

SOCIAL CAPITAL AND HEALTH AMONG OLDER ADULTS IN CHINA:

A MULTI-LEVEL ANALYSIS

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Health and well-being of older adults has become a worldwide public health concern and has been attracting increasing attention from scholars across the globe. But little is known about the health of the Chinese elderly. Using data from The China Health and Retirement Longitudinal Study (CHARLS) --Pilot, a pilot survey in 2008 in two provinces of China, Gansu and Zhejiang, this dissertation examines the association between social capital at both the individual- and community- levels and three health outcomes among older adults in China. A series of multi-level models were estimated using SAS 9.2. Statistical results indicate that such individual-level social capital variables as perceived help and support in the future, help from others, and birthplace significantly impacted health among older Chinese adults. When examining the relationship between community-level social capital and health, this study confirms the significant association between community-level social capital and good health independent of individual-level predictors. This study also indicates that the impact of gender and rural-urban *Hukou* status interacts with the province of residence. The results are discussed in terms of cultural legacy in the Chinese cultural setting, the current social dynamics related to old age support, health-related government reforms, and various disparities across different regions and across different social groups in China.

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CHAPTER 1

INTRODUCTION

The whole world is aging rapidly. The population of China, which consists of more than one-fifth of the world's total, is aging at an extraordinarily rapid speed. The number of elderly is set to rise exponentially over the next few decades in China. According to the world population statistics released by the United Nations (2010), the percentage of elderly in China is expected to increase from 15.7 in 2010 to 22.7 in 2050. Moreover, the population of China's elderly is expected to grow faster than any other age groups in China during the 21st century (Zeng et al., 2002). This rapid elderly growth is particularly important for China, given that China's "one-child policy" is increasingly ripening and resulting in changes to the traditional care-giving and old-age supporting scenarios in Chinese society.

Over the past several decades, China's radical socioeconomic reforms have presented both promising opportunities and mounting challenges to the health of the Chinese elderly. On the one hand, there are rising living standards and life expectancy. Some studies have reported the significant improvements in self-rated health (SRH) and healthy life expectancy (HLE) among the elderly in China during the late 1980s owing to its rapid economic development and its epidemiologic transition (Saito et al., 2003). On

the other hand, there has been a sharp decline of health insurance schemes in both rural and urban areas and ever-increasing regional disparities accompanying China's economic reform policy (Zhao, 2006). Additionally, the ever-increasing migration both across and within the national borders under the social forces of globalization and urbanization have been transforming the scenarios and dynamics of Chinese people's lives. There is an increasing number of older Chinese living alone due to modernization and the out-migration of their children. These social and health changes raise a series of questions: What is the current scenario of social networks and social support mechanisms among Chinese older adults? What is the health status and subjective well-being of older adults in China? Is there a prevalence of depressive symptoms or dissatisfaction among today's older adults in China? And is their health related to social capital factors such as their social networks, their mutuality with others, their trust of others, and their feeling of community cohesions and group memberships?

Objectives of My Dissertation Research

The many social and health changes in China are raising many questions related to the health and life quality of the Chinese elderly. Moreover, differences across gender, across urban/rural residential areas and across different age groups among Chinese elderly have received little research attention. Therefore, the current study aims at examining the social and health conditions among older adults in China by exploring the relationship between social capital at both individual and community/village levels and three different individual-level measures of health among older adults in China. Also

examined are any differences across genders, across rural-urban areas and across different birth age groups.

Health in this study is measured with three health outcomes -- self-rated health, mental health, and subjective well-being. Social capital in this study includes both social capital at the individual level and social capital at the community level. Data from the China Health and Retirement Longitudinal Study (CHARLS) – 2008 Pilot Study is used for secondary quantitative analysis. The CHARLS survey is a random sample of Chinese residents who were 45 years or older and communities they were permanently living in from 2 provinces in China, Gansu and Zhejiang. It was designed by a collaborative team from the University of Southern California, Oxford University, and Peking University in China. The CHARLS survey was designed to provide a wide range of information from socio-economic status, social support, to health conditions of those aged 45 or older. It is also designed to provide data at the individual, household, and community levels (Zhao et al., 2009). The data include 2,685 individuals living in 1,570 households from 96 communities/villages in 16 counties/districts from these two provinces. Multilevel statistical modeling is used to distinguish individual level social capital effects from community level social capital effects on the health status among the older adults and to identify the degree to which variability in the health of individuals can be attributed to the social capital.

Contribution of My Dissertation Research

Health and well-being of older adults has become a worldwide public health concern and has been attracting increasing attention from scholars across the globe. As the home of more than one fifth of the world's population, China is also the leading force in this graying trend. It is projected that the proportion of those aged 60 or older will be about 30% of the Chinese population by 2050 (United Nations, 2001). But little is known about the health of the Chinese elderly.

However, considering the increasingly deteriorating physical health status and need for support among the older adults, a promising perspective that may provide some insight on the health of older adults is social capital theory. Social capital theory proposes that the networks of individuals and their mutuality with others provide multiple resources and opportunities that benefit the development of individuals (Bourdieu, 1985; Coleman, 1990; Putnam, 1995; Kawachi, 1999; Lin, 2000). Recent years has witnessed a growing interest in studying the health and health-related issues among older adults from the social capital perspective. A considerable body of extant research has documented the proactive function of social capital in promoting better health among older adults. Unfortunately, most of these empirical studies have focused on the elderly in Western industrialized countries like the U.S. (Kruger et al., 2007; Schultz et al., 2008), U.K. (Snelgore et al., 2009), Canada (Low et al., 2009), Australia (Berry et al., 2010; Ziersch et al., 2009), Sweden (Lindstrom et al., 2009), and Japan (Ichida et al., 2009; Inaba,

2009). These countries have quite different social settings from China, particularly when considering the availability of old age support and caring systems. Little research has focused on the effects of social capital on the health/well-being of the Chinese older adults.

In order to apply social capital theory to the Chinese elderly, it is important to understand the social environment in China. Over the past several decades, China's radical socioeconomic reforms have presented both promising opportunities and mounting threats to the public health in China. Rising living standards and life expectancy have been accompanied by a sharp decline of health insurance schemes in rural and urban areas as well as ever-increasing regional disparities. Additionally, continuing migration both across and within the national borders under the social forces of globalization and urbanization has been transforming the scenarios and dynamics of Chinese people's lives in a tremendous way. Consequently, traditional cultural values are undergoing many transformations. These include changes in adherence to Confucianism, patriarchy, the closely-knitted intergenerational household structure, filial piety, younger generations' respect and duty to the elderly, and family as the core supporting provider to the elderly (Zimmer et al., 1993; Pei, 1999; Riley, 2004; Zhao, 2006; Chen et al., 2007).

The story of China's recent epidemiological and socio-cultural transformation also tells what is happening in most emerging economies in the Eastern part of our planet. Empirical findings regarding the relationship between social capital and the health of older adults from China can also offer insights to other developing countries with similar

socioeconomic and epidemiological transformations like China, in addition to supplement the evidence of the direction of association between social capital and health.

Additionally, there are relatively few studies that have addressed the health status of the Chinese elderly during the current transformation era (Ren et al., 2004; Zeng et al., 2006; Chen et al., 2010; Wang et al., 2008; Ku et al., 2008). The few studies that do exist have typically measured the older adult's health only with self-rated general health, or psychological health. My research measured the older adults' health with three health outcomes – mental health, subjective well-being, and self-rated health – within a single study, which will provide a more realistic and accurate picture of the older adults' health status. Secondly, many of the existing studies on health have oriented their analytical perspectives from the lens of social economic status. Few have gone beyond this perspective to consider others such as social capital theory. My dissertation research examined the older adults' health from the perspective of their existing social capital at both individual and community levels. Thirdly, up to now, no research has examined the health inequality of older adults in China using a random sample at the provincial level. Further, relatively little is known about the health status among the Chinese elderly with regard to differences across gender, across age groups, and across rural-urban areas. Additionally, research that has examined social capital and the health status of the Chinese elderly has focused on only one or a few specific areas in China. For example, studies by Yip et al. (2006) and Wang et al. (2009) have examined the influence of social capital on health in Chinese cultural settings but their studies focused only on the rural Chinese population in specific regions. Moreover, social capital in these two studies was

measured only at the individual level and included either the structural dimensions of social capital or the cognitive dimensions. My dissertation study helps to fill these gaps by using a representative sample of two Chinese provinces (equivalent to states in the U.S), one with relatively low income and one with relatively high income. And the measurement of social capital in my dissertation study includes social capital at both individual and community/village levels, which provides a more complete picture of social capital by measuring the networks of individuals, their available resources from networks, their trust, reciprocity towards others, their mutuality with others, their participation in group memberships, and cohesion at the community/village level. Specifically, this study assesses the importance of social capital at both the individual and community/village levels for health of Chinese older adults living in Gansu and Zhejiang provinces. More generally, it makes a contribution to the growing body of health research aimed at exploring the role of social structure in producing and maintaining health and health inequalities.

Further, findings from this study have important implications for policy making not only in China but also in other countries that have similar socioeconomic and epidemiological situations as China. Population aging is now a worldwide trend. How to maintain health of the elderly population is a public health concern and a challenge to governments around the world. Empirical findings from this dissertation research may provide guidance for policy making and government-sponsored programs.

Structure of the Dissertation

The second chapter of my dissertation discusses the social context of aging in the past and current transformation era of China, with particular attention given to the changing scenarios of the old age support system, gender inequalities, the rural-urban socioeconomic gap, and different life chances for different age groups.

Chapter 3 reviews the theoretical framework of this study – social capital theory - and the association of social capital and health in the existing literature. This chapter also provides a brief literature review of health inequalities across gender, different age groups and across rural-urban residence. The research questions and hypotheses of the present study follow.

Chapter 4 discusses the data and methods used to analyze the association between social capital and health status among the older adults in China. The diagnostic analyses of the assumptions are also discussed, including the sample size, missing data, and the distributions of the data, the influential cases and multicollinearity. Variables and the measures of the variables as well as the proposed statistical analytical strategies are also discussed, which is followed by a descriptive analysis of both dependent and independent variables.

The findings from the multi-level analysis with both individual and community level data are presented and discussed in Chapters 5-7, with chapter 5 focusing on the effects of social capital on the mental health among older adults in China, chapter 6 on the subjective well-being, and chapter 7 on self-rated health. Chapter 8 provides a

summary of the findings from the study and discusses the strengths and weaknesses of this study as well as the possible directions for the future research.

CHAPTER 2

SOCIAL CONTEXT OF AGING IN PAST AND CURRENT CHINA

This chapter presents a discussion of the social context of aging in the past and current transformation era in China, with a special focus on traditional old age support in China and its changing scenarios in the transformation era; and gender inequity, life chances for different age groups, the *Hukou* system, and the rural-urban socioeconomic gap.

Old Age Support in China

Compared to its Western developed counterparts, China's social security systems and old age support systems are relatively immature even with the country's recent development and progress. Chinese traditional cultural values emphasize the obligation of adult children (sons particularly) to support and care for their parents in old age. In Confucian ideals, filial piety (*xiao* in Chinese) is one of the virtues to be held above all else. In China, the respect and the dutifulness for the parents and ancestors has been the main topic of a large number of stories and has been extolled in many forms over a long history. And family support of old age has always been encouraged and advocated by the Chinese government. For thousands of years, family has been the main source of social security support for the elderly in China. After the founding of the new Chinese

Communist Party government, the Chinese government started its pension system early in 1951. Under this public social security system, all the cadres (government officials) and workers working for the government and state-owned enterprises in the urban areas were provided with generous benefits while the rural population had to rely on land and family as the source of old age support (Ding, 2003). During the 1990s, the Chinese government promulgated a series of programs to provide benefits for the elderly population in some economically well-off areas. Since 2000, a series of pension and insurance schemes programs providing benefits to the elderly population have been practiced in China. However, even today China's pension system has not been implemented on a national scale. In terms of the support of old age in current China it is still a mixture of formal and limited support from government and informal support from family, including the following five programs or patterns: a nationwide old-age pension scheme; family support of old age; a minimum standard of living assistance program; a national scheme of allowance for living expenses and old-age endowment insurance; and the Five Guarantees (*Wubaohu*) social assistance program. However, each of these programs or patterns has its defects. Likewise, the organized social services for the elderly in China are not yet well developed. And, facilities for subsidized institutional care for the elderly are still limited in China. All these pose heightened risks to the health of the elderly in this country.

In addition, the active ingredients of the social environment, cultural forces and social policies pertaining to older adults can be expected to be influencing the health of the elderly. In China, social constraints from the traditional cultural norms such as

patriarchy and Confucianism as well as from the governmental policies result in clear differences from Western developed countries. Traditionally, children take care of their parents into their old age, usually giving them money and providing housing for them. The Chinese family has been characterized by a strictly loyalty-based extended structure tied to a close-knit network of kinship that provides strong support for the elderly (Zimmer & Kwong, 2003). Multigenerational family households have been viewed as the main support for older adults including the provision of place to live and the provision of personal care. However, this family-based culture has been changing rapidly in recent years. The traditional scenario has been undergoing changes with the maturing of the one-child policy in China as well as the cultural influences of globalization. Furthermore, the increasing migration of Chinese both across and within its national borders since the nation's open-door policy, has widened the physical boundaries of families of most Chinese while at the same time narrowing their social support boundaries. These have resulted in an increasing number of older Chinese living alone due to modernization and the out-migration of their children. Family structure in China therefore began to shift from a larger and multigenerational family to a smaller and nuclear family. Due to the industrialization and urbanization process, the number of migrant workers has increased substantially over the years. The outmigration of the younger generation in rural areas has further accelerated the graying of the age structure in rural areas. Based on an opinion poll on family and marriage conducted by the All-China Women's Federation in 2003 (Tang, 2007), the proportions of adults living apart from their parents were as high as 69% in urban area and 59% in rural areas. This survey also indicated that family support

of old age in current China was mainly practiced by the sharing of family expenses and spiritual solicitude at the time, living together with the aged parents was nothing but a supplement (Tang, 2007). Some traditional cultural values such as the respect and filial piety on the part of the younger generations to the older generation have consequently begun to fade. These changing patterns of family life seem to be disintegrating the traditional social networks related to family kinship and the traditional old-age support system in China.

Inequity across Gender, Rural-Urban Areas, and Different Age Groups

Of relevance to this study is an understanding of gender inequalities, rural-urban differentials, and the life experiences of different age groups among older adults in China. Traditionally, Chinese women have been oppressed and disrespected and “women’s work” has long been expected to be centered only around the home. Since the founding of the People’s Republic of China, a series of laws have been formulated to protect women’s rights and ensure gender equalities. Subsequently, the status of Chinese women has improved greatly during recent decades. However, the traditional expectations of the social roles of females and social discrimination against females are still persistent in contemporary China. Women in today’s China remain disadvantaged in terms of education, labor force participation, division of domestic labor, and possession of assets.

In the traditional Chinese culture, Chinese women have been severely marginalized and disrespected. Women were treated as secondary to men and subservience and self-effacement for women was regarded as the virtues for women. For

example, Confucianism upholds that a virtuous woman should be illiterate -- “The woman with no talent is the one who has merit” and “Women are to be led and to follow others.” Based on Confucianism, a virtuous woman should uphold the so-called “three subordinations”: be subordinate to her father before marriage; to her husband after marriage; and to her son after her husband has died. Such mainstream discourse defined that women at every level are to occupy a lower position to men in terms of the gender role and expectations. Also, the extreme demands of deification of the vagina and chaste widowhood on the part of the female all illustrated how females were marginalized in traditional Chinese culture.

Since the founding of the People’s Republic of China, a series of laws have been formulated to protect women’s rights and ensure gender equalities. Since 1952, women’s equal rights with men in all spheres of social life, including marriage and family life, have been clearly stipulated in the Constitution of the People’s Republic of China. Based on this constitutional stipulation, the Chinese central government promulgated a series of laws to further protect the rights and interests of females. For example, the Marriage Law in 1954 and the Law of Inheritance in 1954 protected females’ equal rights in family life. The Protection of Women’s Rights and Interests in 1982 was revised in 1995 in the wake of the 10th anniversary of the United Nations Fourth World Conference on Women convened in Beijing in 1995. In addition, women have been fighting for a way out of the shadow of Confucianism. Subsequently, the status of Chinese women has improved greatly during recent decades (Bauer et al., 1992). However, the long shadow of beliefs about a virtuous woman of the past has far-reaching influence and it never ceases to

emerge in contemporary China. Even today, most admirable females depicted in movies and fictions in China all have the good quality of self-discipline, great sense of unselfish loyalty and self-sacrificing willingness to help the husband and his family.

Women living in today's China remain disadvantaged in terms of education, labor force participation, division of domestic labor, and possession of assets. Women have less access to education and economic resources. In terms of labor force participation, women are more likely to experience gender inequality in employment opportunities that favor men. And, women continue to experience family violence and lack of full control over their sexual and reproductive rights (Bauer et al., 1992).

When considering the rural-urban socioeconomic differences in China, it is important to recognize that a person's residential registration status or *Hukou* has been one primary and salient social identity in China that distinguishes between urban and rural residents. As an institutional legacy of China's socialism, *Hukou* status in China works as an institutional identity which entitles people to different economic resources, education, employment, and social welfare benefits depending on whether their registered residence is in a rural village or an urban community. Following the establishment of the People's Republic of China in 1949, new government leaders set a strictly enforced residential permit system to categorize residents into rural *Hukou* holders and urban *Hukou* holders. Urban residents are born to be "workers" and were provided with an "iron rice bowl" of lifetime employment, while rural residents are born to be farmers and are organized into collectives. The economic planning system also set the prices and investments in rural and urban areas, which always discriminated against the rural areas

and agriculture and gave preference to the urban areas and industry. Even with its recent economic development and the relatively relaxed *Hukou* control over the migration across rural to urban areas, a number of studies have shown that people with different *Hukou* backgrounds fare differently in China and those with a rural *Hukou* generally fare worse than their urban counterparts (Cheng et al., 1994; Chen, 2002; Liu, 2005). Those with urban *Hukou* can get important nonwage benefits as housing subsidies, health care, pension, and unemployment insurance, and typically enjoy a rural-urban wage differential. Rural and urban communities in China are also characterized with different levels of socioeconomic status. Rural communities have fared poorly and most rural communities are poorly endowed with infrastructures and amenities, including the health related resources and infrastructure (Cheng, 1994; Liu, 2005). However, since the late 1970s radical economic reforms taking place in China have generated rapid economic growth that has resulted in improved living standards even in the poor and remote areas in China. Unfortunately, this transformation has been accompanied by some negative developments, one among which is the stark disparities across rural and urban areas in most regions, particularly the rural-urban disparities that encompass health services (Zimmer et al., 2010). As a product of history and culture, the *Hukou* system in China has become an institutionalized social identity which typically shapes the individual's value system and profoundly influences a person's social behaviors. Unfortunately, very little research was found that examined the relationship between the urban-rural dimension and other social characteristics such as social capital.

During the last century, the Chinese society went through a series of dramatic political, economic, and cultural upheavals including the involvement of World Wars, a civil war, the founding of the People's Republic of China, Cultural Revolutions, an Open-door policy, economic reforms, and so on. According to the life course perspective, social experiences of individuals are powerful determinants of social, behavioral, and physiological development across the life span. Changes in human lives over the life course are interactions of personal characteristics and individual action as well as of cultural frames and institutional and structural conditions (Mayer, 2009). Different birth cohorts have experienced different early life conditions and exposure to different social changes and social factors. The behaviors and attitudes of cohort members are molded by their unique temporal location in the stream of history (Ryder, 1965). And, the different social and life experiences of different birth cohorts bear important consequences in mental and physical health for each birth cohort. When considering the life chances and life experiences of different age groups in China, we cannot overlook those historical events that imprint the lives of the different age groups. Some studies have concluded that "long-term neurobiological experiences that unfold in old age may have been shaped, in part, by experiences during early 'critical' or 'sensitive' experiences" (Berkman et al., 2000, p. 852). For those older Chinese adults who were born before the Founding of the People's Republic of China in 1949, they experienced two World Wars, the colonization of China by other foreign forces, a civil war, and many years of unstable social conditions. Their early life experiences differed greatly from those older adults born after the Founding of the People's Republic of China, who had a comparatively more stable

and prosperous life than their earlier cohorts. Of primary interest is how these different life experiences influenced their social capital such as their association with others, their trust and proximities with each other, as well as their perception of support and reciprocities, and then consequently influenced their health status. Studies focusing on the age group variations will contribute to understanding the linkage between social change and social stratification in addition to providing explanations for health inequalities across age groups.

In sum, gender, rural-urban differences and age groups differences are still stark in current China. Examining the differences across these different groups definitely would provide us a more complete picture of Chinese older adults.

CHAPTER 3

SOCIAL CAPITAL AND HEALTH: A LITERATURE REVIEW

To begin, social capital has been described as an attribute of social structure embedded in a web of relationships that serve as a resource for social individuals (Bourdieu, 1986; Coleman, 1986; Putnam, 1993). Social capital perspectives have been drawing increasing attention from scholars around the world who study the health of the elderly population. This chapter first presents a brief overview of social capital theory, including the identification of gaps in the study of health from a social capital perspective. Next is a brief literature review on the health inequalities across gender, rural-urban residence, and different age groups. This is followed by a statement of the research questions and the corresponding hypotheses for this dissertation study.

Social Capital Theory – The Definition and Measurement of Social Capital

Social capital theory, over the past several decades, has been the focus of a variety of social science disciplines including sociology, behavioral science, communication science, and political science. Despite its current popularity, the intellectual background of the term “social capital” has always been traced back to the very beginning of the

discipline of sociology. However, there are ambiguities as to the intellectual origin of social capital. Putnam (1993) identified Lyda Hanifan, a state supervisor of the rural schools in West Virginia, as the first one to introduce the concept of “social capital” in 1916. Lin (2001) traces the seminal origin of social capital theory back to Karl Marx’s capital theory. Still other scholars attribute the seminal idea of social capital to Durkheim’s social integration theory (Portes, 1998; Berkman, 2000; Kawachi, 2001) or to Simmel’s social association theory (Pescosolido, 2006).

