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Intergenerational Financial Exchange and Cognitive Well-Being among Older Adults in China

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INTERGENERATIONAL FINANCIAL EXCHANGE AND
COGNITIVE WELL-BEING AMONG OLDER ADULTS IN CHINA

A Dissertation Presented

by

PING XU

Submitted to the Office of Graduate Studies,
University of Massachusetts Boston,
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2017

Gerontology Program

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COGNITIVE WELL-BEING AMONG OLDER ADULTS IN CHINA

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ABSTRACT

INTERGENERATIONAL FINANCIAL EXCHANGE AND
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December 2017

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Although cognitive loss is part of normal aging, it has unfavorable consequences for older individuals, their family, as well as society. The prevalence of mild cognition impairment is expected to go up in China. How to maintain normal cognition for a longer period of time and to delay impair process is an emerging concern for older Chinese adults. Unlike Western countries, China lacks of formal support system. Intergenerational support between older parents and adult children is a predominant resource when they are in need. This study examines how intergenerational financial exchanges between older parents and their adult children is related to parents' cognitive well-being in the context of Chinese social cultural and family systems, with an emphasis of the differences in the relationship by rural and urban residence. This study focuses on a particular type of

intergenerational exchange, financial transfers, from the older parents' perspective. A modified version of the Mini-Mental State Examination (MMSE) measure of cognitive function serves as the outcome variable. The study also investigates whether there are mediations, namely health-related behaviors and depression, linking intergenerational exchange and cognitive function. Data are drawn from two waves of the Chinese Longitudinal Healthy Longevity Survey (CLHLS) - 2005 and 2008. Results from Latent Class Analysis (LCA) revealed that receiving financial support was the most prevalent pattern among older adults in China. Multinomial regression results showed that older adults who engaged in reciprocal exchange tended to have lower likelihood of experiencing cognitive impairment, providing evidence to support the equity theory. Rural older adults were more disadvantaged than their urban counterparts regarding cognitive well-being and financial exchange. However, no significant rural and urban differences were found in the relationship between intergenerational financial exchange and cognitive well-being. Lastly, some of the intergenerational financial exchange effects on cognitive function were mediated by nutrition. These findings suggest that the inclusion of adequate nutrition intake as a means of maintaining cognition well-being may help communities, families, as well as older individuals, promote a healthy life style and live a high quality of life.

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CHAPTER 1

INTRODUCTION

Purpose of the Study

This study examines how intergenerational financial exchanges between older parents and their adult children is related to parents' cognitive well-being in the context of Chinese social cultural and family systems, with an emphasis of the differences in the relationship by rural and urban residence. This study focuses on a particular type of intergenerational exchange, financial transfers, defined by three patterns of exchanges from the older parents' perspective. These include a) parents receiving low level of financial support from adult children, b) parents receiving high level of financial support from adult children, and c) parents both giving and receiving financial support to and from adult children (reciprocity of exchange). A modified version of the Mini-Mental State Examination (MMSE) measure of cognitive function serves as the outcome variable. The study also investigates whether there are mediations, namely health-related behaviors and depression, linking intergenerational exchange and cognitive function. Data are drawn from two waves of the Chinese Longitudinal Healthy Longevity Survey (CLHLS) - 2005 and 2008 (Zeng, Vaupel, Xiao, Zhang, & Liu, 2001).

Cognitive Function among Older Adults in China

According to the Institute of Medicine (2015, p. 2), “Cognition refers to the mental functions involved in attention, thinking, understanding, learning, remembering, solving problems, and making decisions.” Distinguished from other mental health and well-being statuses, such as depression and life satisfaction, cognitive function focuses more on one’s intellectual (brain) capacities and skills for decision-making. It is a multidimensional concept including a set of mental abilities, such as memory, knowledge, and judgment. Cognitive loss is part of normal aging. Studies have shown that cognitive function decreases with age (Wu, Ying, Gomez-Pinilla, 2011). Pathological cognitive loss includes severe cognitive impairment and dementia. Dementia is not a focus of study here.

Cognitive decline has a number of potential unfavorable consequences for older individuals and their family and is related to increased cost and use of public health services. First, cognitive function is considered a significant indicator of independence in later life (Wang & Li, 2008). For instance, if an older person has difficulties appropriately processing information, remembering things, or making logic decisions, such as managing finances, taking medications, or driving, it would be deleterious for him/her to live independently (Blazer, Yaffe, & Liverman, 2015). Second, cognitive impairment is a profound risk factor for other health problems, such as dementia and even death (Batty, Deary, & Gottfredson, 2007). Thus, cognitive impairment is detrimental to quality of life for the individual and his/her family. Third, cognitive impairment adds health care costs and service use (CDC, 2007). According to a report on cognitive impairment in the US (Alzheimer’s Association, 2011), the prevalence rate of

mild cognition impairment is about 10-20% among those aged 65 and older and about two times as high for those aged 85 and older. Therefore, knowing how to maintain normal cognition for a longer period of time in later life and reducing and delaying the risk of cognitive impairment is salient for older adults.

It is particularly critical to study cognitive function among the older Chinese population for several reasons. The prevalence of mild cognition impairment is about 12.7% among adults aged 60 and over in China (Nie & Wu, 2011). Along with the increasing number and proportion of older adults in China, it is likely that the number of persons with cognitive impairment will go up (Zhang, 2006). Unlike Western countries, China lacks well-developed formal support systems and professional assistance to help older adults in need of care (Lei, Smith, Sun, & Zhao, 2014). Furthermore, relatively less research has been accomplished on cognitive function in China due to data limitations. This is especially true for research on rural and urban differences in cognition – another focus of this study (see below).

Importance of Intergenerational Exchange in China

In general, intergenerational exchange is defined as support given or received between parents and adult children within a family context. The types of support exchanged by family members are based on distinct functions, including instrumental, emotional, appraisal, and informational support (Antonucci, Birditt, Sherman, & Trinh, 2011; Berkman, Glass, Brissette, & Seeman, 2000; Thoits, 2011; Wethington, Moen, Glasgow, & Pillemer, 2000; Kahn & Antonucci, 1980). Instrumental support often refers to financial aid and hands-on activities such as helping with household chores and bill paying, as well as the provision of personal care. It is worth noting that terms like

“exchange”, “transfer”, or “support” were interchangeably used in previous research. Given the relatively underdeveloped pension systems in China and the relatively high disparities across generations in terms of life-time accumulation of savings and other forms of wealth, this study will focus exclusively on financial transfers.

The direction of intergenerational exchange flows both downward (i.e., provided by older parents and received by adult children) and upward (i.e., received by older parents and provided by adult children; Hogan, Eggebeen, & Clogg, 1993; Thomas, 2010). Most of previous studies have focused either on receipt of support or provision of support and its association with later life well-being. However, it is also important to consider both giving and receiving since it not only provides a comprehensive understanding of the exchange possibilities, it also provides a dynamic view on which exchange pattern may be more or less beneficial for older parents. Corresponding to these exchange directions, four patterns may be observed, including providing support only, receiving support only, both providing and receiving support, and no exchange of support.

There are several reasons to investigate intergenerational exchange in China. First of all, financial transfers are a fundamental and critical form of exchange between parents and adult children within China’s social and cultural context (Deindl & Brandt, 2011; Kim & Cook, 2011). Intergenerational financial exchanges are a major resource for older Chinese adults when they are in need, especially when spouses are not available (Wu & Du, 2005). For the past four decades, accelerated aging processes, demographic transitions, migration patterns, family structure changes, fragile social security and health systems, and filial piety traditions (detailed discussion on each factor will be presented in

the next section) have put pressure on the types and levels of intergenerational family support systems in China. Despite changes in terms of family structure and socioeconomic development, family financial support still serves as the predominant resource for both older parents and their adult children (Cong & Silverstein, 2014; Lin & Yi, 2013).

Second, compared to other forms of intergenerational exchange, such as emotional contact and hands-on assistance, monetary support is more tangible, material, and concrete to measure (Guo & Chi, 2010; Sims et al., 2014; Zimmer & Chen, 2012). In particular, financial transfers, or “remittance,” is a more common form of support among adult children who migrate from their home of origin and who often live far away from their older parents (Cong & Silverstein, 2010, 2011; Li, 2001).

Third, the benefits of the intergenerational exchange of support for physical health and psychological well-being have been well-established in Western countries (Antonucci et al., 2011; Berkman et al., 2000; Thoits, 2011); research on this topic is increasing for Asian countries, including China (Cong & Silverstein, 2011; Zhang, Li, & Silverstein, 2005). Relatively little is known about the relationship between intergenerational exchange and cognitive function in China, although social support has been shown to be beneficial for cognitive function in the US (Bassuk, Glass, & Berkman, 1999; Seeman, Lusignolo, Albert, & Berkman, 2001). Some evidence from Chinese studies has shown a positive association between receiving “instrumental” support from family members (mainly referred to as housework and personal care) and cognitive functioning among Chinese rural elders (Wang, Li, & Zhang, 2005). However, they did not find a significant relationship between financial support (receipt of money) and the

risk of cognitive impairment. More recently, Wang and Li (2008), using three waves of survey data conducted in a rural area in Anhui province in China, reported that receiving “emotional” support promoted positive changes in cognition function. The present study seeks to expand our understanding about how intergenerational financial exchange is related to cognitive function among older Chinese adults. For instance, if financial exchange is beneficial for lower risk of cognitive impaired, implications for individuals and families could be provided accordingly.

Thus, a deeper exploration on the protective role of intergenerational financial exchange and cognitive function is required. It is also important to address the factors that influence the patterns of intergenerational exchange. Additional review of the literature is provided in later sections.

Importance of Studying Rural-Urban Differences in China

Rural and urban residential differences have been a historical issue in China (Chan & Zhang, 1999). It started with the household registration system (“hukou”) begun in 1955 in China, which stratified social classes based on rural and urban residency status. About 75% of older Chinese population lives in rural areas for their entire life (National Bureau of Statistics of China, 2014), because the hukou system strongly restricted migration until 1980s, when the economic reform began (Wu & Treiman, 2004). What is more important, people who live in rural areas and who live in urban areas in China have experienced great discrepancies in many ways, including educational opportunities (Wu & Treiman, 2004), job opportunities, access to pension systems, and access to health care systems (Chen, 2009; Liang, Krause, & Bennett, 2001). In other words, where people reside affects their opportunities throughout their life course, which

ultimately influences their wellbeing, including cognitive function, in later life (Dong & Simon, 2010).

Hukou institutional segmentation causes education inequality among rural and urban residents, where the rural population has a high proportion of illiterate than the urban population (Wu & Treiman, 2004). Furthermore, it is almost impossible for rural residents to get a job in cities under the constraint imposed by administrative regulations (Chan & Zhang, 1999). Rural residents are more likely to work in agriculture, which in turn means a longer working period of time without access to a public or private pension compared to urban residents (Cai, Giles, O'Keefe, & Wang, 2012). On the contrary, urban residents, or urban older adults, have historically had greater access to government pension when they retired at age of 50 for women and 65 for men (Cai et al., 2012). Correspondingly, health care services rarely cover rural residents, indicating a higher risk of worse physical and mental health status than urban residents (Chen, 2009).

Further, older urban residents tended to have a higher chance than their rural counterparts to live with adult children in part due to limited housing resources (Chen & Short, 2008; Xie & Zhu 2009), which indicated that financial support to older parents may be considered more as a symbolic function (e.g., respect and care) than as a practical function (Zhu, 2016). Older adults living in urban area were more likely to receive support (both financial and emotional) from their daughters than sons, which was associated with positive subjective well-being (Xie & Zhu, 2009; Zhu, 2016).

Such vast contextual differences based on residential status leads to differences in care needs and support resources, and ultimately, overall well-being, with rural older adults being more disadvantaged than urban older adults. Intergenerational financial

support may play an especially significant role for rural older adults' well-being, including cognitive performance. Thus, it is theoretically important, as well as policy relevant, to investigate the moderating role of residential status on the relationship between intergenerational exchange and cognitive function. However, previous studies have not explicitly examined the living places in intergenerational financial exchange contributes differently to cognition performance in different residential groups.

In brief, rural and urban residence is a factor that warrants a closer look in China where significant discrepancies in terms of standard of living and health care may lead to cognitive function differences. The effects of residential status are complex. Limited research on the residential disparities between financial exchange and cognitive function among older Chinese adults has been published (Dong & Simon, 2010; Zeng, Gu, & Land, 2007). At present, the results are equivocal and inconclusive regarding whether the protective role of financial exchange on cognitive performance is greater among rural elders than urban elders. It is an important focus of this study to explore the rural and urban residential differences for the relationship between intergenerational financial exchange and cognition.

Importance of Studying Mediators Linking Intergenerational Exchange and Cognitive Function in China

If intergenerational financial exchange is related to cognitive function, what if the relationship becomes insignificant once other factors are taken into account? What factors might mediate the relationship? This study will investigate these questions by examining some of the mechanisms linking intergenerational financial exchange and cognitive function. Western researcher has found that health behaviors and related

factors, such as adequate nutrition and availability of medications, and emotional well-being (depression in this study), exert potential mediating effects in this relationship. Exploring the underlying pathways may contribute to Chinese gerontological literature and may have policy and practice implications.

Research Questions

A nationally representative longitudinal data source, the Chinese Longitudinal Healthy Longevity Survey (CLHLS), provides an opportunity to deepen our understanding of the relationship between intergenerational financial exchange and cognitive function, to test whether rural and urban residential status moderates the relationship and to examine whether health-related behaviors and depression mediate the relationship between financial exchange and cognitive function. Among the recent studies of intergenerational support and cognitive function in China, most focus on the influence of one direction of support (e.g., receipt of support) on cognitive function (Deng, Hu, Wu, Dong, & Wu, 2010; Zhu, Hu, & Efrid, 2012). Nonetheless, theoretical perspectives from Western scholars have shown that providing support and reciprocity in support exchange is beneficial to well-being as well.

This present study addresses the following specific research questions.

- 1.1 What is the prevalence of intergenerational financial exchange patterns?
- 1.2 What are the determinants of intergenerational financial exchange patterns?
2. Compared to older parents who received financial exchange from adult children, do older parents who provided financial support, or experienced reciprocal

exchange with their adult children have lower prevalence and incidence of cognitive impairment?

3. Is the relationship between intergenerational financial exchange and cognitive function different for older Chinese adults depending on whether they live in urban versus rural communities?

4. Do health-related behaviors and depression mediate the association between intergenerational financial exchange and the risk of cognitive impairment?

CHAPTER 2

LITERATURE REVIEW

China's Greying Population

Changing age structure. The Chinese population is rapidly aging due to low fertility rates and increases in longevity. The one child per couple policy was initiated in 1979 in China; since then, the total fertility rate rapidly decreased from about 7.5 births per woman in 1963 to 1.6 births per woman in 2009 (Wu & Li, 2014). According to the 2013 Report on China Aging Development (hereafter, the Report) by the Chinese Academy of Social Sciences, the number of people aged 60 years old and above is about 202 million, making up 14.8% of the total Chinese population, among which more than 60% live in rural areas. Furthermore, the size of the oldest-old population (aged 80 and above) was 23 million in 2013. Meanwhile, the dependency ratio, which is the ratio of the total number of people aged 65 years and above to the number of people aged 15 to 64 years, has increased from 20.7% in 2012 to 21.6% in 2013 (Report, 2013). It is estimated that the size of older population (65 and older) will be about 400 million in 2050, which means that there will be one older adult for every three persons under the age of 65 (National Bureau of Statistics of China, 2014). More importantly, this aging trend will continue. However, longer life expectancy does not always indicate a healthy later life. The greying of China's population means increases in concerns over this population's physical, mental, and cognitive health. As of 2013, about half of older adults had at least

one chronic disease, and the number of older adults with functional limitations was 37.5 million (Report, 2013).

Population migration from rural to urban areas. In addition to the changing age structure in contemporary China, China has also experienced profound social and economic development. Chinese economic reforms were initiated in urban areas in 1978 and subsequent multidimensional reforms across the country have dramatically brought about economic growth. Along with the process of industrialization and urbanization, a group of people called the “floating population” has emerged in China. Younger adults, who are most often from the rural labor force, are moving from their villages to urban areas in order to get better jobs and have a better life. According to the 2014 Report on Chinese “floating population” released by the National Health and Family Planning Commission of China, in November 2013, there were 245 million migrants in 2013. That is, about 1 in 6 people in China are migrants. Because the flow of migration from rural to urban areas is age-graded, many older adult family members are left behind in rural areas. This likely has implications for the older adults’ health and income security.

Changes in family structure, and relationships. Population migration from rural to urban areas results in significant changes in family structures and patterns of care for older adults. The percentage of older adults living with adult children in rural areas dropped from 70% in 1991 to 40% in 2006 (World Bank, 2012). These so-called “empty nest” families, defined as older adults who live without adult children in their households, making up about 50% of the total older population, with up to 70% of all empty nesters living in rural areas (National Bureau of Statistics of China, 2014). The gap between the dependency ratio for rural older adults and for urban older adults has grown from 4.5% in

2008 to 13% in 2030, indicating that potential support for older persons in rural areas has decreased relative to older persons in urban areas (World Bank, 2012).

Changing family norms. Social norms and values of filial piety in Chinese culture require that adult children provide support to older adults, and older adults anticipate receiving support from adult children when they are in need of care and support. The traditional norms provide the impetus for intergenerational support and have been shown to be related to the well-being of Chinese elders (Chen & Silverstein, 2000). The primary care providers of older adults have historically been their adult children, when spouses are not able to provide care (Lei et al., 2012; Zimmer & Chen, 2012). Sons are preferred as providers of financial and other forms of instrumental support, whereas daughters are expected to be emotional support providers and to provide direct care (Cong & Silverstein, 2014). It is not surprising that upstream transfers (from adult children to their older parents) are predominant (Lei et al., 2012; Lin & Yi, 2013). However, downstream transfers (from older parents to adult children/grandchildren) has become more prevalent during the relatively recent socioeconomic development, urbanization, and family structure changes. When adult children, especially in rural areas, leave home to find work in urban areas, their parents are often expected to take care of the adult children's dependent off spring (Xu & Chi, 2011). This also means that, in some cases, the older parents' support network is no longer geographically proximate, at least as it applies to their adult children.

Challenges for public support systems for older adults. The public social security system and other support services for older Chinese adults are inadequate and inefficient. The provision of government-backed old-age pensions is restricted to specific

segments of the older population. The pension system initially was established for those who worked for the government and for state-owned enterprises, primarily in urban areas. Relatively few workers were covered by this program in rural areas. Although the national pension program has expanded to rural areas since 2009, large discrepancies continue to exist for urban and rural older adults in terms of pension levels and coverage. For instance, the national average monthly income is 1511 yuan (1 dollar = 6.8 yuan) for urban workers but only 55 yuan for rural residents in 2011 (Wu & Li, 2013). In 2008, the national pension system covered more than half of the urban workforce but only 7.8% of the rural workforce (Wu & Li, 2013).

The national health insurance system is another challenge that older Chinese adults have to face. Health insurance is not universal in China and it differs by urban and rural residence with regard to coverage, reimbursement rates, and payment ceilings. The Urban Employee Basic Medical Insurance (UEBMI) and the Urban Resident Basic Medical Insurance (URBMI) programs only cover urban employees and their families. The New Cooperative Medical Scheme (NCMS) is a program first available in 2004 for rural residents (Government work report, 2012). These three health insurance programs primarily cover inpatient medical expenditures but provide little coverage for outpatient services. A recent study using the 2008 pilot survey of the China Health and Retirement Longitudinal Study (CHARLS) shows that although the enrollment rate is higher for NCMS (45.80%) than for URBMI (38.52%) and UEBMI (26.19%), its reimbursement rate is much lower, varying from 60% to 85% by province (Zhong, 2011). UEBMI is the most generous program with up to a full reimbursement rate. However, most older adults are not eligible for UEBMI, since the majority of elders live in rural areas. As such, the

health insurance system deepens Chinese rural-urban inequalities, potentially leaving short-falls in income security and health care financing left to members of the older adults' families.

Factors Associated with Intergenerational Financial Exchange

Intergenerational exchange between older parents and their middle-aged children related to at least three sets of factors (Khan, 2014). These include older adult's characteristics, family structure and characteristics, and cultural preferences. Research on each of these is described in more detail below.

Older adults' characteristics. Older parents' characteristics may be classified as needs, resources, and attitudes. Contingent exchange theory suggests that individuals engage in exchanges based on his/her needs (e.g., measured by health conditions; Deutsch, 1975; Davey & Eggebeen, 1998). Older adults who are in greater need of support, such as in terms of finances, care with basic and instrumental daily activities, or emotional comfort, are more likely to receive support compared to those in less need. Conversely, older parents are expected to provide support, no matter which form, when their younger children were in need (Lee & Xiao, 1998). Frankenberg and colleagues (2002) find that transfers within family members served as an important means of insurance when in need.

However, other scholars argue that compared to those who were not in need, older parents who need support tend to receive less support from their adult children (Greenwell & Bengtson, 1997). Greenwell and Bengtson (1997) explain that the concept of "social class" is important. Social class refers to older adults' human and financial capital resources, for instance, education, occupation, and income. Older parents who are

in a higher social class (e.g., highly educated with better jobs and income), seek help from non-family sources, such as paid private helpers, when they are in need rather than from their adult children. By contrast, older parents who in the lower social classes (i.e., lack of resources) tend to rely more on informal sources of support, especially family members – including adult children.

Attitudes toward intergenerational exchange are also associated with exchange patterns (Blazor et al., 2015). Social exchange theory posits that a person who exchanges resources with others is largely motivated by the benefits of these exchanges (Homans, 1958). The probability of receiving help was lower for older adults who had little resource to share than for those who had more to give (Greenwell & Bengtson, 1997). In sum, older parent's individual characteristics, such as educational attainment, occupation, income, and self-rated health conditions were related to their exchange behaviors with adult children.

Family structures and child characteristics. Number of children is associated with different patterns and types of intergenerational support, suggesting that having more children is related to higher likelihood of receiving support in later life (Zimmer & Kwong, 2003). Furthermore, the gender of the child(ren) plays an important role influencing intergenerational relations, since daughters and sons tend to provide different forms of support (Silverstein, Parrott, & Bengtson, 1995; Song & Li, 2010; Song, Li, & Feldman, 2012; Whyte & Xu, 2003). Lee and Xiao (1998) argue that sons are expected to be the primary provider of monetary support in Chinese culture. More recent research on the effects of migrating sons on their older parents' well-being has shown that sons who migrated for work reasons are more likely to provide financial assistance than were sons

who remained in the same geographic area (Guo, Aranda, & Silverstein, 2009; Song, Li, & Feldman, 2012). Daughters, in general, are more involved with instrumental support and emotional contact, especially so for married daughters (Song, Li, & Feldman, 2012; Zeng, Brasher, Gu, & Vaupel, 2016). Older adults who live with one of their children tend to exchange more instrumental support with their adult children (Chen, Short, & Entwisle, 2000; Knodel & Chayovan, 2009). The more often older adults and their middle-aged children contact each other, and the closer emotional the relationship is, the more likely they would like to exchange support (Lee, Parish, & Willis, 1994). Therefore, at the family level, characters such as the number of children, children's gender, living arrangement, and relationship proximity can be considered as determinants of financial support.

