the number of children were reduced to .142, -1.173, and .487, respectively.

Religiosity's partial mediating effects were not supported on the relationships between age and gender, and ADL/IADL, mobility, subjective feelings about health, social support, working status, living condition with children, and other health promotion measures of physical activity and alcohol use (Table 4. 12).

Specific Aim 4:

Determine whether the effects of religiosity on health promotion behaviors in elderly Japanese are mediated by the health factors of the elderly.

Hypothesis 4.1:

Elderly Japanese adults' physical, mental, and cognitive health status; subjective feelings about health; and state of social support/integration mediate the effect of religiosity on health promotion behaviors of physical activities and alcohol and tobacco use.

Mediations for Hypothesis (H) 4.1 were examined following the same procedures employed for H3.1. Similar to H 3.1, no zero-coefficients for the initial variables were identified, after controlling for the mediators. None of the health measures were revealed to completely mediate religiosity's effects on health promotion behaviors (Table 4.13). Nevertheless, mobility partially mediated religiosity effects on alcohol use (Sobel $z = -2.382$, $p = .017$) and tobacco use ($z = -2.677$, $p = .007$).

Religiosity had significantly negative associations with both alcohol use ($\beta = -.050$, $p < .001$) and tobacco use ($\beta = -.092$, $p < .001$) (Table 4.13). Religiosity and mobility had a positive relationship ($\beta = .033$, $p = .004$), indicating that greater religiosity was associated with greater difficulty in mobility, or less religiosity was associated with less difficulty in mobility.

Further, mobility and alcohol use ($\beta = -.828, p < .001$) as well as mobility and tobacco use ($\beta = -.620, p < .001$) showed negative relationships, which signified that less difficulty in mobility was associated with alcohol and tobacco use. After controlling for mobility, the direct effect of religiosity on alcohol use and tobacco use was reduced. The partial mediation of mobility on the relationship between religiosity and alcohol use (Sobel $z = -2.382, p = .017$) and between religiosity and tobacco use ($z = -2.677, p = .007$) were both significant.

Similarly, marital status also was identified to partially mediate religiosity effects on alcohol use (Sobel $z = 3.046, p = .002$) and tobacco use ($z = 4.637, p < .001$) in elderly Japanese adults (Table 4.13). Religiosity has negative associations with both alcohol use ($\beta = -.050, p < .001$) and tobacco use ($\beta = -.092, p < .001$). Religiosity and marital status had a negative relationship ($\beta = -.079, p < .001$), suggesting that being unmarried or widowed was related to greater religiosity. At the same time, marital status and alcohol use ($\beta = .768, p < .001$) and marital status and tobacco use ($\beta = .414, p = .002$) had positive associations, indicating that married women tended to drink alcohol and smoke cigarette than did widowed women. After controlling for marital status, the direct effect of religiosity on alcohol use ($\beta = -.037$) and tobacco use ($\beta = -.085$) was reduced.

In addition, no mediation effects of other health measures, such as

ADL/IADL, chronic disease, depressive symptoms, memory impairment, satisfaction about health, health comparison with other people with the same age, social support, working status, number of children, and living condition with children, were supported (Table 4.13).

Specific Aim 5:

Determine the ability of the proposed model to explain health promotion behaviors in Japanese elderly.

Hypothesis 5.1:

The proposed model will explain significant variance in the health promotion behaviors in Japanese elderly.

Path analysis was performed to test the ability of the proposed model to explain the factors that predict older Japanese adults' health promotion behaviors of physical activity, alcohol use, and tobacco use. The proposed model included a total of 19 variables: age (two dummy variables of the group 75-84 and the group 85+), gender, religiosity, and health factors of ADA/IADL, mobility, presence of chronic disease, depressive symptoms, memory impairment, satisfaction about health, health comparison with other people with the same age, social support, marital status, working status, number of children, living conditions with children, and health promotion behaviors of

physical activity, alcohol use, and tobacco use (Figure 3.1). In the model, exogenous variables were age and gender influencing all the endogenous variables, including religiosity, health factors, and health promotion behaviors. Religiosity was proposed to predict health factors and health promotion behaviors, and health factors to predict health promotion behaviors.

The path model provided hypothesized relationships among the variables. These hypothesized links were simultaneously examined using the Amos program. An overall model fit was provided to evaluate the model as a whole.

Path analysis estimates the direct and indirect effects of a variable on other variables, and this contributes to establish a causal inference for the study. Results in the previous sections provided knowledge regarding significant and insignificant relationships among the variables and the mediating effects of religiosity and health factors. Paths that were identified as insignificant should and were removed from the model so as to generate a parsimonious model and to obtain higher power for hypothesis testing. A series of models resulted due to the removal of insignificant paths. Therefore, the goodness of fit for the path model was first reported. The significance of paths was reported for the final model.

Direct and indirect effects of the variables were then addressed using

path analysis. In the current study, however, the focus was on examining these direct and indirect effects of religiosity on health promotion behaviors.

The weighted variance and covariance matrix of the 19 variables was generated in SPSS and used for the path analysis. The correlation matrix is reported in Table 4.14. The goodness-of-fit of the initial model was then tested. Since there is no formal standard to evaluate the goodness-of-fit, it is recommended to use multiple indices to test the model fit (McDonald & Ho, 2002). The basic fit statistic for the causal model is chi-square (χ^2), yet chi-square is sensitive to sample size. Therefore, in the usual practice, chi-square (and degree of freedom [df]) and other several supplemental statistics are reported (Bollen, 1989). Among several kinds of indices, RMSEA, CFI, TLI, and AIC were commonly used indices. Based on the information, the current study reported indices of χ^2/df , RMSEA, PCLOSE, CFI, TLI, and AIC, along with χ^2 and df .

The ratio of χ^2 and df should be close to 1.0 and values of 2.0 or 3.0 are considered “acceptable fit.” For RMSEA (the root mean square error of approximation), the score of zero indicates “perfect fit,” that of less than .05 is considered a “good fit,” and that of less than .08 is “acceptable fit.” PCLOSE estimates RMSEA’s “probability” of “close” fit. Like a chi-square, non-significance is desired, and a higher PCLOSE score indicates a higher close of

fit. CFI (comparative fit index) with values .9 or above indicates “a reasonable fit” and that with values close to 1.0 indicates an “excellent fit” between the tested model and the data. For TLI (Tucker-Lewis index), values less than .9 are considered “unsatisfactory.” AIC (Akaike Information Criterion) is a fit index used for model comparison purposes. Low values are considered “better” fit of the model.

Referring these criteria, the initial model appeared not to fit to the data [$\chi^2=1520.542$, $df= 100$, $\chi^2/df= 15.205$, RMSEA = .116 (90% CI = .111, .121), PCLOSE = .000, CFI = .531, TLI = .198, and AIC = 1700.542] (Table 4.15). Modification indices were requested to help identify important paths to improve the model fit. Among all the links suggested by Amos, a total of 25 paths among 12 variables were chosen for the model. The 12 variables of the final model included age (two age groups of 75-84 and 85+), gender, religiosity, ADL/IADL, mobility, health satisfaction, health comparison to other people with the same age, working status, physical activity, alcohol use, and tobacco use. As a result, the model fit was improved [$\chi^2=368.309$, $df= 114$, $\chi^2/df= 3.231$, RMSEA = .046 (90% CI = .041, .051), PCLOSE = .899, CFI = .916, TLI = .874, and AIC = 520.309]. The final model with standardized path coefficients is presented in Figure 4.1 (also see Table 4.16 for detailed information). The explained variance was also estimated

for physical activity ($R^2 = .215$), for alcohol use ($R^2 = .178$), and for tobacco use ($R^2 = .140$).

After addressing the model fit, direct and indirect effects of the variables are reported in Table 4.17. Since religiosity and its influence on health promotion behaviors are the central of research interest, the investigator focused on assessing the direct and indirect effects of religiosity on health promotion behaviors.

As seen in Table 4.17, positive direct effects of religiosity on physical activity ($\beta = .107, p < .001$) and the negative direct effects of religiosity on tobacco use ($\beta = -.072, p < .01$) were supported. Religiosity's positive association with physical activity ($\beta = .074, p < .001$) and its negative relationship with tobacco use ($\beta = -.044, p = .003$) were also supported in Table 4.10 and 4.11.

However, religiosity's direct effect on alcohol use was not supported in the path analysis ($\beta = -.055, p = .057$) (Table 4.17). This result was also consistent with the result from multiple linear regression analysis ($\beta = -.005, p = .054$) (Table 4.10).

Further, in Figure 4.1 religiosity is seen to indirectly affect physical activity through working status. However, the indirect effect of working status on physical activity was not significant ($\beta = .009, p = .071$). In the

previous section, the mediation effect of working status on the relationships between religiosity and physical activity was also not supported (Sobel $z = -.820$, $p = .412$) (Table 4.13). Religiosity's significant total effect on physical activity ($\beta = .062$, $p < .001$) was not mediated by working status in elderly Japanese (Table 4.13).

CHAPTER 5

DISCUSSION

Introduction

The overall purpose of this dissertation was to identify predictors of older Japanese adults' health promotion behaviors, including physical activity, alcohol use, and tobacco use, by exploring relationships between their religiosity and other variables: demographic characteristics of age and gender; physical, mental, and cognitive health status; subjective feelings about health; social support/integration; and these health promotion behaviors. A secondary analysis was conducted using a panel data set of Japanese elders from Wave 5 survey undertaken in 1999 for the "Health and Well-Being among Older Old in U.S. and Japan" (P.I. Dr. Jersey Liang, Professor at the University of Michigan School of Public Health).

In this chapter, a summary of the results and the associated discussion are presented. Relationships among Japanese elders' religiosity and their age and gender, health, and health promotion behaviors are discussed based on the results. Recommendations for future research are also included in the discussion. Implications for nursing practice, limitations of the current study, and conclusions are followed by the discussion.

Summary and Discussion of the Results

To date, scarce number of studies have examined and little has been known about older Japanese adults' religiosity (Krause et al., 2008). To obtain basic knowledge regarding Japanese elders' religiosity, this study began with examining relationships between these elders' religiosity and their demographic factors of age and gender (Specific Aim 1). The relationships between Japanese elders' religiosity and their health and health promotion behaviors were then examined (Specific Aim 2). Obtaining the information regarding the relationships between religiosity, age and gender, health, and health promotion behaviors, mediating effects of religiosity on the relationships between age and gender, and health and health promotion behaviors (Specific Aim 3), as well as those of health on the relationships between religiosity and health promotion behaviors (Specific Aim 4) were analyzed. Finally, the predicting ability of the proposed model for health promotion behaviors in elderly Japanese was examined (Specific Aim 5). This section presents study findings by summarizing and re-organizing these findings, provides discussion for the findings, and makes recommendations for future studies.