Similarly, the term “social capital” is still encapsulated by some ambiguities both in its conceptualization and measurement. Even among the frequently-quoted definitions of Coleman (1990), Bourdieu (1985), Putnam (1993), Lin (2000), and Kawachi (1999), there are variations as to its framework and emphasis. For example, Bourdieu (1985, p. 248) defined social capital as “the aggregate of the actual or potential resources that are linked to a durable network of more or less institutionalized relationships.” Coleman (1990, p. 302) defined social capital by its function as “a variety of different entities having two characteristics in common: they all consist of some aspects of social structure, and they facilitate certain actions of individuals who are within the structure.” Putnam (1993, p. 167) provided a third definition of social capital as “features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions.” Lin (2000) argued that “who you know” and “what you know” make a difference in society and life and they should be regarded as important ingredients of “social capital.” Consequently Lin has defined social capital as “investment and use of embedded resources in social relations for expected return” (Lin,

2000, p. 786). Kawachi (1999) has provided still another definition with his emphasis being at the collective level: social capital is viewed as “features of social organization – such as trust between citizens, norms of reciprocity, and group membership -- that facilitate collective action” (Kawachi, 1999, p. 1187). Significant variations are evident among these definitions, yet concurring similarity is also evident – the mutual feature in these definitions is that they define “social capital” as a kind of social resource and with “benefits accruing to individuals or families by virtue of their ties with others” (Portes, 1998, p. 6).

Similar to the disagreements among theorists as to the definition of social capital, the measurement and dimensions of social capital are also fragmented and varied. The Office of National Statistics in the United Kingdom has defined five measurable dimensions of social capital – (1) participation and social engagement; (2) self-efficacy; (3) perception of community level structures of characteristics; (4) social interactions, social networks, and support; and (5) trust, reciprocity, and social cohesion (Nieminen et al., 2008). On the other hand, the World Bank (Nieminen et al., 2008) has introduced six measurable dimensions of social capital: (1) networks; (2) trust and solidarity; (3) collective action and cooperation; (4) information and communication; (5) social inclusion; and (6) empowerment and political action.

Other scholars have used different dimensions. Szreter and Woolcock (2004) have presented a comprehensive framework of social capital that includes three dimensions: bonding capital -- “resources available within networks whose members are alike with respect to class, ethnicity, and other sources of social identity” (Szreter & Woolcock,

2004, p. 654); bridging capital – “relations of respect and mutuality between people who know that they are not alike in some socio-demographic sense” (Szreter & Woolcock, 2004, p. 654); and linking social capital – “norms of respect and networks of trusting relationships between people who are interacting across explicit, formal or institutionalized power or authority gradients in society” (Szreter & Woolcock, 2004, p. 654). Harpham et al. (2002) have suggested two broad dimensions of social capital: structural and cognitive. Structural social capital includes the connectedness with others both in formal and informal organizations, while cognitive social capital refers to the attitudinal manifestations such as reciprocity, trust and sharing.

Social Capital and Health

The conceptual and measurement ambiguity of “social capital” has not prevented its popularity in scholarly articles over the past quarter century. The concept of “social capital” has captured the attention of many researchers from different disciplines with various study focuses. Portes (1998, p. 2) has noted that “the concept of social capital is arguably one of the most successful ‘exports’ from sociology to other social sciences and to public discourse during the last two decades”. For instance, educational researchers linked educational outcomes with social capital (Hao, 1998; Bankston & Zhou, 1995) and claim that social capital is positively linked to educational achievement, and development. The important and positive role of social capital has also been evidenced in empirical studies of youth development (Salmi, 2006), political participation (Putnam, 1995) and occupational mobility (Lin, 2001).

Similarly, the role of social capital has risen to considerable prominence in health and health-related studies. A substantial literature, from both social science and epidemiological research, has emerged exploring the nature and role of social capital in an array of mental and physical health dimensions (Sung & Lin 2009; Kawachi, 1997; 1999; 2004; Berkman et al., 2000; Berry et al., 2010; etc.). This literature suggests that social capital has a proactive role in health and health-promotion. For example, Kawachi et al. (1997) empirically tested the relationship between social capital and mortality among non-institutionalized English-speaking persons 18 years old or above living within 39 states of the U.S. They measured social capital by the degree of mistrust, levels of perceived reciprocity, and per capita membership in voluntary associations. They found that both social trust and group membership were negatively associated with mortality. Another study by Berry et al. (2010) found that social capital, measured as community participation, personal social cohesion, trust, and reciprocity, positively affected the general health and mental health of elderly Australians. Still another study by Sung and Lin (2009) measured social capital as the extensity, upper reachability, and range of kinships. Their empirical study in Taiwan found that social capital benefited the psychological health of Taiwanese.

From the existing literature on social capital and health, it appears that the social variable most often being used as a reflection of social capital is trust (Kawachi, 1997; 1999; Putnam, 1993; 2004; Yip et al., 2007; Berry et al., 2000; etc). Other social variables that have been used to measure social capital include social support, social networks, and membership in networks of voluntary associations. Studies have found that

these variables are important factors buffering social individuals from disease, mentally defined or physically defined. For example, a number of studies acknowledged the protective function of social capital in helping people stay away from depressive symptoms (Antonucci et al., 1987; George et al., 1989; Chi & Chou, 2001; Bruce, 2002; Greenglass et al., 2006). According to these studies, social capital in the forms of practical assistance and emotional support is positively related to an individual's proactive coping strategies, which is directly related to mental health.

Other studies, claiming to study “social capital,” measure it as social cohesion and have found that social cohesion helps to promote individual's good health by mobilizing collective resources to influence the provision of services as well as to address the common problems. For example, Wu et al. (2009) studied a group of urban Chinese adolescents and their parents from seven cities in China. They defined social capital in terms of parent-child interaction, parental monitoring, neighborhood safety and neighborhood support. They found that the social capital embedded in the family and community influenced the depressive symptoms of the urban Chinese adolescents. A second example can be found from a study by Fujisawa and his coauthors (2009), who examined the relationship between social capital and perceived health in Japan. They measured social capital as perceived helpfulness, kindness, greeting, and social cohesion and found that social capital indeed was associated with better health outcomes.

Further, as can be seen above, the effects of social capital on health have been confirmed in different socio-cultural settings. In addition to the studies above, Putnam (2004) and Kawachi (1997; 2004) studied social capital in an American cultural setting

and concluded that social capital is beneficial to individuals' health. An empirical study by Snelgrove et al. (2009) evidenced the positive effects of social capital on self-rated health with social capital measured as social trust and civic participation, using the data from the British Household Panel Survey. A study by Berry et al. (2009) in Australia also acknowledged the positive association between social capital and mental and physical health among older Australians. Still another study by Ferlander et al. (2009) in Russia reported the proactive role of social capital in promoting self-rated health of Russians. They measured social capital as marital status, contact with relatives, contact with friends and acquaintances, and membership of voluntary associations.

In sum, recent years have witnessed a growing interest in studying the health and health-related issues among older adults from the social capital perspective. However, most of these empirical studies have focused on individuals in Western industrialized countries like the U.S. (Kruger et al., 2007; Schultz et al., 2008), U.K. (Snelgrove et al., 2009), Canada (Low et al., 2009), Australia (Berry et al., 2010; Ziersch et al., 2009), Sweden (Lindstrom et al., 2009), and Japan (Ichida et al., 2009; Inaba 2009). The societies of these countries have quite different social settings from China, particularly in terms of old age support and caring systems. More research is needed to focus on the social capital and health/well-being of the Chinese older adults as well as other Asian societies. In addition, health in most of the existing research was measured only by one indicator, either mental health or self-rated health. Also, social capital in most of these studies was measured either by structural dimension or cognitive dimension.

Health Inequalities across Gender, Rural-Urban Residence, and Age Groups

A brief literature review also indicates that health inequalities across gender, across rural-urban residence, and different age groups have been widely acknowledged by existing health studies.

Health Inequalities across Gender

As an organizing category of social life, gender is also a primary base of social stratification. Since 1985 when Verbrugge (1985) published his seminal piece on the gender differences in health in the U.S., gender differences in health and illness have been widely noted and the “gender puzzle and conundrum” have continuously been a hot topic in health studies across the globe. Existing studies on health disparity have routinely observed the pattern that women outlive men around the world (Zen, 2009). Existing studies also indicate that the gendered patterns in morbidity are not as clear and straightforward as that of mortality patterns, though most studies have acknowledged that being female is consistently and statistically significant to the poorer health outcomes among women. For example, Christy Erving (2011) reported a consistent disadvantage among African American women across three indicators of health – self-rated health, chronic illness, and functional limitation. Denton et al. (2004) evidenced the gender differences in self-rated health, functional health, chronic illness, and distress among Canadians, based on their multivariate analysis of the Canadian National Population health Survey. Wu et al. (2004) evidenced female’s greater disposition to chronic illness

relative to their male counterparts in rural China with statistical analysis from their household interview data obtained from 6 provinces in China.

Existing literature on health disparity have explained the gender differences in health from gender differences in biological characteristics, in social-structural characteristics, and in behavioral characteristics (Denton et al., 1999, 2004). But most studies explained the gender-based health inequality from the socioeconomic status perspective and the most widely cited determinant of gender inequality in health is socioeconomic status (SES). In general, these scholars (Wu et al. 2004; Yu et al. 2007; Erving 2011) have suggested that the gender differences in health are primarily a result of unequal social and economic status between males and females. Women's lower social standing in comparison to the men directly limits their access to better health resources.

In addition, some research has reported indirect influences of SES on gendered health inequality. One explanation is that lower SES incurred negative psychosocial evaluations among females is harmful to the health and mental health particularly (Denton et al., 2004). Most recently, some scholars have suggested that the gender differences in health are primarily a result of unequal social and economic roles between males and females, and so have begun to investigate the gender-specific inequality in health in addition to other general inequalities. For example, a study by Penning and Strain (1994) reported that the relationship between personal and technical resources and subjective well-being are quite different for males and females in Canada. Further, a study by Maselko et al. (2006) found that public religious activities are the most consistent predictor of health and well-being for men, but not for women in the U.S.

Still some studies have begun to investigate the effect of gender on health as embedded in other social factors and worked with these social factors together in influencing health status. For example, using the General Social Survey data from 1972 to 2004, Zheng (2009) examined the relationship between income, gender and individual self-rated health among U.S. citizens. His study indicated that the effect of income on self-rated health is gender-specific – income is negatively related to men’s self-rated health, but not for women (Zheng, 2009). Another study by Schuler et al. (2006) on the relationship between gender, socioeconomic status (SES), and health in Bangladesh highlighted that SES played a very important role in both shaping the gender norms and contributing to the relatively poorer health among women and girls. A third study by Berry et al. (2010) in Australia examined the relationship between gender, health, and social capital. They reported gender differences in the relationship between social capital and self-rated health – women reported greater community participation and social cohesion than men, yet had worse mental health. These studies argue that it may not be appropriate to assume effects from some social determinants on health are uniform for men and women.

The socialization of females is embedded in the complex web knotted with the stereotypical expectations of gender norms and the inequality between men and women in power, privilege, and access to resources. Social capital is defined as the resources embedded in the social relationship, so differences across gender in the association between social capital and health should be assumed. And research have already that reported the notable gender differences in the relationship between social capital and self-

rated health among Australian – women reported greater community participation and social cohesion than men, yet had worse mental health (Berry et al., 2004). But what is the interplay between gender, social capital and health among older adults in China? Will the gender-based pattern of social capital and health, evidenced in other cultural contexts, be replicated in China, where there is a mixture of law-protected gender equality and somewhat institutionalized discrimination against females, a mixture of lingering traditional legacy of the subordination of females and the nation-wide propaganda of female liberation accompanying the cultural and social-economic transition?

When examining gender and social capital, Lin (2000), in his study of 18 urban cities in China, found social capital to be equally important for both males and females in terms of its effects on earnings and income. And, most surprising, Chinese women were found to be more deficient in social capital compared to their male counterparts (Lin, 2000, p. 790). Further, males and females were found to have different advantages when employing their social capital to achieve socioeconomic mobility. Because family ties were more important to Chinese women, these women usually benefited from their accessibility to their kin ties in their socioeconomic mobility. But how might social capital affect males' and females' health and well-being? And is there a difference between the sexes? So far few studies provide empirical evidence to assess the relative returns of social capital for males and females' health and well-being in China, particularly among the fragile and weak older adults, for whom the social resources based in their relationships seem more important to support and help them. This study helps to

close these gaps in the current literature by examining the gendered differences in the association between social capital and health.

Health Inequalities across Rural and Urban Areas

Similar to gender differences, differences between residential region, such as rural versus urban, have been the subject of extensive investigation. Most recently, scholars interested in health studies have begun examining the association between health and area of residence on a variety of spatial scales such as geographic categories, residential regions, and even census districts (Kawachi et al., 2003). Of particular interest to scholars has been the study of rural and urban areas. They have found clear differences in terms of physical, economic, and institutional structures as well as local sociability and community organizations. Researchers have found that how people behave contributes to their health status, and it is difficult to divorce behavior from the environmental and social contexts in which they live. Sociological studies have extensively documented the health disparities across rural and urban areas and acknowledged that locational and social factors intersect with each other in determining the health and health-related problems between rural and urban locales. Examples include study by Ziller et al. (2009) on rural-urban differences in health care in the U.S.; study by Grineski et al. (2009) on the rural-urban differences in children's asthma hospitalization in the U.S.; study by Jokela et al. (2009) on rural-urban differences in body weight in Finland; study by Greeglass et al. (2005) on rural-urban differences in the elderly people's mental health in the U.S.; and study by Ying et al. (1995) on the rural-urban differences of mental health of both parents and children in China.

According to Mahan et al. (2002), social capital also varies from place to place. A growing body of research contends that health inequalities across area may be explained by variations of social capital across areas (Kawachi et al., 1999; Subramanian et al., 2001). For example, Kawachi et al. (1999) reported that people living in states with lower social capital levels tended to have poorer self-reported health in the U.S. Empirical investigations by Subramanian et al. (2001) also reported that the probability of reporting poor health increased significantly with the decline of state-level social capital in the U.S. Another study by Lochner, Kawachi, Brennan, and Buka (2003) investigated the relationship between social capital and mortality among 342 neighborhood clusters in Chicago. Their statistical analyses indicated that there existed a significantly negative association between neighborhood social capital and mortality for Whites, while the association was not statistically significant for Blacks.

Health Inequalities across Different Age Groups

Age groups are the most commonly examined unit of analysis in demographic and gerontology studies. According to Eric and Yang (2009, p. 1440), “a birth cohort moves through life together and encounters the same historical and social events at the same ages”, so age group effects should be an important part in aging research because age group reflects biological and social processes of aging internal to individuals and represents developmental changes across the life course. Existing research has proved the importance of the interplays between individual biography, historical contexts, and social changes. For example, one study of depression showed that war babies (1935-1945) usually reported more depressive symptoms than their younger cohorts (Kasen et al.,

2003). Moreover, research by O'Rand (2005) found that older cohorts, who had experienced wars and economic depression, had a greater chance to have heart attacks than their younger birth cohort counterparts.

During recent years, with the guidance of life course perspectives as well as the advances in age-period-cohort analysis methods, more and more analyses are attempting to pattern the age group variations in health from the perspective of the relationship between human life and changing social contexts. For example, using the data from the North Carolina Established Populations for Epidemiologic Studies of the Elderly (EPESE), Yang (2007) investigated the growth trajectories and cohort variations in late-life depression in the U.S. and found that “more recent birth cohorts achieved successively higher levels of education that lowered risks for depression” (Yang, 2007: 28). Another example can be seen from the work of Chen et al (2009), who focused on the social stratification in individual health trajectories for multiple cohorts in the changing social environment of Mainland China. They found that the SES gap in health is wider for older cohorts than for younger cohorts.

Social capital is generated through associational activities. Different age groups usually experience different social conditions which influence the way that they form and maintain their association and mutuality with others. Age group variations of social capital have been well-anticipated and evidenced. Putnam (1993) regretted the decline of social capital among younger generations in the U.S. And some studies also began to investigate the variations of the relationship between social capital and health across different age groups. For example, Matt et al. (1993) examined the relationship among

age, social support from friends, and psychological health among adults aged 50 years or older in New York. Their findings indicated that the strength of relationship between friend support and psychological distress varied by age groups – lower friend support led to higher psychological distress among the old-old group (aged 70 years or older), but not among the young-old group (aged 50 to 70 years).

In sum, differences in health across gender, across rural-urban areas, and across different age groups have been evidenced by previous studies. Unfortunately, most studies have ignored the potential interaction of gender, rural-urban residence, and age group with other social ingredients such as social capital and distribution of wealth. More research is still needed to study how gender, rural-urban gap, and age group differences intersect with social capital and other social ingredients to impact health, particularly the health among the older adults in the social context of China.

Research Questions and the Hypotheses

Up to now, most studies on older adults' health have focused predominantly on Western developed countries. A thorough literature review found that only a relatively small number of studies reported on Chinese adults and the samples in most of these studies were usually residents in certain specific areas or even specific communities. For example, Chou et al. (2002; 2005) and Lam et al. (2005) studied depression among Chinese adults in urban areas of Hong Kong. And Ma et al. (2008) specifically focused their research on elderly people living with family members in Beijing.

This dissertation has aimed to provide a more comprehensive investigation into the health effects of social capital among the older adults in China. The study measured

social capital from two dimensions (structural and cognitive) at both the individual and community/village levels. Health was measured with three different outcomes including mental health status, subjective well-being, and self-rated health. Further, for the conceptualization of social capital, this article follows Pierre Bourdieu and Robert Putnam to conceptualize social capital. According to Bourdieu (1984), the fundamental cause of social stratification is the unequal distribution and accumulation of capital. Bourdieu (1984, p. 242-248) further categories capital into three kinds – economic capital, cultural capital, and social capital. For Bourdieu (1984, p. 244), social capital is “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.” That is, the membership in a group can provide its members a ‘credential’ which entitles them to social credit (Bourdieu, 1986, p. 248-49). Moreover, the volume of social capital that an individual owns depends on the size of the network of connections he/she can effectively mobilize and the volume of the capital possessed by each of those to whom he/she is connected (Bourdieu, 1984, p. 249). But Bourdieu did not discuss the specific measures of social capital. According to Putnam (1993, 2000), social capital is also a collective resource that should be measured at the community level. So in the present study, social capital was measured by the individual’s family-based network size, whether they had received help from others, whether they had provided help to others, their belief that they could get the needed help in the future, their trust with others, and the available resources within the community they may use to support them.

This study focused on examining the association between social capital at both individual and community-levels and health among older adults in China, with attention also being given to the possible differences across gender, different age groups, and across rural-urban residence. Health in this study was measured with three different health outcomes – mental health, subjective well-being, and self-rated health. Specifically, this study aimed to:

(1) examine the relationship between individual-level demographic and socioeconomic factors and individual-level health (mental health, subjective well-being, and self-rated general health). It is hypothesized that such sociodemographic background variables as gender, rural-urban *Hukou* status, age, marital status, education, and annual household expenses are strongly associated with older adult's health (mental health, subjective well-being, and self-rated general health). Also, it was hypothesized that socioeconomic status is positively associated with health among Chinese older adults. This included education and household expenditures.

(2) assess the impact of individual-level social capital on health among the older adults in this study. It is hypothesized that individual-level social capital indicators, including network size, providing help to others, receiving help from others, being born in the same community/village that one currently is living, and belief that one can obtain help/support in the future if needed, are positively associated with health among older adults in this study.

(3) assess the association between community-level social capital and individual-

level health among Chinese older adults. It is hypothesized that community-level social capital, measured by the number of amenities and associations within the community/village that are specifically designed for the elderly people and the years the community/village central committee has been in existence, is positively associated with health among Chinese older adults.

(4) determine whether the impact of individual-level demographic variables interact with the individual-level social capital indicators and the contextual characteristics of where these older adults were living in. It is expected that (1) impacts of individual-level social capital on health among the older adults would differ across gender, *Hukou* status, and age; and (2) impacts of gender, *Hukou* status, and age on health would differ across these two provinces of their residence.

CHAPTER 4

DATA AND METHODS

This chapter details the data and the methods that were used in this study to answer the proposed research questions. A description of data comes first, which is followed by a description of the survey methods and the study sample. Afterwards, a detailed discussion of the method for measuring each dependent and independent variable is presented. Then, the proposed analytic strategy used in the data analysis – multi-level analysis -- is discussed, which is followed by a discussion of the statistical assumptions tested, and how the missing data, influential cases and outliers were handled. Finally, a descriptive analysis of both dependent variables and independent variables are presented.

Data

The data come from the China Health and Retirement Longitudinal Study (CHARLS), an ongoing collaborative project of the University of Southern California, Oxford University, and Peking University. The survey instruments used were designed to mirror those used in a variety of other countries such as the Health and Retirement Survey in the U.S. (HRS), and the English Longitudinal Study of Aging (ELSA). Data collection was funded by the National Natural Science Foundation of China, Behavioral

and Social Research Division of the U.S. National Institute on Aging, and the Beijing Representative Office of the World Bank. The CHARLS data set is particularly valuable for this study because it was designed to provide a wide range of information from socio-economic status and social support to health conditions of those aged 45 or above and to collect data at individual, household, and community levels (Zhao et al., 2009). The household survey provides a wide range of information about the households of the elderly as well as the individual information about the elderly respondents and their spouses. In addition to socio-economic and health data, the CHARLS dataset includes a wide range of information from personal background to household characteristics related to demographic background, family structure, and generational transfer. The community survey provides information at the community level, including the physical characteristics of the infrastructures and amenities in the community, the economic characteristics including the average income and other aspects, and socio-political characteristics of the community such as governance.

This study used the CHARLS pilot data. The pilot survey was conducted in 2008 from July to September in Gansu and Zhejiang provinces in China, which covered 2,685 individuals living in 1,570 households from 96 communities/villages in 16 counties/districts from these two provinces. These two provinces were chosen to get at extremes of socioeconomic situation within the current China. Gansu province is located in the less-developed western areas, while Zhejiang province is located in the economically vibrant east coastal areas in China. Taking advantage of China's open-door policy and some encouragement from the central government, Zhejiang province has

developed very strong small-scale private-owned industries and the majority of these small industries are oriented toward exportation. Zhejiang province has always been ranking among the richest provinces in China, with a per capita income of 50% higher than the national average in China in consecutive years since 1990. In contrast, Gansu province is among the poorest provinces in China, with 75% of its population being rural residents with agriculture as their primary source of income. The per capita income of Gansu is less than half that of Zhejiang.