Cultural preferences and public services. The social environment and public health services are associated with intergeneration exchange behaviors (Blazer et al., 2015; Cooney & Dykstra, 2011). In countries where social welfare systems for older adults are more advanced, for instance in the US and some European countries, intergenerational exchange between parents and adult children are less likely than for persons living in developing and underdeveloped countries (Deinal & Brandt, 2011). Despite the important effects of cultural and public services, this study does not have data available to measure it.

In sum, the determinants of intergenerational exchange are numerous and complex. Although the literature suggests that psychological characteristics of older adults (e.g., attitudes toward intergenerational exchange and preferences for support) may also be important (Blazor et al., 2015; Deinal & Brandt, 2011), this study will focus on

structural characteristics of individuals and families that are expected to be related to exchange behaviors, including older adult's socioeconomic status, health conditions, number of sons, number of daughters, living arrangement, and parent-child emotional closeness.

Intergenerational Financial Support and Cognitive Function

Receiving financial support and cognitive function. Receiving support from others has been the most common pattern of support exchange among older adults. A large body of literature has shown a positive association between receipt of support and cognitive functioning (Holtzman et al., 2004; Seeman et al., 2001; Yeh & Liu, 2003; Zhu et al., 2012). Social support is protective against distress and mental health, and promotes self-efficacy, reducing the loss of cognitive function (Cohen & McKay, 1984; Cohen & Wills, 1985). Zhu and colleagues (2012), using a quasi-random sample aged 60 years and above from central China, found that receiving support from family members has a stronger association with older Chinese adult's cognitive function than from friends or other contacts. It is possible that the older parents' expectations are met, which is, children should take care of them so that it is beneficial for the maintenance of cognitive abilities (Zhu et al., 2012; Siu & Phillips, 2002). Another cross-sectional study among Taiwanese city residents found that perceived support from friends was associated with better cognitive scores, in part because active interaction with friends stimulates the brain (Yeh & Liu, 2003). Exchange with family members, friends and neighbors is one effective way to stimulate one's brain to maintain cognitive performance.

However, other studies have shown that receipt of support could be negatively associated with cognitive function (Sims et al., 2014). Using a healthy study sample for

cardiovascular risk factors, cognitive function, and neuroimaging, Sims and colleagues (2014) find an inverse association between distinct functions of support and cognitive function. Windsor and colleagues (2014) also found that negative exchange between family members is related to decline of cognitive performance. They argue that conflicts are more likely to occur between family members than between friends, which leads to distress on the brain, which is deleterious to cognition (Windsor et al., 2014). According to reciprocity theory (Gouldner, 1960; Walster, Berscheid, & Walster, 1976), it is stressful if the receivers of support are not able to give support back to the provider. Further, failing to reciprocate may engender a feeling of dependency and uselessness (Sims et al., 2014; Uehara, 1995). These negative feelings are harmful for psychological well-being, which is linked to risk of cognitive decline. Some other studies have found no association between receiving financial assistance and well-being (Chen & Silverstein, 2000; Zhang et al., 2005).

Giving financial support and cognitive function. Social exchange theory, proposed by Homans in 1958, is based on the concepts of costs and rewards (or benefits). When the relationship is more intimate and stable, such as the relationship between parents and their adult children, however, the rules of exchange allow for reciprocity to take place over a long period of time. Thus, older adults withdraw support from their “support bank,” based on their investments in their adult children in earlier life (Antonucci & Jackson, 1990; Chou, 2009). In addition, this theory posits that the more support older adults provide, the more they will get, ultimately maximizing overall well-being of the family (Chou, 2009; Chou & Chi, 2001).

Support exchange is most appropriate when it is provided to people who are in need (Eggebeen & Davey, 1998). This perspective helps explain why older adults give more support to adult children with low income and to unemployed children. The provision of support also depends on parents' needs and children's relative ability to provide support (Szinovacz & Davey, 2012). Davey and Eggebeen (1998), using two waves of the National Survey of Families and Households, examine the effects of patterns of intergenerational exchange on mental health, finding that giving support to others in need is associated with better mental health of the support giver.

Older adults who provide emotional and instrumental support, often in the form of caring for grandchildren, are more likely to have better psychological well-being within a short period of time (Chao, 2011; Chen & Silverstein, 2000). The association becomes negative when older adults care for grandchildren over long periods of time, partially because of feelings of burden (Chao, 2011).

Inconsistent findings exist regarding the association between providing financial support and well-being in China. Some studies find no significant association linking providing financial assistance to adult children and older parents' well-being (Chen & Silverstein, 2000; Chi & Chou, 2001; Silverstein, Cong, & Li, 2006); whereas other research finds providing financial support to be related to lower levels of depressed or better cognitive function (Chao, 2011; Wang and Li, 2008). Such mixed findings require further research. Older adults who are able to provide financial support to their adult children could be in better health status. Thus, it is expected that providing financial support is related to better cognitive function.

Reciprocity of financial exchange and cognitive function. Exchange theory also posits that a person becomes involved in exchange behaviors if he/she is able to maximize his/her benefits in the process of the exchange (Homans, 1958). Individuals would be satisfied if the relationship is profitable. Exchange theory argues that over-benefitted exchange would be beneficial to one's well-being since people strive to maximize their benefits and minimize their losses. Studies have explored the association between support reciprocity and well-being, such as life satisfaction, indicating that over-benefitted (support received exceeds support provided) reciprocal support is associated with higher levels of life satisfaction (Li, Fok, & Fung, 2011). Thomas (2010) and Lee and colleagues (2014) also reported that both giving and receiving support enhanced older adults' well-being, with giving support to others playing a more essential role.

Equity theory (Walster, Walster, & Berscheid, 1978) emphasizes the fairness or balance of the support exchange relationship. Social equity theory argues the fairness of support exchanges, emphasizing the effects of support balance on well-being (Adams, 1965; Li, Fok, & Fung, 2011). Unbalanced exchange, over-benefitted or under-benefitted, is seen as an unsatisfactory experience. From this perspective, ability to reciprocate exerts crucial effects on one's well-being when a person is involved in intergenerational exchanges. Being under-benefitted, referring to the extent of which one provides support or other valued resources in excess of what is received, is expected to be associated with negative outcomes. Older adults receiving more support may consider themselves dependent because of their inability to return support, yielding unfavorable health outcomes.

However, it would not necessarily be true in the Chinese context. Unlike Western cultures, which places a high value on being independent while maintaining privacy and individualism, Chinese culture and social norms are influenced by filial piety (Cheng & Chan, 2006), and even by law. It is the family's obligations to take care of older parents; and older adults are obligated to care for grandchildren, as well (Zimmer & Kwong, 2003). Being under-benefitted would be associated with better well-being since giving help to adult children is an indicator of maintaining parental roles and being active and independent (Stryker & Burke, 2000). That is, parents have a duty to take care of children and children have a responsibility to care for older parents, as well. In the Chinese case, the absence of receiving support from adult children would be expected to be deleterious to parents' well-being.

Last but not least, with respect to the order of benefits for the three types of exchange patterns on cognitive function, it is expected that: reciprocity > providing only > receiving only > no exchange. According to social exchange theory and equity theory stated above, the ideal form of exchange is reciprocity, or mutual assistance. Thus, it is expected that older parents who engage in both giving and receiving financial support with their children will benefit the most compared to those who do not exchange at all. Further, providing financial support to adult children is a symbolic of better situation than those who receive financial support only. Thus, it is expected that older parents who provide financial support to adult children will be better off in cognition than those recipients of financial support. Finally, older parents who receive financial support only are expected to be better off in cognition than those who do not participate in exchange behaviors since some form of support would be helpful than nothing.

Moderation Effects: Rural versus Urban Residence

As stated earlier, China's historical reasons and government policies caused huge gap in urban and rural areas, including pension system, health care services and system, social network, and even the pollution, which may yield differences in residents' well-being, including cognitive function (Wu & Treiman, 2004). Accordingly, at the individual level, people who were born and lived in rural areas were more disadvantaged in nutrition, education, mental stimulation through skilled occupations, and access to health care; all of which are correlated with cognitive development and maintenance (Liang et al., 2001; Miu et al., 2016; Zeng, Gu, & Land, 2007). Thus, older rural adults may encounter a higher risk of being cognitively impaired due in part to disadvantages in socioeconomic conditions, among which educational attainment plays an important role (Miu et al., 2016; Zeng & Vaupel, 2002). For instance, Zhang and colleagues (2008), using the 1998 and 2000 waves of the Chinese Longitudinal Healthy Longevity Survey, estimated the effects of early life experience on cognitive impairment among the oldest old Chinese, and found that living in urban areas is protective against impairment onset. In particular, compared to urban male elders, the risk of cognitive impaired onset is about two thirds higher among male counterparts who lived in rural areas (Zhang et al., 2008). Further, urban oldest-old have better cognitive function compared with rural residents (Zeng & Vaupel, 2002).

In terms of intergenerational exchanges, the patterns are also different between rural and urban older adults due to education, income gap, and living resources (Lee & Xiao, 1998; Zimmer & Kwong, 2003). In particular, compared to their urban counterparts, the rural elderly population is in a more unfavorable and fragile situation.

Urban older residents often have pensions and health care insurance after retiring, indicating a higher possibility for them to provide financial support to adult children; whereas rural older adults rely more on their adult children's financial support to meet their needs (Xu & Chi, 2011).

Thus, it is expected that in general intergenerational financial exchange may have a stronger protective effect on rural older adults' cognitive function. Specifically, rural parents' cognition is expected to benefit more from receiving financial support from adult children than their urban counterparts.

Mediation Effects: Health Behaviors and Emotional Well-Being

Based on previous studies, researchers have proposed two main potential pathways through which intergenerational exchange may be related to cognitive function. The first set of factors are health-related behaviors, such as nutrition, medications, and health management practices. Receiving support from family members has been found to be related to the recipients' health behaviors and health status (Shi, 1993; Thoits, 2011; Zhang, 2005). Tangible support, in particular financial support, is more likely to solve stressful problems directly and provide resources for the use of health care services to help maintain cognitive performance (Seeman et al., 2001). Furthermore, research has shown that adequate consumption of healthy food (e.g., vegetables, fruits) is associated with better cognitive function (Blazer et al., 2015; Tsai, 2015). Living a healthy lifestyle, for instance, engaging in proper nutrition, less alcohol intake, and not smoking, prevent cognitive decline (Espeland et al., 2015; Ferreira, Owen, Mohan, Corbett, & Ballard, 2015; Valls-Pedret et al., 2015). Therefore, it is expected that intergenerational financial

exchange is beneficial for older adults' health-related behaviors, which in turn protect against cognitive impairment.

A second pathway linking intergenerational support and cognitive performance may include emotional well-being, in particular depression. Empirical evidence shows that exchange of financial support is negatively associated with distress and depression (Chao, 2011; Chen & Silverstein, 2000; Cong & Silverstein, 2008b; Lee et al., 2013; Li, Fok, & Fung, 2011; Zhang & Chen, 2014). Furthermore, lower levels of depression are related to better cognitive function (Blazer et al., 2015; Bunce, Batterham, Christensen, & Mackinnon, 2014). Similarly, Sims and colleagues (2014) revealed that receiving support helps alleviate stressful events, which are in turn associated with poorer cognitive function. Thus, it is anticipated that engaging in financial exchange with their adult children reduce level of depression that ultimately have lower incidence of cognitive impairment, relative to those older adults who do not exchange.

Other Factors Related to Cognitive Function

Other factors related to cognitive function include sociodemographic characteristics (e.g., age, gender, educational attainment, marital status, income), health status (e.g., cardiovascular diseases), and social participation (Anstey et al., 2007; Hogan, 2005; Seeman, Lusignolo, Albert, & Berkman, 2001; Wu et al., 2011).

Cognitive function (i.e., memory, attention, executive function) normally declines with age, however, certain domains of cognition such as knowledge and wisdom may increase with age (Blazer et al., 2015; Harada, Love, & Triebel, 2013; Park, 2000). Female elders tend to perform better in terms of cognitive function (especially in memory domain) relative to their male counterparts (Halpern, 2004; Rochette et al., 2016;

Maitland, Intrieri, Schaie, & Willis, 2000). Married couples maintain normal cognitive function longer than non-married (e.g., single or widowed) older adults (Karlman et al., 2009). Older adults with higher education are more likely to have lower risk of cognitive impairment (Alley, Suthers, & Crimmins, 2007; Brewster et al., 2014; Jefferson et al., 2011). It is worth noting that older adults with lower levels of literacy are at higher risk for experiencing mild cognitive impairment (Lee & Chi, 2016; Nie & Wu, 2011). Income and wealth are associated with better cognitive function among older adults (Jefferson et al., 2011; Karlman et al., 2009; Wilson et al., 2005).

Health status is also related to cognitive function. Older adults with cardiovascular diseases have higher risk for cognitive impairment (Blazer et al., 2015). Physical activity and leisure exercise may be protective factors against cognitive decline, due in part to its health benefits for vascular-related diseases (Brewster et al., 2014; Buchman et al., 2012; Su et al., 2015).

Higher levels of social interaction and social engagement are related to better cognitive performance (Glymour & Manly, 2008). Choi and colleagues (2016) argue that being socially active may reduce distress or loneliness, which ultimately is beneficial for cognition among older Koreans. On the contrary, social isolation is associated with higher risk of cognitive decline, largely due to a lack of mental stimulation (Badcock et al., 2015; Brown et al., 2012). In sum, sociodemographic characteristics, health status, and social participation will serve as covariates when examining the association between intergenerational financial exchange and cognitive function.

Hypotheses

Based on the conceptual framework and previous empirical evidence, the following hypotheses are proposed:

1. The prevalence and predictors of patterns of intergenerational exchange:

Hypothesis 1-1: Receiving financial support from adult children is the most common pattern, followed by the reciprocal exchange of financial support.

Hypothesis 1-2: Parents who have higher socioeconomic status (SES) and better health status, are more likely to be involved with providing financial assistance to their adult children compared to those with lower SES.

Hypothesis 1-3: Older parents who have more sons, do not live with their children, and have closer relationship with children are more likely to receive financial support from adult children.

2. The relationship between intergenerational exchange and cognitive function:

Hypothesis 2-1: Compared to older parents who do not exchange financial support, those who received financial support only will have better cognitive function.

Hypothesis 2-2: Compared to older parents who do not exchange financial support, those who provided financial support only will have better cognitive function.

Hypothesis 2-3: Compared to older parents who do not exchange financial support, those who engaged in reciprocity of financial support will have better cognitive function.

Hypothesis 2-4: Compared to older parents who provided financial support only, those who received financial support only will have higher risk of cognitive impairment.

Hypothesis 2-5: Compared to older parents who provided financial support only, those who both provided and received financial support will have lower risk of cognitive impairment.

Hypothesis 2-6: Compared to older parents who both provided and received financial support, those who received financial support only will have higher risk of cognitive impairment.

3. The moderation effects for the association between intergenerational exchange and cognitive well-being:

Hypothesis 3: The relationship between intergenerational financial exchange and cognition is stronger for older adults who live in rural areas compared to older adults who live in urban areas.

4. The mediation effects linking intergenerational exchange and cognitive well-being:

Hypothesis 4-1: The relationship between intergenerational financial exchange and cognition is mediated by health behaviors, nutrition and medication.

Hypothesis 4-2: The relationship between intergenerational financial exchange and cognition is also mediated by depression.

CHAPTER 3

METHODOLOGY

Data Source

This study drew on data from two waves of the Chinese Longitudinal Healthy Longevity Survey (CLHLS) in 2005 and 2008 (Zeng et al., 2008). The CLHLS was a nationally representative panel study of Chinese older adults age 65 and older living in the community. The panel study began in 1998 based on a random sample of counties and cities in 22 Chinese provinces, originally focused on the oldest-old, persons aged 80 and above. Since 2002, the CLHLS included young older adults aged 65-79.

The CLHLS is well suited for this study. It provides a wide range of information on the prevalence and incidence of health conditions, including physical health, cognition, and mental health. Meanwhile, it is also a useful source of family structure information, especially intergenerational exchanges between older parents and their adult children and grandchildren. Very few large-scale studies contain nationally representative information on both of the above two issues for the Chinese population. Among those studies considering the association between intergenerational exchange and health status, most are from regional samples and are based on a cross-sectional research design. The CLHLS data overcomes both of these limitations.

Study Sample

The CLHLS had 15,638 respondents aged 65 and above who were interviewed in 2005 (baseline data in this study), among which 7,472 respondents were re-interviewed at the 2008 wave; 5,209 died before the 2008 survey, and 2,957 were lost to follow-up at the 2008 wave (time 2 observation in this study). The present study was restricted to community dwelling older adults who were between the ages of 65-105 years old, excluding 699 older adults age 106 and over from the study. The upper age limit was based on recommendations from Zeng and Vaupel (2002) and Zhang (2006), who argued that it was difficult to validate the cognitive information and accuracy of reported age among respondents aged 106 and above. In addition, because this study focused on intergenerational exchange patterns between older parents and their adult children, older adults who did not have any living children were excluded ($n = 784$) from the study sample as well. Older adults without living children showed significantly lower mean cognitive scores in relative to older adults with living children ($t = -6.04, p < .001$).

Furthermore, the percentages of missing data on key variables were relatively small (1% - 4%). Listwise deletion of missing cases yielded a final sample size of 12,020 at baseline (for prevalence models). Among the 12,020 older adults, 9,935 older adults (82.7%) were cognitively normal at baseline, which was the study sample for the incidence models. Descriptive statistics and analyses were based on unweighted data, following the strategy from previous studies using the CLHLS (Gu & Xu, 2007; Gu, Zhang, & Zeng, 2009; Li, Zhang, & Liang, 2009).

Measurement

Cognitive function. The Mini-Mental State Examination (MMSE), created by Folstein and colleagues (1975) was widely used to measure global cognition functioning in survey research. This scale consisted of 30 items that evaluate cognitive orientation, attention, recall memory and language. Scores range from 0 to 30, with higher score indicating better cognitive function. A modified Chinese version of 30 compatible items from the MMSE scale was utilized to measure cognitive function. The 30 items included two dimensions of cognitive health: memory and mental status. First, with respect to memory, respondents were asked to immediately repeat three words read to them and to repeat the same three words a few minutes later. In addition, 25 items addressed the respondents' mental status, such as calculating a series of 3's, naming today's date (month, day, year, and season), the day of the week, naming foods, and redrawing a picture. Respondents with dementia were not able to participate in this section, thus the MMSE only indicates levels of cognitive impairment and was not a test for dementia. A dichotomous variable for cognitive impairment was created, with scores higher than 18 indicating adequate cognitive function, following the criteria set by previous studies with older Chinese adults (Gu & Qiu, 2003; Zhang, 2006; Zhang, Gu, & Hayward, 2008). In 2005, about 17.3% of the respondents scored equal to or lower than 18.

This study also focused on the incidence of cognitive impairment between 2005 and 2008. Respondents who were cognitively impaired at baseline ($n = 2,085$) were not included in this phase of the analysis. This study included older adults who died or were lost to follow-up at time 2 to reduce selection bias and control for competing risks. Based on respondents' cognitive situation both in 2005 and in 2008, the dependent variable

included four categories: a) becoming cognitively impaired, b) died, c) lost to follow-up, and d) remaining cognitively normal over the observation period (reference group).

Intergenerational financial exchanges. In the 2005 wave, CLHLS asked respondents about intergenerational exchanges between parents and their adult children with respect to financial support. Economic support referred to these questions: “*In the past year, how much economic support did you or your spouse receive from your son/daughter-in-law or daughter/son-in-law?*” In addition, respondents were asked: “*In the past year, how much economic support did you or your spouse provide to your son/daughter-in-law or daughter/son-in-law?*” Respondents answered with actual amount of money in yuan (1 dollar = 6.7 yuan). This study considered both son/daughter-in-law and daughter/son-in-law as older adults’ children with whom financial exchanges may have occurred. Therefore, the total amount of money that the older adult received or provided was the sum of money from both son/daughter-in-law and daughter/son-in-law. For instance, the total amount of money that the older adults provided equaled to the amount of money older adults gave to son/daughter-in-law plus the amount of money older adults gave to a daughter/son-in-law.

The amounts of money given and received showed highly skewed distributions; the skewness of the amount of money received was 14.15 (ranges 0–120,000 yuan) and the skewness of the money given was 29.36 (ranges 0–100,090 yuan), given the acceptable range of skewness would be between -2 and 2. Therefore, the amount of money older adults received was coded into five categories based on its quartile distribution (1 = 0, 2 = 1–300, 3 = 301–800, 4 = 801–1,800, and 5 = 1801–120,000). The amount of money older adults provided was coded into four categories based on its

distribution (1 = 0, 2 = 1–1,000, 3 = 1,001–5,000, and 4 = 5,001–100,090) in order to adjust the skewness. This study examined the intergenerational exchange at time 1 (baseline) in the prevalence and incident models.

I acknowledged the important role of other types of intergenerational support for older adults' well-being, such as emotional and instrumental hands-on support. Due to data limitations, however, these were not included in this study.

Moderator. Rural and urban residence served as the moderator and was captured by interviewer observation – “*current residence area of interviewee*” in 2005. The residence was coded 1 = *urban* and 0 = *rural*. About 43% of the study sample lived in urban areas, while 57% lived in rural areas. The percentage of respondents living in rural and urban areas kept stable in 2008.

Mediators. Two types of mediators were employed to examine the potential mechanisms linking intergenerational exchange and cognitive function in later life: health-related behaviors and depression. First, two health-related behaviors were operationalized: a) whether or not older adults received adequate medical service at present when experiencing serious illness (self-reported; 1 = *having received adequate medical services* and 0 = *not having received adequate medical services*) and b) whether or not older adults had access to adequate nutrition (e.g., meat, fish, egg; self-reported; 1 = *having adequate nutrition* and 0 = *not having adequate nutrition*).