Summary of the Study Subjects

A total of 1,897 community-dwelling Japanese men and women age 65

and older were considered for data analyses. Participants were divided into three age groups: 65 to 74 years ($n = 1,054$, 55.6%), 75 to 84 years ($n = 721$, 38.0%), and 85 years and older ($n = 122$, 6.4%). The percentages of each of these age groups are similar to those of the Japanese census in 2000 (i.e., 59.4% for the group 65-74, 30.6% for the group 75-84, and 10.0% for the group 85+, respectively), although the current study employed a slightly greater proportion of people aged 65-74 years old and a smaller proportion of those aged 85 years or older (Health and Welfare Statistics Association, 2004a).

The average age of 1,897 subjects was 74.5 years old ($SD = 5.9$). Of 1,897, 57.8% was women, and this proportion also resembled to 58.1% for the elderly Japanese population in 2000 (Health and Welfare Statistics Association, 2004a). Among study participants, 60.4% were married and 23.4% were working. The average number of children of study subjects was 2.4 ($SD=1.3$). At the time of the Wave survey in 1999, 52.9% of study subjects lived with at least one of their children. This percentage also was similar to that of 52.2% reported in the Japanese census in 2000 (Health and Welfare Statistics Association, 2004a). Because of these resemblances in their demographic characteristics, the study subjects were considered to represent the structure of the elderly Japanese population.

Relationships between Age and Religiosity

Using weighted data, ANOVA models revealed a significant relationship between Japanese elders' level of religiosity and their age. Among elders in three age groups (65-74, 75-84, and 85+), those in the group 75-84 appeared to have a significantly higher level of religiosity than did those in the group 65-74. When un-weighted data were used, both Japanese men and women in the group 85 + also were identified to have higher religiosity score compared to those in the group 65-74. Along with their increased age, older Japanese adults may become more religious over time. This positive association between age and religiosity in older adults was also reported by empirical studies (Levin & Taylor, 1993).

However, a significant difference for the level of religiosity was not found between people in the group 75-84 and those in the group 85+. It is possible to hypothesize that the religiosity of Japanese adults aged 75-84 years and those aged 85 years and older are similar, and that the religiosity of these older generations are different from that of people aged 65-74 years, because of the differences in religious beliefs and practices between them. That is, Japanese people who were 75 years old and those who were 85 years old at the time of the Wave 5 survey in 1999 were born around 1914 to 1924. These generations were born in the period of World War I (1914-1918) and were sent as troops of World War II (1939-1945). At the time of war, these

older age groups of Japanese people were taught to refuse admitting cultures from other countries such as the U.S.; their faith in their own traditional religious beliefs and disciplines may have increased. Meanwhile, Japanese adults who were 65 to 74 years old in the survey period of 1999 were born around 1925 to 1934. They were only 4 to 11 years old at the time of WWII; after the war, these younger generations grew up under the influence of Western cultures and life styles. Because of these different historical backgrounds, the belief and value systems, religious entities in which they believe, the level of religious beliefs, and religious practices of these younger people may be different from those of older people. These differences may have reflected the findings of the current study. To comprehensively understand the differences in the religious beliefs and practices of Japanese elders in different age groups, a qualitative study should be conducted in the future study.

Relationships between Health, Health Promotion Behaviors, and Religiosity

The current study also examined the relationships between religiosity and health factors of physical, mental, and cognitive health status; subjective feelings about health; social support/integration; and health promotion factors of physical activity, alcohol use, and tobacco use, controlling for age and gender effects. Many U.S. studies have reported the positive influences

of religiosity on older individuals' controlled blood values associated with diabetes (King et al., 2002), lessened depressive symptoms (Koenig et al., 1992; Nelson, 1990), slower rates of cognitive decline (Hill et al., 2006), increased subjective health and self-reported health (Ellison, 1991), reduced tobacco consumption (Roff et al., 2005; Strawbridge et al., 1997), alcohol intake elimination (Pascucci & Loving, 1997), and increased physical activities (Roff et al., 2005). Further, other studies have also reported significant relationships between religiosity and social support with life satisfaction and depressive symptoms (Yoon & Lee, 2007), with mortality (Oxman et al., 1995), and with self-reported health (Krause et al., 1999). Based on the above information, the current study hypothesized positive relationships between religiosity and health and health promotion factors for elderly Japanese adults. In other words, greater religiosity was expected to correlate to a better state of health and greater engagement in health promotion behaviors in elderly Japanese.

The current study reported findings that were similar or unique to the results of the U.S. studies mentioned above. Similar to these U.S. studies, the current study found a significantly negative association between memory impairment and religiosity. Japanese elders who had greater religiosity had better memory or cognitive functional ability. Like U.S. studies, Japanese elders' greater religiosity was positively related to their satisfaction with

health, social support, working status, and number of children. On the other hand, unlike U.S. studies, the current study reported positive relationships between religiosity and presence of chronic diseases. Religiosity was significantly related to more chronic health problems. Further, a positive relationship between religiosity and depressive symptoms was reported in the current study. Japanese elders who had greater depressive symptoms possessed greater religiosity. Opposite to the hypothesis in the current study, religiosity was negatively associated with marital status; unmarried or widowed women showed greater religiosity than married women. In addition, religiosity was identified as significantly and positively related to physical activity and negatively related to tobacco use. However, the relationship between religiosity and alcohol was insignificant.

As mentioned above, the current study identified adverse associations between religiosity and chronic health conditions, depressive symptoms, and marital status in elderly Japanese. That is, elderly Japanese adults who suffered greater chronic health problems and depressive symptoms and who were widowed showed significantly greater religiosity. Reed (1987) and Bearon and Koenig (1990) found that religiosity becomes greater when people experience deterioration of health, and religiosity increases among frail people when compared to healthy robust people. In the current study, elderly Japanese adults who suffered greater deterioration in their physical, mental,

and social health status also may have increased their level of religiosity. Older Japanese adults' religiosity may become more evident when they suffer physical and mental health problems than when they do not suffer these health problems.

In other words, it is assumed that elderly adults may more frequently and deeply pray to, or connect to, transcendental religious entities (e.g., their ancestors, God, gods, Buddha) in order to overcome their health and life difficulties. Given the cross-sectional nature of this analysis, a causal relationship cannot be claimed. However, given the literature from other cultures, and given the small but significant correlation in this analysis, it seems feasible that the negative associations between Japanese elders' religiosity and their chronic health problems, depressive symptoms, and marital status found in this study indicate the potential role of religiosity to alleviate difficult physical, mental, and social conditions for elderly Japanese adults. Given this knowledge, it is recommended that health care providers consider religiosity in developing an effective health promotion and disease prevention program for elderly Japanese adults.

Gender, Religiosity, and Health Status

A significant relationship between Japanese elders' religiosity and gender was also identified in the current study. For all three age groups,

Japanese women appeared to have greater levels of religiosity than Japanese men. Similar findings regarding the difference in religiosity between older men and older women were also reported by U.S. and Japanese studies (Krause et al., 1999; Levin et al., 1994; McCaffrey et al., 2004).

In their article, Krause and colleagues (1999) provided a reason for this difference in Japanese men and women. In Japan, older women are more involved in religious practices than older men. Since they were born, these women have been disciplined and expected to be more obedient and nourishing than men (Krause et al.). Many religions encourage obedience, nurturing, and compassion; therefore, such similarities between women's behaviors and religious disciplines may identify the connection. In addition, it is possible to hypothesize that older Japanese women tend to be more religious because of their greater health deterioration compared to older Japanese men.

Indeed, regression analysis revealed that older Japanese women suffered greater severity of chronic conditions ($\beta = .323$, $p = .005$) and worse depressive symptoms ($\beta = 1.319$, $p < .001$) than older Japanese men (Table 4.12). Older women had greater religiosity than older men ($\beta = 2.050$, $p < .001$), and greater religiosity was associated with greater severity of chronic conditions ($\beta = .032$, $p = .016$) and depressive symptoms ($\beta = .064$, $p = .020$). These results help explain why older women appeared to be more religious

than older men.

To address the associations between older Japanese women's greater religiosity and their deteriorated health, a hypothesis should be generated. Actually, older women (X) tend to have greater religiosity (Y) than older men. Older women (X) are also likely to have more severe chronic health problems and depressive symptoms (M) than older men. More severe health conditions (M) may make women more religious (Y), since adverse health conditions may increase older women's fear of illness and death. To cope with and surpass fear for illness, death, physical discomfort, and pain and to enhance their inner strength, elderly women may connect to or pray to transcendental energy sources and ask for help in healing pain, recovering from illness, and promoting their health. Ultimately, as a result of their greater engagement in religious beliefs and practices, older Japanese women can alleviate their depressive symptoms and chronic health problems. Based on this hypothesis, future studies can examine the mediating effects of health factors (e.g., chronic health condition, depressive symptoms) on the relationships between gender and religiosity.

Mediating Effects of Religiosity on the Relationships between Age and Gender, and Health and Health Promotion Behaviors.

In addition to the mediating effects of religiosity mentioned in the

previous section, religiosity's mediating effects were also found in the associations between gender (being female) and marital status (Sobel $z = -8.326$, $p < .001$), between age group 75-84 and marital status ($z = -3.884$, $p < .001$), and between age group 75-84 and the number of children ($z = 3.726$, $p < .001$) (Table 4.12). Elderly Japanese adults in age group 75-84 appeared to be more religious than those in group 65-74 ($\beta = .931$, $p < .001$). Compared to older Japanese men, older Japanese women reported greater religiosity ($\beta = 2.050$, $p < .001$). In the family-oriented society of Japan, having spouses or children, as well as living with these family members, is a significant factor in promoting elderly adults' mental health status (Sugisawa et al., 2002). The Japanese religion of Shinto values the oneness or unification of family members and ancestors. Religious Japanese elders in the 75-84 group and elderly Japanese women may possess strong beliefs in these traditional family norms of Shinto, and this can prevent these elders from divorcing or can facilitate re-marrying in widowed elders.

Further, other mediating effects of religiosity were identified in the relationships between age and memory impairment (Sobel $z = 3.539$, $p < .001$) (Table 4.12). Religiosity mediated the tendency in these elders to become cognitively impaired or develop dementia. Based on these results, religiosity is considered an important health promoting factor for these elderly Japanese. Religiosity should be taken into account in dementia prevention programs for

these Japanese elders.

In addition, the mediating effects of religiosity on the relationships between demographic characteristics of age and gender and health promotion measures of physical activity and alcohol use were not supported in the current study (Table 4.12). For the most part, the total effects of age and gender on physical activity and alcohol use were significant and negative (Table 4.12). That is, in general, younger adults and men were more likely to be physically active and more likely to drink alcohol than were older adults and women. Yet, when religiosity intervened in these relationships, the direct effects of age and gender on physical activity and alcohol use were increased (e.g., from $-.381$ to $-.466$ for age group 75-84 and physical activity). Thus, mediating effects of religiosity were not supported.

Mediating Effect of Health Factors on the Relationships between Religiosity and Health Promotion Behaviors

Religiosity was proposed to be positively related to elderly Japanese adults' engagement in health promotion behaviors. The greater religiosity of elderly adults may help them engage more in health promotion activities; yet, their actual health status may mediate religiosity's positive effects on health promotion activities. To address this hypothesis, mediating effects of health factors between religiosity and health promotion behaviors were examined.