The CHARLS 2008 pilot sample was drawn using multistage stratified probability sampling based on geographic area. First, in each of the two provinces, county-level units were randomly selected with probabilities proportionate to its population sizes. In rural areas, this county-level unit is just the county (*xian* in Chinese), while in urban areas, this county-level unit is urban district (*qu* in Chinese). Second, within each county-level unit, three primary sampling units (PSUs) were selected. In rural areas, primary sampling units were administrative villages (*cun* in Chinese). In urban areas, the primary sampling units were neighborhoods (*shequ* in Chinese) and resident committees (*juweihui* in Chinese). Third, households were randomly sampled from each PSU. Then, a CAPI (computer assisted personal interview) program was used to conduct the interviews among the residents aged 45 or older. All age-eligible residents in the sampled households who were willing to participate in the survey were interviewed. And all together 2,685 respondents aged 45 and over and their spouses from 1,570 households were interviewed. Sample weights were constructed for both households and individuals.

The present analysis used data from the household survey and community survey of the pilot study in 2008. The household survey provides a wide range of information about the households of the elderly and also individual information about the elderly respondents and their spouses. The household survey includes data at both the individual and family levels. It provides (1) demographic information of the household, (2) family organization and financial transfer behaviors, (3) respondent health status and functioning situation, health care and insurance, (4) work experience, retirement and pension income, and (5) expenditure and assets for each respondent and household. Official administrative definitions of communities were used. This includes villages (*cun* in Chinese) in rural areas and neighborhoods (*shequ* in Chinese) in urban areas. The community survey, completed face-to-face by the person in charge of each neighborhood committee or village committee (official head for the village in rural areas or the official head of the neighborhood in the urban areas), provides thorough information of the social, economic and policy environment of each village/community. The 96 villages/communities surveyed in 2008 consist of 74 villages in rural areas and 22 neighborhoods communities in urban areas. The CHARLS 2008 pilot data, relevant documentation, and details of sampling can be accessed through the website of the National School of Development at Peking University in China: <http://charls.ccer.edu.cn/charls/index.asp>.

Variables and Measures

This section discusses the variables and their measures used in the dissertation. Based on the literature review and hypotheses, the following variables were used.

Dependent Variables -- Health Outcomes

In order to provide a more objective and more complete description of the health status among the older adults in China, health status was measured by three outcomes: mental health, self-rated subjective well-being, and self-rated general health.

Mental Health

Based on the popular measures of the Center for Epidemiologic Studies Depression (CES-D) scale, a composite measure of mental health in this study were obtained by summing each respondent's responses to the following 7 items asking how often the respondent (1) "was bothered by things", (2) "had trouble keeping mind on what was doing", (3) "felt depressed", (4) "felt everything he/she did was an effort", (5) "felt fearful", (6) "sleep was restless", and (7) "felt lonely". These 7 items were similarly measured at a Likert scale of 4 ordinal categories – "rarely or none of the time (less than 1 day)"; "some or a little of the time (1-2 days)"; "occasionally or a moderate amount of time (3-4 days)"; "most or all of the time (5-7 days)". These 7 items were first reverse-coded and then summed to indicate mental health (Cronbach's *alpha* is .827), with higher scores indicating fewer mental health disorders and thus better mental health status. Thus, the mental health measure ranges from 7 to 28, with a mean of 13.41 and a standard

deviation of 5.13. In the CHARLS pilot sample, only 17.5% of the respondents reported that they had none of these 7 mental health disorder symptoms.

Subjective Well-Being

Subjective well-being is the “global feelings of well-being about life” perceived by individuals themselves (Campbell et al., 1976). Subjective well-being is usually measured with self-rating questions on life satisfaction and happiness, which are different from other measures of psychological well-being, such as psychological distress (Lim & Putnam, 2010). These two measures always yield broadly consistent results in multivariate analysis, with “happiness” tapping a transient assessment of mood whereas “life satisfaction” usually reflects a more stable evaluation (Lim & Putnam, 2010). In existent literature, subjective well-being (SWB) was also measured by a single self-rating question on “life satisfaction” (e.g., Lim & Putnam, 2010) or an adaptive version of the Satisfaction with Life Scale (Pavot et al., 1993; Lee et al., 2006; Yip et al., 2007). In this study, subjective well-being (SWB) was measured by a proxy variable of the satisfaction with life. The single item about whether the respondent looks at his life with a sense of happiness and satisfaction was used to tap their subjective well-being. The subjective well-being variable also was dichotomously coded with 1= “good subjective well-being (is satisfied)” and 0 = “poor subjective well-being (is not satisfied)”.

Self-Rated Health Status

Existing research has already reported the high correlation between self-rated health and objective health measurements (Simon et al., 2005). Using self-rated health as an indicator of actual health is well established in the existing literature (Mohnen et al., 2011; Zeng et al., 2007). Therefore, this study used respondent's self-rated health to measure his/her actual general health status. And this measure was dichotomously coded with two categories of (1) "fair or poor" and (2) "at least good".

Predictor Variables – Social Capital

Social capital is the main variable in this study. The definition of social capital used in this study follows closely that of Bourdieu (2000) and Putnam (1993). Bourdieu's definition emphasizes the "network" and the embedded resources of the individual, while Putnam's definition emphasizes social cohesion and group membership at community levels. Social capital was measured with indicators at both individual and community levels. Based on a prior literature review of the relevant dimensions of the concept and the available measures in the CHARLS Pilot dataset, the following measures were used to indicate social capital--

Individual-level Social Capital Measures

Network Size

Respondent's network size was a composite measure summed by respondent's responses to the following 3 questions: (1) the number of respondent's children; (2) the number of respondent's siblings still alive; and (3) the number of respondent's married

siblings. These 3 items were rated from 0 to 10. And the summed measure of network size ranged from 8 to 43, with a mean of 20 and a standard deviation of 5.75.

Receiving help from others

Receiving help from others is a key component of social capital. In this study, “receiving help (monetary or non-monetary) from others” was coded dichotomously with 1 = have received help from others and 0 = have not received help from others.

Providing help to others

“Providing help (monetary or non-monetary) to others” was also coded dichotomously with 1 = have provided help to others and 0 = have not provided help to others.

Perception of the availability of help/support in the future

This variable taps whether respondents will have some family members or others to help or support them over the long period if needed. This variable was dummy-coded with “1” equals “have perceived help/support in the future” and “0” equals “do not have perceived help/support in the future”.

Birthplace of the respondent (Interpersonal trust)

In the literature review, trust with others was a key component of social capital (Kawachi et al., 1999; Subramanian et al., 2002). CHARLS 2008 pilot survey did not directly ask the respondents about interpersonal trust. However, some research on social capital (Saito et al., 2002) has used birthplace of respondents to indicate interpersonal trust with others. According to these scholars, respondents born in the same community

comparatively enjoyed more interpersonal trust with others than those who were born in a different community. In this study, we used the birthplace of respondent as a proxy to tap their interpersonal trust with others. This variable asks whether the respondent was born in the current village/community or was born in another village/community or another county/province. This variable was also dummy-coded with “1” equals “born in the current community/village” and “0” equals “born in other village/county/province”.

Community-level social capital measures

A number of social capital scholars (Putnam, Kawachi, Maromot, etc) believe that social integration, measured as individual characteristics, differs from social integration measured as collective characteristics. Kawachi (1999, p. 1187) has argued that social capital should be conceptualized as a collective characteristic and should be measured at the community level. Further, Kawachi insisted that “the mechanisms linking social integration to health may differ depending on the level at which integration is measured”. According to Kawachi (Kawachi, 1999, p. 1187), social capital at the community level may influence the health behaviors of neighborhood residents by “promoting more rapid diffusion of health information”, “increasing the likelihood that healthy norms of behavior are adopted (e.g., physical activity)”, and “ exerting social control over deviant health-related behavior” (Kawachi, 1999, p. 1190). Maromot (1998) also argued that social capital measured at the community level may determine patterns of political participation and policy-setting that are more egalitarian and health-promoting, whereas social capital measured at individual level may fail to capture these group-level

characteristics. In other words, collective features of society may not be reducible to the attributes of individuals living in it.

So in this study, social capital is also measured at the community level. Based on these theoretical perspectives and the available questionnaire items and the specific Chinese social context, the following two items were used to measure the social capital at community level:

Number of amenities/organizations/associations available to older adults within the community

This is a composite measure by summing the number of the following items within the community/village: basketball playground, swimming pool, outside exercise facilities, other outdoor sports facilities, room for card games and chess games, room for Ping Pong, association for calligraphy and painting, dancing team or other exercise organizations, other entertainment facilities, organizations for helping the elderly and the handicapped, activity center for the elderly, elderly association. The summed measure of the numbers and/or associations that can be used by the older people within the community ranged from 0 to 14, with a mean of 4.75 and a standard deviation of 3.26.

Years the village/community central committee office has been in existence

This variable measures the actual year the village/community committee office was established. The committee office within the village (*cunweihui* in Chinese) or the committee office within the community (*juweihui* in Chinese) is the lowest level of official administration and organization in China. It is responsible for the civil affairs

within the community and implementing policies from the central government. Such committees and the persons serving on these committees are always regarded as the sources for consultation, help, and protection in terms of some personal affairs. Studies by Putnam et al. (1993) found that those regional governing bodies that performed their tasks effectively were also ones that had better social capital at the regional level. Based on these studies, it is proposed that the longer the history of a community/village committee, the more trust and social integration will exist among the community collectivity. And, the longer the history of having established a community/village committee, the stronger the sense of group memberships among its residents. In the CHARLS Pilot 2008 survey, the years the village/community office had been established ranged from 2 years to 59 years, with a mean of 28 years and a standard deviation of 18.81 years.

Control Variables – Demographic Background & Socioeconomic Status

The following demographic and socioeconomic variables were included in the predictors of health outcomes among the older adults:

Gender

Gender was dummy-coded with 1=male and 0=female in this study.

Hukou Status

There were two categories of *Hukou* status – rural *Hukou* and urban *Hukou*. And a dummy variable of *Hukou* status was created with 1= urban *Hukou* status and 0 = rural *Hukou* status.

Age

Age was originally measured with the specific years of the age of the respondent. In this study, age was dummy-coded into two groups. That is, 1 refers to those older adults aged 60 or older while 0 referring to those aged between 45 and 59. That is, 1 refers to the older group who were born before 1949, when the People's Republic of China was founded, whereas 0 refers to the younger group born after this important historic event.

Marital Status

The positive association between an individual's marital status and his/her health status has been reported in many existing studies (Subramanian et al., 2002; Fujisawa et al., 2009). Therefore, the dissertation analysis has also included the respondent's current marital status as a control variable. In the CHARLS pilot sample, the majority of respondents (82%) were married and were living with their spouses, only a small portion (18%) reported their marital status as divorced, widowed, remain single or other status. Therefore, this variable was also categorized dichotomously with 1= married and lived with spouse and 0 = other marital status.

Province of Residence

In the CHARLS pilot study, older adults were sampled from 96 communities/villages from two provinces. There were only two provinces at this level and the economic situations of these two provinces were at two extremes in current China. So a variable "province" was included as a fixed independent predictor at the first level. And it was dummy-coded as 1= Gansu while 0 = Zhejiang.

Socioeconomic Status

Educational background and household consumption were used as indicators of socioeconomic status. In the CHARLS Pilot study, the original questionnaire item measuring the respondent's education included 9 categories ranging from "no formal education & illiterate" to "postgraduate, Ph.D". However, most of these categories had less than 100 cases. And nearly half of the older adults (49%) in this dataset were "illiterate". So education was dummy-coded as 1 refers to "at least some education" and 0 "illiterate".

As John Strauss et al. (2010) claimed in their study, "household consumption is a much better index of economic well-being in a country at the level of economic development that China now is, especially in more rural regions" (Strauss et al., 2011:114). Therefore, in this article, I use the respondent's yearly household consumption to indicate the respondent's economic situations. In the CHARLS pilot study, this household consumption variable ranges from 0 Chinese Yuan to 30, 000 Chinese Yuan, with a mean of 6985.80 Chinese Yuan and a standard deviation of 7078.33 Chinese Yuan.

Statistical Analytical Strategies – Multi-level Analysis

This study used multi-level statistical models to test the association between older adults' health and social capital, including social capital at both the individual- and community-levels. The reasons why I used multi-level models go as the following:

First, the CHARLS 2008 pilot data includes interviews with 2,685 older adults aged 45 or older living in 22 communities in urban areas and 74 villages in rural areas in two provinces. The data of individual older adults are clustered in these communities/villages. So the observations from the same village or community may well not be independent. Consequently, during regression analyses there may exist dependency issues among the resulting residuals. These can pose difficulties for statistical inference in the general linear model and generalized linear model framework (Cohen, 2003, p. 537; Hox, 2002, p. 3). According to Cohen (2003) and Hox (2002), using general OLS regression for the clustered data would lead to the overestimation of significance, or “alpha inflation” just because the standard errors of OLS regression from clustered data are “typically negatively biased” (Cohen, 2003, p. 537). Thus the statistical test results for the significance of individual regression coefficients will in general be distorted. One way to solve these problems is to use a multi-level model. By allowing for a random effect at the community level via the multilevel model, this problem may be avoided (Cohen, 2003, p. 537).

Second, existing research has recognized that the community in which individuals live can influence the health of the individual through such mechanisms as the accessibility to health service and health care professionals, the availability of amenities

and infrastructures, and the availability of information and education promoting healthy life styles and habits (Kim & Kawachi, 2006; Zimmer et al., 2010). China is an ideal setting to study the differences across communities and regions as well as in different social settings in terms of rural and urban setting. Traditionally, rural and urban communities in China have been characterized as having different levels of social economic status. Rural communities have fared poorly and have fewer available community resources. Unfortunately, the recent economic development of China has further highlighted the disparities across different regions and communities. Recent achievements in China's economic development have always been accompanied by well documented notable regional disparities in their levels of economic development and in living standards and stark rural-urban inequalities.

Three health outcomes will be used in this study to tap the individual's health status – mental health; subjective well-being; and self-reported general health. Self-reported general health status and subjective well-being were measured dichotomously with two categories of “yes” and “no”. A series of two-level logistic models in SAS 9.2, to be specific, the GLIMMIX procedure in SAS 9.2, were performed to analyze the association between social capital and self-reported general health. Similarly, the association between social capital and subjective well-being was also analyzed by a series of two-level logistic models in SAS 9.2 with GLIMMIX procedures. The mental health measure was a continuous measure summed with 7 items tapping the mental health disorder symptoms. So a series of two-level mixed models in SAS 9.2 were estimated to test the association between social capital and mental health among the older adults in

China. More details of analytical strategies for each of these dependent variables are presented below.

Statistical Analytical Strategies Used for Examining Mental Health

Mental health status was measured by an index which is the sum of 7 CES-D measures. The index provides a continuous variable with higher scores reflecting better mental health status. Listwise deletion of missing data produced a sample size of 996 individuals and 96 communities. It is anticipated that these older adults' mental health would be impacted by their own individual-level sociodemographic background, social capital, and communities of residence. A series of two-level mixed linear models were estimated with SAS 9.2 software to examine the anticipated links between social capital and mental health status among these older adults, using the restricted maximum likelihood (REML) estimation approach.

More specifically, the statistical analysis in this chapter aims: (1) to elaborate the relationship between social capital, both at the individual- and community-level, and mental health by sequentially controlling for other individual-level factors such as the demographic background and socioeconomic status and, controlling for differences between provinces; (2) to determine whether the impacts of individual-level demographic characteristics interact with the individual-level social capital; and (3) to determine whether the impacts of individual-level demographic characteristics interact with characteristics of the regional context.

The effects from the individual-level sociodemographic background, individual- and community-level social capital variables are “fixed” effects. Based on the current

literature on multilevel analysis (Submaranian et al., 2002), I chose not to include random effects from these predictors. Fixed effects are appropriate when literature and theory clarify a direction of effect. One statistical issue that must be addressed is the assumption that the individual cases are not related in some way. Because some cases are related to those other cases living in the same village/community, this “clustering” issue must be addressed. The clustering effect within the communities was estimated with a community-specific random intercept.

The complete model can be written as

$$Y_{ij} = \beta_{00} + \beta_{01}W_j + \beta_{10}X_{ij} + \beta_{11}W_jX_{ij} + \mu_{0j} + \mu_{1j}X_{ij} + \varepsilon_{ij}$$

Where the subscripts i and j reflects older adults (level 1) and communities (level 2), respectively; Y_{ij} is the dependent variable score for a case at Level 1. Here Y_{ij} measures the older adult’s mental health; β ’s are the “fixed” parameters to be estimated; X_{ij} reflects level-1 predictors; W_j reflects level-2 predictors; μ_j is the community-specific random effect, and ε_{ij} refers to the random component of the error term.

Thus, an individual older adult’s mental health score is predicted by the sum of the overall intercept β_{00} , the community random effect in which they are living μ_{0j} , the fixed effects from the predictors at the individual level, $\beta_{10}X_{ij}$, the fixed effects from the predictors at the community-level, $\beta_{01}W_j$, the fixed effects from the cross-level interaction terms, $\beta_{11}W_jX_{ij}$, and the random error components for the combined equation, $\mu_{0j} + \mu_{1j}X_{ij} + \varepsilon_{ij}$.

Specifically, the following models were sequentially processed.

Model 1: To begin, a two-level null (empty) model of individuals (level 1) nested within these 96 communities/villages (level 2) with no predictor variables in the fixed and the random parts of the model was tested:

$$Y_{ij} = \beta_{0j} + e_{ij}$$

In this model, no predictor variables were put in the fixed and the random parts of the model. The mental health condition of the individual is predicted by an intercept that varies across communities. Variation in mental health was partitioned across individuals and between communities/villages. This model provided a baseline for comparing the size of contextual variations across communities in mental health in subsequent models.

Model 2: A two-level model included the predictors for the individual's basic demographic information and socioeconomic status in the fixed part of the model. The model 1 equation was now expanded so that the mental health for an older adult is predicted by a random intercept that varies across communities/villages (as in the previous model) and a random slope for the relationship between the respondent's mental health and the individual-level predictors. This model can be written as

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{ij} + e_{ij}$$

The individual-level predictors were entered in the model in two sequential steps: first, the demographic background variables (sex, age, *hukou*, and marital status) were included (model 2A), then the socioeconomic status variables (education, and annual household expenditure) were added (model 2B).

Model 3: This model is the same as model 2, but included the individual level social capital measures (network size, birthplace of the individual, whether received help from others, whether provide help to others, perceived help & support in the future) in addition to the individual level predictors included in model 2.

Model 4: This model included all the individual-level predictors, and further includes the fixed effect of community social capital (number of amenities/associations specifically for the elderly, and years the community/village committee established) on individual mental health and the extent to which it explains the community-level variances. The notation of this model was:

$$Y_{ij} = \beta_{00} + \beta_{10}X_{ij} + \mu_{0j} + \mu_{1j}X_{ij} + e_{ij}$$

Model 5: This model further considers the cross-level interaction effects of social capital on the older adults' mental health. Specifically, how the effect of perceived help in the future on mental health among older adults differed across the community social capital in the form of number of years the community/village central committee has been in existence.

Model 6: This model is the same as model 4, but further considered the interaction effect of gender and province of residence.

Model 7: This model is the same as model 4, but further considered the interaction effect of *Hukou* and province of residence.

Model 8: This model is the same as model 4, but further considered the interaction effect of age and province of residence.

Model 9: This model is the same as model 4, but further considered the interaction effect of community level social capital and province of residence. Specifically tested is the interaction effect of number of amenities/association within the community/village with the region.

Model 10: This model is the same as model 4, but further tests the interaction effect of gender, age, *Hukou* status and perceived help in the future.

Statistical Analytical Strategies Used for Examining Subjective Well-being

In this study, subjective well-being is a binomial variable with two categories. So a series of multilevel logistic models based on a logit-link function were used. And a series of multilevel logistic regression models (GLIMMIX procedure with adaptive Gaussian Quadrature estimation) were processed in SAS 9.2. All models were estimated using the logit (logarithm of the odds) function. Similar to the Mixed multilevel models for mental health in Chapter 5, the anticipated predictors of older adult's subjective well-being should include older adult's demographic background, socioeconomic status (here refers to their educational level and household annual expenditure), social capital at individual level, and social capital at community level. And it was expected that older adults' subjective well-being would be positively related to the social capital variables at both individual- and community-levels.

Firstly, an "empty" model (model i) that included only a random intercept will be estimated. This empty model will help us to determine whether there are any variances across communities in terms of the self-rated status among the older adults. In model i (the empty model) the probability of self-rating good health is only function of the

community where these older adults were living. And this function was accounted for with a community level random intercept. Model i (the empty model) can be written as

$$\text{Logit}(p_{ij}) = \beta_{0j} \text{ (model i)}$$

where the subscripts i and j reflects older adults and the communities the older adults were living in, respectively; p_{ij} measures the probability of older adults to report a better subjective well-being; β_{0j} is the sum of an intercept that can vary over the communities.

The individual characteristics – including the individual demographic backgrounds, individual socioeconomic status, and individual-level social capital—will then be included in the model (model ii) to investigate how individual characteristics would explain the variations of the self-rated health among the older adults in these 96 communities. In this model (model ii) the probability of reporting good subjective well-being is function of the community of these older adults and of the individual-level variables (demographic characteristics, socioeconomic status, and individual-level social capital). And model ii can be written as

$$\text{Logit}(p_{ij}) = \beta_{0j} + \beta_{1j}X_{ij} \quad \text{(Model ii)}$$

similar to the notations in model i, here in model ii the subscripts i and j reflects older adults and the communities the older adults were living in, respectively; p_{ij} measures the probability of older adults to report a better subjective well-being; β_{0j} is the sum of an intercept that can vary over the communities; X_{ij} refers to individual-level (Level 1)

predictors; β_{1j} reflects the slope for the relationship in community j (level 2) between the subjective well-being (the dependent variable) and the level-1 predictors.