Second, depression was measured by seven statements: “look on the bright side of things,” “keep my belongings neat and clean,” “feel fearful or anxious,” “feel lonely and isolated,” “make own decisions,” “feel useless with age,” and “be as happy as when younger.” The response was coded as 1 (*yes*) and 0 (*no*), and the sum scores across

statements were calculated (ranges 0 to 7). Since approximately 49% of older adults reported score less than 2, I used a dichotomous variable for depression: 1 = *depressed* (respondents with scores 3 and higher) and 0 = *not depressed* (respondents with scores less than 3).

Covariates. Control variables included (older parent) respondent's demographic characteristics: age group (1 = *young-old; 65-79*, 0 = *old-old; 80+*), gender (1 = *female*, 0 = *male*), ethnic group (1 = *minority ethnic group*, 0 = *Han group*), and marital status (1 = *married*, 0 = *divorced/widowed/never married*). Older adult's socioeconomic status was also controlled: educational attainment (1 = *having some years of schooling*, 0 = *having no school*), occupation (1 = *agricultural work*, 0 = *others*), self-reported economic independence (1 = *having economic independence*, 0 = *not having economic independence*).

A set of family characteristics was included as well: number of children alive, number of living sons, number of living daughters, number of children who visited the respondent frequently, and living arrangements (1 = *lives alone*, 0 = *lives with others*).

Health and health-behaviors were also controlled, including self-rated poor health (1 = *poor*, 0 = *very good/good*), limitations in activities of daily living (ADLs; 1 = *having at least one*, 0 = *none*), chronic diseases (1 = *having at least one*, 0 = *none*), and three dichotomous health-related behaviors (i.e., smoking, drinking alcohol, and exercise; 1 = *yes*, 0 = *no*). Further, social participation of respondents was controlled; measured by whether or not respondents engaged in playing cards and/or mah-jong, reading, watching TV, and gardening (1 = *yes*, 0 = *no*).

Analytic Strategy

First, descriptive statistics for the study variables and bivariate analysis results between outcome variable (cognitive well-being) and key predictors were presented for the full sample, as well as for urban and rural subsamples. Next, analyses were conducted to answer the four research questions stated in Chapter 2 accordingly.

Research question 1: Patterns of intergenerational financial exchange and its related factors. To address *Hypothesis 1-1*, Latent Class Analysis (LCA) was conducted to classify patterns of intergenerational financial exchange between older Chinese adults and their adult children. According to Collins and Lanza (2010), LCA incorporated multiple dimensions of a set of variables into one or more latent classes, which often cannot be observed but may be inferred from a set of observed indicators. The LCA was conducted with Mplus version 7. In this study, two key indicators were the amount of money given to (5 categories) and received from their adult children (4 categories). The two key indicators were treated as continuous variables in LCA. The optimal number of latent classes was determined based on several goodness-of fit statistics, often including the likelihood ratio chi-square test statistic (G^2), the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), Entropy, and bootstrap likelihood ratio tests.

Regarding *Hypotheses 1-2* and *1-3*, a bivariate association of each covariate with the derived types of intergenerational financial exchange was examined, using a series of ANOVA. Multinomial logistical regression was employed to examine what characteristics were associated with each exchange pattern.

Research question 2: The relationship between intergenerational financial exchange and cognitive function. Both prevalence and incidence of cognitive

impairment were examined in this study. For the prevalence models (*Hypotheses 2-1 to 2-3*), the dependent variable of cognition was a dichotomous variable (1 = *cognitively impaired*, 0 = *cognitively normal*) at baseline. A series of logistic regression models were estimated by including sets of variables hierarchically (5 models). Model 1 regressed the prevalence of cognitive impairment on intergenerational financial exchange patterns without any covariates (i.e., unadjusted model). Model 2 included rural and urban residency in addition to intergenerational exchange patterns. Model 3 incorporated individual's socioeconomic status (SES). Model 4 added individual's demographic characteristics and family characteristics. Model 5 included health, health behaviors, and leisure activities (i.e., full model). For prevalence models, odds ratio (OR) and 95% confidence interval (95% CI) were reported.

For incidence models (*Hypotheses 2-4 to 2-6*), the dependent variable was the incidence of cognitive decline from 2005 to 2008 among older adults whose cognition was normal at 2005. There were four categories: a) becoming cognitively impaired, b) died, c) lost to follow-up, and d) remaining cognitively normal over the observation period (reference group). I employed a series of multinomial logistic regression models to examine the onset of cognitive impairment, along with reasons for sample attrition. Similar to the prevalence models, hierarchical inclusion of sets of variables were utilized for incidence models. For incidence models, relative risk ratio (RRR) and 95% confidence interval (95% CI) were reported. These analyses were conducted using STATA 14.

Research question 3: The moderating effects for the association between intergenerational exchange and cognitive function. To address rural and urban

residence moderating effects for the association between intergenerational financial exchanges and cognitive function (*Hypothesis 3*), two approaches were utilized. First, I generated interaction terms between rural/urban residence and the exchange groups. Second, I stratified sample into an urban subsample and a rural subsample to further test whether the relationship between covariates and cognition were different among urban older adults in relative to rural older adults. Wald tests were employed to determine whether any differences were statistically significant. As stated earlier, both prevalence models and incidence models were examined.

Research question 4: The mediating effects linking intergenerational exchange and cognitive function. To examine the mediating role of medical services, nutrition, and depression between intergenerational financial exchange and cognitive well-being (*Hypotheses 4-1 to 4-2*), I used the mediation approach provided by Baron and Kenny (1986). Three paths involved in the mediation analyses were depicted in Figure 1. To begin with, the mediators were independently regressed on intergenerational financial exchange and the covariates (Path a). Next, direct effects of exchange on cognition were estimated (Path c). Third, mediators were added into the exchange-cognition regression models, respectively (Path b). Comparing mediator effects on outcomes (Path b) and direct effect of intergenerational exchange on cognitive well-being (Path c), if both paths show independently significant relationships, there may be evidence for mediation. Also, if the main effects of exchange were reduced or became insignificant (Path c), it could be concluded that mediating effects occurred. Furthermore, bootstrapping technique was employed to test the significance of mediation effects – whether indirect effects of exchange patterns via mediators were different from zero (Hayes, 2013; PROCESS

version 2.16 in SPSS version 23). According to Hayes (2013), PROCESS bootstrapped samples and provided a 95% confidence interval for indirect effect. If zero was not across the confidence interval, then the indirect effect was statistically significant at the 0.05 level. If zero was included in the 95% confidence interval, then the indirect effect was not statistically significant at the 0.05 level.

In the bootstrapping mediation test, the outcome variable “cognition” was included as a continuous variable, the MMSE score in 2005. And the independent variable, the three exchange patterns, was a categorical variable. Since PROCESS required mediator to be a continuous variable, this technique was applied to “part” of mediation analyses, not the whole analyses, because the original mediators were binary measures. Therefore, I reconstructed the “nutrition” variable and “depression” variable as continuous scales to run PROCESS. The variable “medical care”, however, was not able to be transferred into continuous variable in the data. Only nutrition and depression were assessed in PROCESS for the purpose of testing the significance of mediation effects, respectively. And Process model 4 proposed by Hayes (2013) was chosen because one mediator was tested at a time.

Sensitivity analyses. I conducted sensitivity analysis for an alternative measure of cognitive function in order to gain a better understanding on the relationship between intergenerational financial exchange and cognitive function. In this analysis, cognitive function scores were included as a continuous variable, with higher scores indicating better cognitive function. Sensitivity analysis was conducted for prevalence models and linear (OLS) regression models were employed (results presented in next chapter).

CHAPTER 4

RESULTS FOR RESEARCH QUESTIONS 1 AND 2

Study Sample Descriptive Results

Descriptive characteristics of the study sample are presented in Table 1. About 17.3% of the study sample had cognitive impairment in 2005 and the mean cognition score was 24.23 ($SD = 6.92$). The mean amount of money older adults gave to their children was 186.84 *yuan* ($SD = 1,684.16 \text{ yuan}$); whereas the mean amount of money older adults received from their children was 1,631.73 *yuan* ($SD = 3,551.21 \text{ yuan}$). Less than half of the older adults (43.4%) lived in an urban area. Most of older adults (89.8%) received adequate medical services when needed. 62.4% of older adults got adequate nutrition. More than half of older adults (51.3%) reported that they were depressed in 2005 based on self-report of depressive symptoms.

The study sample was relatively old, with a mean age of 84.23 years. Among them, the younger older adults (ages 65-79) represented 37.6% of the sample. The study sample tend to be more females (55%), more single older adults (64.2%), and more Han ethnic group members (93.9%). Most of older adults (61.2%) had employment in the agricultural sector. Less than half of older adults (41.4%) had formal education. Less than one third of older adults (30.8%) were economically independent. Older adults had four children, on average, and most of them had both sons and daughters. The mean number of children who visit frequently was three. About 14.2% of respondents lived alone.

Urban-rural differences for the study variables are also presented in Table 1. Rural older adults had a lower level of cognitive function (23.81 vs. 24.80, $p < .001$) and had a higher percentage of being impaired (18.9% vs. 15.3%, $p < .001$) in 2005, relative to urban older adults. Furthermore, indicators of SES showed that urban older adults were more advantaged than their rural counterparts: urban older adults had significantly higher percentages of having at least some formal education (50.9% vs. 34.1%, $p < .001$), a lower percentage of participating in agricultural work (33.9% vs. 82.2%, $p < .001$), and they reported far more economic independence (46.4% vs. 18.8%, $p < .001$). There were no statistically significant age differences between rural and urban residents. Compared with urban older adults, rural older adults were more likely to be women (55.9% vs. 53.8%, $p < .05$), minority ethnic (7.6% vs. 4.2%, $p < .001$), and less likely to be married (34.2% vs. 37.8%, $p < .001$). Rural older adults tended to have more children than urban older adults, but reported a higher rate of living alone (15.4% vs. 12.6%, $p < .001$). Finally, rural older adults tended to be healthier with regard to ADL limitations (16.5% vs. 24.0%, $p < .001$) and chronic diseases (62.0% vs. 69.7%, $p < .001$), but urban older adults tended to have better health-related behaviors, such as exercising (44.1% vs. 24.1%, $p < .001$) and tended to engage more in leisure activities, such as gardening (25.6% vs. 11.5%, $p < .001$).

Latent Patterns of Intergenerational Financial Exchange between Adult Children and Older Parents

As stated in method section, LCA was conducted to identify the patterns of intergenerational financial exchange. Two raw indicators (i.e., 5-categories of receiving money and 4 categories of providing money) were included in LCA. I compared models

with different numbers of classes to select a model with the optimal balance of fit to the observed data and parsimony with respect to the number of parameters needed to identify the classes (see Table 2). Comparison of model fit statistics revealed that a 3-class model was optimal; there were no significant improvements of the model fit beyond this model, after adding more classes to the model.

Figure 2 showed the distribution of the 3-class solution for intergenerational financial exchange. The first class was labeled *low receiving but no giving* (24%). Older adults in this class were likely to receive about 300 *yuan* (about \$50), on average, in the previous year, but they did not give any money to their adult children. The second class was labeled *high receiving but no giving* (66.6%). Older adults in this class received a higher amount of money with a mean amount of 1,800 *yuan* (about \$300) in the past year. Older adults in this class also did not provide any money to their adult children. The third class was labeled *medium receiving and medium giving* (9.4%). Older adults in this class gave to and received money from their adult children at a moderate level, which could be considered as reciprocal exchange. In this class, the mean amount of money gave was about 6,500 *yuan* (about \$1,000) and the mean amount of money received was about 1,200 *yuan* (about \$170).

Table 3 showed the results from bivariate analyses between the three exchange patterns and selected characteristics of older adults. Older adults in low receiving but no giving class (hereafter referred to as the “low receiving group”) had the highest percentage of reporting cognitive impairment (19.3%). Older adults in the medium receiving and medium giving pattern (hereafter referred to as the “reciprocal group”) tended to be the best-off group in terms of cognitive performance and socioeconomic

status. Older adults in the high receiving but no giving group (hereafter referred to as the “high receiving group”) had more children and more children who visited them frequently, but had a higher percentage of living alone, compared with older adults in other two groups.

Regarding health status and health-related behaviors, the low receiving group members were more likely to have poor self-rated health, and the high receiving group members had a higher percentage of limitations with ADLs, whereas older adults in the reciprocal group reported higher average number of chronic health conditions. Older adults in the reciprocal group had highest rates of smoking and exercising. There were no significant differences in alcohol consumption between three groups.

Overall, older adults in reciprocal exchange group had more advantages than low receiving group members, and older adults in high receiving group were in the most disadvantaged situation, especially in terms of socioeconomic status.

In order to explore which variables were related to these exchange patterns, a multinomial logistic regression model was estimated. Results from the model are presented in Table 4, including individual and family characteristics (low receiving group members were the reference group). Two individual demographic characteristics were significantly associated with the exchange patterns. Minority ethnic group members were less likely to belong to the high receiving group (RRR = 0.37, 95% CI [0.32, 0.41]) and belong to the reciprocal group (RRR = 0.51, 95% CI [0.38, 0.68]) compared to the low receiving group. Urban older adults were less likely to be in the reciprocal exchange group than the low receiving group (RRR = 0.75, 95% CI [0.63, 0.89]).

For socioeconomic status, older adults who had some education were more likely to belong to the high receiving group (RRR = 1.14, 95% CI [1.01, 1.29]) and reciprocal group (RRR = 1.29, 95% CI [1.07, 1.56]) relative to low receiving group. Older adults who worked in agriculture were less likely to belong to reciprocal group in relative to low receiving group (RRR = 0.65, 95% CI [0.54, 0.79]). Older adults with economic independence were less likely to belong to high receiving group, compared to low receiving group (RRR = 0.33, 95% CI [0.29, 0.37]).

Regarding family characteristics, with one additional living child, the likelihood of being in the high receiving group (RRR = 1.19, 95% CI [1.13, 1.26]) and the reciprocal group (RRR = 1.16, 95% CI [1.06, 1.27]) was higher than the likelihood of being in the low receiving group. With one additional son, the likelihood was lower for being in the high receiving group (RRR = 0.95, 95% CI [0.91, 0.99]) and the reciprocal group (RRR = 0.93, 95% CI [0.86, 1.00]) than the likelihood of being in the low receiving group. Having additional children who visited frequently was associated with higher likelihood of being in the high receiving group compared to being in the low receiving group (RRR = 1.13, 95% CI [1.09, 1.18]).

As far as health conditions were concerned, older adults with poor self-rated health were less likely to be in the high receiving group relative to being in the low receiving group (RRR = 0.88, 95% CI [0.80, 0.97]). However, compared to older adults with no chronic diseases, older adults who had chronic diseases were more likely to belong to the reciprocal group than to the low receiving group (RRR = 1.22, 95% CI [1.04, 1.42]). Health behaviors were not statistically significantly associated with intergenerational financial exchange patterns.

Participating in leisure activities showed statistically significant associations with intergenerational financial exchange patterns. For instance, older adults who read books were more likely to be in the reciprocal group than in the low receiving group (RRR = 1.65, 95% CI [1.35, 2.01]). Older adults who played cards were more likely to be in the high receiving group relative to the low receiving group (RRR = 1.25, 95% CI [1.10, 1.42]). Older adults who watched TV were more likely to belong to the high receiving group (RRR = 1.42, 95% CI [1.27, 1.59]) and the reciprocal group (RRR = 1.86, 95% CI [1.53, 2.27]) compared to being in the low receiving group.

Bivariate relationships among selected characteristics and cognitive functional status for the full sample are presented in Table 5. In the full sample, respondents who were in the groups of low receiving and high receiving tended to have a higher percentage of cognitive impairment (25.3% vs. 22.2%, 69.5% vs. 67.1%, $p < .001$, respectively). The reciprocal group had a significantly lower percentage of cognitive impairment (5.2% vs. 10.7%, $p < .001$). Older adults who were cognitively impaired were more likely to live in rural areas (61.8% vs. 55.5%, $p < .001$), be depressed (58.0% vs. 49.9%, $p < .001$), be in the oldest old age group (93.3% vs. 59.9%, $p < .001$), be female (73% vs. 51.2%, $p < .001$), and be unmarried (87.8% vs. 59.3%, $p < .001$). Compared to respondents who had normal cognition, a lower percentage of cognitively impaired respondents had some educational attainment (18.2% vs. 46.3%, $p < .001$), reported having worked in in an occupation other than agriculture (28.1% vs. 41.0%, $p < .001$), and report being economically independent (10% vs. 35.2%, $p < .001$). Cognitively impaired respondents also reported fewer children (3.85 vs. 4.12, $p < .001$), fewer children visits (2.48 vs. 3.01, $p < .001$), and lived alone more often (12.7% vs. 14.5%, p

= .03). Last, cognitively impaired respondents tended to report poorer health conditions (65.6% vs. 46.6%, $p < .001$), to live an unhealthy life style (e.g. exercising: 13.2% vs. 36.8%, $p < .001$), and to participate in fewer leisure activities (e.g. playing cards: 5.4% vs. 21.9%, $p < .001$).

Examining rural and urban differences, I also looked at the bivariate relationships between cognitive impairment status and the study variables for urban and rural subsamples (see Table 7). In the urban subsample, respondents with cognitive impairment were more likely to experience high receiving exchange patterns compared to respondents with cognitive normal function (71.5% vs. 63.6%, $p < .001$). However, in the rural subsample, older adults with cognitive impairment were more likely to experience the low receiving pattern relative to those without cognitive impairment (26.4% vs. 20.9%, $p < .001$).

Prevalence Model Results for Cognitive Well-Being

Results from the logistic regression models (unadjusted and adjusted) are presented in Table 6. These models examined the relationships between intergenerational financial exchange patterns and the odds of cognitive impairment at baseline. The results from Model 1 showed that older adults with the reciprocal exchange pattern was less likely to be cognitively impaired, when compared to those with the pattern of low receiving (OR = 0.43, 95% CI [0.34, 0.53]). Model 2 showed that urban older residents were less likely to have cognitive impairment than rural older adults (OR = 0.78, 95% CI [0.71, 0.86]). After exchange patterns and residential status were considered simultaneously, the results for the exchange patterns remained statistically significant. Model 3 incorporated older adults' socioeconomic status. First, the exchange pattern of

high receiving became statistically significant, which was negatively related to cognitive impairment (OR = 0.76, 95% CI [0.67, 0.85]). The reciprocity pattern remained statistically significant (OR = 0.53, 95% CI [0.42, 0.66]). Urban versus rural residence became insignificant after adding SES indicators. Second, older adults with some formal education were less likely to be cognitively impaired (OR = 0.37, 95% CI [0.32, 0.41]) compared to those with no formal schooling. Compared to those who reported they were economically dependent on others, older adults who reported economic independence were less likely to have cognitive impairment (OR = 0.28, 95% CI [0.24, 0.33]).

Model 4 incorporated older adults' demographic characters and family characters. Both the high receiving pattern and reciprocity exchange pattern remained statistically significant (OR = 0.85, 95% CI [0.75, 0.96]; OR = 0.56, 95% CI [0.44, 0.71], respectively). And urban residence was still not statistically significant. Younger older adults were less likely than older old adults to be cognitively impaired (OR = 0.15, 95% CI [0.12, 0.18]). Female older adults were more likely to be cognitively impaired than their male counterparts (OR = 1.42, 95% CI [1.25, 1.62]). Compared to the majority ethnic group, members of minority ethnic groups were less likely to be cognitively impaired (OR = 0.69, 95% CI [0.55, 0.86]). Married older adults had a lower likelihood of cognitive impairment than not married older adults (OR = 0.59, 95% CI [0.50, 0.69]). Having children visit frequently and living alone were negatively associated with cognitive impairment (OR = 0.88, 95% CI [0.84, 0.92]; OR = 0.70, 95% CI [0.60, 0.81], respectively).

Model 5 was a full model, adding individual's health conditions, health-related behaviors, and leisure activities. Compared to older adults in low receiving pattern, the

reciprocity exchange pattern members had a lower likelihood of cognitive impairment (OR = 0.61, 95% CI [0.48, 0.79]). The high receiving pattern became statistically insignificant in the full model. Older adults with self-rated poor health (OR = 1.71, 95% CI [1.52, 1.92]), ADL (OR = 2.57, 95% CI [2.28, 2.91]), and a higher number of chronic diseases (OR = 1.13, 95% CI [1.00, 1.28]) had higher risk of cognitive impairment than respondents with fewer health problems. Exercising (OR = 0.61, 95% CI [0.53, 0.71]) was associated with lower likelihood of cognitive impairment. All leisure activities, namely gardening (OR = 0.54, 95% CI [0.42, 0.69]), reading (OR = 0.38, 95% CI [0.29, 0.50]), playing cards (OR = 0.58, 95% CI [0.47, 0.73]), and watching TV (OR = 0.55, 95% CI [0.49, 0.62]) were related to lower rate of cognitive impairment compared to older adults who did not participate in these activities.

Sensitivity Analyses Results for Prevalence Models

In order to better understand the relationships between intergenerational financial exchange and cognitive function, sensitivity analyses were conducted using MMSE scores as a continuous outcome variable in place of the categorical variable that identified possible cognitive impairment (yes/no). Results from unadjusted and adjusted linear (OLS) regression models for the relationship between intergenerational financial exchange patterns and cognitive scores at baseline are provided in Table 8. According to the results from Model 1, the cognitive score for older adults who had the reciprocal exchange patterns was about 2 points higher as compared to those older adults who had the low receiving with no giving pattern. The exchange pattern of high receiving, however, was not statistically significant. Model 2 showed that older adults who lived in an urban area had better cognitive performance than their rural counterparts. The high

receiving pattern remained insignificant and the reciprocity pattern remained significant. Model 3 incorporated SES indicators. The high receiving pattern became statistically significant ($b = 0.83, p < .001$). And the reciprocity pattern was still statistically significant ($b = 1.40, p < .001$). That is, compared to older adults with low receiving pattern, those with high receiving pattern and those with reciprocity pattern had higher cognitive scores. Older adults with some schooling and who reported being economically independent tended to have higher cognitive scores. Model 4 added individual characteristics and family characteristics. The high receiving pattern and reciprocity pattern remained statistically significant as in Model 3. Model 5 was the full model, incorporating older adult's health conditions, health-related behaviors, and leisure activities. The high receiving pattern and the reciprocity pattern were stably significant associated with better cognitive performance, respectively. In sum, the results in sensitivity analyses showed similar patterns as in Table 6.