The study results identified that mobility partially mediated religiosity's effects on alcohol use (Sobel $z = -2.382$, $p = .017$) and tobacco use ($z = -2.677$, $p = .007$) (Table 4.13). Religiosity was negatively related to both alcohol and tobacco use; elderly Japanese adults who reported greater religiosity reported less alcohol use ($\beta = -.050$, $p < .001$) and tobacco use ($\beta = -.092$, $p < .001$). Religiosity was positively related to difficulty in mobility ($\beta = .033$, $p = .004$); the higher the level of religiosity, the more difficulty with mobility. Further, mobility difficulty was negatively related to alcohol and tobacco use; elderly adults who had more difficulties in their mobility also engaged less in alcohol ($\beta = -.828$, $p < .001$) and smoking tobacco ($\beta = -.620$, $p < .001$). When controlling for mobility, the direct effect of religiosity on alcohol use and tobacco use was reduced. Mobility mediated the relationships between religiosity and elderly adults' alcohol and tobacco consumption.

In other words, Japanese elders with more difficulties in their mobility engaged less in alcohol and smoking tobacco. This can also be interpreted that Japanese elders with less difficulty in their mobility may engage more in alcohol and tobacco use. Better physical health status (i.e., mobility) of elderly adults mediated or reduced the effects of religiosity on alcohol use ($z = -2.382$, $p = .017$) and tobacco ($z = -2.677$, $p = .007$). To help prevent tobacco use and alcohol use of these healthy elderly Japanese, future studies should

explore additional factors that are theoretically and empirically supported in order to mediate the effects of mobility on increasing alcohol and tobacco use. The factors identified should, then, be used to develop and evaluate health promotion programs for healthy Japanese adults.

Further, the partial mediating effect of marital status was also detected on the relationships between religiosity and alcohol use ($z = 3.046$, $p = .002$) and between religiosity and tobacco use ($z = 4.637$, $p < .001$) in Japanese elders (Table 4.13). Elderly Japanese who reported greater religiosity also reported less alcohol use ($\beta = -.050$, $p < .001$) and tobacco use ($\beta = -.092$, $p < .001$). Greater religiosity was found in widowed Japanese women. Widowed Japanese women had greater religiosity, and these widowed women engaged less in alcohol use ($\beta = .768$, $p < .001$) and tobacco use ($\beta = .414$, $p = .002$). Marital status was, however, positively related to alcohol use and tobacco use (widowed = 0, married = 1). When controlling for marital status, the direct effects of religiosity on alcohol use and tobacco use were reduced to $-.037$ and to $-.085$, respectively. This suggests that the effect of religiosity reducing alcohol and tobacco use is less in magnitude after marital status is taken into consideration.

Elderly married women reported more alcohol and tobacco use than did elderly widowed or unmarried women. Being married may promote social activities for elderly Japanese women that involve alcohol and tobacco use,

even if they have greater religiosity. Given this information, health education programs for appropriate alcohol and tobacco use should be provided for elderly married women to help prevent them from excessive substance use and related chronic health problems.

It is important to keep in mind that the alcohol use variable in this analysis was a dichotomous variable, indicating any use versus no use. Thus, it is not assumed that if those using alcohol were using to excess in ways that would compromise health. Unlike some religions, which forbid alcohol use, Shinto accepts alcohol use. Buddhism does not address drinking alcohol. Japanese people use alcohol as a health promoting agent. It is important for future research to measure alcohol use more specifically to determine whether the use reported is excessive and likely to harm health. There may be a non-linear relationship between alcohol and religiosity in Japanese culture.

In addition, the significant and negative relationship between religiosity and being widowed or unmarried for women were also supported. Elderly women who lost their spouses and who live alone may increase their feeling of loneliness and life concerns (Noguchi et al., 1989). After losing their spouses, who are the main source of their emotional and financial support, elderly Japanese women may feel increased loneliness and concern about their life. To cope with these difficulties and stresses and to alleviate

their negative feelings, elderly Japanese women may engage more in religious practices. Religious practices are a stress-coping activity using religious sources to deal with stressful events. It was assumed that, if elderly women have greater religiosity and frequently and strongly connect to religious entities, they could tolerate stressful life events without relying on alcohol and tobacco, or another activity of stress coping. Study results supported this assumption.

In Japan, the number of elderly individuals living alone has been increasing (Health and Welfare Statistics Association, 2004a). In 1986, the percentage of Japanese elders living alone accounted for 26.0% of Japanese households that included elderly adults aged 65 years old and older. In 2003, that percentage has increased to 37.7% because of the increasing number of widowed women. The number of these older Japanese women living alone will continue to increase in the coming years (Health and Welfare Statistics Association, 2004a). Based on statistical evidence, to help the widowed Japanese elders alleviate their feelings of loneliness and overcome stressful life events such as losing a spouse, religiosity should be embraced in health promotion and care programs for these widowed elders.

The Ability of the Model to Explain Health Promotion Behaviors in Elderly Japanese

Initially, the proposed model which contained all 19 study variables did not fit the data [$\chi^2 = 1520.542$, $df = 100$, $\chi^2/df = 15.205$, RMSEA = .116 (90% CI = .111, .121), PCLOSE = .000, CFI = .531, TLI = .198, and AIC = 1700.542] (Table 4.15). After removing insignificant paths and performing modification indices, the model had a good fit [$\chi^2 = 368.309$, $df = 114$, $\chi^2/df = 3.231$, RMSEA = .046 (90% CI = .041, .051), PCLOSE = .899, CFI = .916, TLI = .874, and AIC = 520.309]. Among 19 variables of the initial model, 12 significant variables remained in the final model (Figure 4.1). These variables were age (two age groups of 75-84 and 85+), gender, religiosity, ADL/IADL, mobility, health satisfaction, health comparison to other people with the same age, working status, physical activity, alcohol use, and tobacco use. The final model accounted for 21.5%, 17.8%, and 14.0% of the variance in physical activity, alcohol use, and tobacco use, respectively. The model provides additional important understanding of Japanese elders' religiosity and its role in health and health promotion behaviors. Future studies, however, should include additional factors or variables, such as obesity and overweight, educational and economic status, geographic and residential characteristics, community participation, and *ikigai*, in order to more comprehensively address Japanese

elders' health promotion behaviors.

Obesity and *overweight* are indicators of physical health status. U.S. and Japanese studies suggested that overweight elderly adults tend to be inactive (Dunlap & Barry, 1999; Yamakawa, Tsai, Haig, Miner, & Harris, 2004). Being overweight or obesity may negatively affect elderly adults' physical activity.

Further, elderly adults' demographic factors of *educational and economic status* may also influence their health promotion behaviors. In fact, the smoking behavior of elderly Japanese adults is reported to relate to lack of knowledge regarding the health risk of smoking (Ministry of Health Labor and Welfare, 1999; Nishimura et al., 1996). Elderly adults who attained less education are likely to skip meals more often than those who attained a higher education (Lee & Novielli, 1996). Also, elderly Japanese adults who obtain better income and education may engage more in physical activities than those who have lower economic and educational status (Haga et al., 1982). In addition, American adults who have a lower educational attainment as well as lower economic status tend to engage in tobacco smoking compared to those who attained a higher education (U.S. Department of Health and Human Services, 2004).

The *geographic and residential characteristics* of Japanese elders also may relate to their health promotion behaviors. That is, elderly Japanese

adults who live in rural areas tend to engage more in physical activities than do those who live in urban areas (Tada, Yamamoto, & Morimoto, 1998). Compared to institutionalized elderly, non-institutionalized elderly adults are likely to be more vigorous in their daily life activities (Taneda et al., 1996). In addition, elderly adults with environmental barriers or problems, such as lack of access to health care providers, health promotion facilities, and safe environment, tend to avoid physical activities (Jones & Nies, 1996; Juarbe, Turok, & Perez-Stable, 2002; Pullen, Walker, & Fiandt, 2001; Zhan, Cloutterbuck, Keshian, & Lambardi, 1998).

The closely related factors of community participation and *ikigai* should also be considered to be included in the model. *Community participation* is suggested to help elderly individuals maintain a healthier lifestyle (e.g., eating habits, physical activity) and a better mental and ALD status (Furukawa, Kokubu, & Noguchi, 2004; Iwasaki et al., 1989; Kuroda & Sumida, 2002; Nagamatsu et al., 2000). Along with community participations, having or perceiving *ikigai* is another factor to encourage Japanese elders' engagement in health promotion behaviors (Tomita et al., 1997).

Ikigai is a Japanese concept that embraces such meanings as encouraging life values and purposes and fulfillment of life (Hisamatsu et al., 1973). A Japanese study (Fujimoto et al., 2004) reports that *ikigai* has a

positive association with elders' engagement in physical activities, healthy lifestyle, work, volunteer activities, and life satisfaction and well-being of Japanese elders. Other studies (Haga et al., 1982; Ikeda et al., 1993; Momose et al., 2001) also support the positive effects of *ikigai* and community participation. Through active community participation, elderly Japanese adults appreciate *ikigai* by enriching friendship and communication with other people, preventing social isolation, and promoting health and physical activity.

Because of their close relationships to health promotion, the factors of obesity and overweight, educational and economic status, geographic and residential characteristics, community participation, and *ikigai* need to be integrated in the model so as to more adequately explain Japanese elders' health promotion behaviors.

Nonetheless, in the current study, religiosity's positive direct effects on physical activity ($\beta = .107, p < .001$) and negative direct effects on tobacco use ($\beta = -.072, p < .01$) were supported. Japanese elders who reported greater religiosity also reported more physical activity. Further, these religious Japanese elders were less likely to smoke tobacco. Based on these results, religiosity is considered a significant factor of Japanese elders' health promotion behaviors. Religiosity should be considered in the development of health promotion programs for Japanese elders and the resulting programs

evaluated.

Meanwhile, religiosity's direct effect on alcohol use was not supported in the path analysis ($\beta = -.055$, $p = .057$). This result was consistent with the result from regression analysis which controlled only for age and gender terms ($\beta = -.005$, $p = .054$) (Table 4.10). Yet, the effect of religiosity on alcohol use as well as on tobacco use and physical activity may be strengthened, or weakened, by including additional factors in the model, such as obesity and overweight, educational and economic status, geographic and residential characteristics, community participation, and *ikigai* mentioned in the previous section. The relationship also may be a non-linear one. Future study can address these questions.

Limitations of the Study

The main limitation for the current study was the use of secondary data analysis. The data set provided substantial and valuable information regarding elderly Japanese adults' religiosity, health, and health promotion behaviors in a large representative sample. Important information, such as lived experiences of religiosity depicted and expressed by elderly Japanese adults, was not included in the data set. Nor was the direction of cause and effect. From these cross-sectional data, whether more religious Japanese elders are more prone to depression and chronic disease cannot be addressed,

which seems unlikely based on the literature, or whether those who become ill increase their religiosity as a response to illness. Thus, qualitative understanding of elderly Japanese adults' religiosity was not available for further data interpretation. In future studies, it would be important to conduct qualitative interviews of Japanese elders to further understand the components of religiosity and the timing of changes in health status and religiosity.