Afterwards the community-level social capital variables (model iii) will be added to investigate how community-level social capital variables were related to the subjective well-being among the older adults. In this model (model iii), the probability of reporting good subjective well-being depends on the community of the older adults, on the individual level predictors, and on the social capital at community level. The notation of model iii is written as

$$\text{Logit}(p_{ij}) = \beta_{00} + \beta_{10}X_{ij} + \mu_{0j} + \mu_{1j}X_{ij} \quad (\text{Model iii})$$

where the subscripts i and j reflects older adults and the communities the older adults were living in, respectively; p_{ij} measures the probability of older adults to report a better subjective well-being; β_{0j} is the sum of an intercept that can vary over the communities; X_{ij} refers to individual-level (Level 1) predictors; β_{1j} reflects the slope for the relationship in community j (level 2) between the subjective well-being (the dependent variable) and the level-1 predictors; the two random components are μ_{0j} and $\mu_{1j}X_{ij}$.

Finally, several interaction terms were added (model iv) to test whether there were any intersections between the predictor variables. And the general model notation goes like this:

$$\text{Logit}(P_{ij}) = \beta_{00} + \beta_{01}W_j + \beta_{10}X_{ij} + \beta_{11}W_jX_{ij} + \mu_{0j} + \mu_{1j}X_{ij} \quad (\text{Model iv})$$

Model iv further tests the intersection of sex, *hukou* status, and age with other predictor variables. That is, the probability of an individual older adult's good self-rated health is predicted by the sum of the average intercept β_{00} , of the community/village in which they are living, the fixed effects from the individual level predictors, $\beta_{10}X_{ij}$, the fixed effects from the community-level predictors, $\beta_{01}W_j$, the fixed effects from the cross-level interaction terms, $\beta_{11}W_jX_{ij}$, and the random error components for the combined equation, $\mu_{0j} + \mu_{1j}X_{ij}$.

So a series of logistic analysis was performed to estimate the fixed effects of community- and individual-level social capital forms on self-rated health, the effects of individual-level socio-demographic and socioeconomic characteristics. The significance of cross-level interaction terms between the community-level social capital variables and individual level social capital variable, as well as the interaction terms between gender, *Hukou* status, and age, and province were tested in subsequent models. The multilevel logistic regression models were estimated with GLIMMIX procedure with Adaptive Gaussian Quadrature estimation using SAS 9.2. All models utilized the logit link function, with the logarithm of the odds of good health as the outcome. Specifically, the following models were processed:

In the first model, no predictor variables were put in the fixed and the random parts of the model. The mental health condition of individual is predicted by an intercept that varies across groups. Variation in mental health was partitioned across individuals and between communities/villages. This model provided a baseline for comparing the size of contextual variations in the subjective well-being in subsequent models.

The second model is a two-level model includes the predictors about the individual's basic demographic information and socioeconomic status in the fixed part of the model. The equation in the model 1 is now expanded so that the subjective well-being of an older adult is predicted by a random intercept that varies across communities/villages (as in the previous model) and a fixed slope for the relationship between the older adult's subjective well-being and the individual-level predictors.

The individual-level predictors were entered in the model in two sequential steps: first, the demographic background variables (sex, age, *hukou*, and marital status) were included (model 2A), then the socioeconomic status variables (education, and annual household expenditure) were added (model 2B).

Model 3: This model is the same as model 2, but includes the individual level social capital measures (network size, birthplace of the individual, whether receiving help from others, whether providing help to others, perceived help & support in the future) in addition to the individual level predictors included in model 2.

Model 4: This model includes all the individual-level predictors, but further considers the fixed effect of community social capital (number of amenities/associations specifically for the elderly, and years the community/village committee established) on individual older adult's subjective well-being and the extent to which it explains the community-level variances.

Model 5: This model further considers the cross-level interaction effect of social capital on the older adults' subjective well-being. Specifically, we consider how the effect of community social capital on subjective well-being status among the older adults

in China differed across the older adults who have perceived help/support in the future and those older adults who do not perceive any help or support in the future.

Model 6: This model is the same as model 4, but further considers the interaction effect of sex and province of residence.

Model 7: This model is the same as model 4, but further considers the interaction effect of *Hukou* and province of residence.

Model 8: This model is the same as model 4, but further considers the interaction effect of age and province of residence.

Model 9: This model is the same as model 4, but further considers the interaction effect of community level social capital and province. Specifically, we test the interaction effect of number of amenities/association within the community/village with the province.

Model 10: This model is the same as model 4, but further tests the interaction terms formed by sex, age, *Hukou* status and social capital at individual level.

These models were fitted with restricted maximum likelihood (REML) estimation approach.

Statistical Analytical Strategies Used for Examining Self-rated Health

In the CHARLS pilot 2008 Study, self-assessed health status is measured by the single question of “how would you rate your health”? with five categories of “poor” “fair” “good” “very good” “excellent”. The dependent variable was dichotomized with two binary categories: one for “poor” and “fair” and the other for “good” “very good” and “excellent”. An “empty” model (model i) that included only a random intercept was

examined first. This empty model helped us to determine whether there were any variations across communities in terms of the self-rated status among the respondents. The individual characteristics – including the individual demographic backgrounds, individual socioeconomic status, and individual-level social capital—were then included in the model (model ii) to investigate how individual characteristics would explain the variations of the self-rated health among the respondents in these 96 communities. Afterwards was added the community-level social capital variables (model iii) to investigate how community-level social capital variables were related to the self-rated health among the respondents. Finally, several interaction terms were added (model iv) to test whether there were any intersections between the predictor variables.

In model i (the empty model) the probability of self-rated good health was only function of the community where the respondent was living. And this function was accounted for with a community level random intercept. The notation of model i (the empty model) is:

$$\text{Logit}(p_{ij}) = \beta_{0j} + e_{ij} \quad (\text{model i})$$

In model ii the probability of rating good health is a function of the community the respondent was living and of the individual-level variables (demographic characteristics, socioeconomic status, and individual-level social capital). And, the notation of this model is:

$$\text{Logit}(p_{ij}) = \beta_{0j} + \beta_{1j} X_{ij} + e_{ij} \quad (\text{Model ii})$$

In model iii, the probability of self-rating health as good depended on the community the respondent was living in, on the individual level predictors of sociodemographic characteristics and social capital variables, and on the social capital at the community level. The notation for model iii is:

$$\text{Logit}(p_{ij}) = \beta_{00} + \beta_{10}X_{ij} + \mu_{0j} + \mu_{1j}X_{ij} + \epsilon_{ij} \quad (\text{Model iii})$$

Model iv further tested the intersection of gender, *hukou* status, and age with other predictor variables. That is, the probability that a respondent self-rated his/her health as good is predicted by the sum of the average intercept β_{00} , of the community/village in which he/she was living, the fixed effects from the individual level predictors, $\beta_{10}X_{ij}$, the fixed effects from the community-level predictors, $\beta_{01}W_j$, the fixed effects from the cross-level interaction terms, $\beta_{11}W_jX_{ij} + \mu_{0j}$, and the random error components for the combined equation, $\mu_{0j} + \mu_{1j}X_{ij} + \epsilon_{ij}$.

The notation of model iv can be written as:

$$\text{Logit}(P_{ij}) = \beta_{00} + \beta_{01}W_j + \beta_{10}X_{ij} + \beta_{11}W_jX_{ij} + \mu_{0j} + \mu_{1j}X_{ij} + \epsilon_{ij} \quad (\text{Model iv})$$

In sum, a series of logistic analyses were performed to estimate the fixed effects of community- and individual-level social capital forms on self-rated health, and the effects of individual-level socio-demographic and socioeconomic characteristics. Further, the significance of cross-level interaction terms between the community-level social capital variables and individual level social capital variable, as well as the interaction terms between gender, *Hukou* status, and age, and province of residence were tested in

subsequent models. The multilevel logistic regression models were estimated with GLIMMIX procedure using SAS 9.2. All models utilized the logit link function, with the logarithm of the odds of good health as the outcome.

Specifically, these following models were tested in SAS 9.2:

Model 1: At the very beginning, a two-level null (empty) model of individuals (level 1) nested within these 96 communities/villages (level 2) with no predictor variables in the fixed and the random parts of the model was tested. In this model, no predictor variables were put in the fixed and the random parts of the model. The self-rated health status of individual was predicted by an intercept that varied across groups. Variation in general health was partitioned across individuals and between communities/villages. This model provided a baseline for comparing the size of contextual variations in general self-rated health in subsequent models.

Model 2: This two-level model included the predictors about the individual's basic demographic information and socioeconomic status in the fixed part of the model. The equation in the model 1 was now expanded so that the general self-rated health status of a respondent was predicted by a random intercept that varied across communities/villages (as in the previous model) and a fixed slope for the relationship between the respondent's general self-rated health and the individual-level predictors.

The individual-level predictors were entered in the model in two sequential steps: first, the demographic background variables (gender, age, rural-urban *hukou* status, and marital status) were included (model 2A), then the socioeconomic status variables (education, and annual household expenditure) were added (model 2B).

Model 3: This model is the same as model 2, but further included the individual level social capital variables (family network size, birthplace of the respondent, whether receiving help from others, whether providing help to others, perceived help & support in the future) in addition to the individual level predictors included in model 2.

Model 4: This model included all the individual-level predictors, but further considered the fixed effect of the community level social capital variables (number of amenities/associations that can be used by the elderly, and years the community/village committee office has been in existence) on individual respondent's general self-rated health status and the extent to which it explained the community-level variances.

Model 5: This model further considered the cross-level interaction effect of social capital on the respondent's general self-rated health status. Specifically, an interaction term formed by the individual-level social capital variable "perception of future help/support" and the community-level social capital variable "years the community committee office has been in existence" was tested.

Model 6: This model is the same as model 4, but further considered the interaction effect of gender and province of residence.

Model 7: This model is the same as model 4, but further considered the interaction effect of rural-urban *Hukou* status and province of residence.

Model 8: This model is the same as model 4, but further considered the interaction effect of age and province of residence.

Model 9: This model is the same as model 4, but further considered the interaction effect of community level social capital and province of residence.

Specifically, the interaction effect of number of amenities/association within the community/village with the province.

Model 10: This model is the same as model 4, but further considered the interaction effect of individual-level social capital variable “perception of future help/support” and gender, age, and rural-urban *Hukou* status.

These models were fitted with restricted maximum likelihood (REML) estimation approach.

Data Preparation and Evaluation of Assumptions

Before the actual statistical analysis, the CHARLS pilot 2008 data were checked in terms of the sample size, missing data, distributions, influential cases and outliers, and multicollinearity between the variables. All variables were screened for possible code and statistical assumption violations, as well as for missing values and outliers, with Frequencies, Explore, Plot, Missing Values Analysis, and Regression procedures in SPSS 19.0.

Specific Issues Related to Sample Size and Missing Data

The CHARLS 2008 pilot collected information from 2,685 older adults residing in 1570 households from 96 communities/villages (74 villages in rural areas and 22 communities in urban areas) in two provinces. This is not a very large sample for multi-level analysis, especially in consideration of the relatively larger number of 14 predictors proposed in this study. One concern for this sample size is that there may be difficulties in making inferences about the variance estimates.

All respondents in the CHARLS Pilot 2008 sample were screened for missing values on all the 17 variables included in this study with SPSS 19.0 Missing Value Analysis procedure. Figure 1 presents the pattern of the missing values. That is, missing values are concentrated around the right lower corner rather and the pattern of the missing values is a non-random missing pattern. Most of the missing values were concentrated in variables on the health module, and the mutuality and transfer modules. For example, the percentage of missing cases for such variables as mental health and subjective well-being sit around 26%, while the percentage of missing cases for such variables as getting help from others, providing help to others, and network size is as high as 42%.

Checking the CHARLS Questionnaire Health and Transfer Module again, it was found that at the very beginning of the Health and Transfer Module, was the statement: “please conduct this part of the interview only when the family respondent is at home. Don’t allow the proxy to complete the section” (CHARLS Pilot 2008 Questionnaire, P: 33). Based on this statement it seems that this part of the questionnaire was only answered by the elderly respondents themselves. Interviewers did not collect information for those families where the elderly was not at home during interview. To further examine this “missing cases” problem, a dummy variable was created to check the missing values of the 25 numeric variables in the Health and Transfer Module. Based on the frequency analysis from SPSS (Table 1 in the Appendix), it appears that 1121 cases are missing on all 25 questions and all remaining Health and Transfer Module variables have missing cases consistently around 1100, apparently because of the non-presence of

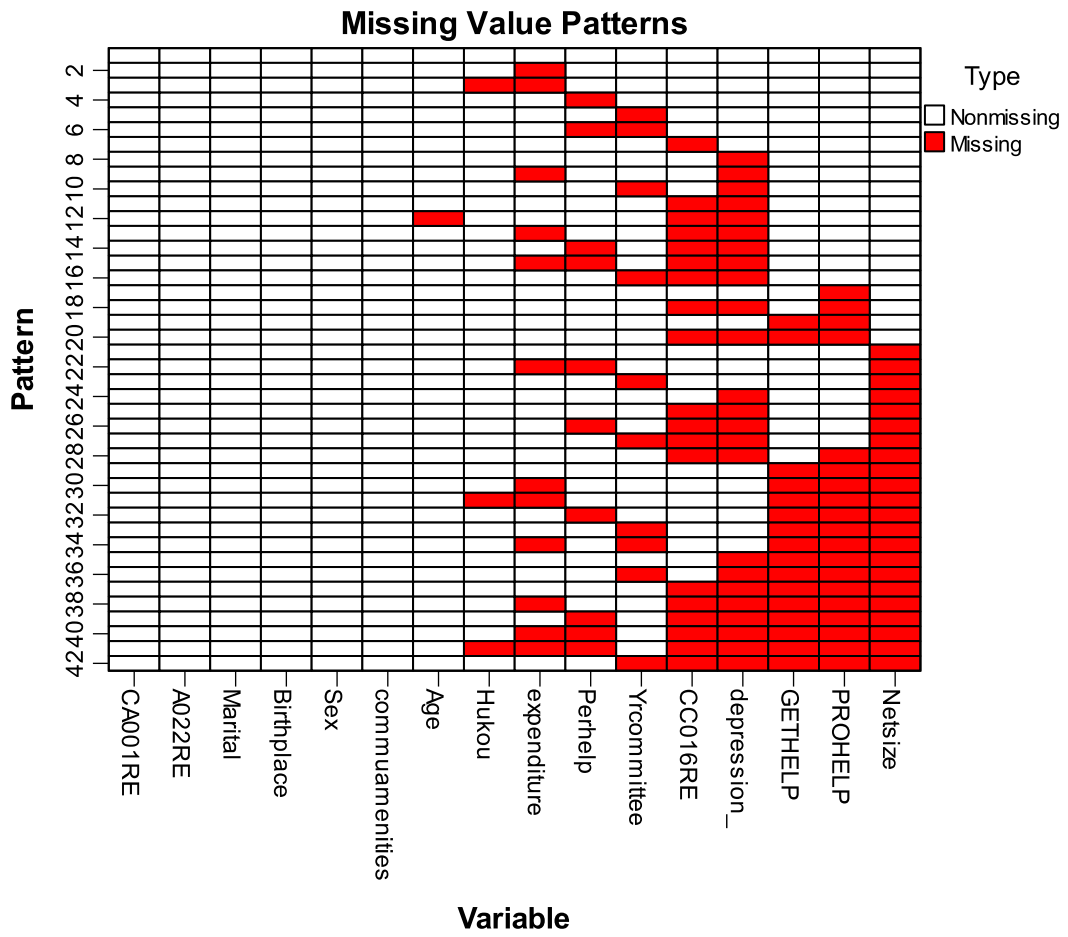
the elderly respondent. That is, about 42% of total sample missed the Health and Transfer Module of CHARLS 2008 Pilot Study.

Listwise deletion produced a sample size of 996 respondents due to missing observation and excluded a large number of cases from the final analysis. Altogether 62% of the total sample was deleted from the final analysis. T-test or Chi-square test were estimated in SPSS 19.0 to see if there were any significant differences between the included and excluded groups. Table 1 presents a comparison based on key study variables. As table 1 shows, significant differences were observed for the groups age, rural-urban *Hukou* status, whether the respondents had helped others, the annual household expenditure, and the years the community/village committee has been in existence. The groups did not differ significantly for the remaining study variables.

A separate Missing Value Analysis was further conducted in SPSS 19.0 to test whether there are significant differences between the two groups. “Indicator Variable Statistics” was used to further examine the differences between these two groups. Six variables with comparatively higher percentages of missing cases in the Health and Transfer Module were used. For each of these variables, an indicator variable with two groups of “present” and “missing” was created and these two groups were compared. The results are presented in Table 2. To be more specific, the respondents with missing data on mental health and subjective well-being were more likely to be older than those who reported information on mental health and subjective well-being. Also, respondents with missing data on mental health and subjective well-being were more likely to live in a community with fewer amenities or associations available to the elderly population

relative to their counterparts who did provide information about their mental health and subjective well-being. When considering respondents with missing data on network size, they were more likely to be older and poorer than those who reported the information on their network size. Respondents with missing data on receiving help from others and providing help to others were more likely to poorer mental health status, and to live a poorer life than those who had reported information on receiving help from others and providing help to others.

Figure 1 Missing Value Patterns



Source: CHARLS 2008 Pilot Survey

Table 1. Comparison of Valid and Missing Cases on Key Study Variables with More Missing Cases

Variable	Mean or Percentage		Test of Significance		
	Valid	Missing	t or χ^2	df	<i>p</i> -value ^a
Mental Health	23.48	23.13	1.705	1981	.088
Subjective Well-being	51.70	48.29	.137	1	.713
Self-rated Health	47.72	52.28	3.306	1	.079
Age	61.52	38.47	4.794	1	.031
<i>Hukou</i> Status	61.47	38.53	8.354	1	.004
Perceived Help	60.64	39.35	1.597	1	.215
Receiving Help	66.34	33.65	4.261	1	.042
Providing Help	66.47	33.53	22.174	1	.000
Expenditure	2358.7	1927.5	3.742	1883	.000
Network Size	9.68	9.55	.612	1396	.540
Community Committee	27.15	29.13	-2.592	2510	.010

^a Two-tailed test.

Table 2 Separate Variance T-Test of Missing Values

		Separate Variance t Tests ^a				
		Mental health	Age	Expenditure	Network	Amenities
Mental health	t	.	-8.6	2.6	.2	8.0
	df	.	1061.4	1309.2	678.7	1265.2
	P(2-tail)	.	.000	.010	.820	.000
	# Present	1983	1983	1963	1022	1983
	# Missing	0	701	690	376	702
	Mean(Present)	23.3142	57.9153	2.1768	9.6575	5.0434
	Mean(Missing)	.	62.2054	1.8594	9.6064	3.9231
Network	t	1.7	-1.0	1.8	.	.7
	df	1959.0	2645.7	2624.8	.	2665.7
	P(2-tail)	.081	.318	.070	.	.457
	# Present	1022	1397	1379	1398	1398
	# Missing	961	1287	1274	0	1287
	Mean(Present)	23.4843	58.8397	2.1914	9.6438	4.7954
	Mean(Missing)	23.1332	59.2486	1.9890	.	4.7016
Well-being	t	-46.6	-8.4	2.5	.1	8.0
	df	1980.0	1036.7	1273.7	645.5	1232.3
	P(2-tail)	.000	.000	.014	.919	.000
	# Present	1981	1996	1975	1031	1996
	# Missing	2	688	678	367	689
	Mean(Present)	23.3094	57.9534	2.1716	9.6499	5.0391
	Mean(Missing)	28.0000	62.1759	1.8687	9.6267	3.9144
Getting help	t	2.1	.3	1.8	-2.3	.0
	df	1763.6	2378.6	2605.5	1.0	2430.6
	P(2-tail)	.035	.796	.069	.256	.985
	# Present	1144	1556	1537	1396	1557
	# Missing	839	1128	1116	2	1128
	Mean(Present)	23.4974	59.0810	2.1789	9.6354	4.7514
	Mean(Missing)	23.0644	58.9734	1.9776	15.5000	4.7491
Providing help	t	2.1	.3	1.8	-2.2	.1
	df	1766.4	2387.5	2609.8	3.0	2438.9
	P(2-tail)	.032	.740	.066	.116	.935
	# Present	1143	1553	1534	1394	1554
	# Missing	840	1131	1119	4	1131
	Mean(Present)	23.5004	59.0940	2.1799	9.6334	4.7548
	Mean(Missing)	23.0607	58.9558	1.9768	13.2500	4.7445

For each quantitative variable, pairs of groups are formed by indicator variables (present, missing).

a. Indicator variables with less than 5% missing are not displayed.

Skewness and Kurtosis

The distributions of the 17 variables used in this study were examined by checking the histogram, Kurtosis and Skewness for each variable in SPSS 19.0. All variables were normally distributed and the values of both Kurtosis and Skewness ranging between -2 and +2 except for variable “annual household expenditure”. The Kurtosis for the variable “annual household expenditure” (kurtosis=3.103) was out of the acceptable range. Theoretically, a logarithmic transformation of household expenditure would help improve the distribution of this variable. However, modeling with and without a transformation of household expenditure did not make substantive differences. Therefore, no transformation was used.

Outliers and Multicollinearity

There were altogether 14 predictor variables in this study, so the critical value of chi-square for 14 df at $\alpha=.001$ is set at 36.12. A check of multivariate outliers was performed in Regression procedure in SPSS 19.0. The results showed that there were 4 extreme cases (case number 357, 2266, 2267, and 2489) with Mahalanobis Distance beyond the critical chi-square value of 36.12 for 14 degree of freedom at $\alpha=.001$. Examining the original data showed that case 357 had a negative number for network size, case 2266 and case 2267 had extremely high household expenditures beyond the range of the variable, and the number of years the community/village central committee had been in existence was extremely high for case 2489. These discrepant values

probably had been recorded erroneously. Therefore, these four cases were deleted from further analysis.

When considering multicollinearity, the Regression procedure results in SPSS indicated that the VIF value of all variables was less than 2. Multicollinearity, therefore, was not a concern in this dataset.