Incidence Model Results for Cognitive Well-Being

Multinomial logistic regression models were estimated to examine the relationship between intergenerational financial exchange and the incidence of cognitive decline from 2005 to 2008 among older adults whose cognition was normal at baseline (in 2005). The dependent variable included four categories: becoming cognitively impaired, died, and lost to follow-up and remaining cognitively normal over the observation period (reference group). Relative risk ratios and 95% confident intervals were reported. Due to the size of the table required to present all of the results from this single regression model, including all model results in one table was not possible. Thus, I presented a summary of the results from a series of nested models in Table 9 (cognitively

normal vs. cognitive impairment contrast), Table 10 (cognitively normal vs. died contrast), and Table 11 (cognitively normal vs. lost to sample contrast). It is important to note that these results were generated from a single regression model across each of the unadjusted and adjusted models.

In Table 9, Model 1 was the unadjusted model; compared to older persons who were low receivers, older adults who experienced high receiving were 23% more likely to become cognitively impaired than to remain cognitively normal (RRR = 1.23, 95% CI [1.03, 1.47]). The reciprocity pattern was not statistically significant associated with the incidence of cognitive impairment. Model 2 added urban residence (vs. rural residence); its relationship with onset of cognitively impaired was not statistically significant. Thus, the association between the high receiving pattern and the incidence of cognitive impairment remained statistically significant. And the relationship between the reciprocity pattern and the onset of cognitive impairment remained statistically insignificant. Model 3 incorporated socioeconomic variables. The association between the high receiving pattern and the incidence of cognitive impairment became insignificant after adding up the socioeconomic variables. The reciprocity pattern was still not significantly related to the onset of cognitive impairment. Older adults with some formal education were less likely to experience onset of cognitive impairment than remaining normal cognitive function (RRR = 0.47, 95% CI [0.39, 0.55]). Older adults who did agricultural work had lower risk of onset of cognitive impairment (RRR = 0.78, 95% CI [0.65, 0.94]). Being economically independent was protective against the risk of becoming cognitively impaired (RRR = 0.38, 95% CI [0.31, 0.46]). In addition, urban residence became statistically significant, revealing that urban older adults were 21%

more likely than rural counterparts to experience the onset of cognitive impairment (RRR = 1.21, 95% CI [1.02, 1.43]). Model 4 added individual's demographic characteristics and family characteristics. Intergenerational financial exchange patterns remained insignificant. Younger older adults were 85% less likely to become cognitively impaired than older adults relative to remaining cognitively normal (RRR = 0.15, 95% CI [0.12, 0.18]). Women older adults were 23% more likely than older men to become cognitively impaired (RRR = 1.23, 95% CI [1.02, 1.47]). Minority group members were less likely to experience onset of cognitive impairment than to remain normal cognition (RRR = 0.63, 95% CI [0.46, 0.87]). Married older adults had a lower risk than older unmarried older adults of becoming cognitively impaired than remaining cognitively normal (RRR = 0.78, 95% CI [0.63, 0.95]). Family characteristics were not significantly associated with onset of cognitive impairment. Health conditions, health-related behaviors, and leisure activities were added to Model 5. In the full model, intergenerational financial exchange patterns were not statistically significantly associated with onset of cognitive decline. The results from Model 5 revealed that having ADLs increased the risk of cognitive impairment. Playing cards (mah-jong) and watching TV were negatively related to cognitive impairment risk (RRR = 0.79, 95% CI [0.64, 0.97]; RRR = 0.74, 95% CI [0.62, 0.88], respectively).

Table 10 depicts the results for risk of death relative to being cognitively normal from 2005 to 2008. As shown in Model 5 (the full model), intergenerational financial exchange patterns were not significantly related to the risk of death compared to remaining cognitively normal. Urban residence was also not statistically significant related to risk of death. Having economic independence was significantly related to a

reduced the risk of death compared to remaining normal cognition (RRR = 0.73, 95% CI [0.63, 0.86]). Furthermore, younger older adults had lower risk of death in relative to remain cognitively normal (RRR = 0.18, 95% CI [0.16, 0.21]). Older women were less likely than older men to die relative to remaining cognitively normal (RRR = 0.61, 95% CI [0.53, 0.70]). Married older adults had a lower risk of death in relative to remain cognitively normal (RRR = 0.68, 95% CI [0.59, 0.78]). Older adults with ADLs had two times the risk of death than remaining cognitively normal (RRR = 2.85, 95% CI [2.41, 3.37]).

Table 11 shows the regression results contrasting risk of being lost-to-follow-up (drop-outs) relative to being cognitively normal. The financial exchange patterns remained statistically insignificant from Model 1 to Model 5. In Model 5, urban older adults had 51% higher risk than rural elders for dropping out of the study than to remain cognitively normal (RRR = 1.51, 95% CI [1.33, 1.73]). Older adults who did agricultural work were less likely to lost to follow-up relative to remain cognitively normal (RRR = 0.71, 95% CI [0.62, 0.83]). Being economically independent was related to a reduced risk of dropping out relative to being cognitively normal (RRR = 0.74, 95% CI [0.64, 0.86]). Younger older adults were less likely than elder older adults to drop out relative to being cognitively normal (RRR = 0.60, 95% CI [0.53, 0.68]). Older adults with more children were less likely to lost to follow up relative to remain cognitively normal (RRR = 0.89, 95% CI [0.83, 0.97]). However, older adults with more visits from their children were more likely to drop out of the study (RRR = 1.07, 95% CI [1.01, 1.13]) compared to remain normal cognition. Older adults who lived alone had a lower risk of lost to follow up relative to being cognitively normal (RRR = 0.83, 95% CI [0.70, 0.99]). Having ADLs

significantly increased the risk of dropping out than remaining cognitively normal (RRR = 2.28, 95% CI [1.90, 2.74]).

CHAPTER 5

RESULTS FOR RESEARCH QUESTIONS 3 AND 4

In this chapter, I explored whether or not the relationship between intergenerational financial exchange and cognitive function differed by rural and urban residency status (research question 3 for moderation effects). In addition, I examined whether having adequate medical services when need and depression status mediated the association between intergenerational financial exchange and cognitive function (research question 4 for mediation effects). I firstly presented the results for moderation effects of residency status. The results for mediation effects of adequate medical care, nutrition, and depression were presented next.

Rural and Urban Moderation Effects for Prevalence Models

First, I employed the typical approach of interaction analyses (i.e., main and interaction effects) to predict cognitive impairment prevalence, using rural and urban residence status and intergenerational financial exchange patterns. Since the moderator was a dummy variable (urban vs. rural) and key predictor was a categorical variable (3 categories of exchange), the interaction analyses included three main effect variables and two interaction terms: a) urban (main effect), b) reciprocity (main effect; low receiving = reference group), c) high receiving (main effect; low receiving = reference group), d) urban \times reciprocity (interaction effect), and e) urban \times high receiving (interaction effect).

Table 12 depicts the logistic regression results with the interaction terms. Model 1 did not include interaction terms and Model 2 added the two interaction terms. Results from Model 2 showed, the interaction terms by exchange patterns and rural/urban status were not statistically significant, indicating that no moderating effect was found. However, the reciprocal exchange pattern was significantly related to lower likelihood of being cognitively impaired (i.e., OR = 0.65, 95% CI [0.47, 0.90] in Model 2).

In order to test whether rural/urban residence status also moderated the relationships between the covariates and cognitive impairment, I stratified the full study sample by rural/urban residence and estimated unadjusted and adjusted logistic regression models for the prevalence of cognitive impairment; thus, the analyses are repeated by residential location (see Table 13 and Table 14). In both the unadjusted and adjusted models, for urban older adults, the association between cognitive impairment and the exchange pattern of high receiving was not statistically significant. In contrast, in the rural area sample, compared to low receivers, high receivers were less likely to be cognitively impaired as compared to remain cognitively normal in both unadjusted models (OR = 0.77, 95% CI [0.67, 0.89]) and adjusted models (OR = 0.84, 95% CI [0.71, 0.99]). In both the urban sample and rural sample, the exchange pattern of reciprocity was significantly associated with lower likelihood of cognitive impairment (adjusted model: urban OR = 0.56, 95% CI [0.37, 0.84]; rural OR = 0.64, 95% CI [0.47, 0.89]).

In the full model (see Table 13 Model 4) for urban older adults, respondents with some formal education were less likely to be cognitively impaired (OR = 0.76, 95% CI [0.60, 0.96]). Younger respondents were less likely than old older adults to be cognitively impaired (OR = 0.22, 95% CI [0.16, 0.32]). Married older adults had a lower likelihood

than unmarried older adults to be cognitively impaired (OR = 0.67, 95% CI [0.51, 0.88]). Older adults who lived with others, those who lived alone were at lower risk of cognitive impairment (OR = 0.50, 95% CI [0.37, 0.67]). Urban older adults with poor self-reported health status (OR = 1.63, 95% CI [1.35, 1.98]), ADLs (OR = 2.18, 95% CI [1.80, 2.64]) and more chronic diseases (OR = 1.28, 95% CI [1.04, 1.58]) were more likely to be cognitively impaired. Respondents who exercised (OR = 0.52, 95% CI [0.41, 0.66]) and participated in leisure activities (e.g. gardening OR = 0.47, 95% CI [0.32, 0.68]) were less likely to be cognitively impaired.

In comparison, for rural older adults, the results from the full model (see Table 14 Model 4) showed that doing agricultural work was related with a higher likelihood of being cognitively impaired (OR = 1.24, 95% CI [1.01, 1.53]). For rural older adults, having economic independency was beneficial for cognitive function (OR = 0.70, 95% CI [0.51, 0.95]). Rural older women had higher risk of being cognitively impaired than rural older men (OR = 1.21, 95% CI [1.00, 1.46]). In addition, in the rural sample, respondents with more frequent visits from their children were less likely to be cognitively impaired (OR = 0.89, 95% CI [0.83, 0.95]). Similar to the regression results for urban older adults, rural older adults who had poorer self-rated health were more likely to be cognitively impaired (OR = 1.76, 95% CI [1.52, 2.03]). Rural older adults who exercised (OR = 0.69, 95% CI [0.57, 0.84]), and participated in leisure activities (e.g. gardening, OR = 0.61, 95% CI [0.44, 0.87]) were significantly less likely to be cognitively impaired.

Rural and Urban Moderation Effects for Incidence Models

To examine whether the relationship between intergenerational financial exchange and the onset of cognitive impairment differ by residence status, similar to the

prevalence models, the interaction analyses included three main effect variables and two interaction terms: a) urban (main effect), b) reciprocity (main effect; low receiving = reference group), c) high receiving (main effect; low receiving = reference group), d) urban \times reciprocity (interaction effect), and e) urban \times high receiving (interaction effect).

Table 15 shows the results from multinomial logistic regression models with interaction terms between rural/urban residence and intergenerational exchange groups. No significant rural/urban differences were found for the risk of becoming cognitively impaired in relative to cognitively normal.

Table 16 and Table 17 present results from multinomial logistic regression models for urban subsample and rural subsample separately. It was found that when stratifying total study sample into urban and rural subsamples, there were no significant association between intergenerational financial exchange and the onset of cognition decline.

Mediation Effects on Prevalence Models for Full Sample

This section examined the research question 4 for the association between intergenerational financial exchange and cognitive well-being mediated by medical services access, nutrition, and depression. Following Baron and Kenny's (1986) approach, I firstly explored whether intergenerational financial exchange was associated with mediators (Path a). I then examined the association between mediators and outcome (i.e., cognitive impairment; Path b). If the effect of intergenerational financial exchange on the outcome (Path c) is reduced or has no effect when the mediator was considered, it could be concluded that mediating effect occurs. Then the bootstrapping technique was applied to test the significance of the mediation effects.

Preliminary analyses were conducted on the net association of each type of intergenerational financial exchange (i.e., low receiving, high receiving, and reciprocity) and mediators and the prevalence of cognitive impaired. Mediating effects were found on the association between low receiving pattern and being cognitively impaired. To better demonstrate mediation roles, I used high receiving group as the reference group for mediation models instead of low receiving group. In addition, using high receiving group as reference group provides more understanding of the differences between high receiving group and reciprocal group.

As Table 18 indicates, several, but not all, patterns of financial exchange were related to the three mediators. Compared to high exchange receivers, low exchange receivers (OR = 0.67, 95% CI [0.58, 0.77]) and reciprocal exchange group older adults (OR = 0.69, 95% CI [0.55, 0.87]) were less likely to get adequate medical services when needed. Regarding nutrition, older adults in low receiving group were less likely to have adequate nutrition compared to those in high receiving group (OR = 0.80, 95% CI [0.72, 0.88]). Furthermore, compared to high receiving older adults, low receiving older adults had a lower likelihood of being depressed (OR = 0.87, 95% CI [0.79, 0.96]).

Table 19 presents the association of exchange type with cognitive function, including adequate medical services as a covariate. Model 1 showed the adjusted regression results of direct association between financial exchange and cognitive impairment. Older adults with reciprocal exchange had significantly smaller odds of being cognitively impaired relative to older adults with high receiving (OR = 0.68, 95% CI [0.54, 0.86]). Model 2 showed that having adequate medical services was related to lower risk of being cognitively impaired (OR = 0.66, 95% CI [0.52, 0.84]). In addition,

the relationship between reciprocity and cognitive impairment had a 2% reduction in odds ratio compared to Model 1 (OR = 0.66, 95% CI [0.52, 0.84]). Since bootstrapping technique was not able to apply to test the significance of medical services due to data limitation, the mediating role of adequate medical services on cognition prevalence could not be concluded.

Similarly, Table 20 shows the association of intergenerational financial exchange, adequate nutrition, and cognitive well-being. It revealed that the effects of being a member of the low receiving group on cognitive impairment was mediated by adequate nutrition (i.e., significant main effect of low receiving became insignificant when adequate nutrition was included as a covariate). Furthermore, results from bootstrapping mediation test showed that the indirect effect of nutrition on cognition was 0.01 with the 95% CI [0.00, 0.02], indicating a statistically significant mediation effect of nutrition. As depicted in Figure 3, being a member of the low receiving group was linked with lower possibility of getting adequate nutrition and in turn linked to greater odds of being cognitively impaired. In contrast, the association between reciprocity pattern and cognitive well-being was not mediated by adequate nutrition. The odds ratios of reciprocity remained significant with no percentage change.

The association among intergenerational financial exchange, depression, and cognitive well-being is presented in Table 21. As shown in both Model 1 and Model 2, compared to high receiving pattern, older adults who were in the reciprocity exchange group were less likely to be cognitively impaired (OR = 0.68, 95% CI [0.54, 0.86]). Being depressed was not significantly associated with being cognitively impaired. Results from bootstrapping mediation test showed that the indirect effect of depression on

cognition was -0.002 with 95% CI [-0.004, -0.001], indicating a significant mediation effect of depression although the effect was very weak.

In order to test the confounded influence of all the three mediators, medical services, nutrition, and depression were examined simultaneously on the prevalence of cognitive impairment. Results are presented in Table 22. Compared the indirect effects of exchange patterns via the three mediators (Model 2) to the direct effects of exchange patterns on cognition (Model 1), no mediating effects were found according to Baron and Kenny's approach (1986), which was that the coefficient of main effect was not reduced when mediators were added into model.

Mediation Effects on Prevalence Models for Urban and Rural Subsamples

To further examine whether mediating effects for the prevalence of cognitive impairment differ by urban and rural residence, I employed the same analytical strategies used for the full study sample. This section first presents the results for urban older adults, followed by rural older adults.

Table 23 shows the association between intergenerational financial exchange and the three mediators: adequate medical services, adequate nutrition, and depression for urban older adults. Compared to older adults with high receiving pattern, those with low receiving pattern had lower likelihood of getting adequate medical services (OR = 0.63, 95% CI [0.48, 0.82]), getting adequate nutrition (OR = 0.78, 95% CI [0.68, 0.91]), and being depressed (OR = 0.81, 95% CI [0.70, 0.93]). In addition, compared to high receivers, reciprocal group members had lower likelihood of being depressed (OR = 0.76, 95% CI [0.63, 0.93]).

Table 24 presents the associations among intergenerational financial exchange, adequate medical services, and cognitive well-being. Model 1 provides the main effect of intergenerational financial exchange on cognitive impairment. It showed that compared to urban older adults in high receiving pattern, urban older adults with reciprocal exchange were less likely to be cognitively impaired (OR = 0.55, 95% CI [0.37, 0.81]). Model 2 added adequate medical services and showed a negative association between adequate medical services and cognitive impairment (OR = 0.54, 95% CI [0.40, 0.73]). However, the association between intergenerational financial exchange and cognitive impairment did not change when access to adequate medical services was added, which indicated that access to adequate medical services had no mediating effects on the linkage between intergenerational exchange and cognitive well-being for urban older adults.

Similarly, I did not find a mediating role for access to adequate nutrition for the association between intergenerational exchange and cognitive well-being for urban older adults (see Table 25). Although adequate nutrition was associated with lower rate of being cognitively impaired (OR = 0.80, 95% CI [0.66, 0.96]), the association between intergenerational exchange and cognitive well-being did not change when adding adequate nutrition. Last, for urban older adults, the association between intergenerational exchange and cognitive function was not mediated by depression. As shown in Model 2 in Table 26, being depressed was not significantly associated with cognitive impairment.

For rural older adults, compared to older adults in the high receiving group, older adults in the low receiving group were less likely to have access to adequate medical services (OR = 0.69, 95% CI [0.58, 0.82]) and to have adequate nutrition (OR = 0.80, 95% CI [0.71, 0.91]; see Table 27). Furthermore, compared to rural older adults in high

receiving group, reciprocal group members were less likely to get adequate medical services (OR = 0.58, 95% CI [0.45, 0.75]), but were more likely to be depressed (OR = 1.24, 95% CI [1.03, 1.49]).

Table 28 indicates that the links between low receiving pattern and cognitive impairment were mediated by adequate medical services for rural older adults. Adequate medical services were associated with lower likelihood of being cognitively impaired (OR = 0.59, 95% CI [0.49, 0.72]). When incorporating adequate medical services into Model 2, the significant association between low receiving (compared to older adults in the high receiving group) and cognitive impairment in Model 1 became insignificant in Model 2. The odds ratio of low receiving compared to high receiving older adults were reduced modestly by about 2%.

In addition to adequate medical services, adequate nutrition was also found to mediate the association between low receiving pattern and cognitive impairment for rural older adults (see Table 29). That is, low receiving pattern was related to less likelihood of getting adequate nutrition and in turn linked to higher likelihood of being cognitively impaired.

Similar to urban older adults, no mediating role of depression was found for rural older adults (see Table 30). As shown in Model 2, being depressed was not significantly associated with cognitive impairment.

Mediation Effects for Incidence Models (Full Sample)

This section described results for mediation effects on the association between intergenerational financial exchange and onset of cognitive impairment. Table 31 shows the independent association of intergenerational financial exchange patterns with medical

services, nutrition, and depression among older adults with normal cognitive function at time 1 (baseline) (Path a). Compared to high receivers, low receivers were less likely to have adequate medical services (OR = 0.63, 95% CI [0.53, 0.75]), and to have adequate nutrition (OR = 0.81, 95% CI [0.73, 0.90]). Low receivers tended to have a lower risk of depression at baseline in relation to higher receivers (OR = 0.86, 95% CI [0.78, 0.96]). Furthermore, compared to high receivers, older adults with a reciprocal exchange pattern were less likely to attain adequate medical services (OR = 0.67, 95% CI [0.52, 0.86]).

The direct association between intergenerational exchange patterns and the onset of cognitive impairment (Path c) were reported in the previous section (see Table 9, Table 10, and Table 11). After controlling for all covariates, intergenerational financial exchange patterns were not statistically significantly associated with the incidence of cognitive decline.

Table 32 shows the mediation model for medical services and the incidence of cognitive impairment. No mediation role was found for medical services. Table 28 presents the results for a test of the association between intergenerational exchange, nutrition, and the onset of cognitive impairment. Older adults with adequate nutrition were more likely to die than to remain cognitively normal (RRR = 1.23, 95% CI [1.09, 1.39]). Similarly, older adults with sufficient nutrition were more likely to drop out of the study than to remain cognitively normal (RRR = 1.16, 95% CI [1.03, 1.31]). However, the results showed no mediating role of nutrition for the association between intergenerational exchange and onset of cognitive impairment.

Table 34 shows whether depression mediates the association between intergenerational exchange and onset of cognitive impairment. Being depressed was

significantly associated with higher risk of becoming cognitively impaired in relative to remaining cognitively normal (RRR = 1.21, 95% CI [1.03, 1.41]). However, the association between intergenerational exchange and onset of cognitive impairment was not mediated by depression.

Mediation Effects on Incidence Models for Urban and Rural Subsamples

Consistent with the analytic procedures employed for the prevalence models, I also examined the mediation effects on incidence models for urban and rural subsamples. In this section, I only displayed tables in Path “a” for urban and rural subsamples, because the association between intergenerational exchange and outcome variable in Path “b” and Path “c” were not statistically significant.

Table 35 presents the association between intergenerational financial exchange and the three mediators, namely medical services, nutrition, and depression, among urban older adults with normal cognitive function at baseline. The results show that compared to urban older adults with a high receiving pattern of financial exchange, urban low receivers were less likely to get adequate medical services (OR = 0.51, 95% CI [0.37, 0.71]), and less likely to have adequate nutrition (OR = 0.77, 95% CI [0.65, 0.91]), and also less likely to be depressed (OR = 0.83, 95% CI [0.71, 0.97]).

Similar to results for the full sample, in the urban subsample, no mediation effects for medical services, nutrition, and depression were found for the association between intergenerational financial exchange and onset of cognitive impairment (results not shown in table). However, being depressed was associated with higher risk of drop out the study than of remaining cognitively normal for urban older adults (RRR = 1.34, 95% CI [1.15, 1.57]).

Table 36 shows the association of intergenerational financial exchange and three mediators simultaneously among rural older adults with normal cognitive function at baseline. In the rural subsample, compared to high receivers, low receivers were less likely to get adequate medical services (OR = 0.69, 95% CI [0.56, 0.85]), and less likely to get adequate nutrition (OR = 0.84, 95% CI [0.73, 0.97]). In addition, rural older adults with reciprocal exchange were less likely to get adequate medical services compared to rural high receivers (OR = 0.61, 95% CI [0.45, 0.82]).

For rural older adults, having adequate medical services was related to a lower risk of death compared to maintaining normal cognitive function (RRR = 0.78, 95% CI [0.62, 0.98]). Having adequate nutrition was associated with higher risk of death (RRR = 1.33, 95% CI [1.15, 1.55]) and with higher risk of loss to follow-up (RRR = 1.26, 95% CI [1.06, 1.49]). However, mediation model results showed that medical services, nutrition, and depression played no mediating roles for the relationship between intergenerational exchange and onset of cognitive impairment.