Another major limitation lies on the fact that the analyses were done using cross-sectional methods. Although the study collected for multiple waves, only one wave of data was used for the current study. Neither regression nor path analysis allows the determination of the causal effects that were implied in the study. Results only show that the current model is plausible but nothing can be claimed beyond that. Again, cause and effect interpretations await qualitative and longitudinal studies.

Finally, the low internal consistency of some of the scales is another concern. For example, Cronbach's alpha of the scales for the memory impairment measure was only .589, and that of physical activity was .614. The number of items for memory scale is nine, and that for physical activity is three. The low internal consistency of these scales could have chance to yield measurement error which affect the accuracy and efficiency of study outcomes. Future studies should be conducted to determine more reliable

measures for these variables for elderly Japanese people.

Implications

Findings of this study provide new knowledge for health science researchers, health care professionals, and health policy makers and administrators regarding the significance of religiosity to health and health promoting behaviors in older Japanese adults. Until recently, little attention has been taken to the concept of Japanese religiosity, and the relationships between Japanese elders' religiosity and their health and health promotion behaviors have been insufficiently examined. Because of the lack of empirical evidence based on scientific studies, the significance of religiosity to health and health promotion has not been clearly addressed in the Japanese health policy or integrated in the care and health promotion programs for elderly Japanese.

The results of the current study provide additional information on the significance of religiosity on Japanese elders' health and health promotion behaviors. Religiosity was identified as a significant predictor for Japanese elders' health promotion behaviors, along with other predictors such as elderly adults' age, gender, physical health status, health perceptions, and working status. Moreover, it may be possible to strengthen religious practice in Japanese individuals by nursing care. Based on these empirical findings,

nurses and other health care professionals need to consider developing and evaluating interventions focused on promoting religiosity, *kokoro*, or spiritual well-being for the elderly.

As mentioned, the limited knowledge relating religiosity to health may have discouraged nurses and other health care professionals from developing evidence-based health care programs on religiosity for their older clients. The findings of this study can help these health care providers develop a holistic care plan and health promotion programs integrating religiosity into physical, mental, cognitive, and social health elements of their older clients. In Japan, increasing number of elderly adults continue to suffer complicated physical, mental, and social health problems. By focusing on elderly adults' religiosity, or spiritual beliefs and practices, these health care providers can help enhance fragile elders' inner strength, surpass their physical, mental, and social health limitations, and promote their well-being.

Further, the current study provided health science researchers with a theoretical framework that accounts for the relationships between religiosity, health, and health promotion behaviors. Using this basic framework, these researchers can further extend their studies regarding Japanese elders' religiosity, health, and health promotion behaviors.

Summary

Overall, the findings of this study provided important information in understanding elderly Japanese adults' religiosity and their health and health promotion behaviors, a focus that has been lacking in the previous health science literature. Similar to U.S. studies reviewed, this study identified greater religiosity in older age groups and elderly women than did in younger age groups and elderly men.

As hypothesized, religiosity was positively related to the presence of chronic health problems, satisfaction of health, social support, working status, the number of children, and physical activity as well as negatively related to memory impairment and tobacco use in elderly Japanese. It was also hypothesized that religiosity had negative relationships with depressive symptom, and positive relationships with marital status in elderly Japanese. The results did not support these hypotheses as being theorized they would. However, this may be an artifact of the cross-sectional design if worse health status causes increased religiosity as a coping response, rather than religiosity protecting against poor health as we proposed. This would be the case if the effect size of poor health on religiosity is greater than the effect size of religiosity on health status.

Further, religiosity mediated the gender effects on presence of chronic

diseases, depressive symptoms, marital status, and tobacco use as well as age effects on memory impairment, marital status, and the number of children. In elderly Japanese adults, greater chronic health problems and depressive symptoms and being widowed or unmarried were significantly associated with greater religiosity. Based on these results, religiosity may be considered a healing agent for frail people with advanced age and with adverse physical, mental, cognitive, and social health status. Religiosity should be evaluated as an integral component in the care and health promotion programs for frail Japanese elders.

Despite the fact that religiosity was related to lower alcohol and tobacco consumption, mobility (being mobile) and marital status (being married) mediated these effects of religiosity and increased elderly adults' alcohol and tobacco consumptions. To help reduce tobacco and alcohol consumptions of mobile elders and elderly married women, future study should explore the addition of other factors that may mediate the effects of mobility and marital status on increasing alcohol and tobacco use.

Using a path analysis, positive direct effects of religiosity on physical activity and the negative direct effects of religiosity on tobacco use were supported. However, religiosity's effect on alcohol use was not supported. Further, the explained variance for the final model was estimated for physical activity ($R^2 = .215$), for alcohol use ($R^2 = .178$), and for tobacco use

($R^2 = .140$). To more comprehensively address Japanese elders' health promotion behaviors, inclusion of additional variables, such as obesity and overweight, educational and economic status, geographic and residential characteristics, community participation, and *ikigai* was recommended for future study. The results of this study raise important questions about the relationship of religiosity and health and health promotion behaviors in samples from cultures with religious systems based on different philosophical assumptions and practices. The correlations between religiosity and health and health promotion behaviors are from studies in the United States with largely Christian samples. Tenets of Christianity emphasize group or organizational religious practices. This perspective may reflect social support which has been found to be correlated with measures of health and health promotion behaviors. The sample for the current study was primarily Shinto or Buddhist; practices in both of these religions are more individual. These interesting questions could not be explored in the current study, but are worthy of consideration in future work.

Figure 2.1. Conceptual Model

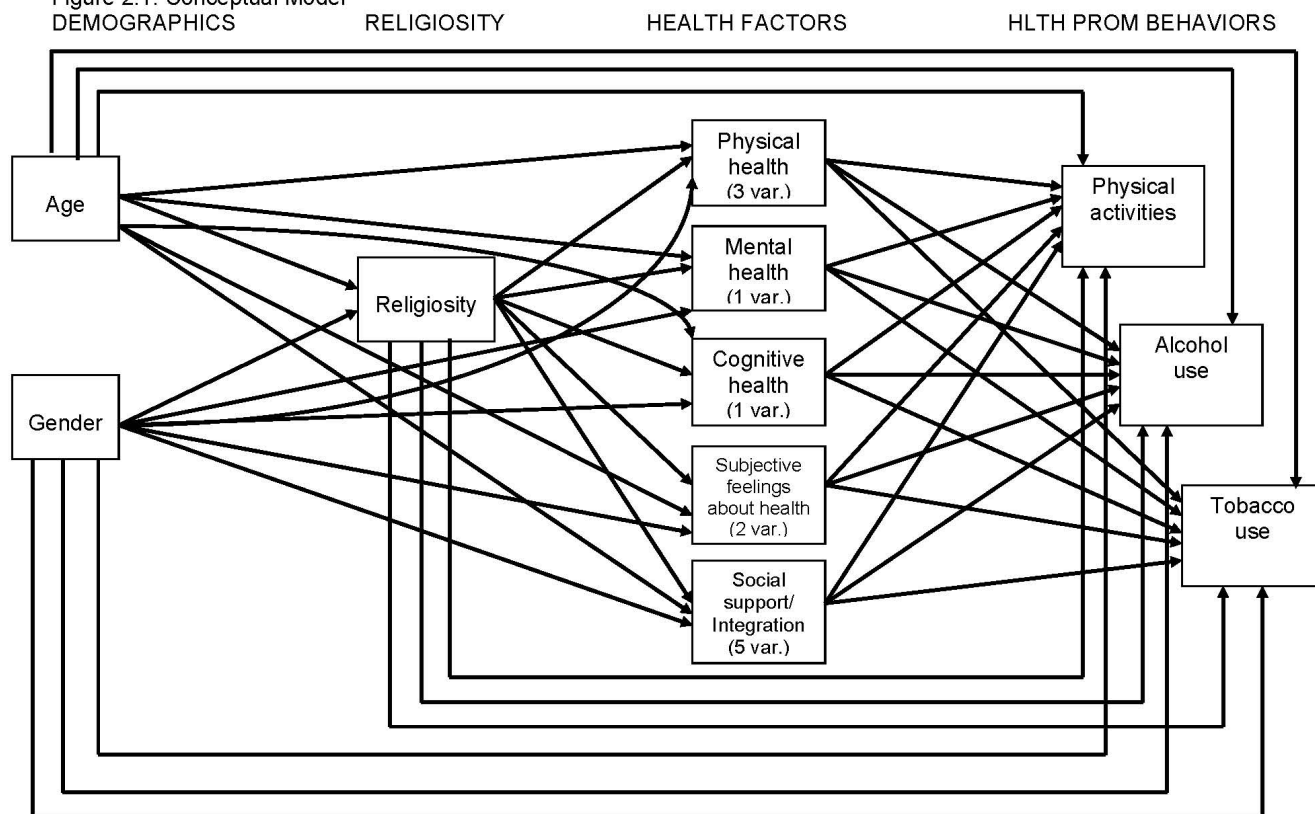


Table 3.5. Measures of Study Variables

Constructs /Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Religiosity	1) Religious coping	Q78 (1): "When facing difficulties, I calm myself when I pray to God or Buddha." Q78 (2): "When making an important decision, it is important for me to consult with God or Buddha." Q78 (3): "Praying to God or Buddha helps me overcome my stress and worries."	6 items; Summative score; Potential range: 6-24 Interval	1 to 4: 4. Always think so 3. Sometimes think so 2. Don't usually think so 1. Never think so Missing: Don't know
	2) Private religious practices	Q77 (1): "At my home I pray and offer prayers for my ancestors. Also I include offerings of water, incense, and rice." Q77 (2): "How often do you read Buddhist scriptures or the Bible in your home?" Q77 (3): "How often do you watch or listen to religious programs on the TV or radio?"		