Descriptive Statistical Analysis Results

This section provides a descriptive analysis of all dependent and independent variables in the final sample, which characterizes the participants in this study. After excluding the missing data on the health outcome and predictor variables, there were 996 respondents (persons 45 or older) living within 96 communities/villages from two provinces in China. Table 3 provides descriptive statistics for the individual- and community-level variables. More than half of the respondents reported good mental health, good general health status, and good subjective well-being. Female and younger age (younger than 60) respondents were slightly overrepresented in the sample. The majority of respondents were married and living with their spouses with rural *Hukou* status, whereas a smaller percentage was living in urban areas. The respondents in general had a poor educational background. Approximately 80% of the respondents believed that they would get help or support in the future. Slightly greater than half reported that they had received help from others, while less than half said they had provided help to others. In terms of community/village characteristics, the 96 communities/villages on average had 5 community/village-based associations or amenities (e.g., outside exercise facilities, room for card games and chess games, room

for Ping Pong, association for calligraphy and painting, and elderly association) available for the older population. Finally, most of the communities/villages had established their committee office during the 1980s.

Table 3. Descriptive statistic for individual- and community-level variables of the final sample (CHARLS Pilot 2008).

	Mean	SD	Range/Categories
Individual Level Variables (N=996)			
Health Outcomes			
Mental health	23.31	4.48	7 (Poor) --28 (Very Good)
Subjective well-being	.62	.49	0=not satisfied; 1=satisfied
Self-rated health	.72	.45	0=not good; 1=at least good
Demographic Characteristics			
Sex	.48	.49	0=female; 1=male
Age	.44	.49	0=younger group; 1=older groups
<i>Hukou</i> Status	.20	.39	0=rural; 1=urban
Marital Status	.82	.38	0=otherwise; 1=married & living with spouse
Province	.53	.49	0=Zhejiang; 1=Gansu
SES variables			
Education Attainment	.57	.49	0=illiterate; 1=at least some formal education
Household Expenditure	6985.80	7078.33	0 (CN¥) --10,000 (CN¥)
Individual level social capital variables			
Birthplace	.49	.50	0=others; 1=born in current community/village
Network size	9.6	3.8	2--25
Receiving help	.51	.49	0=no; 1=yes
Providing help	.49	.50	0= no; 1=yes
Having Perceived support	.77	.42	0=no; 1=yes
Community level social capital variables (N=96)			
#.Amenities/associations	4.75	3.26	0-14
Yrs committee office established	28.34	18.81	2--59

CHAPTER 5

SOCIAL CAPITAL AND MENTAL HELATH

This chapter focuses on examining the association between social capital at both the individual- and community levels and mental health among older Chinese adults. The statistical results from the software SAS 9.2 were then presented and discussed.

Statistical Results

Tables 4 reports the fixed and random parameter estimates from the multilevel mixed linear models in the order in which they were developed.

The test results in Model 1 indicate that the 96 communities/villages were significantly different from each other regarding elderly residents' mental health status. The variance in the mental health status among the elderly across different communities/villages is 3.503 ($p < .001$). Also, the size of the intraclass correlation (ICC) was calculated using the formula

$$ICC = \frac{S2bg}{S2bg+S2wg} \text{ (Tabachnick \& Fidell, 2008, p. 822)}$$

And the intraclass correlation size for this null model is 0.072. That is, about 7.2% of the variability in these respondents' mental health was associated with

differences between communities/villages in which they were living. This number further confirms the need for a two-level mixed model analysis.

Model 2A added the respondents' demographic characteristics – gender, age, rural-urban *Hukou* status, marital status, the province of residence, and the respondents' socioeconomic status variables (education and annual household expenditure). Statistical significant effects were observed for gender, rural-urban *Hukou* status, marital status, and province of residence. As expected, male respondents ($b = 0.902, p < .001$), respondents with urban *Hukou* status ($b = 0.816, p < 0.01$), and those respondents who were married and were living with their spouses ($b = 1.525, p < 0.001$) were more likely to report better mental health status. Respondents residing in Gansu province ($b = -2.922, p < 0.001$) comparatively had poorer mental health than their counterparts residing in Zhejiang province.

Model 2B added education and annual household expenditure. As shown by the statistical results, introducing socioeconomic status variables did not change the effects of the socio-demographic predictors. Gender ($b = 0.692, p < 0.001$), rural-urban *Hukou* status ($b = 0.775, p < 0.01$), marital status ($b = 1.55, p < 0.001$), and the respondent's province of residence ($b = -2.909, p < 0.001$) still significantly predicted the respondent's mental health status. In addition, as expected, respondent's education was a significant predictor of mental health status. Those respondents who were illiterate and could not read and write reported worse mental health ($b = 0.695, p < 0.001$) than those who had some formal education and at least could read and write. But no significant difference is observed for respondents with different levels of yearly household expenditures.

Model 3 introduced the social capital variables at the individual level. The statistical results indicated that, while introducing individual level social capital variables did not change the significant effects of gender ($b = 0.687, p < 0.05$), marital status ($b = 1.815, p < 0.001$), and the province of residence ($b = -2.590, p < 0.001$), the effect of rural-urban *Hukou* status became statistically insignificant, suggesting that the rural-urban gap in mental health among these respondents was somewhat confounded by the individual level social capital, particularly, the perception of whether they would get the needed help in the future. But the effect of household expenditures became significant ($b = -0.083, p < 0.05$) after the addition of the social capital variables at the individual level. In addition, among the 5 social capital variables at the individual level, only the coefficient for “perception of help/support in the future” was significant ($b = .693, p < .05$), indicating that those respondents who were sure that they would get the needed help or support from others in the future had better mental health.

Community-level social capital variables were added in Model 4. Statistical results in Model 4 indicated that the number of associations or amenities within the community/village available for the elderly people was a significant predictor of these respondents' mental health condition. Those respondents living in communities/villages with more associations or amenities available for the elderly were more likely to report better mental health status ($b = 0.136, p < 0.05$). Further, introducing social capital variables at the community level did not change the significant effects of gender, marital status, province of residence, education, household expenditure, or the perception of help/support in the future.

Several interaction terms were tested sequentially in the remaining models. First, three interaction terms formed by the gender, rural-urban *Hukou* status, and age with the province of residence were sequentially added to test whether the effect of gender, rural-urban *Hukou* status, and age on the mental health of the respondent would vary across these two different provinces. Statistical results indicated that there was no statistically significant variation in the relationship of age and mental health status between respondents residing in different provinces (results not reported in Table 4). But the effects from gender (Model 5 in Table 4), and rural-urban *Hukou* status (Model 6 in Table 4) differed significantly in different provinces. Female respondents from Zhejiang province even reported much better mental health than males from Gansu province. Respondents with rural *Hukou* status from Zhejiang province even reported better mental health status than respondents with urban *Hukou* status from Gansu province.

Next, interaction terms formed by gender, rural-urban *Hukou* status, and age with the key social capital variables at the individual level – perception of help/support in the future, and receiving help from others were examined. However, no statistical significances were found. So these results are not reported in Table 4.

Also tested was the effect of an interaction term formed by the individual level social capital variable “perception of support/help in the future” and the community-level social capital variable “number of years the community had a committee office in existence”. Statistical results (not reported in Table 4) suggest that there were no significant differences.

It was also important to note the significant variation found between communities/villages. The null model with no predictors (Model 1 in Table 4) indicated significant variation in mental health between communities ($\sigma^2_{\mu 0} = 3.503, p < .001, ICC = 0.072$). In Model 2A, the community/village variation in the mental health status among the older adults was shown to be significant despite considering the individual compositional characteristics ($\sigma^2_{\mu 0} = 1.111, p < .001, ICC = 0.064$). Even with the addition of the individual level socioeconomic status variables and the community level social capital variables, the variation between communities/villages continued to be significant (Table 4, Model 2B – 4).

A variable “province” was included to test the effects of province of residence. Statistical results indicated that respondents in Gansu province on average reported worse mental health ($b = -2.922, p < .001$ in Model 2A) compared to respondents living in Zhejiang province. The significant differentials observed between these two provinces continued even after controlling for all other affects ($b = -1.831, p < .001$ in model 4).

The -2 log likelihood, AIC, AICC, and BIC were used to evaluate the models. Comparing the values of AIC, AICC, and BIC in the different models indicates that model 4 (Table 4) which included socio-demographic characteristics and social capital variables at both the individual- and the community-levels (-2 log likelihood = 5210.8, AIC = 5214.8, AICC = 5214.8, and BIC = 5219.8) is more efficient and better than model 2A (table 4) that includes only demographic variables (-2 log likelihood = 11228.8, AIC = 11232.8, AICC = 11232.8, BIC = 11237.9) and model 2B that includes demographic

variables and socioeconomic status variables (-2 log likelihood = 11116.5, AIC = 11122.5, AICC = 11122.6, BIC = 11136.2).

Table 4. Fixed and random parameters estimates from the multilevel mixed models for good mental health (in unstandardized coefficient, N=996)

Fixed Parameter	Model 1	Model 2A	Model 2B	Model 3	Model 4	Model 5	Model 6
Intercept	23.247*** (.216)	22.828*** (.332)	21.546*** (.352)	21.927*** (.654)	21.623*** (.881)	21.945*** (.860)	21.851*** (.860)
Individual Predictors							
Demographic Background							
Male		0.902*** (.184)	0.692*** (.197)	0.687* (.317)	0.693* (.328)	0.151* (.399)	0.6768* (.327)
60 yrs or older		-0.320 (.197)	-0.293 (.201)	-0.261 (.280)	-0.357 (.289)	-0.38 (.288)	-0.356 (.289)
Urban <i>Hukou</i>		0.816** (.268)	0.775** (.288)	0.615 (.379)	0.034 (.415)	0.002 (.415)	-0.473 (.629)
Married & living with Spouse)		1.525*** (.262)	1.554*** (.263)	1.815*** (.365)	1.821*** (.374)	1.809*** (.373)	1.837*** (.373)
<i>Gansu</i> Province		-2.922*** (.288)	-2.909*** (.285)	-2.590*** (.356)	-1.831*** (.437)	-2.437*** (.506)	-2.327*** (.520)
Socioeconomic Status							
some formal education			0.695** (.212)	0.727** (.293)	0.627* (.302)	0.565* (.302)	0.615* (.043)
Household Expenditure			-0.041 (.033)	-0.083* (.042)	-0.091* (.043)	-0.092* (.043)	-0.091* (.043)
Social Capital at Individual-Level							
Network size				0.002 (.035)	-0.016 (.036)	-0.015 (.035)	-0.012 (.040)
Birthplace, current community				-0.098 (.317)	-0.070 (.327)	-0.097 (.326)	-0.086 (.327)
Receiving help				-0.262 (.263)	-0.181 (.270)	-0.182 (.269)	-0.185 (.269)
Providing help				0.323 (.269)	0.259 (.275)	0.245 (.275)	0.255 (.275)
Perceived future help				0.693* (.318)	0.782* (.327)	0.772* (.326)	0.781* (.326)
Social Capital at Community-Level							
Number of Amenities					0.136* (.065)	0.142* (.065)	0.108* (.068)
Years of Committee					0.013 (.012)	-0.013 (.012)	-0.009 (.013)
Cross-Level Interactions							
Gender × Province						0.07** (.52)	
<i>Hukou</i> × Province							1.349* (0.748)
Random Parameters							
across Communities ($\sigma^2_{\mu 0}$)	3.503*** (.656)	1.111*** (.305)	1.042** (.289)	1.178** (.429)	0.863* (.386)	0.879* (.382)	0.936* (.390)
Intra-class Correlation (ICC)	0.072	0.064	0.061	0.075	0.056	0.056	0.061
Model Fit Statistics							
-2 Res Log Likelihood	11381.2	11228.8	11116.5	5570.9	5210.8	5208.7	5206.3
AIC	11385.3	11232.8	11122.5	5574.9	5214.8	5208.7	5210.3
AICC	11385.3	11232.8	11122.6	5574.9	5214.8	5208.7	5210.3
BIC	11396.5	11237.9	11136.2	5580.0	5219.8	5213.7	5215.3

Note: +p<.10, *p<0.05, **p<0.01, ***p<0.001

Discussion

This study advances the literature on social capital and mental health by empirically demonstrating the complicated roles of social capital in the distribution and reproduction of mental health. This study systematically examined the roles of different dimensions of social capital in the social distribution and reproduction of mental health by including social capital both at the individual- and community-levels. And at each level, social capital was measured by indicators in two different dimensions – structural and cognitive dimensions.

Statistical results indicate that, cognitive social capital at the individual level, measured by the perception of needed help and support in the future, was a significant predictor of good mental health status among the respondents. As the product of both filial beliefs and economic necessity, support from the family and the community has long been advocated as the basis for old age support in China, particularly in rural areas (Tang, 2007). Those respondents who were sure that they would receive the needed help and support in the future were more positive about their old age support in the future. Therefore, it is logical to assume positive effects from the perception of the availability of the needed help and support in the future.

Other social capital measures at the individual level – born in the same community of their current residence, network size, receiving help from others, and providing help to others – were found to exert no significant influences on respondents' mental health. These findings from current research did not support the original hypothesis and several previous studies (Fujisawa, 2009; Sun et al., 2009). Some scholars

(Silverstain et al., 2006) have argued that sometimes support or the benefits from the reciprocity and support with others may be counterbalanced by the loss of self-efficacy that was implied by receiving support. So some scholars (Sun, 2010) have suggested that supportive relationship sometimes may cause strain on both the provider and the receiver. According to these scholars (Silverstain et al., 2006; Sun, 2012), some details in supportive relationship such as the specific role and expectations are needed in order to examine the impact of mutual support on health. With the rapid economic development and the influences from globalization, the old age support system is also changing its scenarios in China. So, further research on the complex filial dynamics in current era China is needed, which may provide a deeper understanding of the relationship between mutual help and support with mental health among older adults.

At the community-level, the cognitive dimension of social capital – the number of years the community committee has been in existence – was not a significant predictor of the mental health among the older adults. The structural dimension of social capital at the community-level, the number of amenities and associations specifically designed for the elderly, was found to be a significant predictor of good mental health.

This study embeds social capital within a broader sociological framework of health and other structural factors, including gender, age, rural-urban *Hukou* status, socioeconomic status, and province of residence of the respondent. The statistical results confirm the proactive role of social capital on mental health even after controlling for other demographic and socioeconomic status variables. With regard to the main concept of interest in this study, social capital variables, this study found a significant effect of the

individual's perception of the needed help and support in the future from others. Further, introducing the individual level social capital variables confounded the significant effect of *Hukou* status. With regards to social capital at the community level, this study found a significant effect of the availability of amenities or association within the community/village. However, another indicator of community level social capital, years the community/village has established their own committee, did not show any significant effect on mental health of the respondents. One possible explanation is the potential downsides of social capital cautioned in some previous studies (Kawachi et al., 2000; Putnam, 2000; Lynch et al., 2000). According to these studies (Kawachi et al., 2000; Putnam, 2000; Lynch et al., 2000), some communities may place excessive obligations on community members to show a cohesive milieu. And some may require community members to conform to some kinds of social norms. Some of these excessive obligations may cause strain on community members and may counterbalance the positive impact of social capital at the community level.

In terms of the relationship between respondent's mental health and certain social and demographic factors, this study indicates that female respondents, respondents with rural *Hukou* status, and respondents who were widowed, divorced, or still remained single had comparatively poorer mental health. This study also confirmed the significant association between better mental health and better educational attainment, which was consistent with the previous literature (Subramanian et al., 2002; Fujisawa et al., 2009). The direction of association between annual household expenditure and mental health status, however, was opposite to the original dissertation hypothesis. Also, the negative

impact from the household expenditure became significant after the social capital variables being added, which may imply a reversed direction of reciprocity. But further research is needed to verify this interpretation.

Some research has found a significant effect of age on mental health, however, statistical results from this study did not support these earlier studies (Yip et al., 2007). This study also indicates the complicated intersection of mental health, social capital, and other structural factors. For example, after adding the individual socioeconomic status variable, the variable “rural-urban *Hukou* status” no longer impacted the respondent’s mental health. However, the interaction term of rural-urban *Hukou* status (urban *Hukou* = 1) and province of residence (Gansu = 1) was a significant predictor of respondent’s mental health. In Gansu province, older adults with urban *Hukou* status tended to report much better mental health status than their counterparts with rural *Hukou* status from Zhejiang province. Also, the significance of the interaction term between gender (male = 1) and province of residence (Gansu = 1) indicates that the association between gender and mental health varies across the different provinces of residence. In Gansu province, male respondents reported better mental health than the female respondents in Zhejiang province.

Further, the present study demonstrates the importance of neighborhood conditions on mental health. Findings from this study suggest that where people live is important to how they perceive their mental health status. A consistent significant variances across communities (see the values of $\sigma^2_{\mu_0}$ and ICCs) in all the models indicates that variations of the respondents’ mental health can be explained by the community of

the respondents. One of the key advantages of a multilevel statistical model lies in its ability to estimate the variation between groups of respondents such as by communities. “Significant variation between communities provides us with a clue about the influence of community context in shaping health patterns” (Subramanian et al., 2002). In this study, even after taking into account the individual effects of demographic background and socioeconomic status, respondents from different communities/villages still had a difference in mental health status.

CHAPTER 6

SOCIAL CAPITAL AND SUBJECTIVE WELL-BEING

This chapter focuses on examining the association between social capital and the subjective well-being among older adults in China. First, the statistical results are presented. This is followed by a discussion of the theoretical implications and the implications for practice.

Statistical Results

Tables 5a and 5b present the results of the multilevel logistic models in the order in which they were developed. Table 5a reports the logits from the multilevel logistic models for good subjective well-being. Table 5b reports the odds ratios of reporting good subjective well-being as well as the 95% confidence interval for the odds ratio. Odds ratios were calculated by $\text{Exp}(\text{logit})$ and the 95% confidence intervals were calculated by $\text{CI} = \text{Exp}(\text{logit} \pm \text{standard error})$. The interaction terms formed by gender and perception of help and support in the future, age and perception of help and support in the future, rural-urban *Hukou* status and perception of help and support in the future, gender and province of residence, age and province of residence, and perception of help and support in the future and years the community central committee has been in existence were

found to be insignificant. So Table 5 does not present the model results that included these interaction terms. For interpretation, odds ratios reported in Table 5b were used.

The test results in Model 1 of Table 5b (the null model without any predictor variables) indicated that 96 communities/villages were different from each other in their elderly residents' subjective well-being. The random parameter between communities was significant at $\sigma^2_{\mu 0} = 0.232$. The approximated intraclass correlation (ICC) was calculated using the formula $ICC = \frac{\sigma^2_{\mu 0}}{\sigma^2_{\mu 0} + 3.29}$ (Merlo et al., 2006). In this study, $ICC = \frac{0.232}{0.232 + 3.29} = 0.066$. That is, about 7 percent of the variation in subjective well-being could be explained by the community factors. This number further supports the use of multilevel models.

Based on the results in model 2A of Table 5b, statistical significant effects were observed for marital status and province of residence. As expected, respondents who were married and living with their spouses were more likely to report better subjective well-being (odds ratio = 1.62, $p < .01$) compared to respondents who were single, widowed, or divorced. That is, their predicted odds of reporting good subjective well-being were about 62% higher than their counterparts. The predicted odds of reporting good subjective well-being for respondents in Gansu province (odds ratio = 0.40) were 60% lower than respondents from Zhejiang province.

As indicated by the statistical results in Model 2B of Table 5b, introducing socioeconomic status variables did not change the effects of marital status and province of residence. In addition, as expected, the respondent's education was a significant predictor of his/her subjective well-being -- compared to those who were illiterate and

could not read and write, those respondents who could at least read and write on average reported better subjective well-being (odds ratio = 1.19, $p < .05$). Thus, for the respondents who had been formally educated and could read and write, the predicted odds of reporting good subjective well-being were about 19% higher than those who were illiterate.

Model 3 in Table 5 introduced the social capital variables at the individual level. The statistical results of model 3 in Table 5b indicated that while introducing individual level social capital variables did not change the significant effect of marital status, and province of residence, it did result in education being statistically insignificant. This suggests that the effect of education on the subjective well-being was somewhat confounded by the individual level social capital, particularly, the variable “perception of available help and support in the future”. The odds ratio of reporting better subjective well-being for those respondents who were sure they would get the needed help and support in the future was 1.59. It implies that the predicted odds of reporting good subjective well-being for a respondent would be 59% higher if he/she believed that he/she could receive the needed help or support in the future. In addition, a significant effect of birthplace was observed (odds ratio = 0.71). For those respondents who were born in the same community/village that they were currently living, the predicted odds of reporting good subjective well-being decreased by 29%. This result was contrary to my original hypothesis that being born in the same community/village is positively related to subjective well-being. But considering the Chinese governments’ strict control over

migration and over rural-urban *Hukou* status, particularly before the open door policy, this result is not so surprising. This will be discussed further below.

The community level social capital variables were added in Model 4 of Table 5. Statistical results of Model 4 in Table 5b indicate that years the community/village central committee has been in existence was a significant predictor of the respondent's subjective well-being. Those respondents who were living in communities/villages that established their own community/village committee earlier were more likely to report better subjective well-being (odds ratio = 1.01, $p < .05$) compared to respondents living in communities/villages with a relatively short history of a community/village committee. Also, introducing social capital variables at the community level did not change the significant effects of marital status, province of residence, birthplace, and the perception of help and support in the future. And, education remained insignificant.

Several interaction terms were tested sequentially. First, an interaction term formed by the individual level social capital variable "perception of help and support in the future" with the community level social capital variable "years the community/village committee office has been in existence" was added to test whether the relationship between the respondent's perception of help and support in the future and his/her subjective well-being differs across communities/villages with different years of having a community/village committee being established. However, the statistical results did not show a significant effect (statistical results of the model included this interaction term were not reported in Table 5a and Table 5b). Then, interaction terms formed by gender, rural-urban *Hukou* status of the respondent, and the age group of the respondent with

province of residence were sequentially added to test whether the effect of gender, rural-urban *Hukou* status, and age varied across the two provinces. Results (not reported in table 5a and Table 5b) indicate that there were no statistically significant differences for the effects of gender, and age. The one exception was the effect from rural-urban *Hukou* status which differed by province. Specifically, the effect of rural-urban *Hukou* status on the respondent's subjective well-being was significantly modified by the province of residence. In Gansu province, respondents with urban *Hukou* status reported significantly better subjective well-being than their counterparts with rural *Hukou* status, even after adjusting the effects from all the individual predictors and community-level predictors. Also, respondents with urban *Hukou* status from Gansu province were more likely to report good subjective well-being compared to respondents with urban *Hukou* status from Zhejiang province. Finally, in model 9, an interaction term created with the variable "number of amenities/associations available for the elderly people" and province of residence was added. But the statistical results (not reported in Table 5a and Table 5b) indicate no significant differences of this interaction term.