CHAPTER 6

DISCUSSION

Objectives of the Study

Cognition declines as people age and it is one of the critical risk factors for loss of independence and overall quality of life for older adults. Determining how to maintain normal cognition for a longer period of time or to delay cognitive decline in later life raises concerns for care needs and services utilization. This issue is especially urgent in developing countries like China, where the size of the aging population is rapidly increasing, which in turn accelerates the burden of cognitive decline at the societal and individual levels. Family support is a primary resource for older Chinese adults and their adult children are the most likely source of support, when they are in need (Wu & Du, 2005). In addition, intergenerational support between adult children and their older parents has been found to be beneficial for older parent's physical health and psychological well-being (Cong & Silverstein, 2011; Zhang, Li, & Silverstein, 2005; Zhu, 2016). Relatively little is known about the association between intergenerational financial support and cognitive well-being among the older Chinese population. It is informative and useful to explore this relationship.

In the current study, I built upon previous research by investigating the following four research questions: (1) What patterns of intergenerational financial exchange were present and what variables were related to these patterns among older adults in China? (2)

Was intergenerational financial exchange, as measured by the derived patterns, associated with cognitive well-being among older Chinese adults? (3) Was the association between exchange patterns and cognitive well-being moderated by urban and rural residency? and (4) Were the links between exchange patterns and cognitive well-being mediated by medical services, nutrition, and depression?

Factors Associated with the Intergenerational Financial Exchange Patterns

Previous Chinese studies on intergenerational exchanges have focused solely on support received from or given to adult children in isolation of one another (Chen & Silverstein, 2000; Zhu et al., 2012). Although the receipt of support from grown children was a major pattern for older Chinese adults, with economic development and family structure changes, transformations have been undergone in intergenerational support patterns. By incorporating multiple dimensions of financial exchanges between older parents and their adult children, one can obtain comprehensive and dynamic view of intergenerational relationships and its role in older parents' well-being. Therefore, it is important to take into account both financial support provided and received and reciprocity in these exchanges.

In the study sample, Latent Class Analysis (LCA) was employed to identify patterns of intergenerational financial exchange. Based on the amount and direction of money transferred, three patterns were identified: high receiving group (67%), low receiving group (24%), and reciprocal exchange group (9%). This is consistent with previous research that showed older adults receiving support from adult children is the most prevalent pattern in Asian countries like China (Wu & Du, 2005). There was, however, no group defined by the provision of finances from older adults to their children

based on the LCA results. The identification of three distinct patterns of intergenerational financial exchange between older parents and their adult children provided a new view how exchange types within the Chinese family context are emerging. These patterns are unique compared to findings from previous research, which often treated exchanges as providing only, receiving only, both providing and receiving, and no exchange (Lee et al., 2014; Lei et al., 2012). The pattern of providing support only was not found in this study. It could be due to selection bias, which is, the study sample is considerably older (with mean age 84) that the adult child of a respondent was also an older adult.

After identifying the unique patterns of intergenerational financial exchange among older Chinese adults, I explored associations between each exchange group and a select set of individual characteristics. Overall, reciprocity group members were the most advantaged older adults, showing they had relatively adequate resources (i.e., better socioeconomic status) and were in better health (i.e., lower likelihood of cognitive impairment at baseline). On the contrary, older adults in the high receiving group were in the most vulnerable situation, with low socioeconomic status and poor health conditions, indicating a higher need of support.

Compared to rural older adults, urban older adults were more likely to belong to the reciprocal exchange group relative to the low receiving group. In addition, as expected, socioeconomic status, measured as educational attainment, occupation, and self-reported economic independence, was associated with patterns of intergenerational financial exchange. For instance, older adults with some formal education were more likely to belong to the reciprocal exchange group as compared to the low receiving group. Moreover, older adults who reported economic independence were less likely to belong

to the high receiving group than belong to the low receiving group. These findings were consistent with previous research, showing that the more resources older adults hold, the more likely they were involved in financial exchanges with their adult children (Chou, 2009). Older adults who required more support are more likely to receive support, while also not providing support (Frankenberg, Lillard, & Willis, 2002).

The analysis also provided evidence to support my hypotheses regarding the association between family characteristics and intergenerational financial exchange patterns; that is, the number of children an older adult had would be associated with higher likelihood of being in high receiving group. Zimmer and Kwong (2003) found similar evidence supporting the positive association between the number of children and the receipt of financial support. Furthermore, I expected that having a closer relationship with children would be related to an increase in the likelihood of receiving monetary support. This was supported. A commonsense explanation for this finding is that emotional cohesion would motivate children to provide support to their older parents.

Associations between Intergenerational Financial Exchange and Cognitive Well-Being

Prevalence of cognitive well-being. Intergenerational financial exchange was associated with the prevalence of cognitive function. In particular, the results showed that older adults in the reciprocal exchange group had a significantly lower likelihood of cognitive impairment compared to the low receiver group, controlling for demographic characteristics, socioeconomic status, urban residence, health conditions and behaviors, and leisure activities. This finding was consistent with previous research that showed engaging in both providing and receiving support was positively related to older adult's well-being (Lee et al., 2014; Li et al., 2011; Thomas, 2010). The “use it or lose it”

hypothesis could also explain the finding, indicating that mutual contact between parties improves mental stimulation, which in turn protects against cognitive decline (Holtzman et al., 2004; Zhang, 2006). Balanced exchange was the optimal choice over under-benefitted or over-benefitted exchange (Eggebeen & Davey, 1998). Older adults who engaged in reciprocity exchange patterns were more likely to have better cognitive performance, which provided evidence in support of equity exchange theory.

Additionally, compared to older adults in the low receiving group, those in the high receiving group tended to have better cognitive function. This finding provides evidence in supporting the benefits of receiving support and cognitive well-being (Seeman et al., 2001; Zhu et al., 2012). Older adults with a high level of receiving monetary support had lower likelihood of being cognitively impaired. It is possible that more resources may be put to activities and better health care that results in better cognition. It is also plausible that filial piety expectations are met and thus older people may be less depressed and more likely to stay active, yielding better cognitive health.

Although some Western literature found negative association between receiving support and well-being for older adults (Windsor et al., 2014) due to older adult's feeling of dependency or uselessness, it is not necessary true for China. China has an important cultural tradition influenced by Confucian and filial piety, which emphasizes that adult children have responsibilities to take care of their older parents in later life. Older adults in the high receiving group were the ones most likely to be in vulnerable situation. The effects of receipt of financial support on well-being should be greatest when needs are met among this group of older adults.

Incidence of cognitive well-being. Regarding the incidence analysis, I did not find a statistically significant relationship between intergenerational financial exchange patterns and the onset of cognitive impairment. However, it is worth noting that in the unadjusted model, compared to low receiving group members, older adults in high receiving group had higher risk of becoming cognitively impaired than remaining cognitively normal. This association became insignificant when SES were added into model, suggesting that SES may be a powerful variable for explaining the onset of cognitive impairment over and above any support received or provided. These findings were consistent with previous evidence provided by Zhang (2006), where she examined gender differences in the onset of cognitive impairment. It is possible that the large number of control variables in my models reduced the significant association to statistical insignificance. For instance, educational attainment was found to be highly associated with cognitive well-being (Miu et al., 2016; Zeng & Vaupel, 2002). Also, physical health conditions, such as ADLs and chronic diseases, were negatively related to cognitive performance (Blazer et al., 2015). Moreover, the length of exchange relationship might contribute to the onset of cognitive impairment. It is possible that keeping a stable exchange relationship would protect against cognitive decline. Due to data limitations, however, this study was not able to measure the length of time in which financial exchanges occurred.

Similarly, compared with older adults in the low receiving group, older adults in the high receiving group had a higher risk of death than of remaining cognitively normal in the unadjusted model. This association was reduced to statistical insignificance after adjusting for the covariates, in particular after entering educational attainment and

economic independency into the models. Again, this demonstrates the importance of the older adults own financial situation over the receipt or provision of financial resources between generations. Further, compared to older adults with no formal education, those who received some years of schooling had a significantly lower incidence of death as compared to remaining cognitively normal. And, being economically independent was associated with lower risk of death compared to remaining normal cognition. These findings indicated that not only did financial support play a role in relation to the onset of cognitive well-being, but also the absolute value of wealth/assets and human capital for mortality risk. These findings reinforced the need to continue to examine other dimensions of financial exchange, for instance, the relative value of financial support in the exchange process, which is the ratio of financial support to the wealth one owned, and the length of time over which financial resources are exchanged.

Moderation Effect of Urban and Rural Residency Status

The household registration system in China has exerted considerably discrepancies for rural and urban residents with regard to opportunities in education, job market, pension systems, and access to health care systems (Chen, 2009; Liang et al., 2001). Differences in early life experience caused by rural and urban residency status ultimately influence one's well-being in later life (Dong & Simon, 2010). Therefore, it is important to reveal the association between intergenerational exchange and cognitive well-being by rural and urban residency status.

Consistent with previous literature on social status and health discrepancies among urban older adults and rural older adults in China (Miu et al., 2016; Shi, 1993; Wu & Treiman, 2004; Zimmer & Kwong, 2003), this study also found that rural older adults

experienced more unfavorable situations. For example, a higher proportion of members of the high receiver group lived in rural areas compared to older adults in the low receiver and reciprocity groups. The lowest rate of rural residence occurred among older adults in the reciprocity group. Rural older adults had a higher prevalence of cognitive impairment than their urban counterparts. In addition, rural older adults reported a lower percentage of having some schooling, a lower percentage of being in an occupation other than agriculture work, and a lower percentage of being economically independent.

Unexpectedly, there was no empirical evidence for a rural/urban moderation effect in both the prevalence and incidence models of cognitive impairment. That is, the magnitude of the relationship between exchange patterns and cognitive well-being did not differ by rural and urban residency. This is somewhat difficult to explain given the apparent advantages available to urban older adults in China as compared to rural older adults (e.g., better housing, better health care). One possibility is that the ratio of resources (financial exchanges) to needs (older parent's cognitive well-being) for the study sample was not appreciably different between rural areas and urban areas. For instance, although adult children in urban areas might have a higher capacity for providing financial support, their older parents may require higher need for support, as well; whereas in rural areas, a lower amount of financial support from adult children might be sufficient to meet the older parents' needs in terms of health care, adequate nutrition and so forth. Under these circumstances, the differences in the relationship between financial exchange and cognition would not be evident across rural areas and urban areas. Due to data limitations, however, variables were not included in this study, such as the adult children's income. The rural/urban moderation effect might be

identified if these variables were available. This represents an opportunity for future research.

Another possibility is that some covariates, in particular type of occupation, economic independence, and poor health conditions, contributed more to the explanation of variation in cognitive health than did rural versus urban residence when it comes to the association between exchange patterns and cognitive function. Future research should evaluate whether residency moderates these relationships with cognitive well-being.

Further, it could also be the case that the variable for rural and urban residency included significant measurement error, affecting the empirical relationship. In this study, rural and urban status was based on administrative records rather than direct observation of the urban character of the area in which the respondent to the survey lived. For instance, older adults defined as living in cities or living in rural areas may actually have been living in communities that did not characterize the more common concept of what it means to be a rural versus urban area. A study that examines a more valid measure of residency is required to have more confidence in the possible moderation of financial exchange and cognitive health among older Chinese adults.

Mediation Effects of Medical Services, Nutrition, and Depression

Understanding why intergenerational financial exchange is related to cognitive well-being among older Chinese population served as the last goal of this study. To accomplish this, I investigated three mediators, including self-report of receipt of adequate medical services, adequate nutrition intake, and depression. The relationship between financial exchange and cognitive well-being was partially mediated by access to adequate nutrition. This finding confirmed those findings of previous studies (Blazer et

al., 2015; Tsai, 2015), in which it was shown that nutrition was positively associated with cognitive function among older adults in Western countries.

As anticipated, financial exchange was positively associated with the likelihood of receiving adequate medical services. In addition, getting medical services when needed was associated with a lower likelihood of being cognitively impaired in the prevalence models. However, the lack of evidence showing a mediating effect of medical services for the association between exchange patterns and cognitive well-being requires further investigation. It is possible that the various medical services may account for a weak association. It may also be that the actual medical services older adults received were not directly related to cognitive function. If this were the case, then the benefits of financial exchange may not be impactful for cognition because the resources did not result in appropriate medical care.

With respect to depression, it was found that compared to high receiving group members, older adults in low receiving group was less likely to be cognitively impaired in the prevalence models. The lack of a statistical association between depression and the prevalence of cognitive impairment was surprising given consistent findings linking depression to cognitive decline in previous studies (Blazer et al., 2015; Bunce et al., 2014; Sims et al., 2014). One explanation may hinge on the reciprocal association between depression and cognitive well-being. It was also found that older adults with cognitive impairment were more likely to be depressed (Morimoto et al., 2014). Further, a selection effect may be in place as older adults who experienced the worst cognitive decline and who would be most susceptible to depression were not in the survey due to

institutionalization or death prior to observation. In sum, the mediating effects of depression was not found in the cross-sectional design in this study.

However, depression was found to be associated with a higher risk of the onset of cognitive impairment compared to remaining normal cognition. Thus, it is important to be aware of temporal effects for the association between depression and cognition. Depression in this study was a measure of emotional well-being. The hypothesis was that intergenerational financial exchange would enhance emotional closeness between parents and adult children, which in turn would be protective against cognitive decline. Depression might not be the best indicator of emotional well-being among the study population.

Limitations and Future Directions

Researchers should consider several limitations when interpreting the results of this study. The first limitation is related to measurement of the independent variables. The intergenerational financial exchange questions were retrospective and were asked to older parents only. It is possible that patterns of intergenerational financial exchange would be different if the questions were based on the adult children's perspective. Nevertheless, the main empirical associations between exchange patterns and cognitive function were consistent with previous studies on financial support and health outcomes. It is also recognized that other forms of exchange were not included in this study, such as instrumental support (i.e., household work and grandparenting) and emotional support, which have been shown to be associated with cognitive well-being as well.

It will also be important to investigate the relative value of the exchanges (absolute and relative amounts) based in part on the ratio of the amount of monetary

exchanged to the wealth/asset older parents owned, since socioeconomic status of the older adults played an important role in cognitive decline, as stated above. Additionally, a certain amount of money, for instance 700 yuan in a given year (about 100 US dollars) may have little impact for one older adult with high income but may mean a lot for another older adult with low income.

Another limitation is the support from other adults (e.g., from siblings or friends) were not evaluated in this study. Although financial support from children was the primary resource, some research in western countries also shows the importance of siblings and/or friends in supporting older adults, in particular for those with disabilities (Coyle, Kramer, & Mutchler, 2014). However, considering the mean age of my study sample, the portion of financial support from their siblings and friends might not make a statistical difference among older Chinese adults.

Last, the sample in this study was relatively healthy and robust, despite the fact that 67% of the study sample were 80 years old and above. This may lead to some selection bias, where the healthiest of the older Chinese adults are the ones most likely to survive and to be eligible for inclusion in the survey. On the other hand, the most cognitively ill could be included in this study as well. Given that cognitive function is closely related to age, and the financial exchange abilities of oldest-old respondent's children and young-old respondent's children may differ. Future research may benefit from stratifying study samples into young-old and old-old subsamples to investigate whether the linkage between financial exchange and cognitive well-being would be different at different age cut points.

Contributions

Despite these limitations, the present study has a number of merits. This study advances previous research by identifying the patterns of intergenerational financial exchange among older Chinese adults, which provides the potential for a better understanding of characteristics of older adults engaging in each type of exchange patterns. Compared to traditional exchange categories subjectively defined by researchers, LCA evaluated and determined specific solutions for the unique population within the Chinese social and family context by reference to patterns of exchange actually resident in the data.

This issue is particularly important as Chinese society has been experiencing changes driven by factors such as shrinking family size, rural to urban migration, changes in the economic system and long-distance support based on the geographic dispersion of families. All these changes could exert influence on the intergenerational exchange patterns and cognitive well-being. For instance, financial support might be more common than other forms of support, such as emotional support, especially in rural areas due to population migration. In addition, the impact of financial support from adult children on older parent's cognitive well-being would be greater for rural older adults as well.

Due to the family planning policy (also called the “one-child” policy instituted in the late 1970s), the next generation of older parents might be different from the study generation in several ways, including differences in levels of educational attainment, adherence to filial piety norms, and living arrangement expectations. Older adults in this study sample had four children, on average. They normally lived with their youngest son if they had sons. With economic development, the younger Chinese population became

more highly educated than those respondents in this study sample, this may lead to the anticipation of better cognitive function in later life. With only one son or one daughter, it is estimated that reciprocity support between adult children and their parents would be more common, since there is no dilution for resources to other off-spring. In this case, this study provides a foundation for further research on exchange patterns and cognitive well-being in later life.

The other strengths of this study included the use of nationally representative longitudinal data from China. Drawing upon two waves of the CLHLS data set allowed me to examine both the prevalence and incidence of cognitive impairment. Better than other datasets studying intergenerational exchange in China, which was either regional or cross-sectional, this dataset also provided opportunities to examine the rural versus urban differences among the study sample.

Another goal of this study was to explore the rural and urban differences for the association between intergenerational financial exchange and cognitive well-being. Findings from this study provide a more comprehensive understanding of the relationships between rural older adults and urban older adults than is currently available in the research literature. Although this study did not find significant moderating role of residential status due to various reasons, it is still intriguing and informative and hopefully will encourage further investigation of this issue.

The present study expanded on previous research by exploring potential pathways through which intergenerational financial exchange may affect cognitive well-being among older Chinese population. Having adequate nutrition in daily life, such as meat, fresh fish, eggs, and beans, was found to be an influential factor. This finding provides

implications for policy makers who may consider establishing and promoting nutrition programs targeting older adults, which will ultimately benefit family members, as well as society. In addition, it is worthwhile to keep in mind other possible mechanisms linking intergenerational financial exchange and cognitive well-being in order to help older Chinese adults maintain normal cognition for a longer period of time, for instance, social networks and formal volunteer activities. More research is needed here.

In conclusion, the present study provided evidence for the positive association between intergenerational financial exchange and cognitive well-being. This study also showed that the inclusion of adequate nutrition intake as a means of maintaining cognition well-being may help communities, families, as well as older individuals, promote a healthy life style and live a high quality of life.

Table 1. Sample Statistical Descriptive

Characteristic	Total	Urban	Rural	t/x^2
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	
Dependent variable				
Cognitive function (MMSE)	24.23 (6.91)	24.80 (6.85)	23.81 (6.93)	-7.64***
Cognitively impaired, %	17.3	15.3	18.9	27.79***
Independent variables				
Total amount of money gave (<i>yuan</i>)	187.84 (1,684.16)	310.83 (1,987.50)	93.38 (1,400.32)	-6.72***
Total amount of money received (<i>yuan</i>)	1,631.73 (3,551.21)	1,969.77 (4,311.32)	1,371.95 (2,804.48)	-8.67***
Moderator				
Urban, %	43.4			
Mediators				
Adequate medical service, %	89.8	93.6	86.9	164.90***
Adequate nutrition, %	62.4	69.4	57.1	190.00***
Depressed, %	51.3	46.4	55.0	89.14***
Covariates				
<i>Individual demographic characteristics</i>				
Age (65-105)	84.23 (11.32)	84.19 (11.34)	84.27 (11.30)	0.38
Young-old (65-79), %	37.6	37.8	37.5	0.12
Female, %	55.0	53.8	55.9	5.55*
Minority ethnic, %	6.1	4.2	7.6	60.84***
Married, %	35.8	37.8	34.2	16.13***
<i>Individual socioeconomic status</i>				
Having some schooling, %	41.4	50.9	34.1	341.45***
Agricultural occupation, %	61.2	33.9	82.2	2,899.78***
Economic independency, %	30.8	46.4	18.8	1,053.56***
<i>Family member characteristics</i>				
Number of child(ren) alive (1-13)	4.0 (1.70)	3.90 (1.66)	4.13 (1.66)	2.06
Number of son(s) alive	2.5 (1.42)	2.35 (1.41)	2.59 (1.44)	6.49**
Number of daughter(s) alive	2.2 (1.51)	2.12 (1.43)	2.27 (1.48)	17.91***
Number of child(ren) visiting frequently (0-11)	2.9 (1.79)	2.83 (1.77)	3.01 (1.80)	0.05
Living alone, %	14.2	12.6	15.4	18.00***
<i>Health conditions</i>				
Self-rated poor health, %	49.9	49.8	49.9	0.04
Having any ADLs, %	19.8	24.0	16.5	106.33***
Having any chronic health conditions, %	65.3	69.7	62.0	76.68***

(Table 1 Continued)

Table 1

Sample Statistical Descriptive (Continued)

Characteristic	Total	Urban	Rural	t/χ^2
	$M (SD)$	$M (SD)$	$M (SD)$	
<i>Health-related behaviors</i>				
Current smoker, %	20.6	17.9	22.7	41.42***
Current alcohol consumption, %	21.3	18.8	23.1	32.93***
Current exercising, %	32.7	44.1	24.1	536.50***
<i>Leisure activities</i>				
Gardening, %	17.6	25.6	11.5	400.23***
Reading, %	23.1	35.2	13.8	762.55***
Playing cards, %	19.0	22.0	16.7	52.26***
Watching TV, %	71.9	79.6	66.1	266.27***
<i>N</i>	12,020	5,220	6,800	

MMSE = Mini-Mental State Examination. ADL = activities of daily living.

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

Table 2. Model Fits of Latent Class Models of Intergenerational Financial Exchange

Number of class (<i>k</i>)	Log-likelihood ratio (G2)	AIC	Adjusted BIC	Entropy	BLPT <i>p</i> value
2	-31,832.35	63,678.70	63,709.31	.67	.000
3	-24,610.03	49,240.06	49,283.78	.76	.000
4	-19,925.07	39,876.14	39,932.99	.80	.93

Note: Boldface type indicates the selected model.

AIC = Akaike information criterion. Adjusted BIC = adjusted Bayesian information criterion. BLRT = bootstrapped likelihood ratio tests (comparison with (k-1) class model).