(Table 3.5 continues)

(Table 3.5 continued)

Constructs /Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Physical health	1) Limitations in performance of self-care (Activities of Daily Living [ADL] and Instrumental ADL [IADL])	Q35: "How difficult is it for you to perform the following activities without the help of another person?": (1) taking a bath (2) dressing or undressing yourself (3) eating (4) getting out of bed, getting up from or sitting down in a chair (5) going outside (6) going to the bathroom (in your own home) and relieving yourself. Q36: "How difficult is it for you to perform the following activities without the help of another person?": (1) going out shopping for personal items, medicine, etc. (2) using a telephone (3) going out alone, riding a bus or subway (4) dusting furniture, taking out the garbage, or other light housework.	Potential range: 0 or 1; Dichotomy	0 or 1: 0. Not difficult at all 1. Somewhat difficult Missing: Don't know
	2) Mobility	Q39: "How difficult is it for you to do the following without help or aids such as a cane or support?": (1) stand continuously for about 15 minutes (2) stand continuously for about 15 minutes	Potential range: 0 or 1; Dichotomy	0 or 1: 0. Not difficult at all 1. Somewhat difficult Missing: Don't know

(Table 3.5 continues)

(Table 3.5 continued)

Constructs /Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Physical health (cont.)	2) Mobility	(3) stand continuously for about 15 minutes (4) walking about 200-300 meters (220-330 yards) (5) squat and get down on your knees (6) stretch our your hand and reach for something above your head (7) grasp something with your fingers, use your fingers freely (8) lift and carry a heavy weight such as 10 kilograms of rice (22 pounds) (9) climb 2-3 flights of stairs.	Potential range: 0 or 1; Dichotomy	0 or 1: 0. Not difficult at all 1. Somewhat difficult Missing: Don't know
	3) The presence of chronic diseases	Q30: "Are you suffering from any 20 illnesses or their side/after effects?": 1) heart disease, 2) arthritis/rheumatism, 3) high blood pressure, 4) diabetes, 5) stroke/cerebral hemorrhage, 6) cataracts/other eye diseases, 7) Parkinson disease, 8) cancer, 9) anemia, 10) phlebitis, 11) stomach or intestinal ulcers, 12) kidney disease, 13) disease of thyroid, 14) gout, 15) bedsores or ulcers of the feet/serious burns/other skin diseases, 16) bronchitis/asthma/ tuberculosis/other chronic respiratory diseases, 17) chronic back pain, 18) broken born/born fracture, 19) loss or injury of the hands/feet, 20) diseases of the liver or gall bladder.	Potential range: 0 or 1; Dichotomy	0 or 1: 0. 0-2 chronic diseases 1. 3 or more chronic diseases Missing: Don't know

(Table 3.5 continues)

(Table 3.5 continued)

Constructs/ Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Mental health (depressive symptoms)	1) The absence or presence of depressive symptoms	Q76: In the past week, how often have you experienced each of the following? (3): "In the past week, even though I received encouragement from family and friends, I couldn't get rid of my feelings of depression" (6): "I was depressed" (9): "I felt that my life up to now has been a failure" (10): "I experienced a vague feeling of fear" (17): "I felt like crying, cried" (18): "I felt sad." (14): "I felt lonely"	20 items; Summative score; Potential range: 0-60; Interval	0 to 3: 0. Hardly ever (0 days) 1. A little bit of the time (1-2 days) 2. Some of the time (3-4 days) 3. Most of the time (5-7 days) Missing: Don't know
	2) The ability to control behaviors, thoughts, and feelings during a specific period	(1): "In the past week, I worried about something that I don't usually worry about" (2): "I didn't want to eat, I had poor appetite" (5): "I felt nervous and wasn't able to concentrate" (7): "Things that are usually no problem for me, I found an effort" (11): "I couldn't sleep" (13): "I felt I had less to say than usual" (20): "I didn't feel like doing anything."		

(Table 3.5 continues)

(Table 3.5 continued)

Constructs/ Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Mental health (depressive symptoms) (cont)	2) The ability to control behaviors, thoughts, and feelings during a specific period (cont)	(8): "I felt that my future is bright" (12): "I felt joyful" (16): "I felt happy" (4): "In the past week, I felt I have as much ability as other people"	20 items; Summative score; Potential range: 0-60; Interval	Only for (8), (12), (16), and (4): 0 to 3: 3. Hardly ever (0 days) 2. A little bit of the time (1-2 days) 1. Some of the time (3-4 days) 0. Most of the time (5-7 days) Missing: Don't know
	3) The frequency and intensity of general affect	(15): "I felt distant from the people around me" (19): "I felt that people disliked me."		0 to 3: 0. Hardly ever (0 days) 1. A little bit of the time (1-2 days) 2. Some of the time (3-4 days) 3. Most of the time (5-7 days) Missing: Don't know

(Table 3.5 continues)

(Table 3.5 continued)

Constructs/ Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Cognitive health (memory impairment)	1) Orientation s to time and place 2) Memory 3) Attention span	Q102: "Would you tell me your address?" Q103: "What is the date today? Please give me the year, month, and day" Q104: "What day of the week is it?" Q105: "What was your mother's madden name?" Q106: "What is the name of the present prime minister of Japan?" Q107: "Do you remember the name of the person who was prime minister before the present prime minister?" Q109: "Could you please tell me the date and year of your birth?" Q110: "How old are you?" Q108: "Please subtract 3 from 20 and tell me the number you get. Then from this number, please subtract 3 and tell me the number you get. Then, keep subtracting 3 from each new number you get, telling me the results as you go?"	Potential range: 0 to 4; Interval	1 to 4: 1. Being intact (0·2 errors) 2. Mildly impaired (3·4 err) 3. Moderately impaired (5·7 errors) 4. Severely impaired (8 or more errors)

(Table 3.5 continues)

(Table 3.5 continued)

Constructs /Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Subjective feelings about health	1) Evaluations of one's overall health status	Q47: "On the whole, how is your health at the present time?"	2 items; Summative score; Potential range: 2-10; Interval	1 to 5: 5. Very much 4. Fairly 3. Cannot say 2. Not very much 1. Not at all Missing: Don't know
	2) One's satisfaction with his/her present health status	Q50: "Generally speaking, how satisfied are you with your present state of health?"		
	3) Comparison of one's health to others of the same age	Q48: "Compared to people of your age, do you think your health is better, about the same, or worse?"	1 item; Item score; Potential range: 1-3; Ordinal	1 to 3: 3. Better 2. About the same 1. Worse Missing: Don't know

(Table 3.5 continues)

(Table 3.5 continued)

Constructs/ Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is the scores assigned to the response category)
Social support/ integration	1) Social support: the extent to which a person perceives emotional and instrumental support from other people	Q54 (SQ2): "(If there is someone who listens to you when you feel worried or troubled,) to what extent does the person listen to what you say?" Q55 (SQ2): "(If there is someone who shows you sympathy and consideration,) how much consideration does the person show you?" Q58 (SQ2): "(If there is someone who assists you when you need a little help in your everyday life, how much does the person help you?"	3 items; Summative score; Potential range: 3-9; Ordinal	1 to 3: 3. Very much/very well 2. Can't say one way to another 1. Not very much/not very well Missing: Don't know
	2) Social integration	(1) Marital status: Q9: "Are you married at present?"	1 item; Item score; Potential range: 0 or 1; Dichotomy	1 or 0: 1. Married 0. Not married Missing: Don't know
		(2) Working status: Q2: "Do you presently have a job in which you are earning income?"	1 item; Item score; Potential range: 0 or 1; Dichotomy	1 or 0: 1. Working 0. Not working Missing: Don't know

(Table 3.5 continues)

(Table 3.5 continued)

Constructs/ Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is the scores assigned to the response category)
Social support/ integration (cont)	2) Social integration	(3) The number of children Q14: "How many children do you have? Include adopted children but not you're daughters, or sons in law, or children that have died."	1 item; Item score; Potential range: 0-6; Nominal	0 to 6: 0. Zero 1. One 2. Two 3. Three 4. Four 5. Five 6. More than six Missing: Don't know
		(4) Living condition with children: Q14 SQ1: "How far your child's house is from your home? How long does it take to go from your house to theirs?"	1 item; Item score; Potential range: 0 or 1; Nominal	1 or 0: 1. Living together 0. Not living together Missing: Don't know, not available

(Table 3.5 continues)

(Table 3.5 continued)

Constructs/ Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is scores assigned to the response category)
Health promotion behaviors	1) Physical activities	Q44 (1): "How often do you engage in yard work (e.g., gardening, planting vegetables)?" Q44 (2): "How often do you engage in exercise or sports?" Q44 (3): "How often do you take a stroll or walk a considerable distance (over one kilometer [i.e., 0.6 mile] or ten blocks)?"	3 items; Summative score; Potential range: 3-12; Interval.	1 to 4: 4. Often 3. Sometimes 2. Seldom 1. Not at all Missing: Don't know
	2) Alcohol use	Q45: "Do you drink beer, sake, or other alcoholic beverages?"	1 item; Item score; Potential range: 0 or 1; Nominal	1 or 0: 1. Yes 0. No Missing: Don't know
	3) Tobacco use	Q46: "Do you smoke at present?"	1 item; Item score; Potential range: 0 or 1; Nominal	1 or 0: 1. Yes 0. No Missing: Don't know

(Table 3.5 continues)

(Table 3.5 continued)

Constructs/ Variable names	Dimensions	Items	# of items; Score; Potential range; Level of scaling	Responses (the number is values assigned to the response category)
Age	Age	Q17_1: "Please tell me your age?"	1 item; Item score; Potential range: 0 or 1; Ordinal	1 to 3: 1. Young-old: age 65-74 2. Old-old: age 75-84 3. Oldest-old: age 85 years and over
Gender	Gender	Q17_1: Interviewer's observation (i.e., the gender of a respondent is determined by the observation of the interviewer)	1 item; Item score; Potential range: 0 or 1; Nominal	1 or 0: 0. Male 1. Female

Figure 3.1. Path Model (Initial Model)