Statistical results in Model 2A of Table 5b indicate that the community/village variation in the subjective well-being among the respondents was shown to be significant after controlling for the individual level socioeconomic status variables and the community level social capital variables ($\sigma^2_{\mu 0} = 0.19$, with a standard error at .063). In addition, compared to Zhejiang, respondents in Gansu province on average reported worse subjective well-being. And the significant differences observed between these two provinces continued even after controlling for all other effects.

The -2 log likelihood, AIC, AICC, and BIC are used to evaluate the models. Comparing the values of AIC, AICC, and BIC in the different models indicate that the models that included social capital at both the individual- and the community-levels are significantly different (Model 4, -2 log likelihood = 1118.09, AIC = 1126.42, AICC = 1126.98, and BIC = 1128.98) from the model that included only demographic variables (Model 2A, -2 log likelihood = 2522.44, AIC = 2536.44, AICC = 2536.49, BIC = 2554.31) or the model that included demographic variables and socioeconomic status variables (Model 2B, -2 log likelihood = 2496.93, AIC = 2514.93, AICC = 2515.02, BIC = 2537.91). And the model that included social capital at both the individual- and community-levels is more efficient and better than the other models. These results are discussed below.

Table 5a. Fixed and random parameter estimates from the multilevel logistic models for subjective well-being (in logits, N=996)

Fixed Parameter	Model 1	Model 2A	Model 2B	Model 3	Model 4	Model 5
Intercept	.482* (.180)	.483* (.165)	.437* (.178)	.438* (.178)	-.029* (.446)	.089* (.449)
Individual Predictors						
Demographic Background						
Male		0.043 (.097)	-0.011 (.104)	0.162 (.172)	0.146 (.181)	0.137 (.179)
60 yrs or older		-0.056 (.104)	-0.049 (.107)	0.058 (.152)	0.089 (.158)	0.092 (.158)
Urban <i>Hukou</i>		0.204 (.141)	0.207 (.147)	0.005 (.200)	0.168 (.225)	0.498 (.273)
Married & living with Spouse)		0.485** (.135)	0.498** (.137)	0.678** (.191)	0.639** (.209)	0.644** (.202)
<i>Gansu</i> Province		-0.924*** (.134)	-0.923*** (.136)	-0.724*** (.177)	-1.044*** (.225)	-1.237*** (.264)
Socioeconomic Status						
at least some formal education			0.155* (.111)	0.2364 (.158)	0.265 (.164)	0.263 (.165)
Household Expenditure			0.019 (.017)	0.019 (.023)	0.017 (.023)	0.017 (.023)
Social Capital at Individual-Level						
Network size				-0.002 (.019)	-0.004 (.019)	-0.003 (.019)
Birthplace, current community				-0.338* (.172)	-0.414* (.178)	-0.428* (.178)
Receiving help				-0.044 (.142)	-0.030 (.147)	-0.033 (.147)
Providing help				-0.065 (.145)	-0.037 (.149)	-0.039 (.149)
Perceived future help				0.464** (.166)	0.592** (.172)	0.591** (.172)
Social Capital at Community-Level						
Number of Amenities					0.043 (.034)	-0.055 (.034)
Years of Committee					0.011* (.006)	0.012* (.006)
Cross-Level Interactions						
<i>Hukou</i> × Province						0.562* (.748)
Random Parameters						
across Communities ($\sigma^2_{\mu 0}$)	0.232** (.056)	0.189** (.063)	0.187* (.064)	0.218* (.102)	0.155* (.100)	0.142* (.097)
Intra-class Correlation (ICC)	0.066	0.055	0.055	0.063	0.046	0.041
Model Fit Statistics						
-2 Log Likelihood	2656.36	2536.44	2514.93	2456.62	1126.42	1120.02
AIC	26656.22	2536.49	2515.02	2456.97	1126.98	1121.66
AICC	2567.34	2554.31	2537.91	2457.98	1128.98	1121.98
BIC	2656.36	2536.44	2514.93	2456.62	1126.42	1122.02

Note: a. +p<.10, *p<0.05, **p<0.01, ***p<0.001

b. Standard error provided in parentheses.

Table 5b. Odds ratio from the multilevel logistic models for subjective well-being (N=996. 95% confidence interval in parentheses)

Fixed Parameter	Model 1	Model 2A	Model 2B	Model 3	Model 4	Model 5
Intercept	.48* (.18)	.48* (.16)	.44* (.18)	.44* (.18)	-.03* (.45)	.09* (.45)
Individual Predictors						
Demographic Background						
Male		1.04 (0.95/1.15)	0.99 (0.89/1.10)	1.18 (0.99/1.40)	1.16 (0.97/1.39)	1.15 (0.96/1.37)
60 yrs or older		0.95 (0.85/1.05)	0.95 (0.86/1.06)	1.06 (0.91/1.23)	1.09 (0.93/1.28)	1.09 (0.94/1.28)
Urban <i>Hukou</i>		1.23 ** (1.06/1.41)	1.23** (1.06/1.42)	1.01 (0.82/1.23)	1.18 (0.94/1.48)	1.65 (1.25/2.16)
Married & living with Spouse)		1.62** (1.42/1.86)	1.65** (1.43/1.89)	1.97** (1.63/2.38)	1.90** (1.54/2.33)	1.90** (1.56/2.33)
<i>Gansu</i> Province		0.40*** (0.35/0.47)	0.40*** (0.35/0.46)	0.49*** (0.41/0.58)	0.35*** (0.28/0.44)	0.29*** (0.22/0.38)
Socioeconomic Status						
at least some formal education			1.19* (1.04/1.30)	1.70* (1.08/1.48)	1.30* (1.11/1.51)	1.30* (1.10/1.53)
Household Expenditure			1.02 (1.00/1.04)	1.02 (0.99/1.04)	1.02 (0.99/1.04)	1.02 (0.99/1.04)
Social Capital at Individual-Level						
Network size				1.00 (0.98/1.02)	0.99 (0.98/1.02)	1.00 (0.98/1.02)
Birthplace, current community				0.71* (0.60/0.85)	0.66* (0.55/0.79)	0.65* (0.55/0.78)
Receiving help				0.96 (0.83/1.10)	0.97 (0.84/1.12)	0.97 (0.84/1.12)
Providing help				0.94 (0.82/0.92)	0.96 (0.83/1.12)	0.96 (0.83/1.12)
Perceived future help				1.59** (1.35/1.88)	1.81** (1.54/2.15)	1.81** (1.52/2.14)
Social Capital at Community-Level						
Number of Amenities					1.04 (1.01/1.08)	0.95 (0.91/0.98)
Years of Committee					1.01* (1.00/1.02)	1.01* (1.00/1.02)
Cross-Level Interactions						
<i>Hukou</i> × Province						1.75* (0.83/3.71)
Random Parameters						
across Communities ($\sigma^2_{\mu 0}$)	0.232** (.06)	0.19** (.06)	0.19* (.06)	0.22* (.10)	0.16* (.10)	0.14 * (.09)
Intra-class Correlation (ICC)	0.066	0.055	0.055	0.063	0.046	0.041
Model Fit Statistics						
-2 Log Likelihood	2656.36	2536.44	2514.93	2456.62	1126.42	1120.02
AIC	26656.22	2536.49	2515.02	2456.97	1126.98	1121.66
AICC	2567.34	2554.31	2537.91	2457.98	1128.98	1121.98
BIC	2656.36	2536.44	2514.93	2456.62	1126.42	1122.02

Note: +p<.10, *p<0.05, **p<0.01, ***p<0.001

Discussion

This chapter examined the effects of individual and community-level social capital, and individual demographic and socioeconomic variables on Chinese older adults' subjective well-being. Results from the multilevel logistic regression analyses suggest that certain dimensions of social capital at the individual- and community-levels are significant predictors of these respondents' subjective well-being. Specifically, statistical analyses indicate that the respondent's perception of whether he/she could get the needed help or support in the future was positively associated with his/her subjective well-being. This significant association was found in all models, even after adjustment for demographic and socioeconomic variables. Perception of help and support in the future is an indicator of the cognitive dimension of social capital. This finding is consistent with some previous studies. For example, studies by Yip et al. (2007) have acknowledged that the cognitive dimension of social capital could facilitate social networks and support mechanisms which positively affect subjective well-being.

Similarly, the significant effect from the community level social capital variable "number of years that community committee has been in existence" was found to be consistent in all models. The committee office within the village in the rural areas (*cunweihui* in Chinese) or the committee office within the community in the urban areas (*juweihui* in Chinese) is the lowest level of official administration and organization in China. The community committee office is always responsible for the civil affairs within the community and also assisting in implementing some policies from the central government. Such committees and the persons serving on these committees are often

trusted and regarded as the sources for consultation, help, and protection in terms of some personal affairs. Some social capital researchers (Putnam, 1993; Kawachi & Berkman, 2000) have argued that community level organizations facilitate better health among its residents because these organizations facilitate more collective actions, which in turn may influence health by encouraging the provision of social service, facilitating health information, or controlling deviant behaviors. Statistical results from this study provide evidence that the community organizations play supportive roles that impact residents' subjective well-being.

In the existent literature on social capital and health, social capital is typically operationalized as social networks, trust, and civic participation (Subramanian et al., 2002; Kawachi & Berkman, 2000; Fujisawa et al., 2009). In this study, a question about whether the respondent was born in the same community/village where he/she lived was used as a proxy for trust of others. It was hypothesized that respondents, who were born in the same community they were residing, would more likely to trust their neighbors in their community and thus report comparatively better subjective well-being. Statistical analysis did not support this hypothesis. In fact, the opposite was found. That is, the association between the respondent's birthplace and his/her subjective well-being was significant but negative. Perhaps this opposite effect was found because of China's rural-urban *Hukou* system and the Chinese government's strict control over its citizens' mobility and migration, particularly before the open door policy. Under China's rural-urban *Hukou* system, residents in one area were strictly prohibited from settling down in other areas. Strict control was especially exercised to limit the mobility and migration of

rural residents to urban areas and to limit the mobility and migration of residents in economically poorer areas to wealthier areas (Chan et al., 1999). For rural respondents in particular, being born in the village they currently lived indicates that they had never changed their residence. However, this may not have been by choice but due to the Chinese *Hukou* restrictions. Considering the difficulties of changing residence and rural-urban *Hukou* in China, particularly before its open door policy, it is possible that respondents never had a real opportunity to move away as desired. Consequently those respondents who were found to still be living in the village/community where they were born may have felt some frustration and unsatisfied with themselves and consequently reported poorer subjective well-being.

Further, this suggests that western-based social capital theory and its conceptualization might not be fully applicable in the cultural context of China. Some scholars (Xu et al., 2010; Norstrand et al., 2011) have argued that further conceptualization of social capital might be required for studies of such Eastern cultural contexts as China. According to these scholars, the western conceptualization of social capital emphasizes civic participation and participation in other voluntary organizations. However, in China, civic participation has always been limited and discouraged by the government (Xu et al., 2010).

An individual's social network has been found to be a significant predictor of higher level subjective well-being in previous studies (Cheng et al., 2009; Lim & Putnam, 2009). For example, Lim and Putnam (2010) found that congregational networks enhanced an individual's subjective well-being in the U.S., using data from the Faith

Matters Study. And, Cheng et al. (2009) found that family-focused networks were most beneficial to subjective well-being among Chinese older adults in HongKong. The dissertation results do not support these earlier studies. One possible explanation for this lack of association is that the measure of network in this dissertation did not tap the frequency of contact and the amount of support and help these respondents had received from their kin and extended family members. Another possible reason for the lack of effect is that despite different degrees of adherence to traditional cultural values of filial piety, older generations in China may have adapted to the impact of social changes on intergenerational relationships and may have even lowered their expectations for the younger generations and their relatives (Cheng & Chan, 2006).

Consistent with the literature (Cheng & Chan, 2006; Cheng et al., 2009), the dissertation results found the relationship between the sociodemographic and the subjective well-being of respondents to be generally weak and non-significant, except for the significant impact from marital status. Respondents who were married and were living with their spouses reported a higher level of subjective well-being compared to those who were never married, divorced, or widowed, even with the adjustment of other socioeconomic and social capital variables.

In addition, the dissertation results show that the respondent's province of residence was an important predictor of his/her subjective well-being. Respondents in Gansu province reported a lower level of subjective well-being compared to their counterparts in Zhejiang province. When considering the five interaction terms added in this analysis, only the interaction term formed by rural-urban *Hukou* status and province

of residence was statistically significant (odds ratio = 1.75, $p < 0.05$), which indicates that the impact of rural-urban *Hukou* status was magnified by the province of residence. Respondents with urban *Hukou* status in Gansu province were more likely to report good subjective well-being compared to their counterparts with rural *Hukou* status in Gansu province. Further, respondents with urban *Hukou* status from Gansu province were more likely to report good subjective well-being compared to respondents with urban *Hukou* status from Zhejiang province. The difference of rural-urban *Hukou* status across these two provinces may be explained by the difference in the economic situations in these provinces, with Gansu province being much poorer. More specifically, the significant interaction term between rural-urban *Hukou* status and province of residence may be interpreted as highlighting the importance of place of residence in economically disadvantaged areas in the transformation era of China. Rural-urban *Hukou* status showed no significant impact on the subjective well-being of the respondents, but the interaction term formed between rural-urban *Hukou* status and province of residence was significant. The significant impact of urban *Hukou* status observed among respondents in Gansu province did not appear among respondents in Zhejiang province. Thinking of the different levels of these two provinces in terms of economic development and wealth distribution, it can be seen how these social factors are interrelated with each other in the contemporary era of China and how these variables influence the ordinary people's social life and behaviors. That is, in the economically vibrant areas as Zhejiang province, the traditional rural-urban gap has been narrowing down. Whereas in the poorer areas as

Gansu province, rural-urban *Hukou* still plays a very significant role in an individual's life (Chan et al., 1999).

In sum, respondents with a higher level of subjective well-being were mostly from Zhejiang province, were married and living with their spouses, had at least some formal education, had a perception of available help and support in the future when needed, and their community/village committee had been in existence longer.

CHAPTER 7

SOCIAL CAPITAL AND SELF-RATED HEALTH

This chapter examines the association between social capital, both at the individual and community levels, and the self-rated health among older adults in China. First, the statistical results are presented. This is followed by a discussion of the theoretical implications and the implication for practice.

Statistical Results

Tables 6a and 6b present the results of the multilevel logistic models in the order in which they were developed. The logits of all predictor variables for reporting good self-rated health were presented in Table 6a. The independent effects of each predictor variable are presented in the odds ratios of reporting good self-rated health among the older adults in Table 6b. Also provided in Table 6b are the 95% Confidence intervals for each odds ratio. Odds ratios were calculated by $\text{Exp}(\text{logit})$ and the 95% confidence intervals were calculated by $\text{CI} = \text{Exp}(\text{logit} \pm \text{standard error})$. For interpretation, I used odds ratios (OR) reported in Table 6b. A variety of interaction terms were considered but found to be non-significant. These included the interaction terms formed by gender and perception of availability of future help and support, age and perception of availability of

future help and support, rural-urban *Hukou* status and perception of availability of future help and support, gender and province of residence, and age and province of residence. Due to the lack of significance, tables 6a and 6b did not include the models testing these interaction terms.

The test results in Model 1 of Table 6b (the null model with no predictors) indicate that 96 communities/villages were significantly different from each other regarding their elderly residents' self-rated health status ($\sigma^2_{\mu 0} = 0.95$, $p < 0.001$). The approximated intraclass correlation (ICC) was calculated using the formula $ICC = \frac{\sigma^2_{\mu 0}}{\sigma^2_{\mu 0} + 3.29}$ (Merlo et al., 2006). In this study, $ICC = \frac{0.95}{0.95 + 3.29} = 0.224$. That is, about 22 percent of the variation in the respondents' self-rated health could be explained by the community factors.

In model 2A of Table 6b, only individual-level demographic variables were included. As expected, gender, age, and *Hukou* status were significant predictors of respondent's self-rated health status. The predicted odds of good self-rated health for males were 1.478 times the odds for females (odds ratio = 1.478). In other words, the odds of reporting good self-rated health for males were almost 48% higher than the odds for females. Similarly, respondents with urban *Hukou* status (odds ratio = 1.865) were 87% more likely to report good health status than respondents with rural *Hukou* status. Age was negatively associated with self-rated health status (odds ratio = 0.627), suggesting that respondents aged 60 years or older on average have reported worse general health status compared to younger respondents (younger than 60). The probability of reporting good self-rated health for respondents older than 60 was

decreased by 38%. Further, the respondents in Gansu province reported significantly worse general health compared to respondents in Zhejiang province (odds ratio=0.348). The odds of reporting good self-rated health for respondents in Gansu province were decreased by 66% compared to their counterparts in Zhejiang province.

After adjusting for individual-level socioeconomic variables (Model 2B in Table 6b), still significant were the effects of age (odds ratio = 0.647), rural-urban *Hukou* status (odds ratio = 1.770), and province of residence (odds ratio = 0.342). But the effect of gender lost its statistical significance. Two individual-level socioeconomic status variables – education and household annual expenditure – were both significantly related to self-rated health status among these respondents. Compared to those illiterate respondents, respondents who had received some formal education were almost 50% more likely to report good health (odds ratio = 1.496). However, the effect of household expenditure was significantly negative (odds ratio = 0.956). Every one thousand Chinese *Yuan* increase in the annual household expenditure was associated with a 5% decrease in the predicted odds of reporting good self-rated health, which is contrary to our hypothesis.

Model 3 in Table 6b added five individual-level social capital variables. After adjusting for these five individual-level social capital variables, still significant were the effects of age (odds ratio = 0.658), province of residence (odds ratio = 0.329), education (odds ratio = 1.874), and household expenditure (odds ratio = 0.920). But the effect of rural-urban *Hukou* status no longer showed any statistical significance. This implies that the effect of rural-urban *Hukou* status on the general health was somewhat confounded by

the individual level social capital variables. Among the significant social capital variables, were whether respondents had received help (monetary or non-monetary) and whether they believed that they could get help in the future if needed. Belief in availability of help in the future was positively related to self-rated health (odds ratio = 1.428), while receiving help from others was negatively related to the respondent's perceived general health (odds ratio = 0.675). Respondents who were sure that they could get needed help and support in the future were 43% more likely to report good health compared to those who were not. However, respondents who reported that they had received help from others were 33% more likely to report poor health compared to those who had never received any help from others. The direction of this association was opposite to that hypothesized.

Community level social capital variables were added in Model 4 of Table 6b. Statistical results indicate that the number of amenities or associations that can be used by the elderly within the community/village was a significant predictor of self-rated health. Those respondents living in communities/villages that had more associations or amenities that could be used by the elderly were more likely to report good health status (odds ratio = 1.134, $p < .05$). Also, introducing social capital variables at the community level did not change the significant effects of age (odds ratio = 0.621), province of residence (odds ratio = 0.567), education (odds ratio = 1.752), annual household expenditure (odds ratio = 0.913), receiving help from others (odds ratio = 0.639), and the belief of getting the needed help in the future (odds ratio = 1.459).

Several interaction terms were tested sequentially. First, interaction terms formed with gender, age, rural-urban *Hukou* status and perception of the availability of help and support in the future, were tested to see if there were any interactions between social capital at the individual level, measured as the perception of the availability of needed help and support in the future, and these demographic background variables. Statistical results indicated that none of the interaction terms were significant (statistical results not reported in Table 6a and 6b). Then, an interaction term formed by the individual level social capital variable “perception of the availability of support/help in the future” with the community level social capital variable “years the community committee has been in existence” was tested. As reported in Model 5 of Table 6b, the statistical results indicate that this interaction term was significant (odds ratio = 1.141, with $p < 0.05$). That is, the longer the existence of a community/village central committee, the more likely the respondent’s self-rated health would be impacted by their perception of the availability of the needed help and support in the future. Then, the interaction terms formed by gender, rural-urban *Hukou* status, and age with province of residence were sequentially added. Statistical results indicate that there was one significant interaction effect and that was between “rural-urban *Hukou* status” and “province of residence” (Table 6b, Model 6). The impact of rural-urban *Hukou* status on perceived general health was magnified by the province of residence. Specifically, respondents with urban *Hukou* status from Gansu province reported significantly better general health (odds ratio = 1.96) than respondents with rural *Hukou* status in Gansu province (odds ratio = 0.35). Further, respondents with urban *Hukou* status from Gansu province reported better general health (odds ratio =

1.96) than respondents with urban *Hukou* status from Zhejiang province (odds ratio = 1.87).

Statistical results also revealed a significant variation between communities. And, even with the addition of the individual level socioeconomic status variables and the community level social capital variables, the variation between communities/villages continued to be significant (Table 6, Model 2B – 4).

AIC, AICC, and BIC are used to evaluate the models. Comparing the values of AIC, AICC, and BIC in the different models indicates that those models that included social capital at the individual- and the community-levels were comparatively better (AIC = 2534.29, AICC = 2534.68, and BIC = 2619.85) than the model that included only demographic variables (Model 2A in Table 6b, AIC = 5418.89, AICC = 5418.96, BIC = 5418.97) or the model that included demographic variables and socioeconomic status variables (Model 2B, AIC = 5422.58, AICC = 5422.67, BIC = 5436.28). These results are discussed further below.