Table 3. Differences in Respondent Characteristics by Intergenerational Exchange Patterns

	<i>Low receiving</i>	<i>High receiving</i>	<i>Reciprocity</i>	
	<i>M (SD)/%</i>	<i>M (SD) /%</i>	<i>M (SD) /%</i>	<i>F/x²</i>
Cognitively impaired (no)	19.3	17.9	9.3	62.46***
<i>Individual demographic characteristics</i>				
Age	84.33 (11.59)	84.60 (11.18)	81.45 (11.30)	40.15***
Female (male)	54.3	56.3	47.1	36.32***
Minority (Han)	11.0	4.7	4.9	143.43**
Urban (rural)	45.3	41.7	51.1	42.65***
Married (not married)	36.2	34.2	45.8	60.80***
Having some school (no)	40.8	39.2	58.4	156.92**
Agricultural occupation (no)	59.5	64.5	42.8	207.70**
Economic independence (no)	41.3	24.0	53.1	591.19**
<i>Family characteristics</i>				
Number of sons	2.33 (1.42)	2.57 (1.44)	2.28 (1.36)	40.86***
Number of daughters	2.03 (1.45)	2.27 (1.46)	2.19 (1.48)	28.00***
Number of children who visited frequently	2.48 (1.73)	3.10 (1.79)	2.83 (1.72)	126.74**
Living alone (no)	13.6	14.9	10.9	14.47***
<i>Health characteristics</i>				
Poor self-rated health (no)	52.1	49.1	49.7	7.34*
Having any ADLs (no)	19.0	20.4	17.5	6.70*
Having chronic conditions (no)	63.8	65.1	70.4	16.43***
Current smoker (no)	19.7	20.3	24.4	11.94**
Current alcohol consumption (no)	22.1	20.7	23.4	5.75
Current exercising (no)	33.0	31.2	43.0	65.47***

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living.

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

Table 4. Multinomial Logistic Regression Analyses for Patterns of Intergenerational Financial Exchange

Variable	<i>High receiving</i> (vs. <i>Low receiving</i>)		<i>Reciprocal</i> (vs. <i>Low receiving</i>)	
	RRR	95% CI	RRR	95% CI
<i>Individual demographic characteristics</i>				
Young-old (old-old)	1.02	[0.91,1.15]	1.11	[0.93,1.33]
Female (male)	1.00	[0.88,1.12]	1.20	[1.00,1.43]
Minority ethnic (Han)	0.37***	[0.32,0.44]	0.51***	[0.38,0.68]
Urban (rural)	1.02	[0.92,1.14]	0.75***	[0.63,0.89]
Married (not married)	1.00	[0.89,1.14]	0.98	[0.81,1.18]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	1.14*	[1.01,1.29]	1.29**	[1.07,1.56]
Agricultural occupation (no)	0.95	[0.84,1.07]	0.65***	[0.54,0.79]
Economically independent (no)	0.33***	[0.29,0.37]	0.83	[0.69,1.00]
<i>Family characteristics</i>				
Number of son(s) alive	0.95*	[0.91,0.99]	0.93*	[0.86,1.00]
Number of daughter(s) alive	0.95*	[0.91,0.99]	1.00	[0.93,1.08]
Frequent child(ren) visits	1.13***	[1.09,1.18]	1.04	[0.98,1.11]
Living alone (no)	1.07	[0.93,1.23]	0.89	[0.70,1.12]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	0.88**	[0.80,0.97]	0.98	[0.85,1.13]
Having any ADLs (no)	1.12	[0.99,1.28]	1.17	[0.96,1.44]
Having any chronic diseases (no)	1.09	[0.99,1.20]	1.22*	[1.04,1.42]
<i>Health-related behaviors</i>				
Current smoker (no)	1.05	[0.93,1.19]	1.17	[0.97,1.40]
Current alcohol consumption (no)	0.96	[0.85,1.08]	0.98	[0.82,1.17]
Current exercising (no)	0.93	[0.83,1.03]	0.96	[0.82,1.13]
<i>Leisure activities</i>				
Gardening (no)	0.97	[0.85,1.11]	1.19	[0.99,1.43]
Reading (no)	1.09	[0.94,1.25]	1.65***	[1.35,2.01]
Playing cards (no)	1.25***	[1.10,1.42]	1.15	[0.96,1.37]
Watching TV (no)	1.42***	[1.27,1.59]	1.86***	[1.53,2.27]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 5. Bivariate Analysis of Selected Characteristics Associated with Cognitive Function (Full Sample)

Characteristics	Cognitively normal	Cognitively impaired	<i>p</i>
	%	%	
<u>Independent variable</u>			
Low receiving	22.2	25.3	
High receiving	67.1	69.5	***
Reciprocity	10.7	5.2	
<u>Moderator</u>			
Urban	44.5	38.2	***
Rural	55.5	61.8	
<u>Mediator</u>			
Adequate medical service	8.4	18.6	***
Nutrition	64.1	54.7	***
Depressed	49.9	58.0	***
<u>Covariates</u>			
<i>Individual demographic characteristics</i>			
Young-old (65-79)	44.1	6.7	***
Old-old (80+)	55.9	93.3	
Male	48.8	27.0	***
Female	51.2	73.0	
Han	93.8	94.3	
Minority ethnic	6.2	5.7	
Married	40.7	12.2	***
Non-married	59.3	87.8	
<i>Individual socioeconomic status</i>			
Having some schooling	46.3	18.2	***
Having no schooling	53.7	81.8	
Agricultural occupation	59.0	71.9	***
Other occupation	41.0	28.1	
Economic independency	35.2	10.0	***
Economic not independency	64.8	90.0	

(Table 5a Continued)

Table 5

*Bivariate Analysis of Selected Characteristics Associated with Cognitive Function
(Full Sample) (Continued)*

Characteristics	Cognitively normal	Cognitively impaired	<i>p</i>
	%	%	
<i>Family characteristics</i>			
Having any son(s) alive	95.6	95.3	
Having any daughter(s) alive	90.8	90.7	
Living alone	14.5	12.7	*
Frequent child(ren) visits	3.01(1.78)	2.48(1.75)	***
<i>Health conditions</i>			
Self-rated poor health	46.6	65.6	***
Having any ADLs	14.1	46.9	***
Having any chronic health conditions	64.4	69.5	***
<i>Health-related behaviors</i>			
Smoking	22.3	12.2	***
Drinking	22.6	14.9	***
Exercise	36.8	13.2	***
<i>Leisure activities</i>			
Gardening	20.5	3.8	***
Reading	27.2	3.4	***
Playing cards	21.9	5.4	***
Watching TV	77.9	43.7	***

Note: *p* values: differences between two group samples (cognitively normal vs. cognitively impaired).

ADL = activities of daily living.

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

Table 6. Bivariate Analysis of Selected Characteristics associated with Cognitive Function by Residency Status

Characteristics	Urban			Rural		
	Cognitively normal	Cognitively impaired	<i>p</i>	Cognitively normal	Cognitively impaired	<i>p</i>
	%	%		%	%	
<u>Independent variable</u>						
Low receiving	23.7	23.5	***	20.9	26.4	***
High receiving	63.6	71.5		69.9	68.2	
Reciprocity	12.7	5.0		9.2	5.4	
<u>Mediator</u>						
Adequate medical service	94.9	86.8	***	89.0	78.1	***
Nutrition	71.1	60.0	***	58.4	51.5	***
Depressed	44.9	54.7	***	53.9	60	***
<u>Covariates</u>						
<i>Individual demographic characteristics</i>						
Young-old (65-79)	43.6	5.6	***	44.5	7.3	***
Old-old (80+)	56.4	94.4		55.5	92.7	
Male	49.8	26.3	***	48	27.4	***
Female	50.2	73.7		52	72.6	
Han	95.8	96.0		92.2	93.2	
Minority ethnic	4.2	4.0		7.8	6.8	
Married	42.2	13.2	***	39.5	11.6	***
Non-married	57.8	86.8		60.5	88.4	
<i>Individual socioeconomic status</i>						
Having some schooling	55.8	23.7	***	38.7	14.8	***
Having no schooling	44.2	76.3		61.3	85.2	
Agricultural occupation	31.4	48.1	***	81.2	86.6	***
Other occupation	68.6	51.9		18.8	13.4	
Economic independency	51.4	18.7	***	22.1	4.7	***
Economic not independency	48.6	81.3		77.9	95.3	

(Table 6 Continued)

Table 6

*Bivariate Analysis of Selected Characteristics associated with Cognitive Function by Residency**Status (Continued)*

Characteristics	Urban			Rural		
	Cognitively normal	Cognitively impaired	<i>p</i>	Cognitively normal	Cognitively impaired	<i>p</i>
	%	%		%	%	
<i>Family characteristics</i>						
Having any son(s) alive	94.6	95.0		96.4	95.5	
Having any daughter(s) alive	90.4	90.3		91.2	91.0	
Living alone	13.2	9.4	**	15.5	14.7	
Frequent child(ren) visits	2.93(1.75)	2.57(1.83)	***	3.15(1.80)	2.58(1.70)	***
<i>Health conditions</i>						
Self-rated poor health	46.8	66.5	***	46.4	65.1	***
Having any ADLs	18.5	55.0	***	10.6	41.8	***
Having any chronic health conditions	68.5	76.0	***	61.2	65.5	**
<i>Health-related behaviors</i>						
Smoking	19.5	8.9	***	24.6	14.3	***
Drinking	20.2	11.0	***	24.5	17.2	***
Exercise	49.5	13.9	***	26.7	12.7	***
<i>Leisure activities</i>						
Gardening	29.3	4.5	***	13.4	3.3	***
Reading	40.6	5.3	***	16.5	2.3	***
Playing cards	24.9	5.6	***	19.4	5.2	***
Watching TV	84.8	50.6	***	72.3	39.5	***

Note: *p* values: differences between two group samples (cognitively normal vs. cognitively impaired).

ADL = activities of daily living.

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

Table 7. Logistic Regression Results for Cognitive Function: Prevalence Estimates

(1 = cognitively impaired, 0 = cognitively normal)

	Model 1: Base		Model 2: + Residency		Model 3: + SES	
	OR	95% CI	OR	95% CI	OR	95% CI
High receiving (low receiving)	0.91	[0.81, 1.02]	0.9	[0.81, 1.01]	0.76***	[0.67, 0.85]
Reciprocity (low receiving)	0.43***	[0.34, 0.53]	0.43***	[0.35, 0.54]	0.53***	[0.42, 0.66]
Urban (rural)			0.78***	[0.71, 0.86]	1.11	[0.99, 1.24]
<i>Individual socioeconomic status</i>						
Having some schooling (no)					0.37***	[0.32, 0.41]
Agricultural occupation (no)					0.96	[0.85, 1.08]
Economic independency (no)					0.28***	[0.24, 0.33]
<i>Individual demographic characteristics</i>						
Young-old (old-old)						
Female (male)						
Minority ethnic (Han)						
Married (not)						
<i>Family characteristics</i>						
Number of son(s) alive						
Number of daughter(s) alive						
Frequent child(ren) visits						
Living alone (no)						
<i>Health conditions</i>						
Self-rated poor health (good/fair)						
Having any ADLs (no)						
Having any chronic health conditions (no)						

(Table 7 Continued)

Table 7

Logistic Regression Results for Cognitive Function: Prevalence Estimates

(1 = cognitively impaired, 0 = cognitively normal) (Continued)

	Model 1: Base		Model 2: + Residency		Model 3: + SES	
	OR	95% CI	OR	95% CI	OR	95% CI
<i>Health-related behaviors</i>						
Current smoker (no)						
Current alcohol consumption (no)						
Current exercising (no)						
<i>Leisure activities</i>						
Gardening (no)						
Reading (no)						
Playing cards (no)						
Watching TV (no)						

(Table 7 Continued)

Table 7

Logistic Regression Results for Cognitive Function: Prevalence Estimates
(1 = cognitively impaired, 0 = cognitively normal) (Continued)

	Model 4: + Demo and family		Model 5: + All covariates	
	OR	95% CI	OR	95% C
High receiving (low receiving)	0.85*	[0.75, 0.96]	0.9	[0.79, 1.03]
Reciprocity (low receiving)	0.56***	[0.44, 0.71]	0.61***	[0.48, .79]
Urban (rural)	0.97	[0.86, 1.09]	1.01	[0.89, 1.14]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.54***	[0.46, 0.62]	0.71***	[0.60, 0.82]
Agricultural occupation (no)	1.18*	[1.04, 1.35]	1.21**	[1.05, 1.39]
Economic independency (no)	0.61***	[0.51, 0.73]	0.81*	[0.67, 0.99]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.15***	[0.12, 0.18]	0.23***	[0.19, 0.28]
Female (male)	1.42***	[1.25, 1.62]	1.13	[0.98, 1.31]
Minority ethnic (Han)	0.69***	[0.55, 0.86]	0.66***	[0.53, 0.83]
Married (not)	0.59***	[0.50, 0.69]	0.62***	[0.52, 0.73]
<i>Family characteristics</i>				
Number of son(s) alive	1.04	[1.00, 1.09]	1.03	[0.99, 1.08]
Number of daughter(s) alive	1.02	[0.98, 1.07]	1	[0.96, 1.05]
Frequent child(ren) visits	0.88***	[0.84, 0.92]	0.92***	[0.87, 0.96]
Living alone (no)	0.70***	[0.60, 0.81]	0.72***	[0.61, 0.85]
<i>Health conditions</i>				
Self-rated poor health (good/fair)			1.71***	[1.52, 1.92]
Having any ADLs (no)			2.57***	[2.28, 2.91]
Having any chronic health conditions (no)			1.13*	[1.00, 1.28]

(Table 7 Continued)

Table 7

*Logistic Regression Results for Cognitive Function: Prevalence Estimates
(1 = cognitively impaired, 0 = cognitively normal) (Continued)*

	Model 4: + Demo and family		Model 5: + All covariates	
	OR	95% CI	OR	95% C CI
<i>Heath-related behaviors</i>				
Current smoker (no)			1.05	[0.89, 1.25]
Current alcohol consumption (no)			0.94	[0.80, 1.10]
Current exercising (no)			0.61***	[0.53, 0.71]
<i>Leisure activities</i>				
Gardening (no)			0.54***	[0.42, 0.69]
Reading (no)			0.38***	[0.29, 0.50]
Playing cards (no)			0.58***	[0.47, 0.73]
Watching TV (no)			0.55***	[0.49, 0.62]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 8. Linear Regression of Cognitive Scores by Intergenerational Financial Exchange Patterns

	Model 1		Model 2		Model 3	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
High receiving (low receiving)	0.25	0.15	0.28	0.15	0.83***	0.14
Reciprocity (low receiving)	2.26***	0.24	2.20***	0.24	1.40***	0.23
Urban (rural)			0.91***	0.13	-0.29*	0.14
<i>Individual socioeconomic status</i>						
Having some schooling (no)					3.06***	0.13
Agricultural occupation (no)					0.31*	0.15
Economic independency (no)					3.25***	0.15
<i>Individual demographic characteristics</i>						
Young-old (old-old)						
Female (male)						
Minority ethnic (Han)						
Married (not)						
<i>Family characteristics</i>						
Number of child(ren) alive						
Number of son(s) alive						
Number of daughter(s) alive						
Frequent child(ren) visits						
Living alone (no)						
<i>Health conditions</i>						
Self-rated poor health (good/fair)						
Having any ADLs (no)						
Having any chronic health conditions (no)						
<i>Health-related behaviors</i>						
Current smoker (no)						
Current alcohol consumption (no)						
Current exercising (no)						
<i>Leisure activities</i>						
Gardening (no)						
Reading (no)						
Playing cards (no)						
Watching TV (no)						
Constant	23.84***	0.13	23.43***	0.14	21.20***	0.2
Adjusted <i>R</i> -square	0.01		0.01		0.13	

(Table 8 Continued)

Table 8

Linear Regression of Cognitive Scores by Intergenerational Financial Exchange Patterns (Continued)

	Model 4		Model 5	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
High receiving (low receiving)	0.49***	0.14	0.27*	0.13
Reciprocity (low receiving)	1.09***	0.21	0.69***	0.2
Urban (rural)	0.16	0.13	0.02	0.12
<i>Individual socioeconomic status</i>				
Having some schooling (no)	1.81***	0.14	1.03***	0.14
Agricultural occupation (no)	-0.33*	0.14	-0.29*	0.14
Economic independency (no)	1.18***	0.16	0.61***	0.14
<i>Individual demographic characteristics</i>				
Young-old (old-old)	3.75***	0.14	2.32***	0.13
Female (male)	-1.10***	0.13	-0.58***	0.13
Minority ethnic (Han)	0.92***	0.24	0.82***	0.22
Married (not)	1.07***	0.15	0.84***	0.14
<i>Family characteristics</i>				
Number of son(s) alive	-0.22***	0.05	-0.13**	0.05
Number of daughter(s) alive	-0.16**	0.05	-0.08	0.05
Frequent child(ren) visits	0.41***	0.05	0.26***	0.05
Living alone (no)	0.96***	0.17	0.73***	0.16
<i>Health conditions</i>				
Self-rated poor health (good/fair)			-1.13***	0.11
Having any ADLs (no)			-3.95***	0.14
Having any chronic health conditions (no)			-0.42***	0.11
<i>Health-related behaviors</i>				
Current smoker (no)			-0.04	0.14
Current alcohol consumption (no)			-0.1	0.13
Current exercising (no)			0.80***	0.12
<i>Leisure activities</i>				
Gardening (no)			0.33*	0.15
Reading (no)			1.00***	0.16
Playing cards (no)			0.74***	0.14
Watching TV (no)			2.46***	0.13
Constant	20.96***	0.27	21.15***	0.28
Adjusted <i>R</i> -square	0.22		0.34	

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate. ADL = activities of daily living. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 9. Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-up Among Cognitively Normal Older Adults

	Became cognitively impaired vs. Remained cognitively normal					
	Model 1		Model 2		Model 3	
	RRR	95% CI	RR R	95% CI	RRR	95% CI
High receiving (low receiving)	1.23*	[1.03,1.47]	1.22*	[1.02,1.46]	1.03	[0.86,1.23]
Reciprocity (low receiving)	0.91	[0.69,1.20]	0.91	[0.69,1.20]	1.05	[0.79,1.40]
Urban (rural)			0.94	[0.81,1.09]	1.21*	[1.02,1.43]
<i>Individual socioeconomic status</i>						
Having some schooling (no)					0.47***	[0.39,0.55]
Agricultural occupation (no)					0.78**	[0.65,0.94]
Economic independency (no)					0.38***	[0.31,0.46]
<i>Individual demographic characteristics</i>						
Young-old (old-old)						
Female (male)						
Minority ethnic (Han)						
Married (not married)						
<i>Family characteristics</i>						
Number of son(s) alive						
Number of daughter(s) alive						
Frequent child(ren) visits						
Living alone (no)						
<i>Health conditions</i>						
Self-rated poor health (good/fair)						
Having any ADLs (no)						
Having any chronic health conditions (no)						
<i>Health-related behaviors</i>						
Current smoker (no)						
Current alcohol consumption (no)						
Current exercising (no)						

(Table 9 Continued)

Table 9

Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-up Among Cognitively Normal Older Adults (Continued)

	Became cognitively impaired vs. Remained cognitively normal					
	Model 1		Model 2		Model 3	
	RRR	95% CI	RR	95% CI	RRR	95% CI
<i>Leisure activities</i>						
Gardening (no)						
Reading (no)						
Playing cards (no)						
Watching TV (no)						

(Table 9 Continued)

Table 9. *Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-up Among Cognitively Normal Older Adults (Continued)*

	Became cognitively impaired vs. Remained cognitively normal			
	Model 4		Model 5	
	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	1.11	[0.92,1.35]	1.14	[0.94,1.39]
Reciprocity (low receiving)	1.17	[0.87,1.57]	1.22	[0.91,1.64]
Urban (rural)	1.02	[0.86,1.22]	1.03	[0.86,1.23]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.63***	[0.52,0.76]	0.69***	[0.56,0.84]
Agricultural occupation (no)	1	[0.83,1.21]	1	[0.82,1.21]
Economic independency (no)	0.74**	[0.59,0.92]	0.79*	[0.63,0.98]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.15***	[0.12,0.18]	0.17***	[0.14,0.21]
Female (male)	1.23*	[1.02,1.47]	1.13	[0.93,1.37]
Minority ethnic (Han)	0.63**	[0.46,0.87]	0.62**	[0.45,0.85]
Married (not married)	0.78*	[0.63,0.95]	0.78*	[0.64,0.96]
<i>Family characteristics</i>				
Number of son(s) alive	1	[0.93,1.07]	0.99	[0.93,1.06]
Number of daughter(s) alive	0.97	[0.90,1.04]	0.96	[0.90,1.03]
Frequent child(ren) visits	0.97	[0.91,1.04]	0.98	[0.92,1.05]
Living alone (no)	0.97	[0.79,1.21]	0.98	[0.78,1.21]
<i>Health conditions</i>				
Self-rated poor health (good/fair)			1.14	[0.98,1.34]
Having any ADLs (no)			1.95***	[1.56,2.42]
Having any chronic health conditions (no)			0.99	[0.84,1.16]
<i>Health-related behaviors</i>				
Current smoker (no)			0.93	[0.75,1.16]
Current alcohol consumption (no)			1	[0.82,1.22]
Current exercising (no)			0.9	[0.75,1.07]
<i>Leisure activities</i>				
Gardening (no)			1.03	[0.83,1.29]
Reading (no)			0.88	[0.69,1.13]
Playing cards (no)			0.79*	[0.64,0.97]
Watching TV (no)			0.74***	[0.62,0.88]

Note: $n = 9,935$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 10. Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-Up Among Cognitively Normal Older Adults

	Died vs. Remained cognitively normal					
	Model 1		Model 2		Model 3	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	1.14*	[1.00,1.28]	1.13*	[1.00,1.28]	0.95	[0.84,1.08]
Reciprocity (low receiving)	0.89	[0.73,1.07]	0.89	[0.74,1.07]	0.96	[0.79,1.17]
Urban (rural)			0.97	[0.88,1.07]	1.18**	[1.05,1.33]
<i>Individual socioeconomic status</i>						
Having some schooling (no)					0.77***	[0.69,0.86]
Agricultural occupation (no)					0.78***	[0.69,0.89]
Economic independency (no)					0.37***	[0.32,0.42]
<i>Individual demographic characteristics</i>						
Young-old (old-old)						
Female (male)						
Minority ethnic (Han)						
Married (not married)						
<i>Family characteristics</i>						
Number of son(s) alive						
Number of daughter(s) alive						
Frequent child(ren) visits						
Living alone (no)						
<i>Health conditions</i>						
Self-rated poor health (good/fair)						
Having any ADLs (no)						
Having any chronic health conditions (no)						
<i>Health-related behaviors</i>						
Current smoker (no)						
Current alcohol consumption (no)						
Current exercising (no)						

(Table 10 Continued)

Table 10

Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-Up Among Cognitively Normal Older Adults (Continued)