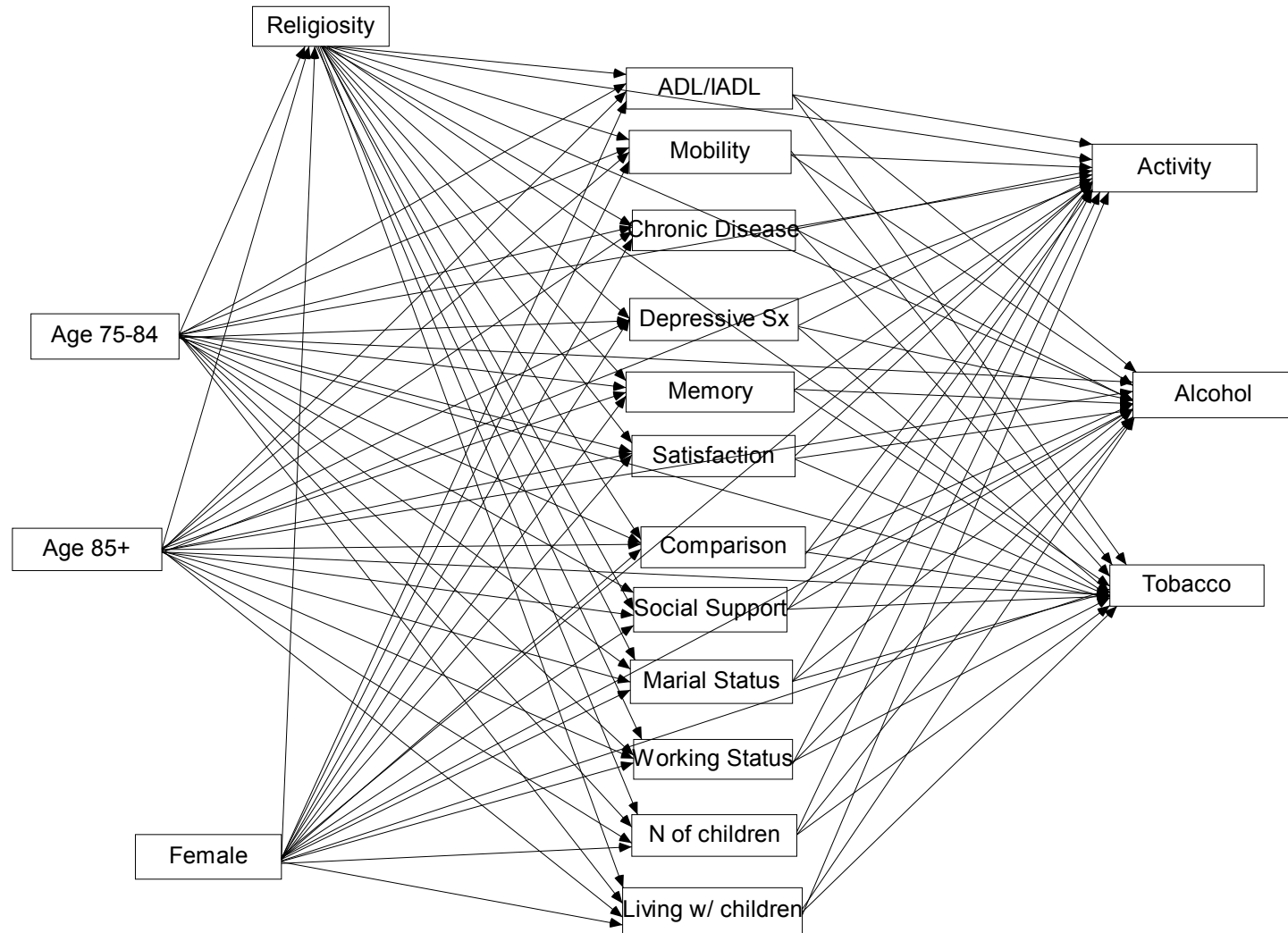


Table 4.2. Descriptive Statistics of Study Variables

Age	Gender	Religiosity		Depressive Sx		Memory		Satisfaction		Comparison	
		M	SD	M	SD	M	SD	M	SD	M	SD
65-74	Male	13.05	4.445	5.64	3.952	1.07	.282	7.16	1.827	2.34	.695
	Female	15.21	4.226	7.08	5.033	1.12	.386	6.99	1.723	2.22	.693
	Total	14.20	4.460	6.40	4.606	1.10	.342	7.07	1.774	2.28	.696
75-84	Male	14.26	4.827	6.09	4.788	1.17	.445	7.03	1.928	2.38	.699
	Female	15.96	4.076	7.17	4.822	1.30	.592	6.64	1.885	2.26	.739
	Total	15.34	4.436	6.76	4.833	1.25	.546	6.78	1.908	2.30	.726
85 +	Male	13.17	5.210	6.29	5.339	1.25	.566	7.22	1.988	2.71	.587
	Female	16.31	3.618	7.97	5.642	1.62	.856	6.44	1.928	2.42	.690
	Total	15.00	4.604	7.27	5.551	1.48	.777	6.73	1.979	2.53	.664
Total	Male	13.45	4.646	5.82	4.321	1.11	.368	7.12	1.869	2.37	.695
	Female	15.59	4.146	7.17	4.981	1.23	.540	6.81	1.815	2.25	.713
	Total	14.68	4.491	6.58	4.752	1.18	.478	6.94	1.844	2.30	.708

(Table 4.2 continues)

(Table 4.2 continued)

Age	Gender	Social Support		N. of Children		Activity	
		M	SD	M	SD	M	SD
65-74	Male	8.44	.952	2.17	1.012	8.49	2.502
	Female	8.41	.967	2.15	1.136	8.62	2.394
	Total	8.42	.960	2.16	1.079	8.56	2.445
75-84	Male	8.47	.914	2.54	1.202	8.27	2.714
	Female	8.47	.945	2.74	1.451	8.13	2.656
	Total	8.47	.933	2.67	1.369	8.18	2.676
85 +	Male	8.35	.997	3.41	1.355	7.58	2.677
	Female	8.27	1.128	3.28	1.693	6.83	2.612
	Total	8.30	1.076	3.33	1.566	7.12	2.651
Total	Male	8.44	.941	2.37	1.140	8.37	2.590
	Female	8.42	.970	2.48	1.366	8.29	2.562
	Total	8.43	.958	2.43	1.276	8.32	2.573

(Table 4.2 continues)

(Table 4.2 continued)

Age	Gender	N	ADL/IADL		Mobility		Chronic Dis		Alcohol Use		Tobacco Use	
			0	1	0	1	0	1	0	1	0	1
65-74	Male	493	93.2%	6.8%	85.8%	14.2%	82.1%	17.9%	36.5%	63.5%	63.6%	36.4%
	Female	561	91.6%	8.4%	67.3%	32.7%	77.2%	22.8%	79.3%	20.7%	92.3%	7.7%
	Total	1054	91.6%	8.4%	76.0%	24.0%	79.5%	20.5%	59.3%	40.7%	78.9%	21.1%
75-84	Male	261	87.3%	12.7%	72.2%	27.8%	75.9%	24.1%	49.8%	50.2%	67.4%	32.6%
	Female	460	78.0%	22.0%	40.6%	59.4%	69.5%	30.5%	79.5%	20.5%	95.2%	4.8%
	Total	721	81.4%	18.6%	52.2%	47.8%	71.8%	28.2%	68.8%	31.2%	85.2%	14.8%
85 +	Male	47	63.0%	37.0%	50.0%	50.0%	75.0%	25.0%	68.1%	31.9%	74.5%	25.5%
	Female	75	44.8%	55.2%	15.7%	84.3%	65.2%	34.8%	90.7%	9.3%	96.0%	4.0%
	Total	122	52.2%	47.8%	28.9%	71.1%	69.0%	31.0%	82.0%	18.0%	87.7%	12.3%
Total	Male	801	89.4%	10.6%	79.4%	20.6%	79.7%	20.3%	42.7%	57.3%	65.5%	34.5%
	Female	1096	83.0%	17.0%	52.9%	47.1%	73.2%	26.8%	80.2%	19.8%	93.7%	6.3%
	Total	1897	85.7%	14.3%	64.2%	35.8%	75.9%	24.1%	64.3%	35.7%	81.8%	18.2%

(Table 4.2 continues)

(Table 4.2 continued)

Age	Gender	N	Marital		Working		Living w/ child	
			0	1	0	1	0	1
65-74	male	493	9.5%	90.5%	58.1%	41.9%	51.9%	48.1%
	female	561	41.2%	58.8%	77.0%	23.0%	45.9%	54.1%
	Total	1054	26.4%	73.6%	68.2%	31.8%	48.7%	51.3%
75-84	male	261	18.5%	81.5%	79.7%	20.3%	44.4%	55.6%
	female	460	72.8%	27.2%	90.0%	10.0%	35.9%	64.1%
	Total	721	53.2%	46.8%	86.3%	13.7%	39.0%	61.0%
85 +	male	47	38.3%	61.7%	83.0%	17.0%	36.2%	63.8%
	female	75	96.0%	4.0%	98.7%	1.3%	26.4%	73.6%
	Total	122	73.8%	26.2%	92.6%	7.4%	30.3%	69.7%
Total	male	801	14.1%	85.9%	66.7%	33.3%	48.5%	51.5%
	female	1096	58.1%	41.9%	83.9%	16.1%	40.3%	59.7%
	Total	1897	39.6%	60.4%	76.6%	23.4%	43.8%	56.2%

Table 4.12. Mediating Effects of Religiosity on the Relationships between Age/Gender and Health/Health Promotion Behaviors

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	p	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: ADL/IADL				.										
X1: Age_2	.980	.152	.000		.931	.220	.000		1.057	.163	.000		3.544	.000
X2: Age_3	2.393	.223	.000		.698	.450	.121		2.412	.242	.000		1.533	.125
X3: Gender	.500	.148	.001		2.050	.211	.000		.618	.163	.000		3.532	.000
M: Religiosity	-	-	-					.066	-.031	.017	.075			
Y: Mobility				.										
X1: Age_2	1.018	.109	.000		.931	.220	.000		1.053	.114	.000		3.847	.000
X2: Age_3	2.141	.229	.000		.698	.450	.121		2.133	.246	.000		1.527	.127
X3: Gender	1.232	.113	.000		2.050	.211	.000		1.285	.121	.000		7.168	.000
M: Religiosity	-	-	-					.066	-.011	.013	.387			
Y: Chronic disease				.016								.021		
X1: Age_2	.384	.116	.001		.931	.220	.000		.396	.121	.001		2.589	.009
X2: Age_3	.524	.219	.017		.698	.450	.121		.593	.236	.012		1.320	.187
X3: Gender	.323	.115	.005		2.050	.211	.000		.271	.123	.027		2.149	.031
M: Religiosity	-	-	-					.066	.032	.013	.016			

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.12 continues)

(Table 4.12 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	p	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: Depressive Sx				.021								.023		
X1: Age_2	.235	.249	.346		.931	.220	.000		.206	.257	.423		.788	.431
X2: Age_3	.800	.527	.129		.698	.450	.121		.736	.553	.184		1.010	.312
X3: Gender	1.319	.240	.000		2.050	.211	.000		1.109	.253	.000		3.996	.000
M: Religiosity	-	-	-					.066	.064	.028	.020			
Y: Memory				.061								.053		
X1: Age_2	.147	.023	.000		.931	.220	.000		.142	.022	.000		3.539	.000
X2: Age_3	.373	.044	.000		.698	.450	.121		.307	.046	.000		1.511	.131
X3: Gender	.097	.022	.000		2.050	.211	.000		.103	.022	.000		4.218	.000
M: Religiosity	-	-	-					.066	-.006	.002	.022			
Y: Satisfaction				.012								.018		
X1: Age_2	-.256	.089	.004		.931	.220	.000		-.303	.093	.001		-2.582	.009
X2: Age_3	-.314	.177	.077		.698	.450	.121		-.402	.191	.035		-1.249	.212
X3: Gender	-.289	.086	.001		2.050	.211	.000		-.370	.091	.000		-3.751	.000
M: Religiosity	-	-	-					.066	.022	.010	.030			
Y: Comparison				.015								.015		
X1: Age_2	.041	.035	.238		.931	.220	.000		.030	.036	.411		.818	.414
X2: Age_3	.264	.069	.000		.698	.450	.121		.225	.074	.002		1.382	.167
X3: Gender	-.124	.033	.000		2.050	.211	.000		-.144	.035	.000		-3.789	.000
M: Religiosity	-	-	-					.066	.006	.004	.137			

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.12 continues)