Table 6a. Fixed and random parameter estimates from the multilevel logistic models for good self-rated health (in logits, N=996, standard error provided in parentheses)

Fixed Parameter	Model 1	Model 2A	Model 2B	Model 3	Model 4	Model 5	Model 6
Intercept	.955*** (.223)	1.337*** (.332)	1.281*** (.231)	.729*** (.521)	.083** (.681)	.438** (.712)	.194* (.695)
Individual Predictors							
Demographic Background							
Male		0.391** (.184)	0.232 (.151)	-0.204 (.269)	-0.081 (.282)	-0.046 (.284)	0.137 (.179)
60 yrs or older		-0.466 ** (.197)	-0.436 ** (.147)	-0.418* (.221)	-0.476* (.232)	-0.486* (.233)	-0.478* (.233)
Urban <i>Hukou</i>		0.623** (.268)	0.571** (.206)	0.255 (.317)	0.153 (.354)	0.056 (.358)	0.461 (.445)
Married & living with Spouse)		0.093 (.262)	0.089 (.182)	0.319 (.266)	0.301 (.274)	0.320 (.274)	0.308 (.275)
<i>Gansu</i> Province		-1.061*** (.152)	-1.071*** (.153)	-1.112*** (.271)	-0.568 (.437)	-0.514 (.441)	-0.787 * (.408)
Socioeconomic Status							
at least some formal education			0.403* (.156)	0.628* (.247)	0.561* (.257)	0.552* (.259)	0.555* (.165)
Household Expenditure			-0.044* (.026)	-0.083* (.042)	-0.091* (.035)	-0.061* (.035)	-0.058+ (.023)
Social Capital at Individual-Level							
Network size				0.041 (.028)	0.043 (.029)	0.044 (.029)	0.044 (.030)
Birthplace, current community				0.258 (.258)	0.384 (.269)	0.331 (.272)	0.365 (.271)
Receiving help				-0.392* (.218)	-0.448* (.270)	-0.453* (.229)	-0.457* (.228)
Providing help				0.008 (.217)	0.032 (.275)	0.024 (.227)	-0.022 (.227)
Perceived future help				0.356* (.248)	0.378* (.258)	0.195* (.418)	0.377* (.259)
Social Capital at Community-Level							
Number of Amenities					0.126* (.055)	0.075* (.093)	0.116* (.057)
Years of Committee					0.013 (.009)	-0.013 (.012)	0.003 (.006)
Cross-Level Interactions							
Perceived help × Community Committee						0.132* (.075)	
<i>Hukou</i> × Province							0.672* (.611)
Random Parameters							
across Communities ($\sigma^2_{\mu_0}$)	0.95*** (.082)	0.92*** (.076)	0.73** (.073)	0.56** (.227)	0.53* (.238)	0.53* (.240)	0.56 * (.243)
Intra-class Correlation (ICC)	0.224	0.218	0.182	0.147	0.139	0.139	0.147
Model Fit Statistics							
AIC	5401.32	5418.89	5422.58	2714.29	2534.88	2546.85	2532.66
AICC	5401.22	5418.96	5422.67	2724.68	2534.68	2546.96	2532.98
BIC	5403.42	5418.97	5436.28	2780.56	2619.85	2552.95	2538.02

Note: +p<.10, *p<0.05, **p<0.01, ***p<0.001

Table 6b. Odds ratio from the multilevel logistic models for good self-rated health (N=996. 95% confidence interval in parentheses)

Fixed Parameter	Model 1	Model 2A	Model 2B	Model 3	Model 4	Model 5	Model 6
Intercept	.955*** (.223)	1.337*** (.332)	1.281*** (.231)	.729*** (.521)	.083** (.681)	.438** (.712)	.194* (.695)
Individual Predictors							
Demographic Background							
Male		1.48** (1.23/1.78)	1.26 (1.08/1.47)	0.82 (.62/1.07)	0.92 (.69/1.11)	0.96 (.72/1.27)	1.15 (.96/1.37)
60 yrs or older		0.63 ** (.52/.76)	0.65 ** (.56/.75)	0.66* (.53/.82)	0.62* (.49/.78)	0.62* (.49/.78)	0.62* (.49/.78)
Urban <i>Hukou</i>		1.87** (1.43/2.44)	1.77** (1.44/2.17)	1.29 (.94/1.77)	1.16 (.82/1.66)	1.06 (.74/1.51)	1.59 (1.01/2.47)
Married & living with Spouse)		1.10 (.84/1.58)	1.09 (.91/1.31)	1.38 (1.05/1.79)	1.35 (1.03/1.78)	1.38 (1.05/1.81)	1.36 (1.03/1.79)
<i>Gansu</i> Province		0.35*** (.29/.40)	0.34*** (.29/.40)	0.33*** (.25/.43)	0.57 (.37/.88)	0.60 (.38/.93)	0.46 * (.30/.68)
Socioeconomic Status							
at least some formal education			1.50* (1.28/1.75)	1.87* (1.46/2.40)	1.75* (1.36/2.27)	1.74* (1.34/2.25)	1.74* (1.48/2.05)
Household Expenditure			0.96* (.93/.98)	0.92* (.88/.96)	0.91* (.88/.95)	0.94* (.91/.97)	0.94+ (.92/.97)
Social Capital at Individual-Level							
Network size				1.04 (1.01/1.07)	1.04 (1.01/1.07)	1.05 (1.01/1.08)	1.05 (1.01/1.08)
Birthplace, current community				1.29 (1.00/1.85)	1.47 (1.12/1.92)	1.39 (1.06/1.83)	1.44 (1.10/1.89)
Receiving help				0.68* (.54/.84)	0.64* (.49/.84)	0.64 * (.51/.80)	0.63* (.50/.79)
Providing help				1.01 (.81/1.25)	1.03 (.78/1.36)	1.02 (.81/1.29)	0.98 (.78/1.23)
Perceived future help				1.43* (1.11/1.83)	1.46* (1.13/1.89)	1.22* (1.01/1.46)	1.46* (1.13/1.89)
Social Capital at Community-Level							
Number of Amenities					1.13* (1.07/1.20)	1.08* (.98/1.18)	1.12* (1.06/1.19)
Years of Committee					1.01 (1.00/1.02)	0.99 (.89/1.03)	1.00 (.95/1.04)
Cross-Level Interactions							
Perceived help × Community Committee						1.14* (1.06/1.23)	
Hukou × Province							1.96* (1.06/3.61)
Random Parameters							
across Communities ($\sigma^2_{\mu 0}$)	0.95*** (.082)	0.92*** (.076)	0.73** (.073)	0.56** (.227)	0.53* (.238)	0.53* (.240)	0.56 * (.243)
Intra-class Correlation (ICC)	0.224	0.218	0.182	0.147	0.139	0.139	0.147
Model Fit Statistics							
AIC	5401.32	5418.89	5422.58	2714.29	2534.88	2546.85	2532.66
AICC	5401.22	5418.96	5422.67	2724.68	2534.68	2546.96	2532.98
BIC	5403.42	5418.97	5436.28	2780.56	2619.85	2552.95	2538.02

Note: +p<.10, *p<0.05, **p<0.01, ***p<0.001

Discussion

This chapter shows that certain dimensions of social capital were significantly associated with self-rated health. Statistical results confirmed the significant association between community-level social capital and perceived good health independent of demographic characteristics, socioeconomic status, and individual-level social capital. Community-level social capital (in the form of the number of the amenities and association within the community/village that can be used by the elderly population) was found to have a significant and positive association with good self-rated health among the respondents. This relationship is consistent with previous research (Snelgrove et al., 2006; Yip et al., 2007). Some social capital researchers (Putnam 1993; Kawachi & Berkman, 2000) have argued that community level organizations facilitate the better health status among its residents because these organizations may induce more collective actions. Collective actions practiced by these organizations or amenities may influence health by providing social service, facilitating health information, and/or controlling deviant behaviors.

The lack of statistical significance regarding cognitive social capital at the community-level (i.e., number of years the community committee office has been in existence) are more puzzling and less consistent with expectations. Number of years the community committee office has been in existence was not a significant predictor of respondent's self-rated health. However, the interaction term formed by the respondents' "perception of the availability of help and support needed in the future" and "years the community committee office has been in existence" was found to be significantly related

to the respondent's self-rated health. This implies that the effects of belief of getting the needed help in the future on self-rated health are conditional on the history of the community committee office. For those respondents who were living in communities/villages that had established their village/community committee earlier, their perception of getting the needed help and support in the future was more likely to influence their self-rated health status in a positive way. The committee office within the community (*juweihui* in Chinese) is the lowest level of official administration and organization in China that is responsible for the civil affairs within the community and for assisting in implementing policies and programs from the central and regional governments. It is generally believed that such committees and the persons serving on these committees are typically trusted and regarded as the sources for consultation, help, and protection in terms of some personal affairs. The puzzling impact of community committee office also reflects the ordinary people's mixed feelings of governance in the transformation era of China. On the one hand, the market economy has gradually reduced the influences of local governments on satisfying people's basic living needs. On the other hand, the lingering effects of a planned economy and the cultural tradition of collectivism is still there. As a result, respondents living in communities/villages with a longer history of having a community/village central committee office probably had gotten used to receiving collective help and support from the community committee and so expect continued help and support from the community/village committee in the future. Thus, their perception of the availability of the needed help and support may provide them with a more positive attitude about their health.

With regard to the effect of social capital at the individual-level, this study indicates that if a respondent believed that he/she would get the needed help and support in the future (cognitive social capital), then he/she was more likely to report his/her health as good, even after accounting for individual demographic and socioeconomic status variables. This suggests that the cognitive dimension of social capital at the individual level is important to the perceived health of the respondents. This result is consistent with empirical findings from other cultural settings and supports the conclusion drawn by Fujisawa et al. (2009, p. 503) that “cognitive social capital has an impact on health not only in Western societies but also in Asian societies”. Further, the importance of the belief that help and support will be available when needed in the future testifies to the legacy of traditional cultural values. As stated in a popular saying in China – “We need to raise children in order to get needed help in old age (in Chinese *yangerfanglao*)”. Traditional Chinese culture emphasizes filial piety and mandates that adult children should take care of their aged parents. With its rapid economic development and continuing globalization, there has been a fading emphasis on the adult children’s obligations to their parents. However, it appears that legacy of traditional culture is still affecting people’s lives, such as through their perception of their health. This appears to be particularly true in the poor rural areas where the elderly residents have had to rely on their adult children to support and care for them due to the lack of government-assisted programs and facilities.

Another individual-level social capital variable, whether the respondent had received help from others, was found to be significantly but negatively related to good

self-rated health. This is opposite of the hypothesis presented in Chapter 2 that the respondent's mutual support with others has a positive effect on health. One possible explanation is that the monetary or non-monetary help the respondent had received was from local government or current community programs for people in poor health. Since the 1990s, the Chinese government has implemented such programs as including a minimum standard of living, old-age endowment insurance, and the Five Guarantees (*Wubaohu* in Chinese) to provide benefits to the elderly population, especially those with long-term illness and poverty (Ding, 2003). However, further research is needed to better understand this effect.

This study also found that community/village of residence was important to the health of the elderly in China. Statistical analyses from this study indicate a consistent significant random parameter across communities in all models, which implies the important influence of community contexts in shaping health patterns among the respondents. Statistical results also indicate that respondents in Gansu province had poorer self-rated health than respondents in Zhejiang province. Existing research has recognized that the province/state in which individuals live can influence the health of the individual through such mechanisms as the accessibility to health service and health care professionals, the availability of amenities and infrastructures, as well as the necessary information and education promoting healthy life styles and habits (Kim & Kawachi, 2006; Zimmer et al., 2010). China is an ideal setting to study the differences across provinces and different social settings. Traditionally, rural and urban communities in China have been characterized by different levels of socioeconomic status. Rural

communities have fared poorly and have fewer available community resources. Even recent achievements, as part of China's economic development, have continued to be accompanied by well documented notable province and regional disparities in level of economic development and in living standards and stark rural-urban inequalities (Zimmer et al., 2010). The dissertation results appear to highlight the disparities across the two provinces and across the communities/villages. *Gansu* province is located in the less-developed western area of China, while *Zhejiang* province is located in the economically vibrant east coastal area of China. Taking advantage of China's open-door policy and some encouragement from the central government, the residents in *Zhejiang* province have developed strong small-scale privately-owned industries and the majority of these small industries are oriented toward exportation. With a per capita income 50% higher than the national average since 1990, *Zhejiang* province has always been ranking among the richest provinces in China. In contrast, *Gansu* province is among the poorest provinces in China, with 75% of its population being rural residents and still practicing traditional agriculture and with a per capita income less than half that of *Zhejiang* province (Zhao et al, 2009).

When examining the effects of demographic variables on self-rated health, the dissertation results show that older age and being single/widowed/divorced were significant predictors of poor self-rated health. This supports previous research studies (Subramanian et al., 2002; Fujisawa et al., 2009). Similarly, the dissertation results show a significant effect of socioeconomic status variables on self-rated health, which again support previous studies (Zimmer et al., 2010; Fujisawa et al., 2009). More specifically,

the results support the significant positive relationship between education and good self-rated health. On the one hand, the relationship between household expenditure, another indicator of socioeconomic status in this study, and self-rated health, was negatively rather than positively associated to perceived health. This was opposite to the proposed hypothesis that socioeconomic status is positively associated with perceived health. However, the collapse of the Cooperative Medical System in rural areas and the erosion of the Labor Insurance Scheme in urban areas since the early years of economic reform in China have left the majority of Chinese no longer having guaranteed access to free or subsidized health services (Zhao, 2006). Further, the market costs of health care in China have been continuing to grow. Based on a World Bank's report (World Bank, 2005), health care costs have been rising rapidly in China since its economic reform policy. According to this report, the Chinese government performed well in providing affordable essential care during the 1960s and 1970s. However, the costs of health care have risen since then. During the 1990s, private spending on health grew at an annual rate of 20 percent (World Bank, 2005). In 2003, a single hospitalization cost about 4,000 Chinese *yuan* on average, equivalent to 43 percent of the average national income and almost two times the average income for a person living in a poor area. A review of Chinese people's expenditure also shows that health care expenditures are the third major expenditure for Chinese people, after food and education (World Bank, 2005). One possible explanation for the negative association between annual household expenditure and perceived health was that respondents' annual household expenditures were mainly spent on health care services. However, this explanation is subject to further study.

This study also demonstrated statistically significant complex interaction effects between rural-urban *Hukou* status and province of residence. The impact of rural-urban *Hukou* status was magnified by the province of residence. Urban *Hukou* status played a more significant role in determining respondents' self-rated health in *Gansu* province in comparison to respondents in *Zhejiang* province. Respondents with urban *Hukou* status in *Gansu* province reported better perceived health than respondents with urban *Hukou* status in *Zhejiang* province. As noted above *Gansu* is a poor province while *Zhejiang* is relatively rich. As an institutional legacy of China's socialism, *Hukou* status in China works as an institutional identity that distinguishes between urban and rural residents. Rural-urban *Hukou* status entitles people to different economic resources, education, employment, and social welfare benefits depending on their registered residence. Urban residents are born to be "workers" and were provided with an "iron rice bowl" of lifetime employment, while rural residents are born to be farmers and are organized into collectives. The economic planning system also sets the prices and investments in rural and urban areas, which has traditionally discriminated against the rural areas and agriculture and given preference to the urban areas and industry. Those with urban *Hukou* can get important nonwage benefits as housing subsidies, health care, pension, and unemployment insurance, and typically enjoy a rural-urban wage differential (Liu, 2005). But rural population had to rely on land and family as the source of old age support (Liu, 2005). Even with its recent economic development and the relatively relaxed *Hukou* control over the migration across rural to urban areas, a number of studies have shown that people with different *Hukou* backgrounds fare differently in China and those with a

rural *Hukou* generally fare worse than their urban counterparts (Cheng et al., 1994; Chen, 2002; Liu, 2005). The significant intersection between rural-urban *Hukou status* and province of residence actually indicates the complicated interrelations between distribution of wealth, social capital, and other social factors.

CHAPTER 8

CONCLUSIONS

This chapter presents a general conclusion of the findings in the present study. Also, the strengths and weaknesses of the present study as well as the possible future direction of research on social capital and health in China are discussed.

Research Questions Revisited and Summary of the Findings

Using data from the China Health and Retirement Longitudinal Study (CHARLS) 2008 pilot study, this dissertation focused on examining the association between social capital at both the individual- and the community-levels and health among older adults in China, with attention also given to the possible differences across gender, age groups, and rural-urban *Hukou* status. Health in this study was measured with three different health outcomes – mental health, subjective well-being, and self-rated health. Specifically, this study focused on the following research questions:

The first question asked was how the individual-level social capital variables were related to health (mental health, subjective well-being, and self-rated health) among respondents in the CHARLS 2008 Pilot study? It was proposed that the individual-level social capital indicators, including the respondent's network size, providing help to others, receiving help from others, being born in the community/village that one currently

lives, and the perception of the availability of help/support in the future if needed, were positively associated with health among the respondents.

This study provides empirical evidence to answer the question affirmatively. Individual-level social capital variables were found to be associated with health among the respondents. The statistical results from this study support the importance of social capital at the individual level in influencing health among Chinese older adults. After controlling for other individual-level variables, one key indicator of social capital at the individual level, perception of the availability of the needed help and support in the future, was a significant predictor of good mental health (Table 4, Model 3 to Model 6), good subjective well-being (Table 5b, Model 3 to Model 6), and good self-rated health (Table 6b, Model 3 to Model 6) for respondents in this study. Perception of getting the needed help and support in the future has been regarded as a key indicator of cognitive social capital and the positive association between cognitive social capital and better health among elderly people has been recognized in Western cultural settings (Kawachi et al., 1999; Veenstra, 2005). This study further confirms the importance of cognitive social capital in Eastern cultural settings. Further, the significance of the perception of the availability of the needed help and support in the future also testifies to the legacy of traditional cultural values. As stated in a popular saying in China – raising children in order to get needed help in old age (*yangerfanglao* in Chinese), traditional Chinese culture emphasizes the filial piety and mandates that the adult children should take care of their aged parents. And family support of old age has always been encouraged and advocated by the Chinese government. With its rapid economic development and

continuing globalization, there has been a fading emphasis on the adult children's obligations to their parents. However, it appears that legacy of traditional culture is still affecting people's lives, such as through their perception of their health. Particularly in the poor rural areas where the elderly residents had to rely on their adult children to provide support and care due to the lack of government-assisted programs and facilities for old age support.

Receiving help from others, another indicator of social capital at the individual level in this study, was also found to be significantly related to health through its negative effect on self-rated health (Table 6b, Model 3). The direction of this association was contrary to the originally-proposed hypothesis in this dissertation study. One possible explanation for this negative association is that the poorer a person's health, the more likely the person received needed help, financially or nonfinancially. Since the founding of the People's Republic of China, the Chinese government has been practicing its *Five Guarantees (Wubaohu)* social assistance program -- a well-known social assistance program to poor elderly without any support from family. With this program, childless and disabled elderly were guaranteed food, clothing, housing, medical care, and burial expenses through collective support at local levels. In recent years the Chinese government has promoted a series of subsidiary programs like the rural pension scheme and Basic Program for Social Security Insurance to help the older and poor elderly to maintain a minimum living standard at the local levels (Tang, 2007). One possible explanation is that the monetary or non-monetary help the respondent received was

probably some subsidiaries from local government or current community because of their poor health.

Another social capital indicator at the individual level, birthplace, was a significant predictor only for subjective well-being (Table 5b, Model 3), but the direction was negative. That is, respondents born in the same community/village they currently lived reported poorer subjective well-being. This is contrary to the originally proposed hypothesis in this dissertation and other studies (Fujisawa et al., 2009). However, relating the birthplace to the registered *Hukou* system and the rural-urban *Hukou* differences in China, this result is not surprising. In China, *Hukou* has long been regarded as an institutional identity with urban *Hukou* holders being given a series of benefits in terms of education, employment and social security programs. Being born to be a urban *Hukou* holder has long been regarded as a kind of ascribed status. And being able to change the permanent *Hukou* residence status from the rural to the urban has long been regarded as a kind of achieved status in China (Chan et al., 1999). Further, the Chinese government has always exercised strict control over the individual's rural-urban *Hukou* status to limit the mobility and migration of residents in economically poorer areas to wealthier areas, particularly before its open door policies. For rural respondents in particular, being born in the village they currently lived indicates that they had never changed their residence status. They may have felt some frustration and felt unsatisfied with themselves and consequently reported poorer subjective well-being. However, the causal direction between birthplace and health, as well as that of receiving help and health, are open to debate and more research is still needed.

Respondent's individual network size (Table 4, Model 3; Table 5b, Model; Table 6b, Model 3) and whether they had provided help to others (Table 4, Model 3; Table 5b, Model 3; Table 6b, Model 3) were found to be irrelevant to all three health outcome measures among the respondents, which is contrary to the originally proposed research question as to whether the individual-level social capital variables are significantly and positively related to health outcome measures. However, this result is consistent with a recent study from two urban cities in China (Sun et al., 2009). In this study, the authors (Sun et al., 2009) also found that the network size and helping others were not significantly related to health among respondents from two cities in China. There are several possible accounts for this lack of association. First, this dissertation study measured social networks by the size of their networks with children and immediate family members. This measure did not tap the social context in which networks are forged and the roles and identities shared in these networks. However, roles and identities shared in the networks may play a determinant role in influencing the individual's perceptions of his/her network size and the mutual support and help with others (Sun et al., 2009), measuring only the size of the network does not capture the complex dynamics of interpersonal networks of older adults in China. Some scholars (e.g., Pevalin, 2004) have argued that different people have different relationship networks and some networks might be good for health while others might be neutral or even cause harm. In addition, the lack of association between whether the respondent had provided help to others and health may also be explained with the legacy of the cultural connotations and expectation of filial piety and towards the younger generations in

traditional Chinese culture. In Chinese culture, filial piety and the respect and the dutifulness for the parents and ancestors have been virtues to be held above all else. Such virtues have been the main topic of a large number of literary works and have been extolled in many forms over a long history. However, obligation and responsibilities of the elderly have been rarely discussed.

The second research question asked was how community-level social capital is related to individual health (mental health, subjective well-being, and self-rated general health)? It was proposed that community-level social capital, measured by the number of amenities and associations within the community/village that the elderly people could use, and by the number of years that the community/village central committee has been in existence, is positively associated with health among the respondents.