	Died vs. Remained cognitively normal					
	Model 1		Model 2		Model 3	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
<i>Leisure activities</i>						
Gardening (no)						
Reading (no)						
Playing cards (no)						
Watching TV (no)						

(Table 10 Continued)

Table 10

Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-Up Among Cognitively Normal Older Adults (Continued)

	Died vs. Remained cognitively normal			
	Model 4		Model 5	
	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	1.05	[0.92,1.21]	1.08	[0.94,1.24]
Reciprocity (low receiving)	1.1	[0.90,1.36]	1.15	[0.93,1.43]
Urban (rural)	1.02	[0.90,1.16]	1.01	[0.89,1.16]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.82**	[0.72,0.93]	0.92	[0.80,1.07]
Agricultural occupation (no)	0.94	[0.82,1.08]	0.95	[0.82,1.10]
Economic independency (no)	0.66***	[0.57,0.77]	0.73***	[0.63,0.86]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.15***	[0.13,0.17]	0.18***	[0.16,0.21]
Female (male)	0.69***	[0.60,0.78]	0.61***	[0.53,0.70]
Minority ethnic (Han)	0.80*	[0.65,0.99]	0.80*	[0.65,0.99]
Married (not married)	0.66***	[0.57,0.76]	0.68***	[0.59,0.78]
<i>Family characteristics</i>				
Number of son(s) alive	1.01	[0.96,1.06]	1	[0.95,1.05]
Number of daughter(s) alive	1.04	[0.99,1.09]	1.03	[0.97,1.08]
Frequent child(ren) visits	0.95*	[0.91,1.00]	0.97	[0.93,1.02]
Living alone (no)	0.86	[0.73,1.01]	0.9	[0.76,1.06]
<i>Health conditions</i>				
Self-rated poor health (good/fair)			1.15*	[1.02,1.29]
Having any ADLs (no)			2.85***	[2.41,3.37]
Having any chronic health conditions (no)			1.02	[0.91,1.15]
<i>Health-related behaviors</i>				
Current smoker (no)			0.94	[0.81,1.09]
Current alcohol consumption (no)			0.99	[0.86,1.13]
Current exercising (no)			0.80***	[0.71,0.91]
<i>Leisure activities</i>				
Gardening (no)			0.89	[0.76,1.05]
Reading (no)			0.86	[0.73,1.01]
Playing cards (no)			0.70***	[0.60,0.82]
Watching TV (no)			0.74***	[0.65,0.85]

Note: $n = 9,935$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 11. Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-Up Among Cognitively Normal Older Adults

	Lost to follow-up vs. Remained cognitively normal					
	Model 1		Model 2		Model 3	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	0.95	[0.84,1.08]	0.99	[0.87,1.12]	0.92	[0.80,1.04]
Reciprocity (low receiving)	0.96	[0.79,1.16]	0.93	[0.76,1.12]	0.91	[0.75,1.11]
Urban (rural)			1.92***	[1.72,2.13]	1.75***	[1.55,1.99]
<i>Individual socioeconomic status</i>						
Having some schooling (no)					0.96	[0.85,1.08]
Agricultural occupation (no)					0.60***	[0.52,0.68]
Economic independency (no)					0.58***	[0.51,0.67]
<i>Individual demographic characteristics</i>						
Young-old (old-old)						
Female (male)						
Minority ethnic (Han)						
Married (not married)						
<i>Family characteristics</i>						
Number of son(s) alive						
Number of daughter(s) alive						
Frequent child(ren) visits						
Living alone (no)						
<i>Health conditions</i>						
Self-rated poor health (good/fair)						
Having any ADLs (no)						
Having any chronic health conditions (no)						
<i>Health-related behaviors</i>						
Current smoker (no)						
Current alcohol consumption (no)						
Current exercising(no)						

(Table 11 Continued)

Table 11

Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-Up Among Cognitively Normal Older Adults (Continued)

	Lost to follow-up vs. Remained cognitively normal					
	Model 1		Model 2		Model 3	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
<i>Leisure activities</i>						
Gardening (no)						
Reading (no)						
Playing cards (no)						
Watching TV (no)						

(Table 11 Continued)

Table 11

Multinomial Logistic Models of the Odds of Cognitive Decline, Death, and Loss to Follow-Up Among Cognitively Normal Older Adults (Continued)

	Lost to follow-up vs. Remained cognitively normal			
	Model 4		Model 5	
	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	0.93	[0.81,1.06]	0.93	[0.81,1.07]
Reciprocity (low receiving)	0.93	[0.76,1.14]	0.93	[0.76,1.14]
Urban (rural)	1.59***	[1.40,1.80]	1.51***	[1.33,1.73]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	1.08	[0.94,1.23]	1.06	[0.92,1.22]
Agricultural occupation (no)	0.68***	[0.59,0.78]	0.71***	[0.62,0.83]
Economic independency (no)	0.74***	[0.64,0.86]	0.74***	[0.64,0.86]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.54***	[0.47,0.61]	0.60***	[0.53,0.68]
Female (male)	1.07	[0.94,1.22]	1.05	[0.91,1.21]
Minority ethnic (Han)	0.29***	[0.21,0.41]	0.30***	[0.21,0.41]
Married (not married)	0.76***	[0.66,0.87]	0.78***	[0.67,0.89]
<i>Family characteristics</i>				
Number of son(s) alive	0.96	[0.90,1.02]	0.96	[0.90,1.02]
Number of daughter(s) alive	0.98	[0.92,1.04]	0.98	[0.92,1.04]
Frequent child(ren) visits	1.06*	[1.01,1.12]	1.07*	[1.01,1.13]
Living alone (no)	0.80*	[0.67,0.95]	0.83*	[0.70,0.99]
<i>Health conditions</i>				
Self-rated poor health (good/fair)			1.06	[0.94,1.19]
Having any ADLs (no)			2.28***	[1.90,2.74]
Having any chronic health conditions (no)			0.93	[0.80,1.01]
<i>Health-related behaviors</i>				
Current smoker (no)			0.95	[0.82,1.09]
Current alcohol consumption (no)			0.99	[0.86,1.14]
Current exercising (no)			1.09	[0.96,1.23]
<i>Leisure activities</i>				
Gardening (no)			1.07	[0.93,1.23]
Reading (no)			1.10	[0.94,1.28]
Playing cards (no)			1.03	[0.90,1.18]
Watching TV (no)			0.82**	[0.70,0.95]

Note: $n = 9,935$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 12. Logistic Regression on Cognitively Impairment: Interaction Terms with Rural/Urban Residence
(1 = cognitively impaired, 0 = cognitively normal)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
High receiving (low receiving)	0.91	[0.79,1.03]	0.85	[0.72,1.01]
Reciprocity (low receiving)	0.61***	[0.48,0.79]	0.65**	[0.47,0.90]
Urban (rural)	1.01	[0.89,1.14]	0.91	[0.72,1.16]
Urban * high receiving			1.17	[0.90,1.53]
Urban * reciprocity			0.85	[0.51,1.43]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.71***	[0.60,0.82]	0.71***	[0.60,0.83]
Agricultural occupation (no)	1.21**	[1.05,1.39]	1.21**	[1.05,1.40]
Economic independency (no)	0.81*	[0.67,0.99]	0.82*	[0.68,1.00]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.19,0.28]	0.23***	[0.19,0.28]
Female (male)	1.13	[0.98,1.31]	1.13	[0.98,1.31]
Minority ethnic (Han)	0.66***	[0.53,0.83]	0.66***	[0.52,0.83]
Married (not)	0.62***	[0.52,0.73]	0.61***	[0.52,0.73]
<i>Family characteristics</i>				
Number of son(s) alive	1.03	[0.99,1.08]	1.03	[0.99,1.08]
Number of daughter(s) alive	1.01	[0.96,1.05]	1.01	[0.96,1.05]
Frequent child(ren) visits	0.92***	[0.87,0.96]	0.92***	[0.87,0.96]
Living alone (no)	0.72***	[0.61,0.85]	0.72***	[0.61,0.86]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.71***	[1.52,1.92]	1.71***	[1.52,1.92]
Having any ADLs (no)	2.57***	[2.28,2.91]	2.58***	[2.28,2.91]
Having any chronic health conditions (no)	1.13*	[1.00,1.28]	1.13*	[1.00,1.27]
<i>Health-related behaviors</i>				
Current smoker (no)	1.05	[0.89,1.25]	1.05	[0.88,1.24]
Current alcohol consumption (no)	0.94	[0.80,1.10]	0.94	[0.81,1.10]
Current exercising (no)	0.61***	[0.53,0.71]	0.62***	[0.53,0.72]
<i>Leisure activities</i>				
Gardening (no)	0.54***	[0.42,0.69]	0.54***	[0.42,0.69]
Reading (no)	0.38***	[0.29,0.50]	0.38***	[0.29,0.50]
Playing cards (no)	0.58***	[0.47,0.73]	0.58***	[0.47,0.73]
Watching TV (no)	0.55***	[0.49,0.62]	0.55***	[0.49,0.62]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 13. Logistic Regression Models on Cognitive Impairment: Stratified Urban Subsamples

(1 = cognitively impaired, 0 = cognitively normal)

	Model 1		Model 2		Model 3		Model 4	
High receiving (low receiving)	1.14	[0.95,1.36]	0.88	[0.73,1.07]	0.93	[0.76,1.14]	1.02	[0.82,1.26]
Reciprocity (low receiving)	0.40**	[0.28,0.57]	0.53**	[0.37,0.77]	0.53*	[0.36,0.77]	0.56*	[0.37,0.84]
<i>Individual socioeconomic status</i>								
Having some schooling (no)			0.39**	[0.32,0.47]	0.56**	[0.45,0.69]	0.76*	[0.60,0.96]
Agricultural occupation (no)			0.98	[0.82,1.16]	1.19	[0.99,1.43]	1.17	[0.96,1.44]
Economic independency (no)			0.33**	[0.27,0.41]	0.62**	[0.49,0.79]	0.93	[0.72,1.21]
<i>Individual demographic characteristics</i>								
Young-old (old-old)					0.13**	[0.10,0.18]	0.22**	[0.16,0.32]
Female (male)					1.45**	[1.17,1.80]	1.05	[0.82,1.33]
Minority ethnic (Han)					0.74	[0.49,1.12]	0.76	[0.49,1.18]
Married (not)					0.63**	[0.49,0.82]	0.67*	[0.51,0.88]
<i>Family characteristics</i>								
Number of son(s) alive					1.07*	[1.00,1.15]	1.05	[0.98,1.14]
Number of daughter(s) alive					1.04	[0.97,1.11]	1.01	[0.94,1.09]
Frequent child(ren) visits					0.92*	[0.85,0.98]	0.95	[0.88,1.03]
Living alone (no)					0.52**	[0.40,0.69]	0.50**	[0.37,0.67]

(Table 13 Continued)

Table 13

Logistic Regression Models on Cognitive Impairment (1 = cognitively impaired, 0 = cognitively normal): Stratified Urban Subsamples (Continued)

	Model 1	Model 2	Model 3	Model 4
<i>Health conditions</i>				
Self-rated poor health (good/fair)			1.63***	[1.35,1.98]
Having any ADL (no)			2.18***	[1.80,2.64]
Having any chronic health conditions (no)			1.28*	[1.04,1.58]
<i>Health-related behaviors</i>				
Current smoker (no)			0.82	[0.60,1.10]
Current alcohol consumption (no)			0.8	[0.61,1.05]
Current exercising (no)			0.52***	[0.41,0.66]
<i>Leisure activities</i>				
Gardening (no)			0.47***	[0.32,0.68]
Reading (no)			0.33***	[0.23,0.47]
Playing cards (no)			0.59**	[0.42,0.83]
Watching TV (no)			0.49***	[0.40,0.59]

Note: $n = 5,220$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living.

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

Table 14. Logistic Regression Models on Cognitive Impairment: Stratified Rural Subsamples

(1 = cognitively impaired, 0 = cognitively normal)

	Model 1	Model 2	Model 3	Model 4
High receiving (low receiving)	0.77* ** [0.67,0.89]	0.69* ** [0.60,0.80]	0.80* * [0.68,0.94]	0.84* [0.71,0.99]
Reciprocity (low receiving)	0.46* ** [0.35,0.61]	0.52* ** [0.39,0.70]	0.58* ** [0.43,0.79]	0.64* * [0.47,0.89]
<i>Individual socioeconomic status</i>				
Having some schooling (no)		0.34* ** [0.29,0.41]	0.52* ** [0.43,0.63]	0.65* ** [0.53,0.80]
Agricultural occupation (no)		0.97 [0.81,1.17]	1.18 [0.97,1.43]	1.24* [1.01,1.53]
Economic independency (no)		0.22* ** [0.17,0.29]	0.59* ** [0.44,0.80]	0.70* [0.51,0.95]
<i>Individual demographic characteristics</i>				
Young-old (old-old)			0.16* ** [0.13,0.21]	0.23* ** [0.18,0.30]
Female (male)			1.39* ** [1.18,1.65]	1.21* [1.00,1.46]
Minority ethnic (Han)			0.67* * [0.52,0.87]	0.64* * [0.49,0.84]
Married (not)			0.57* ** [0.46,0.70]	0.59* ** [0.47,0.73]
<i>Family characteristics</i>				
Number of son(s) alive			1.02 [0.97,1.08]	1.02 [0.96,1.08]
Number of daughter(s) alive			1.01 [0.96,1.07]	1 [0.94,1.06]
Frequent child(ren) visits			0.86* ** [0.81,0.91]	0.89* ** [0.83,0.95]
Living alone (no)			0.81* [0.67,0.98]	0.87 [0.71,1.07]

(Table 14 Continued)

Table 14

Logistic Regression Models on Cognitive Impairment (1 = cognitively impaired, 0 = cognitively normal): Stratified Rural Subsamples (Continued)

	Model 1	Model 2	Model 3	Model 4
<i>Health conditions</i>				
Self-rated poor health (good/fair)			1.76***	[1.52,2.03]
Having any ADL (no)			2.84***	[2.42,3.33]
Having any chronic health conditions (no)			1.07	[0.92,1.24]
<i>Health-related behaviors</i>				
Current smoker (no)			1.2	[0.98,1.49]
Current alcohol consumption (no)			1.02	[0.84,1.23]
Current exercising (no)			0.69***	[0.57,0.84]
<i>Leisure activities</i>				
Gardening (no)			0.61**	[0.44,0.87]
Reading (no)			0.46***	[0.30,0.70]
Playing cards (no)			0.58***	[0.44,0.77]
Watching TV (no)			0.57***	[0.50,0.67]

Note: $n = 6,800$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living.

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

Table 15. Multinomial Logistic Regression on the Onset of Cognitive Impairment from 2005 to 2008: Interaction Terms with Rural/Urban Residence

	Cognitively impaired (vs. Cognitively normal)		Dead (vs. Cognitively normal)		Lost (vs. Cognitively normal)	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	1.10	[0.86,1.42]	1.07	[0.89,1.29]	0.95	[0.78,1.16]
Reciprocity (low receiving)	1.17	[0.79,1.75]	1.15	[0.86,1.54]	0.98	[0.71,1.34]
Urban (rural)	0.96	[0.67,1.36]	1.01	[0.79,1.30]	1.56** *	[1.22,1.99]
Urban × high receiving	1.09	[0.74,1.60]	1.00	[0.76,1.32]	0.97	[0.74,1.27]
Urban × reciprocity	1.09	[0.60,1.98]	1.01	[0.66,1.54]	0.92	[0.61,1.38]
<i>Individual socioeconomic status</i>						
Having some schooling (no)	0.69** *	[0.56,0.84]	0.92	[0.80,1.07]	1.06	[0.92,1.22]
Agricultural occupation (no)	1.00	[0.82,1.21]	0.95	[0.82,1.10]	0.72** *	[0.62,0.83]
Economic independency (no)	0.79* *	[0.63,0.99]	0.73***	[0.63,0.86]	0.74** *	[0.64,0.86]
<i>Individual demographic characteristics</i>						
Young-old (old-old)	0.17** *	[0.14,0.21]	0.18***	[0.16,0.21]	0.60** *	[0.53,0.68]
Female (male)	1.13	[0.93,1.37]	0.61***	[0.53,0.70]	1.05	[0.91,1.21]
Minority ethnic (Han)	0.62**	[0.45,0.85]	0.80*	[0.65,0.99]	0.30** *	[0.21,0.42]
Married (not)	0.78* *	[0.64,0.96]	0.68***	[0.59,0.78]	0.77** *	[0.67,0.89]
<i>Family characteristics</i>						
Number of son(s) alive	0.99	[0.93,1.06]	1.00	[0.95,1.05]	0.96	[0.90,1.02]
Number of daughter(s) alive	0.96	[0.90,1.03]	1.03	[0.97,1.08]	0.98	[0.92,1.04]
Frequent child(ren) visits	0.98	[0.92,1.05]	0.97	[0.93,1.02]	1.07*	[1.01,1.13]
Living alone (no)	0.98	[0.79,1.21]	0.90	[0.76,1.06]	0.83* *	[0.70,0.99]

(Table 15 Continued)

Table 15

Multinomial Logistic Regression on the Onset of Cognitive Impairment from 2005 to 2008:

Interaction Terms with Rural/Urban Residence (Continued)

	Cognitively impaired (vs. Cognitively normal)		Dead (vs. Cognitively normal)		Lost (vs. Cognitively normal)	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
<i>Health conditions</i>						
Self-rated poor health (good/fair)	1.14	[0.98,1.34]	1.15*	[1.02,1.29]	1.06	[0.94,1.19]
Having any ADLs (no)	1.95** *	[1.56,2.43]	2.85***	[2.41,3.37]	2.28***	[1.90,2.74]
Having any chronic health conditions (no)	0.99	[0.84,1.16]	1.02	[0.91,1.15]	0.90	[0.80,1.01]
<i>Health-related behaviors</i>						
Current smoker (no)	0.93	[0.75,1.16]	0.94	[0.81,1.09]	0.95	[0.82,1.09]
Current alcohol consumption (no)	1.00	[0.82,1.22]	0.99	[0.86,1.13]	0.99	[0.86,1.14]
Current exercising (no)	0.90	[0.75,1.07]	0.80***	[0.71,0.91]	1.09	[0.96,1.23]
<i>Leisure activities</i>						
Gardening (no)	1.03	[0.83,1.29]	0.89	[0.76,1.05]	1.07	[0.93,1.23]
Reading (no)	0.88	[0.69,1.13]	0.86	[0.73,1.01]	1.10	[0.94,1.28]
Playing cards (no)	0.79*	[0.64,0.97]	0.70***	[0.60,0.82]	1.03	[0.90,1.18]
Watching TV (no)	0.74** *	[0.62,0.88]	0.74***	[0.65,0.85]	0.82**	[0.70,0.95]

Note: $n = 9,935$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 16. Multinomial Logistic Regression on the Onset of Cognitive Impairment from 2005 to 2008: Stratified Urban Subsamples

	Urban (n = 4,423)					
	Cognitively impaired (vs. Cognitively normal)		Dead (vs. Cognitively normal)		Lost to follow-up (vs. Cognitively normal)	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	1.24	[0.91,1.68]	1.12	[0.90,1.38]	0.93	[0.77,1.11]
Reciprocity (low receiving)	1.30	[0.83,2.03]	1.16	[0.86,1.58]	0.90	[0.69,1.16]
<i>Individual socioeconomic status</i>						
Having some schooling (no)	0.64* *	[0.47,0.88]	0.93	[0.75,1.17]	0.93	[0.76,1.14]
Agricultural occupation (no)	1.05	[0.79,1.40]	1.06	[0.86,1.32]	0.79* *	[0.65,0.97]
Economic independency (no)	0.89	[0.64,1.22]	0.87	[0.69,1.09]	0.84	[0.68,1.02]
<i>Individual demographic characteristics</i>						
Young-old (old-old)	0.13* **	[0.09,0.18]	0.19***	[0.15,0.23]	0.65* **	[0.54,0.78]
Female (male)	1.16	[0.85,1.58]	0.63***	[0.50,0.78]	1.03	[0.85,1.24]
Minority ethnic (Han)	0.83	[0.47,1.45]	0.84	[0.56,1.26]	0.43* **	[0.27,0.69]
Married (not)	0.79	[0.57,1.09]	0.75* *	[0.60,0.94]	0.77* *	[0.64,0.94]
<i>Family characteristics</i>						
Number of son(s) alive	0.98	[0.87,1.10]	1.02	[0.94,1.11]	0.89* *	[0.81,0.98]
Number of daughter(s) alive	0.95	[0.85,1.07]	1.08	[0.99,1.17]	0.91	[0.83,1.01]
Frequent child(ren) visits	1.01	[0.91,1.13]	0.98	[0.91,1.06]	1.07	[1.00,1.16]
Living alone (no)	1.09	[0.77,1.55]	0.93	[0.71,1.21]	0.96	[0.75,1.23]

(Table 16 Continued)

Table 16

Multinomial Logistic Regression on the Onset of Cognitive Impairment from 2005 to 2008:

Stratified Urban Subsamples (Continued)

	Urban (<i>n</i> = 4,423)					
	Cognitively impaired (vs. Cognitively normal)		Dead (vs. Cognitively normal)		Lost to follow-up (vs. Cognitively normal)	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
<i>Health conditions</i>						
Self-rated poor health (good/fair)	1.11	[0.87,1.43]	1.11	[0.93,1.33]	1.05	[0.89,1.23]
Having any ADLs (no)	1.73***	[1.27,2.36]	2.45* **	[1.95,3.08]	2.29 ***	[1.82,2.88]
Having any chronic health conditions (no)	1.14	[0.87,1.48]	1.12	[0.93,1.36]	1.02	[0.86,1.21]
<i>Health-related behaviors</i>						
Current smoker (no)	1.10	[0.79,1.54]	1.00	[0.79,1.26]	0.83	[0.67,1.02]
Current alcohol consumption (no)	1.09	[0.80,1.49]	0.89	[0.71,1.12]	0.98	[0.81,1.20]
Current exercising (no)	0.78	[0.60,1.02]	0.71* **	[0.59,0.86]	0.95	[0.80,1.13]
<i>Leisure activities</i>						
Gardening (no)	1.08	[0.79,1.46]	0.99	[0.80,1.23]	1.05	[0.88,1.25]
Reading (no)	0.84	[0.60,1.19]	0.77* **	[0.61,0.98]	1.21	[0.99,1.49]
Playing cards (no)	0.82	[0.60,1.12]	0.65* **	[0.52,0.81]	0.96	[0.81,1.14]
Watching TV (no)	1.05	[0.76,1.45]	0.90	[0.71,1.15]	0.88	[0.69,1.11]