(Table 4.12 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	p	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: Social support				.002								.011		
X1: Age_2	.047	.052	.365		.931	.220	.000		.049	.054	.363		.887	.375
X2: Age_3	-.124	.103	.230		.698	.450	.121		-.020	.111	.854		-.179	.858
X3: Gender	-.024	.050	.630		2.050	.211	.000		-.058	.053	.271		-.1087	.277
M: Religiosity	-	-	-					.066	.022	.006	.000			
Y: Marital status				-								-		
X1: Age_2	-1.199	.116	.000		.931	.220	.000		-1.173	.120	.000		-3.884	.000
X2: Age_3	-2.421	.249	.000		.698	.450	.121		-2.357	.266	.000		-1.528	.127
X3: Gender	-2.244	.128	.000		2.050	.211	.000		-2.165	.134	.000		-8.326	.000
M: Religiosity	-	-	-					.066	-.029	.013	.028			
Y: Working status				-								-		
X1: Age_2	-1.019	.129	.000		.931	.220	.000		-1.049	.134	.000		-3.723	.000
X2: Age_3	-1.773	.360	.000		.698	.450	.121		-1.656	.363	.000		-1.469	.142
X3: Gender	-.900	.114	.000		2.050	.211	.000		-.961	.121	.000		-6.149	.000
M: Religiosity	-	-	-					.066	.029	.013	.033			
Y: Number of children				.071								.073		
X1: Age_2	.503	.060	.000		.931	.220	.000		.487	.062	.000		3.726	.000
X2: Age_3	1.165	.118	.000		.698	.450	.121		1.165	.126	.000		1.530	.126
X3: Gender	.054	.058	.348		2.050	.211	.000		.022	.061	.717		.360	.719
M: Religiosity	-	-	-					.066	.016	.007	.020			

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.12 continues)

(Table 4.12 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	p	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: Living with children				.										
X1: Age_2	.368	.102	.000		.931	.220	.000		.347	.106	.001		2.589	.010
X2: Age_3	.747	.210	.000		.698	.450	.121		.613	.223	.006		1.351	.177
X3: Gender	.298	.097	.002		2.050	.211	.000		.246	.104	.018		2.298	.022
M: Religiosity	-	-	-					.066	.022	.012	.054			
Y: Physical activity				.020								.033		
X1: Age_2	-.381	.124	.002		.931	.220	.000		-.466	.128	.000		-2.760	.006
X2: Age_3	-1.440	.245	.000		.698	.450	.121		-1.389	.262	.000		-1.488	.137
X3: Gender	-.027	.119	.823		2.050	.211	.000		-.149	.126	.238		-1.174	.240
M: Religiosity	-	-	-					.066	.074	.014	.000			
Y: Alcohol use												.		
X1: Age_2	-.282	.110	.011		.931	.220	.000		-.310	.116	.007		-2.260	.024
X2: Age_3	-1.190	.260	.000		.698	.450	.121		-1.347	.287	.000		-1.473	.141
X3: Gender	-1.681	.105	.000		2.050	.211	.000		-1.675	.112	.000		-8.147	.000
M: Religiosity	-	-	-					.066	-.005	.012	.668			
Y: Tobacco use												.		
X1: Age_2	-.266	.138	.054		.931	.220	.000		-.241	.145	.097		-1.547	.122
X2: Age_3	-.527	.299	.078		.698	.450	.121		-.420	.310	.176		-1.020	.307
X3: Gender	-2.043	.146	.000		2.050	.211	.000		-1.987	.154	.000		-7.761	.000
M: Religiosity	-	-	-					.066	-.044	.015	.003			

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

Table 4.13. Mediating Effects of Health Variables on the Relationships between Religiosity and Health Promotion Behaviors

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	P	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: Physical activity X: Religiosity M: ADL/IADL	.062 - -	.013 - -	.000 - -	.012	.001 - -	.016 - -	.937 - -		.062 -2.661 -	.013 .168 -	.000 .000 -	.138	.0662	.950
Y: Alcohol use X: Religiosity M: ADL/IADL	-.050 - -	.011 - -	.000 - -	-	.001 - -	.016 - -	.937 - -		-.051 -.934 -	.011 .173 -	.000 .000 -		-.0623	.951
Y: Tobacco use X: Religiosity M: ADL/IADL	-.092 - -	.014 - -	.000 - -	-	.001 - -	.016 - -	.937 - -		-.092 -.074 -	.014 .187 -	.000 .695 -		.0625	.950
Y: Physical activity X: Religiosity M: Mobility	.062 - -	.013 - -	.000 - -	.012	.033 - -	.011 - -	.004 - -		.076 -1.791 -	.013 .122 -	.000 .000 -	.123	2.669	.008
Y: Alcohol use X: Religiosity M: Mobility	-.050 - -	.011 - -	.000 - -	-	.033 - -	.011 - -	.004 - -		-.047 -.828 -	.012 .114 -	.000 .000 -	-	-2.382	.017
Y: Tobacco use X: Religiosity M: Mobility	-.092 - -	.014 - -	.000 - -	-	.033 - -	.011 - -	.004 - -		-.089 -.620 -	.015 .145 -	.000 .000 -	-	-2.677	.007

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.13 continues)

(Table 4.13 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	P
	B	SE(B)	P	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: Physical activity				.012								.048		
X: Religiosity	.062	.013	.000		.004	.013	.001		.074	.014	.000		.307	.759
M: Chronic disease	-	-	-						-1.117	.144	.000			
Y: Alcohol use				-								-		
X: Religiosity	-.050	.011	.000		.004	.013	.001		-.051	.012	.000		.307	.759
M: Chronic disease	-								-.167	.123	.173			
Y: Tobacco use				-								-		
X: Religiosity	-.092	.014	.000		.004	.013	.001		-.092	.015	.000		-.307	.759
M: Chronic disease									.005	.152	.974			
Y: Physical activity				.012								.023		
X: Religiosity	.062	.013	.000		.097	.027	.000		.072	.015	.000		1.079	.281
M: Mental health	-	-	-						-.054	.014	.000			
Y: Alcohol use				-										
X: Religiosity	-.050	.011	.000		.097	.027	.000		-.054	.012	.000		-1.291	.197
M: Mental health	-								-.027	.012	.025			
Y: Tobacco use				-										
X: Religiosity	-.092	.014	.000		.097	.027	.000		-.091	.015	.000		-1.315	.188
M: Mental health									-.015	.015	.330			

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.13 continues)

(Table 4.13 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	P	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: Physical activity X: Religiosity M: Cognitive health	.062 . .	.013 . .	.000 . .	.012	.000 . .	.002 . .	.731		.062 -.788	.013 .134	.000 .000	.032	.000	1.000
Y: Alcohol use X: Religiosity M: Cognitive health	-.050 . .	.011 . .	.000..	.	.000 . .	.002 . .	.731		-.051 -.525	.011 .130	.000 .000		.000	1.000
Y: Tobacco use X: Religiosity M: Cognitive health	-.092 . .	.014 . .	.000..	.	.000 . .	.002 . .	.731		-.093 -.096	.014 .143	.000 .499		.000	1.000
Y: Physical activity X: Religiosity M: SFH Satisfaction	.062 . .	.013 . .	.000 . .	.012	.008 . .	.010 .	.407		.058 .522	.013 .031	.000 .000	.152	0.787	.431
Y: Alcohol use X: Religiosity M: Satisfaction	-.050 . .	.011 . .	.000..	.	.008 . .	.010 .	.407		-.054 .181	.011 .029	.000 .000		-.790	.430
Y: Tobacco use X: Religiosity M: Satisfaction	-.092 . .	.014 . .	.000..	.	.008 . .	.010 .	.407		-.093 .068	.014 .035	.000 .051		-.794	.427

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.13 continues)

(Table 4.13 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	P	R ²	B	SE(B)	p	R ²	B	SE(B)	p	R ²		
Y: Physical activity				.012								.111		
X: Religiosity	.062	.013	.000		.003	.004	.478		.060	.013	.000		.740	.459
M: Comparison	.	.	.						1.130	.082	.000			
Y: Alcohol use				.										
X: Religiosity	-.050	.011	.000		.003	.004	.478		-.052	.011	.000		-.741	.459
M: Comparison	.								.375	.074	.000			
Y: Tobacco use				.										
X: Religiosity	-.092	.014	.000		.003	.004	.478		-.097	.015	.000		-.744	.457
M: Comparison									.157	.091	.085			
Y: Physical activity				.012								.016		
X: Religiosity	.062	.013	.000		.021	.006	.000		.068	.015	.000		2.770	.006
M: Social support	.	.	.						.085	.071	.230			
Y: Alcohol use				.										
X: Religiosity	-.050	.011	.000		.021	.006	.000		-.064	.013	.000		-2.853	.004
M: Social support	.								.111	.060	.065			
Y: Tobacco use				.										
X: Religiosity	-.092	.014	.000		.021	.006	.000		-.090	.017	.000		-2.920	.004
M: Social support									-.120	.070	.086			

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.13 continues)

(Table 4.13 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	P	R ²	B	SE(B)	p	R ²	B	SE(B)	P	R ²		
Y: Physical activity X: Religiosity M: Marital status	.062 ·	.013 ·	.000 ·	.012	·079	.011	.000		.071 .439	.014 .126	.000 .001	.019	·3.135	.002
Y: Alcohol use X: Religiosity M: Marital status	·050 ·	.011	.000	·	·079	.011	.000		·037 .768	.011 .109	.001 .000		3.046	.002
Y: Tobacco use X: Religiosity M: Marital status	·092	.014	.000	·	·079	.011	.000		·085 .414	.014 .137	.000 .002		4.637	.000
Y: Physical activity X: Religiosity M: Working status	.062 ·	.013 ·	.000 ·	.012	·010	.012	.406		.064 .323	.014 .143	.000 .024	.015	·.820	.412
Y: Alcohol use X: Religiosity M: Working status	·050 ·	.011	.000	·	·010	.012	.406		·050 .540	.011 .115	.000 .000		.820	.412
Y: Tobacco use X: Religiosity M: Working status	·092	.014	.000	·	·010	.012	.406		·092 .299	.014 .140	.000 .033		.827	.408

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

(Table 4.13 continues)

(Table 4.13 continued)

Variable	Step 1				Step 2				Step 3				Sobel test	p
	B	SE(B)	P	R ²	B	SE(B)	p	R ²	B	SE(B)	P	R ²		
Y: Physical activity				.012								.013		
X: Religiosity	.062	.013	.000		.023	.007	.001		.064	.014	.000		2.668	.008
M: Number of children	.	.	.						-.039	.048	.416			
Y: Alcohol use				.										
X: Religiosity	-.050	.011	.000		.023	.007	.001		-.048	.011	.000		-2.625	.009
M: Number of children	.								-.082	.040	.043			
Y: Tobacco use				.										
X: Religiosity	-.092	.014	.000		.023	.007	.001		-.091	.014	.000		-2.932	.003
M: Number of children									-.079	.051	.124			
Y: Physical activity				.012								.012		
X: Religiosity	.062	.013	.000		.033	.011	.003		.061	.014	.000		2.471	.013
M: Living with children	.	.	.						-.158	.126	.211			
Y: Alcohol use				.										
X: Religiosity	-.050	.011	.000		.033	.011	.003		-.048	.012	.000		-2.400	.016
M: Living with children	.								-.191	.104	.066			
Y: Tobacco use				.										
X: Religiosity	-.092	.014	.000		.033	.011	.003		-.092	.015	.000		-2.695	.007
M: Living with children									-.247	.129	.056			

Note. X = Initial variable(s); M = Mediator variable; Y = Outcome variable.