When examining the relationship between community-level social capital and health, this study confirms the significant association between community-level social capital and good health independent of individual-level social capital. One key indicator of social capital at the community level, number of amenities and association within the community/village that the elderly people could use, was found to be a significant predictor of good mental health (Table 4, Model 4) and good self-rated health among the respondents in this study (Table 6b, Model 4). Scholars have argued that community-level organization is a key indicator of social capital at the community level. Such organizations and associations facilitate the better health among its residents because these organizations may induce more collective actions. That may influence health of its

residents by providing more social services, facilitating health information or even controlling some deviant behaviors (Putnam, 1993; Kawachi & Berkman, 2000).

Another key indicator of social capital at the community level, years the community/village had established their central committee was found to be a significant predictor of good subjective well-being among the respondents in this study (Model 4 in Table 5b). The central committee offices within the community in the urban areas (*juweihui* in Chinese) and within the village in the rural areas (*cunweihui* in Chinese) are the lowest level of official administration and organization in China that are responsible for the civil affairs within the community/village and for assisting in implementing policies and programs from the central and regional governments. It is generally believed that such committees and the persons serving on these committees are always trusted and regarded as the sources for consultation, help, and protection in terms of some personal affairs. The longer the history of the community/village committee office, the more likely the respondents were sure that they would get certain kinds of collective help and assistance in the future.

The third research question asked was how the individual-level demographic and socioeconomic characteristics were associated with individual-level health (mental health, subjective well-being, and self-rated general health) among the respondents? It was proposed that an individual's demographic background such as gender, rural-urban *Hukou* status, age, and province of residence were significant predictors of the respondent's health status. Also, it was proposed that socioeconomic status, measured by

education and household expenditure, was positively associated with health among the respondents.

Statistical results show that rural-urban *Hukou* Status (Table 4, Model 2; Table 5b, Model 2; Table 6b, Model 2) and province of residence (Table 4, Model 2; Table 5b, Model 2; Table 6b, Model 2) significantly impacted the respondent's mental health, subjective well-being, and self-rated health. Respondents with an urban *Hukou* consistently reported better mental health, better subjective well-being, and better self-rated health compared to their counterparts with rural *Hukou*. Respondents in Gansu province reported poorer mental health, a lower level of subjective well-being, and poorer self-rated health compared to their counterparts in Zhejiang province. The significant impacts of rural-urban *Hukou* and province of residence is consistent with the findings in previous studies (Zimmer et al., 2010). Statistical results in this study also indicate that marital status significantly impacted mental health (Table 4, Model 2A) and subjective well-being (Table 5b, Model 2A) among the respondents in this study. This result is also consistent with other existing studies (Fujisawa et al., 2009; Subramanian et al. 2002). Those respondents who were married and were living with their spouse reported better mental health status and better subjective well-being compared to their counterparts who were either single or divorced or widowed. Older age was also a significant predictor of poorer self-rated health (Table 6b, Model 2A). Respondents older than 60 years consistently had poorer health status compared to the respondents younger than 60. Gender (Table 4, Model 2 to Model 6) was also significantly associated with mental

health among the respondents in this study, with males reporting better mental health than females.

When examining the effects of socioeconomic status on health, the dissertation results show that education significantly impacted all three health outcomes, including mental health (Table 4, Model 2B, Model 3, and Model 4), subjective well-being (Table 5b, Model 2B, Model 3, and Model 4), and self-rated health (Table 6b, Model 2B, Model 3, and Model 4). This supports the significant positive relationship between education and good self-rated health reported in previous research studies (Subramanian et al., 2002; Fujisawa et al., 2009). However, the impact of household expenditure, another indicator of socioeconomic status in this study, on health, however, was negative rather than positive. Statistical results indicates that the higher the annual household expenditure, the worse the health. This was opposite to findings in the previous studies (Fujisawa et al., 2009). One possible explanation for this negative effect is that respondent's annual household expenditure were mainly spent on health care services. World Bank's Report on China's health care service and health care costs (World Bank, 2005) has pointed that health care expenditure as the third major expenditure for Chinese people, after food and education. However, this explanation is subject to further study.

The fourth research question asked was whether the impact of the individual demographic variables interacted with the individual-level social capital variable "perception of the availability of help and support in the future" and the variable "province of residence"? It was expected that (1) impact of the individual-level social capital variable "perception of the availability of help and support in the future" on health

would differ across gender, rural-urban *Hukou* status, and different age groups; and (2) impacts of gender, rural-urban *Hukou* status, and age on health would differ across different provinces of residence.

In terms of the interaction effects between individual-level demographic background (gender, age, rural-urban *Hukou*) and the key individual-level social capital variables, perception of getting needed help and support in the future, this dissertation study found no statistically significant interactions (Table 4, table 5, and Table 6 did not report the model results of these interaction terms). This suggests that the impact of the perception of the availability of needed help and support in the future did not vary across gender, rural-urban *Hukou* status, and different age groups. However, the impact of gender (Table 4a, Model 5), and rural-urban *Hukou* status (Table 4, Model 6; Table 5b, Model 5; Table 6b, Model 6) were significantly modified by the province of residence. Specifically, statistic results indicated that the impact of gender on mental health depended on the province of residence (Table 4, Model 5). Among respondents from Gansu province, males reported much better mental health than their female counterparts. Also, the impact of rural-urban *Hukou* status on mental health (Table 4, Model 6), subjective well-being (Table 5b, Model 6), and self-rated health (Table 6b, Model 6) was significantly modified by the respondent's province of residence. Respondents from Gansu province with urban *Hukou* status reported better mental health, better subjective well-being, and better perceived health than Gansu respondents with rural *Hukou* status. Traditional Chinese culture values treating females as secondary to males and regard the subservience and self-effacement of women as virtues. When considering rural-urban

Hukou, it is an institutionalized identity in China that entitles people to different economic resources, education, employment, and social welfare benefits, with important nonwage benefits and subsidies being given to urban *Hukou* status holders. Respondents in this study were from two provinces in China. Gansu province is located in the less-developed western areas, while Zhejiang province is located in the economically vibrant east coastal areas in China. The significant interactions between gender and province of residences, and between *Hukou* status and province of residence indicate the complicated interrelations between distribution of wealth, traditional cultural values, and health of the individuals in the transformation era of China. That is, in the less developed areas in China, traditional cultural values still significantly impacted the individual's health and social behaviors.

The cross-level interaction term formed by “the respondent's perception of getting the needed help and support in the future” and “the years the community central committee has been in existence” was found to be a significant predictor only for the respondent's self-rated health (Table 6b, Model 5). This implies that the effect of the perception of the availability of the needed help and support in the future was modified by the history of the community/village central committee office. The committee office within the community in China is responsible for the civil affairs within the community and for assisting in implementing policies and programs from the central and regional governments. It is generally believed that such committees and the persons serving on these committees are often regarded as the source of help and protection in terms of some emergencies and personal affairs. The significant interaction between the history of the

central committee office and the perception of the availability of the needed help and support in the future implies the legacy of collective old age support in China.

The statistical results from this dissertation study also suggest that community was relevant to the health among the respondents in the CHARLS 2008 pilot sample (see the random parameters across communities and ICCs in Model 1 to 6 in Table 4, in Table 5b, and Table 6b). Results shown in Tables 4, 5, and 6 demonstrate that all three measures of health at the individual-level had variations that could be attributed to the community/village factors. In addition, a comparison of the model fit statistics in Tables 4, 5b, and 6b indicates that the model including both the individual-level variables and the community-level variables (Table 4, Model 4; Table 5b, Model 4; and Table 6b, Model 4) was more efficient than the models that included only variables at the individual level (Table 4, Model 2 & Model 3; Table 5b, Model 2 & Model 3; and Table 6b, Model 2 & Model 3). These findings observed in this study offer additional evidence that community, measured as the villages in the rural areas and communities in the urban areas, is not just a unit of the boundary of administration but a unit that exerts a meaningful influence on health among its residents. This is consistent with the ‘social-structural’ promise of social capital and health suggested by some scholars (Subramanian et al., 2002; Veenstra, 2005; Aida et al., 2009). According to these scholars, socially patterned attributes of geographically defined “places” play an important role in influencing its residents’ health.

Implications

Based on the results from this study, four theoretical and practical implications are suggested. First, “social capital” is a “multifaceted” (Portes, 1998) concept and the role of social capital in influencing health cannot be singularly generalized because different dimensions and indicators of social capital may have different impacts. Currently existing quantitative investigations of the association between social capital and health have been inconsistent in terms of the relationship and direction of effect of social capital indicators on health. And, these differences appear to be, at least in part, dependent on the targeted areas and communities (Subramanian et al., 2002; Lochner et al., 2003; Veenstra, 2005; Fujisawa et al., 2009). For example, social trust and mutual help have been recognized as significant predictors of good health in America (Subramanian et al., 2002) and Japan (Fujisawa et al., 2009). But social trust and mutual help were not related to health among Canadians (Veenstra, 2005). This dissertation study provides examination within the Chinese cultural setting. This study measured social capital at both the individual and the community levels. At the individual level, social capital was measured by the individual’s social network size, receiving help from others, providing help to others, perception of the availability of the needed help and support in the future, and being born in the community one currently lives. Among these 5 measures, only the significant impact from the belief of getting the needed help in the future was consistent on all three health outcomes. Mutual help with others in this dissertation was measured by two indicators, whether the respondent had received any help from others and whether the respondent had provided any help to others. Providing

help to others was found to be insignificant to all three health outcomes in this dissertation study (Table 4, Model 3; Table 5b, Model 3; and Table 6b, Model 3). Receiving help was found to be significant only for self-rated health status (Table 6b, Model 3). Islam et al. (2006) reviewed the ecological and multilevel studies on social capital and health conducted in nearly 40 countries. One conclusion made by Islam and his coauthors (Islam et al., 2006) was that the effects of social capital on health might be different depending on the level of the unit of analysis and levels of income inequalities and welfare programs. Scholars (e.g. Inoguchi, 2000; Fujisawa, 2009) have already argued that the relationship between structural social capital and health in Asian societies were different from that in Western societies. More research is still needed to help clarify the measurement of “social capital” and the associations between social capital and health in the unique cultural context of China as well as in other cultural settings.

Second, this study highlights the profound influence of cultural legacy on health among the respondents. Among the five indicators of social capital at the individual level, belief of getting the needed help in the future was consistently found to be associated with the three health outcomes in a statistically significant way. Such significant associations imply that the cultural legacy of filial piety and parents’ expectation of adult children’s duties and obligations in taking care of the aged generation still impacts Chinese people’s lives. Accompanying its economic reform and development and increasing globalization, tremendous transformations have taken place in recent years in China, including a change in cultural values. New cultural values and life styles have rapidly become trends in China. However, the legacy from the long-standing Chinese

culture is still lingering around and profoundly influences the social behaviors of Chinese people.

Third, large variations of living and a severe socioeconomic gap between the rich and poor exist in current China. As economic growth has accelerated in China, income differences have been increasingly expanded, especially from region to region. Respondents in this study were from two provinces in China, Zhejiang and Gansu. These two provinces are at the two extremes in terms of socioeconomic development in China. Zhejiang is located in the developed southeast coastal region, and Gansu is located in the less developed northwestern region. Zhejiang province has been consistently sitting on the top with the highest rural and urban incomes per capita, while Gansu has been ranked among the lowest with its comparatively lower rural and urban per capita income. Respondents in Gansu province reported poorer mental health, poorer subjective well-being, and poorer self-rated health than respondents in Zhejiang province. This may shed light on the complicated interrelations between social capital, distribution of wealth, and health. Also, Zhejiang has been one of the most dynamic provinces in terms of its economic growth, private enterprises, and household small-scale industrialization. At the same time, the majority population of Gansu province still lives by traditional agriculture. The impact of rural-urban *Hukou* status significantly intersected with the province of residence. This indicates that the rural-urban differentiation in less developed areas in China is more magnified.

Fourth, community development should be emphasized in current China to ensure a healthy and safer living for older adults. More specifically, it appears that investment in

community infrastructure, especially in recreation facilities, amenities and organizations, have a beneficial role in improving health. This may be particularly important for the poorer communities. Further, developing community and organizing community-based services will give play to the role of community/village committee. As the lowest level administrative organization in China, the community/village committee provides much social security service for retirees, the elderly, weak, disabled, widower, widowed, and childless. With the changing patterns of family structure, Chinese people have also changed their perspectives of supporting their elderly parents. Tang (2007) has reported that more and more young adults prefer to live by themselves. They want the society to share some responsibilities of providing help and support for old people. Developing community/village-based activity centers and associations to help and protect the elderly will help to advocate the rights of the old people as well as provide collective help for the aged. These organizations can also contribute to the maintaining of traditional Chinese cultural values such as respect for the aged, and promoting mutual aid and mutual help.

Study Strengths

This study advances the empirical research on social capital and health in the following ways. First, this study tries to measure social capital in a straightforward and more objective way. Some studies on social capital measure social capital mainly based on the individual perceptions (Fujisawa et al., 2009; Sun et al., 2009). One problem with such measurement is that personal perceptions are likely to be influenced by the characteristics of the respondent (Mohmen et al., 2011). The present study avoids this problem by measuring social capital at both the individual- and community-levels with

straightforward and objective measures. “Social capital” in this study closely follows Bourdieu’s (1985, p. 248) definition and is measured by both structural and cognitive dimensions proposed by Harpham et al. (2002). Social capital at the individual level is measured with individual-level data, while social capital at the community-level is measured with data collected at the community level.

Second, this study presents a more complete picture of the health among the older adults in China by measuring health with three health outcomes – mental health, subjective well-being, and self-rated health. Findings from this study show that there are some similar patterns regarding the effects of social capital across these three health outcomes. For example, perceived help in the future is a consistent significant predictor of mental health, subjective well-being, and general health. However, differences still exist. For example, whether a community has amenities or associations available for the elderly is significantly associated with the older adults’ mental health and general health status, whereas the history of the community/village committee is significantly associated to the older adults’ subjective well-being.

Third, this study examines the impacts of social capital at both the individual- and the community-level with a series of multilevel models. The CHARLS 2008 pilot data includes interviews with 2,685 older adults aged 45 or older living in 22 communities in urban areas and 74 villages in rural areas in two provinces. The data of individual are clustered in these communities/villages. Multilevel modeling may avoid such problems as the distorted significance of association by allowing for a random effect at the community level. Further, existing research has recognized that the community in which

the individual lives can influence the health of the individual through such mechanisms as the accessibility to health service and health care professionals, the availability of amenities and infrastructures, and the availability of information and education promoting healthy life styles and habits (Kim & Kawachi, 2006; Zimmer et al., 2010). Multilevel modeling is an ideal technique to study the differences across communities.

Study Weaknesses

Several limitations in this study need to be mentioned. First, the data used in the present study are from a pilot study in two provinces in China, Gansu and Zhejiang. So, it is limited in representing the more general characteristics of the social and economic life of the older adults in China.

Second, the data are from a cross sectional study so it is difficult to test the possible reverse causality between social capital and health suggested by researchers (Subramanian et al., 2002; Yoshikazu et al., 2009). These scholars have suggested the possible reverse causality between social capital and health. That is worse health status may lead to lower levels of social capital. Unfortunately, this study is cross sectional so the possible reverse causality cannot be ruled out.

Third, this study is limited in its large number of missing cases. The CHARLS pilot study required that the questionnaire items concerning the older adult's health status and the transfer and help with others be answered by the older adults themselves and not proxies. As a result, this data set has a large number of missing cases, particularly with regard to health questions. Consequently, only 996 valid cases (42%) at the individual level were used for the final analysis. The large number of missing cases may have

hampered the final statistical results. In addition, the results may not be generalized with confidence with such a higher percentage of cases are missing.

Fourth, the assessment of social capital in this study is limited. This study used five indicators to measure older adults' social capital at the individual level. Two variables were used in this study to measure the community-level social capital. These indicators were used in previous literature to measure social capital. However, CHARLS was not specifically designed for tapping the social capital among the older adults in China. So several other important indicators of social capital widely examined in studies in Western context, such as the civic participation at the community level, and voluntarism (Putnam, 2000; Harpam et al., 2000) could not be tested in this study. Accordingly, the evidence of the relationship between social capital and health presented in this study may not be taken to mean that similar effects exist for other dimensions of social capital.

Fifth, there are some limitations regarding the use of the health indicators. In this study, three health outcome measures were all self-assessed by the respondents. There is some concern of the validity of self-reported assessment of health. For example, report by He and the coauthors (He, Snegupta, Zhang, & Guo, 2007) have already pointed out that sometimes self-rated health could not accurately depict the actual health condition, particularly among the elderly population. Most older people tend to overestimate their health conditions.

Finally, this study only controlled the impacts of socioeconomic status variables at the individual level, but did not control any possible effects from socioeconomic status

at the community level. This is another limit in this study. Socioeconomic status at the community level may impact social capital variables at both the individual- and community-levels.

Future Research Direction

Based on the limitations in this dissertation study, the following suggestions are provided for future research. First, future research on the association between social capital and health among the older adults in China should use a larger nationally representative sample to cover variations across different regions, both in social life and economic development. The sample in the present study comes from two extremes in China in terms of the economic development -- Gansu with a very low economic development level and Zhejiang with one of the highest economic development levels in China. Findings from this study may be representative of provinces with similar economic development levels, however, what are the relationships in other provinces? A nationally representative sample would provide findings with a higher level of generalizability to the larger population under study.

Second, in the present study, both the independent variables and dependent variables were assessed by self-reported questionnaire items. Future study may adopt other objective and scientific ways to assess the measures of health and social capital, for example, by using biomarkers to measure an individual's health.

Third, future studies should include additional components of social capital. In the present study, the respondent's social network only measures his/her connectedness with family members or extended family members, and does not tap other social capital

dimensions such as their contact with friends and coworkers. Also, trust and civic participation at the community level are important components of social capital reported in literature in Western societies (Putnam, 1993; 2000). The present study did not provide any clues as to the influences of such components on the respondent's health and so leaves this for future research. Some studies (Fujisawa et al., 2009) on social capital and health in Japanese society directly translated the questionnaire items for social capital in Western societies into Japanese and used the corresponding questionnaire items to tap the social capital and its influences on health in Japanese society. Future studies on social capital and health in China should consider this approach and consequently use similar questionnaire items to tap the similar components of social capital to see whether the conclusions may be trans-culturally supported.

Finally, the use of the qualitative research method is recommended for future research. This could include a focus on older adults' reciprocity and mutuality with the neighbors, the complex dynamics of mutual help among their extended families. Qualitative research may provide a richer description of respondents' social capital level and offer a better understanding of positive and negative impacts on their health. The many social and economic changes currently underway in China have produced a misalignment between cultural traditions and practices. Caught between the transformation forces of traditionalism and modernism, many elderly people have found that their cultural values and beliefs, forged in an earlier era, out of step with the new social dynamics. Further, the stark disparities among the respondents in terms of socioeconomic standing, household types and place of residence make their reciprocity

and mutuality behaviors and expectations more complicated. Qualitative interviews can help to detail the actual perceptions of the elderly in China.

APPENDIX A

VARIABLES AND THEIR MEASURES

Dependent Variable – Health

. General self-rated health

- . Respondent's self-comment on his/her health

. Mental health index (Cronbach's $\alpha = .809$)

- . How often the respondent is bothered by things
- . How often the respondent had trouble keeping mind
- . How often the respondent felt depressed
- . How often the respondent felt everything he/she did was an effort
- . How often the respondent felt tearful
- . How often the respondent felt unhappy
- . How often the respondent sleep was restless

. Subjective well-being

- . Look back on life with a sense of happiness

Independent Variable -- Social Capital

. Networks --

- (1) The number of respondent's children (from 0 to 10);
- (2) The number of respondent's siblings still alive (0 to 10);
- (3) The number of respondent's married siblings (0 to 10);

. Receiving help from others --

(1) Whether the respondent had received any monetary help from family members;

(2) Whether the respondent had received any non-monetary help from family members;

. Providing help to others --

(1) Whether the respondent provides more than 100 Yuan financial help to others;

(2) Whether the respondent provides any non-monetary gifts or not to others

. Birthplace –

Whether the respondent was born in the same village/neighborhood he/she currently lives in

. Perception of needed help/support in the future –

Whether the respondent has any perceived help or support in the future to help him/her

. Community cohesiveness –

How long the community/village has established its community/village committee

. available resources at community level –

. A sum of whether the community/village has the following community/village-based amenity or association for the elderly.

- basketball playground
- swimming pool
- outside exercise facilities
- other outdoor sports facilities
- room for card games and chess games
- room for Ping Pong

- association for calligraphy and painting
- dancing team or other exercise organizations
- other entertainment facilities
- organizations for helping the elderly and the handicapped
- activity center for the elderly
- elderly association

·**Demographic Variables –**

. **Gender** (male vs. female)

. **Hukou status** (rural vs. urban)

. **Age group** (younger than 60 vs. 60 or older)

. **Marital status** (married and living with spouse vs. single/widowed/divorced)

. **Province** (Gansu vs. Zhejiang)

·**Socioeconomic Status Variables --**

. **Education**

. The educational level the respondent has completed (some formal education and at least could read & write vs. being illiterate)

. **Annual household expenditure**

. The annual expenditure of the household (from 0 to 30, 000 Chinese Yuan)

APPENDIX B

FREQUENCY TABLE OF MISSING CASES IN CHARLS PILOT 2008 MODULE B

Frequencies

Statistics

BMISSING

N	Valid	2685
	Missing	0

BMISSING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.00	25	.9	.9	.9
	3.00	35	1.3	1.3	2.2
	4.00	162	6.0	6.0	8.3
	5.00	382	14.2	14.2	22.5
	6.00	363	13.5	13.5	36.0
	7.00	178	6.6	6.6	42.6
	8.00	81	3.0	3.0	45.7
	9.00	141	5.3	5.3	50.9
	10.00	81	3.0	3.0	53.9
	11.00	46	1.7	1.7	55.6
	12.00	19	.7	.7	56.4
	13.00	12	.4	.4	56.8
	14.00	23	.9	.9	57.7
	15.00	7	.3	.3	57.9
	16.00	2	.1	.1	58.0
	18.00	1	.0	.0	58.0
	20.00	1	.0	.0	58.1
	23.00	1	.0	.0	58.1
	24.00	4	.1	.1	58.2
	25.00	1121	41.8	41.8	100.0
	Total	2685	100.0	100.0	

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