Table 4.14. Pearson's Correlations among Study Variables

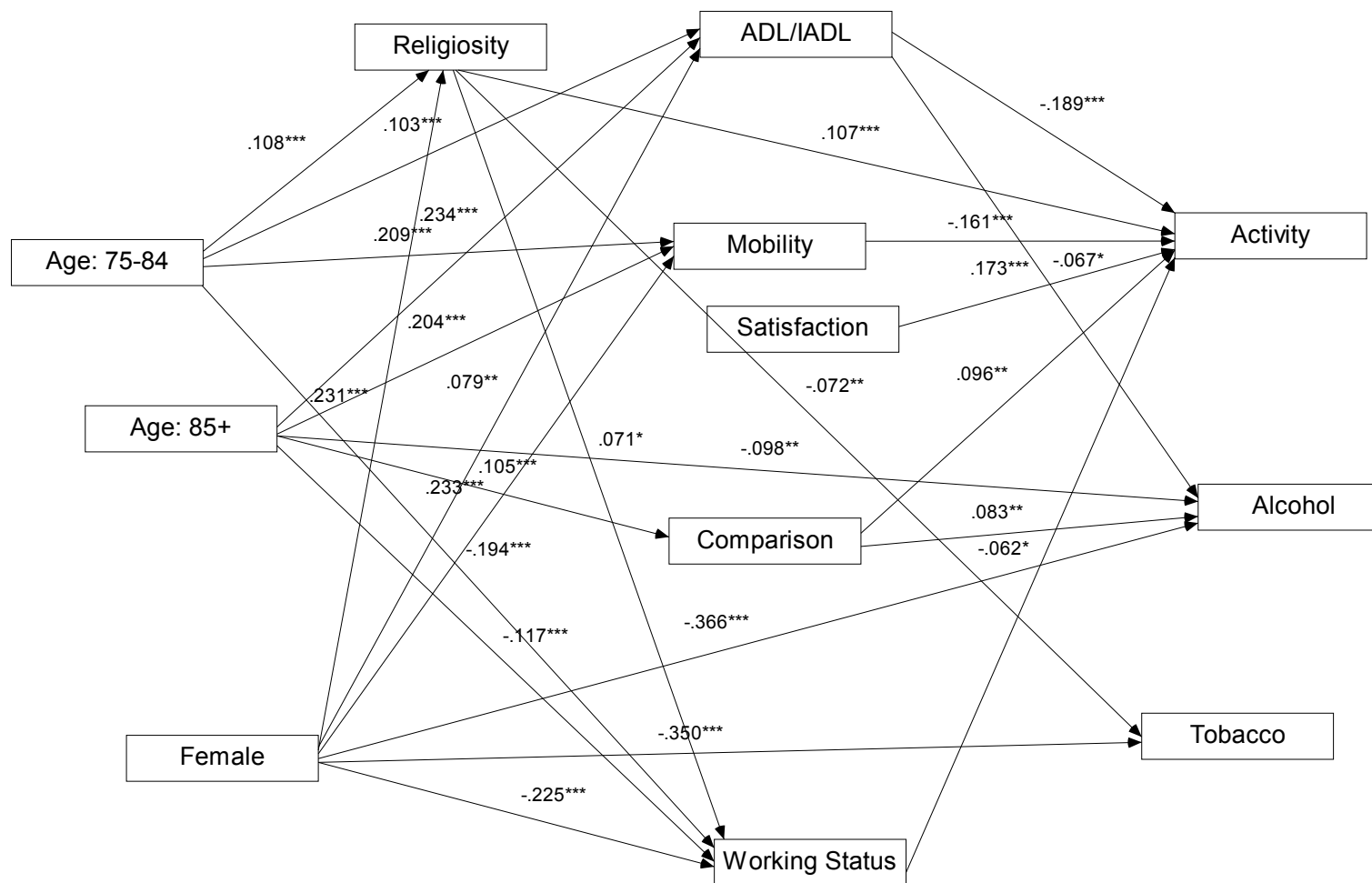
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1																		
2	-.175	1																	
3	.111	-.017	1																
4	.134	.011	.243	1															
5	.073	.226	.087	-.005	1														
6	.199	.177	.258	.077	.439	1													
7	.112	.032	.065	.076	.191	.280	1												
8	.028	.043	.131	.085	.142	.172	.223	1											
9	.127	.051	.094	.008	.180	.152	.058	.020	1										
10	-.046	-.044	-.053	.014	-.348	-.405	-.357	-.205	-.078	1									
11	.016	.076	-.068	-.009	-.285	-.344	-.274	-.143	-.063	.650	1								
12	.042	.023	.022	.105	-.005	-.002	-.029	.000	-.040	.104	.068	1							
13	-.256	-.167	-.454	-.192	-.136	-.259	-.102	-.120	-.111	.047	-.007	-.056	1						
14	-.190	-.078	-.227	-.011	-.151	-.242	-.094	-.098	-.096	.168	.136	.015	.222	1					
15	.176	.155	.074	.073	.075	.132	.035	.007	.124	-.002	.051	.037	-.149	-.055	1				
16	.093	.066	.092	.101	.097	.052	.024	-.026	.071	.002	-.003	.004	-.176	-.026	.187	1			
17	-.027	-.101	.004	.102	-.335	-.321	-.154	-.043	-.108	.353	.305	.053	.026	.043	-.012	-.028	1		
18	-.060	-.101	-.389	-.145	-.144	-.198	-.064	-.054	-.088	.132	.120	.044	.190	.124	-.074	-.074	.100	1	
19	-.076	-.027	-.368	-.157	-.030	-.127	-.049	-.058	-.015	.054	.061	-.058	.148	.075	-.055	-.055	-.055	.203	1

Note. Boldface indicates significance at $p < .05$. 1 = age group 75-84; 2 = age group 85+; 3 = gender; 4 = religiosity; 5 = ADL/IADL; 6 = mobility; 7 = chronic disease; 8 = depressive symptoms; 9 = memory impairment; 10 = satisfaction with health; 11 = health compared to other people with the same age; 12 = social support; 13 = marital status; 14 = working status; 15 = number of children; 16 = living condition with children; 17 = physical activity; 18 = Alcohol use; 19 = Tobacco use.

Table 4.15. Goodness-of-Fit Indicators of the Full Model
(N=1,061)

Model	χ^2	df	χ^2/df	RMSEA	90% CI for RMSEA		PCLOSE	CFI	TLI	AIC
					Low	Up				
Model 1 (Initial)	1520.542	100	15.205	.116	.111	.121	.000	.531	.198	1700.542
Model 2 (Final)	368.309	114	3.231	.046	.041	.051	.899	.916	.874	520.309

Figure 4.1. Path Model (Final Model)



Physical Activity: $R^2 = 21.5\%$; Alcohol Use: $R^2 = 17.8\%$; Tobacco Use: $R^2 = 14.0\%$.

Table 4.16. Estimates of Path Coefficients

	Estimate	SE	CR	p	Std Estimate
Religiosity \leftarrow Age 75-84	1.000	.276	3.629	***	.108
Religiosity \leftarrow Female	2.077	.268	7.742	***	.231
ADL/IADL \leftarrow Age 75-84	.068	.019	3.567	***	.103
ADL/IADL \leftarrow Age 85+	.344	.043	8.100	***	.234
ADL/IADL \leftarrow Female	.051	.019	2.660	**	.079
Mobility \leftarrow Age 75-84	.197	.025	7.850	***	.209
Mobility \leftarrow Age 85+	.432	.057	7.630	***	.204
Mobility \leftarrow Female	.214	.026	8.260	***	.233
Comparison \leftarrow Age 85+	.331	.073	4.502	***	.105
Working \leftarrow Age 85+	-.238	.060	-3.938	***	-.117
Working \leftarrow Age 75-84	-.177	.027	-6.481	***	-.194
Working \leftarrow Religiosity	.007	.003	2.338	*	.071
Working \leftarrow Female	-.198	.027	-7.437	***	-.225
Alcohol \leftarrow Age 85+	-.220	.065	-3.392	**	-.098
Alcohol \leftarrow Female	-.356	.028	-12.694	***	-.366
Tobacco \leftarrow Female	-.271	.023	-11.930	***	-.350
Tobacco \leftarrow Religiosity	-.006	.003	-2.448	**	-.072
Activity \leftarrow Mobility	-.898	.176	-5.097	***	-.161
Activity \leftarrow Satisfaction	.255	.054	4.734	***	.173
Activity \leftarrow Comparison	.357	.134	2.661	**	.096
Alcohol \leftarrow Comparison	.059	.021	2.838	**	.083
Activity \leftarrow ADL/IADL	-1.517	.242	-6.262	***	-.189
Activity \leftarrow Religiosity	.061	.016	3.899	***	.107
Activity \leftarrow Working	-.360	.159	-2.265	*	-.062
Alcohol \leftarrow ADL/IADL	-.102	.045	-2.250	*	-.067

***p < .001, ** p < .01, *p < .05.

Table 4.17. Direct, Indirect, and Total Effects of Demographics and Religiosity on Health and Health Promotion Behaviors

	Age 75-84			Age 85 +			Female			Religiosity		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Religiosity	.108***	-	.108***	-	-	-	.231***	-	.231***	-	-	-
ADL/IADL	.103***	-	.103***	.234***	-	.234***	.079**	-	.079**	-	-	-
Mobility	.209***	-	.209***	.204***	-	.204***	.233***	-	.233***	-	-	-
CD	.110***	-	.110***	.037	-	.037	-	-	-	-	-	-
Depressive	-	.006	.006	-	-	-	.117***	.013*	.130***	.056	-	.056
Memory	.131***	-	.131***	.075*	-	.075*	.081**	-	.081**	-	-	-
Satisfaction	-	-	-	-	-	-	-.038	-	-.038	-	-	-
Comparison	-	-	-	.105***	-	.105***	-.054	-	-.054	-	-	-
SS	-	.011**	.011**	-	-	-	-	.024**	.024**	.105**	-	.105**
Marital	-.240***	-.006*	-.246***	-.216***	-	-.216***	-.418***	-.013*	-.431***	-.056*	-	-.056*
Working	-.194***	.007*	-.187***	-.117***	-	-.117***	-.225***	.017*	-.208***	.071*	-	.071*
N. children	.209***	-	.209***	.191***	-	.191***	-	-	-	-	-	-
Living w/	.108***	-	.108***	.085**	-	.085**	-	-	-	-	-	-
Activity	-	-.030**	-.030**	-	-.060***	-.060***	-	-.021	-.021	.107***	-.002	.105***
Alcohol use	-	-.013**	-.013**	-.098**	-.007	-.105**	-.366***	-.022**	-.388***	-.055	-	-.055
Tobacco use	-	-.008**	-.008**	-	-	-	-.350***	-.017**	-.367***	-.072**	-	-.072**

Note. CD = presence of chronic disease; SS = social support; Living w/ = living condition with children.

*p < .05. ** p < .01. ***p < .001.

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