Note: Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 17. Multinomial Logistic Regression on the Onset of Cognitive Impairment from 2005 to 2008: Stratified Rural Subsamples

	Rural (<i>n</i> = 5,512)					
	Cognitively impaired vs. Cognitively normal		Dead vs. Cognitively normal		Lost to follow-up vs. Cognitively normal	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
High receiving (low receiving)	1.07	[0.83,1.38]	1.04	[0.86,1.25]	0.95	[0.77,1.17]
Reciprocity (low receiving)	1.18	[0.79,1.77]	1.15	[0.85,1.55]	0.98	[0.71,1.36]
<i>Individual socioeconomic status</i>						
Having some schooling (no)	0.71*	[0.55,0.93]	0.91	[0.76,1.10]	1.19	[0.97,1.46]
Agricultural occupation (no)	0.97	[0.74,1.28]	0.88	[0.72,1.08]	0.66*	[0.53,0.81]
Economic independency (no)	0.69*	[0.50,0.96]	0.65***	[0.52,0.81]	0.67*	[0.54,0.84]
<i>Individual demographic characteristics</i>						
Young-old (old-old)	0.20** *	[0.15,0.26]	0.18***	[0.15,0.22]	0.56* **	[0.46,0.68]
Female (male)	1.10	[0.85,1.43]	0.61***	[0.50,0.73]	1.11	[0.90,1.38]
Minority ethnic (Han)	0.52**	[0.35,0.78]	0.78	[0.60,1.01]	0.21* **	[0.13,0.35]
Married (not)	0.80	[0.61,1.04]	0.64***	[0.53,0.77]	0.78*	[0.63,0.96]
<i>Family characteristics</i>						
Number of son(s) alive	1.00	[0.92,1.09]	0.98	[0.92,1.05]	1.01	[0.93,1.09]
Number of daughter(s) alive	0.97	[0.89,1.06]	1.00	[0.93,1.07]	1.03	[0.95,1.12]
Frequent child(ren) visits	0.96	[0.88,1.05]	0.96	[0.90,1.03]	1.07	[0.99,1.16]
Living alone (no)	0.92	[0.70,1.22]	0.88	[0.71,1.09]	0.71* *	[0.55,0.92]

(Table 17 Continued)

Table 17

Multinomial Logistic Regression on the Onset of Cognitive Impairment from 2005 to 2008:

Stratified Rural Subsamples (Continued)

	Rural (<i>n</i> = 5,512)					
	Cognitively impaired vs. Cognitively normal		Dead vs. Cognitively normal		Lost to follow-up vs. Cognitively normal	
	RRR	95% CI	RRR	95% CI	RRR	95% CI
<i>Health conditions</i>						
Self-rated poor health (good/fair)	1.15	[0.94,1.40]	1.17*	[1.00,1.36]	1.04	[0.87,1.23]
Having any ADLs (no)	2.21** *	[1.61,3.04]	3.35***	[2.61,4.30]	2.13* **	[1.57,2.90]
Having any chronic health conditions (no)	0.89	[0.72,1.09]	0.96	[0.83,1.12]	0.79* *	[0.67,0.94]
<i>Health-related behaviors</i>						
Current smoker (no)	0.84	[0.63,1.11]	0.91	[0.75,1.10]	1.10	[0.89,1.35]
Current alcohol consumption (no)	0.96	[0.74,1.24]	1.06	[0.89,1.27]	0.98	[0.80,1.20]
Current exercising (no)	0.98	[0.78,1.24]	0.87	[0.73,1.03]	1.23* *	[1.02,1.47]
<i>Leisure activities</i>						
Gardening (no)	0.97	[0.70,1.34]	0.77* *	[0.60,0.99]	1.14	[0.91,1.43]
Reading (no)	0.94	[0.65,1.35]	0.93	[0.73,1.18]	0.91	[0.71,1.17]
Playing cards (no)	0.74* *	[0.55,1.00]	0.74** *	[0.61,0.91]	1.13	[0.93,1.38]
Watching TV (no)	0.62** *	[0.50,0.77]	0.68*** *	[0.57,0.80]	0.80* *	[0.65,0.98]

Note: Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 18. Association between Intergenerational Financial Exchange and Mediators

	Adequate medical services		Adequate nutrition		Depressed	
	OR	95% CI	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.67** *	[0.58,0.77]	0.80** *	[0.72,0.8 8]	0.87**	[0.79,0.9 6]
Reciprocity (high receiving)	0.69**	[0.55,0.87]	1.11	[0.97,1.2 8]	0.98	[0.86,1.1 1]
Urban (rural)	1.43** *	[1.23,1.66]	1.20** *	[1.09,1.3 1]	0.94	[0.86,1.0 3]
<i>Individual socioeconomic status</i>						
Having some schooling (no)	0.86	[0.73,1.01]	1.12*	[1.01,1.2 4]	0.97	[0.88,1.0 8]
Agricultural occupation (no)	0.58** *	[0.49,0.69]	0.75** *	[0.68,0.8 3]	1.21** *	[1.09,1.3 3]
Economic independency (no)	1.00	[0.83,1.20]	1.03	[0.93,1.1 6]	0.78** *	[0.70,0.8 6]
<i>Individual demographic characteristics</i>						
Young-old (old-old)	0.96	[0.82,1.14]	0.86**	[0.78,0.9 5]	0.93	[0.84,1.0 2]
Female (male)	1.00	[0.85,1.18]	1.05	[0.95,1.1 6]	0.96	[0.87,1.0 5]
Minority ethnic (Han)	0.8	[0.64,1.01]	1.55** *	[1.31,1.8 4]	1.48** *	[1.25,1.7 4]
Married (not)	0.78**	[0.65,0.92]	0.87*	[0.79,0.9 7]	0.77** *	[0.70,0.8 6]
<i>Family characteristics</i>						
Number of son(s) alive	0.92**	[0.87,0.97]	1.03	[0.99,1.0 7]	0.94** *	[0.91,0.9 7]
Number of daughter(s) alive	0.95*	[0.90,1.00]	1.05*	[1.01,1.0 9]	0.95**	[0.92,0.9 9]
Frequent child(ren) visits	1.24** *	[1.18,1.31]	1.04*	[1.01,1.0 8]	1.03	[0.99,1.0 6]
Living alone (no)	0.51** *	[0.43,0.61]	0.65** *	[0.57,0.7 3]	1.32** *	[1.17,1.4 8]

(Table 18 continued)

Table 18

Association between Intergenerational Financial Exchange and Mediators (Continued)

	Adequate medical services		Adequate nutrition		Depressed	
	OR	95% CI	OR	95% CI	OR	95% CI
<i>Health conditions</i>						
Self-rated poor health (good/fair)	0.44** *	[0.38,0.50]	0.62** *	[0.57,0.67]	1.91** *	[1.76,2.06]
Having any ADLs (no)	1.16	[0.98,1.36]	1.46** *	[1.31,1.62]	0.83** *	[0.75,0.92]
Having any chronic health conditions (no)	0.81**	[0.70,0.93]	0.99	[0.91,1.08]	1.06	[0.98,1.15]
<i>Health-related behaviors</i>						
Current smoker (no)	0.83*	[0.70,1.00]	0.97	[0.87,1.08]	0.86**	[0.78,0.95]
Current alcohol consumption (no)	1.33**	[1.12,1.59]	1.17**	[1.06,1.30]	0.86**	[0.78,0.95]
Current exercising (no)	1.62** *	[1.36,1.92]	1.48** *	[1.35,1.63]	0.58** *	[0.54,0.64]
<i>Leisure activities</i>						
Gardening (no)	1.34*	[1.05,1.70]	1.1	[0.98,1.24]	0.99	[0.89,1.11]
Reading (no)	1.98** *	[1.54,2.54]	1.45** *	[1.28,1.64]	0.97	[0.86,1.09]
Playing cards (no)	1.42**	[1.14,1.75]	1.19**	[1.07,1.33]	0.89*	[0.81,0.99]
Watching TV (no)	1.56** *	[1.36,1.80]	1.41** *	[1.29,1.55]	0.88**	[0.81,0.97]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 19. Influence of Intergenerational Exchange and Adequate Medical Services on Cognitive Well-Being

(1 = cognitively impaired, 0 = cognitively not impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	1.11	[0.97,1.27]	1.08	[0.95,1.24]
Reciprocity (high receiving)	0.68***	[0.54,0.86]	0.66***	[0.52,0.84]
Adequate medical services (no)			0.59***	[0.50,0.69]
Urban (rural)	1.01	[0.89,1.14]	1.03	[0.91,1.17]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.71***	[0.60,0.82]	0.70***	[0.60,0.82]
Agricultural occupation (no)	1.21**	[1.05,1.39]	1.18*	[1.02,1.36]
Economic independency (no)	0.81*	[0.67,0.99]	0.81*	[0.67,0.98]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.19,0.28]	0.23***	[0.18,0.28]
Female (male)	1.13	[0.98,1.31]	1.13	[0.98,1.31]
Minority ethnic (Han)	0.66***	[0.53,0.83]	0.65***	[0.51,0.82]
Married (not)	0.62***	[0.52,0.73]	0.60***	[0.50,0.71]
<i>Family characteristics</i>				
Number of son(s) alive	1.03	[0.99,1.08]	1.03	[0.98,1.08]
Number of daughter(s) alive	1.00	[0.96,1.05]	1.00	[0.95,1.05]
Frequent child(ren) visits	0.92***	[0.87,0.96]	0.93**	[0.88,0.98]
Living alone (no)	0.72***	[0.61,0.85]	0.69***	[0.58,0.81]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.71***	[1.52,1.92]	1.64***	[1.45,1.84]
Having any ADLs (no)	2.57***	[2.28,2.91]	2.62***	[2.32,2.96]
Having any chronic health conditions (no)	1.13*	[1.00,1.28]	1.12	[0.99,1.26]
<i>Health-related behaviors</i>				
Current smoker (no)	1.05	[0.89,1.25]	1.05	[0.89,1.25]
Current alcohol consumption (no)	0.94	[0.80,1.10]	0.96	[0.82,1.12]
Current exercising (no)	0.61***	[0.53,0.71]	0.63***	[0.54,0.73]
<i>Leisure activities</i>				
Gardening (no)	0.54***	[0.42,0.69]	0.54***	[0.42,0.70]
Reading (no)	0.38***	[0.29,0.50]	0.39***	[0.30,0.51]
Playing cards (no)	0.58***	[0.47,0.73]	0.60***	[0.48,0.74]
Watching TV (no)	0.55***	[0.49,0.62]	0.56***	[0.50,0.63]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 20. Influence of Intergenerational Exchange and Adequate Nutrition on Cognitive Well-Being

(1 = cognitively impaired, 0 = cognitively not impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	1.15*	[1.01,1.30]	1.13	[0.99,1.29]
Reciprocity (high receiving)	0.66***	[0.52,0.83]	0.66***	[0.53,0.84]
Adequate nutrition (no)			0.83**	[0.74,0.93]
Urban (rural)	1.01	[0.89,1.14]	1.02	[0.90,1.15]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.71***	[0.60,0.82]	0.71***	[0.61,0.83]
Agricultural occupation (no)	1.21**	[1.05,1.39]	1.20*	[1.04,1.38]
Economic independency (no)	0.81*	[0.67,0.99]	0.82*	[0.68,0.99]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.19,0.28]	0.22***	[0.18,0.27]
Female (male)	1.13	[0.98,1.31]	1.14	[0.98,1.32]
Minority ethnic (Han)	0.66***	[0.53,0.83]	0.67***	[0.54,0.85]
Married (not)	0.62***	[0.52,0.73]	0.61***	[0.51,0.72]
<i>Family characteristics</i>				
Number of son(s) alive	1.03	[0.99,1.08]	1.03	[0.99,1.08]
Number of daughter(s) alive	1.00	[0.96,1.05]	1.01	[0.96,1.05]
Frequent child(ren) visits	0.92***	[0.87,0.96]	0.92***	[0.87,0.96]
Living alone (no)	0.72***	[0.61,0.85]	0.71***	[0.60,0.84]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.71***	[1.52,1.92]	1.67***	[1.49,1.88]
Having any ADLs (no)	2.57***	[2.28,2.91]	2.62***	[2.32,2.96]
Having any chronic health conditions (no)	1.13*	[1.00,1.28]	1.13*	[1.00,1.27]
<i>Health-related behaviors</i>				
Current smoker (no)	1.05	[0.89,1.25]	1.05	[0.88,1.24]
Current alcohol consumption (no)	0.94	[0.80,1.10]	0.95	[0.81,1.11]
Current exercising (no)	0.61***	[0.53,0.71]	0.62***	[0.54,0.73]
<i>Leisure activities</i>				
Gardening (no)	0.54***	[0.42,0.69]	0.54***	[0.42,0.69]
Reading (no)	0.38***	[0.29,0.50]	0.39***	[0.29,0.51]
Playing cards (no)	0.58***	[0.47,0.73]	0.59***	[0.47,0.73]
Watching TV (no)	0.55***	[0.49,0.62]	0.56***	[0.49,0.62]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 21. Influence of Intergenerational Exchange and Depression on Cognitive Well-Being

(1 = cognitively impaired, 0 = cognitively not impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	1.11	[0.97,1.27]	1.10	[0.97,1.26]
Reciprocity (high receiving)	0.68***	[0.54,0.86]	0.68***	[0.54,0.86]
Depressed (no)			0.92	[0.82,1.03]
Urban (rural)	1.01	[0.89,1.14]	1.01	[0.89,1.14]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.71***	[0.60,0.82]	0.71***	[0.60,0.83]
Agricultural occupation (no)	1.21**	[1.05,1.39]	1.21**	[1.05,1.40]
Economic independency (no)	0.81*	[0.67,0.99]	0.81*	[0.67,0.98]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.19,0.28]	0.23***	[0.19,0.28]
Female (male)	1.13	[0.98,1.31]	1.13	[0.98,1.31]
Minority ethnic (Han)	0.66***	[0.53,0.83]	0.67***	[0.53,0.84]
Married (not)	0.62***	[0.52,0.73]	0.61***	[0.52,0.73]
<i>Family characteristics</i>				
Number of son(s) alive	1.03	[0.99,1.08]	1.03	[0.98,1.08]
Number of daughter(s) alive	1.00	[0.96,1.05]	1.00	[0.96,1.05]
Frequent child(ren) visits	0.92***	[0.87,0.96]	0.92***	[0.87,0.96]
Living alone (no)	0.72***	[0.61,0.85]	0.73***	[0.62,0.86]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.71***	[1.52,1.92]	1.73***	[1.54,1.95]
Having any ADLs (no)	2.57***	[2.28,2.91]	2.56***	[2.27,2.89]
Having any chronic health conditions (no)	1.13*	[1.00,1.28]	1.13*	[1.00,1.28]
<i>Health-related behaviors</i>				
Current smoker (no)	1.05	[0.89,1.25]	1.05	[0.88,1.24]
Current alcohol consumption (no)	0.94	[0.80,1.10]	0.94	[0.80,1.09]
Current exercising (no)	0.61***	[0.53,0.71]	0.61***	[0.52,0.71]
<i>Leisure activities</i>				
Gardening (no)	0.54***	[0.42,0.69]	0.54***	[0.42,0.69]
Reading (no)	0.38***	[0.29,0.50]	0.38***	[0.29,0.50]
Playing cards (no)	0.58***	[0.47,0.73]	0.58***	[0.47,0.72]
Watching TV (no)	0.55***	[0.49,0.62]	0.55***	[0.49,0.61]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 22. Influence of Intergenerational Exchange and Adequate Medical Services, Nutrition, and Depression on Cognitive Well-Being (1 = cognitively impaired, 0 = cognitively impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	1.11	[0.97,1.27]	1.07	[0.94,1.23]
Reciprocity (high receiving)	0.68**	[0.54,0.86]	0.66***	[0.53,0.84]
Adequate medical services (no)			0.60***	[0.52,0.71]
Adequate nutrition (no)			0.88*	[0.78,0.98]
Depressed (no)			0.89	[0.80,1.00]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.71***	[0.60,0.82]	0.70***	[0.60,0.82]
Agricultural occupation (no)	1.21**	[1.05,1.38]	1.17*	[1.02,1.34]
Economic independency (no)	0.82*	[0.67,0.99]	0.82*	[0.67,0.99]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.19,0.28]	0.22***	[0.18,0.27]
Female (male)	1.14	[0.98,1.31]	1.13	[0.98,1.32]
Minority ethnic (Han)	0.66***	[0.53,0.83]	0.66***	[0.53,0.84]
Married (not)	0.61***	[0.52,0.73]	0.59***	[0.50,0.71]
<i>Family characteristics</i>				
Number of child(ren) alive	0.99	[0.94,1.06]	0.99	[0.93,1.06]
Number of son(s) alive	1.03	[0.99,1.08]	1.03	[0.98,1.08]
Number of daughter(s) alive	1.01	[0.96,1.05]	1.01	[0.95,1.05]
Frequent child(ren) visits	0.92***	[0.87,0.96]	0.93**	[0.89,0.98]
Living alone (no)	0.72***	[0.61,0.85]	0.68***	[0.58,0.81]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.71***	[1.52,1.92]	1.64***	[1.46,1.85]
Having any ADLs (no)	2.57***	[2.28,2.91]	2.64***	[2.34,2.98]
Having any chronic health conditions (no)	1.13*	[1.00,1.28]	1.12	[0.99,1.26]
<i>Health-related behaviors</i>				
Current smoker (no)	1.05	[0.89,1.25]	1.04	[0.88,1.24]
Current alcohol consumption (no)	0.94	[0.80,1.10]	0.96	[0.82,1.12]
Current exercising (no)	0.61***	[0.53,0.71]	0.63***	[0.54,0.73]
<i>Leisure activities</i>				
Gardening (no)	0.54***	[0.42,0.69]	0.55***	[0.42,0.70]
Reading (no)	0.38***	[0.29,0.50]	0.39***	[0.30,0.52]
Playing cards (no)	0.58***	[0.47,0.73]	0.59***	[0.48,0.74]
Watching TV (no)	0.55***	[0.49,0.62]	0.56***	[0.50,0.63]

Note: $N = 12,020$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 23. Association between Intergenerational Financial Exchange and Mediators:
Urban Subsample

	Adequate medical services		Adequate nutrition	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.63***	[0.48,0.82]	0.78**	[0.68,0.91]
Reciprocity (high receiving)	1.09	[0.68,1.75]	1.14	[0.92,1.42]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.83	[0.61,1.12]	1.15	[0.98,1.35]
Agricultural occupation (no)	0.54***	[0.41,0.71]	0.71***	[0.61,0.82]
Economic independency (no)	1.34	[0.96,1.88]	1.18	[1.00,1.40]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.84	[0.61,1.14]	0.87	[0.74,1.02]
Female (male)	0.96	[0.71,1.30]	1.09	[0.93,1.27]
Minority ethnic (Han)	0.84	[0.51,1.40]	1.90***	[1.35,2.68]
Married (not)	0.68*	[0.49,0.94]	0.85	[0.72,1.01]
<i>Family characteristics</i>				
Number of child(ren) alive	1.01	[0.89,1.14]	0.95	[0.87,1.03]
Number of son(s) alive	0.89*	[0.80,0.98]	1.09**	[1.02,1.17]
Number of daughter(s) alive	0.91	[0.82,1.01]	1.08*	[1.01,1.15]
Frequent child(ren) visits	1.29***	[1.18,1.42]	0.99	[0.94,1.05]
Living alone (no)	0.37***	[0.27,0.51]	0.73**	[0.60,0.88]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	0.37***	[0.28,0.48]	0.65***	[0.57,0.74]
Having any ADLs (no)	1.19	[0.89,1.59]	1.37***	[1.16,1.61]
Having any chronic health conditions (no)	0.96	[0.73,1.27]	1.05	[0.92,1.21]
<i>Health-related behaviors</i>				
Current smoker (no)	0.84	[0.60,1.18]	0.94	[0.79,1.12]
Current alcohol consumption (no)	1.03	[0.74,1.45]	1.1	[0.93,1.31]
Current exercising (no)	1.90***	[1.40,2.58]	1.48***	[1.29,1.71]
<i>Leisure activities</i>				
Gardening (no)	1.3	[0.89,1.91]	1.08	[0.92,1.28]
Reading (no)	2.08***	[1.40,3.10]	1.51***	[1.26,1.81]
Playing cards (no)	1.29	[0.89,1.86]	1.14	[0.97,1.34]
Watching TV (no)	1.11	[0.84,1.45]	1.40***	[1.20,1.65]

(Table 23 continued)

Table 23

Association between Intergenerational Financial Exchange and Mediators: Urban Subsample

	Depressed	
	OR	95% CI
Low receiving (high receiving)	0.81**	[0.70,0.93]
Reciprocity (high receiving)	0.76**	[0.63,0.93]
<i>Individual socioeconomic status</i>		
Having some schooling (no)	0.99	[0.85,1.15]
Agricultural occupation (no)	1.37***	[1.19,1.58]
Economic independency (no)	0.78**	[0.67,0.91]
<i>Individual demographic characteristics</i>		
Young-old (old-old)	0.86*	[0.74,0.99]
Female (male)	0.93	[0.80,1.08]
Minority ethnic (Han)	1.09	[0.82,1.45]
Married (not)	0.78**	[0.67,0.91]
<i>Family characteristics</i>		
Number of child(ren) alive	1.02	[0.94,1.09]
Number of son(s) alive	0.92**	[0.87,0.98]
Number of daughter(s) alive	0.94*	[0.89,1.00]
Frequent child(ren) visits	1.04	[0.99,1.10]
Living alone (no)	1.33**	[1.11,1.61]
<i>Health conditions</i>		
Self-rated poor health (good/fair)	1.94***	[1.72,2.19]
Having any ADLs (no)	0.79**	[0.68,0.92]
Having any chronic health conditions (no)	1.1	[0.96,1.25]
<i>Health-related behaviors</i>		
Current smoker (no)	0.86	[0.73,1.01]
Current alcohol consumption (no)	0.93	[0.79,1.08]
Current exercising (no)	0.60***	[0.53,0.68]
<i>Leisure activities</i>		
Gardening (no)	1.03	[0.89,1.19]
Reading (no)	0.95	[0.81,1.12]
Playing cards (no)	0.84*	[0.72,0.97]
Watching TV (no)	0.99	[0.85,1.16]

Note: $n = 5,220$. Category in the parentheses is the reference group for each covariate. ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 24. Influence of Intergenerational Exchange and Adequate Medical Services on Cognitive Well-Being: Urban Subsample

(1 = cognitively impaired, 0 = cognitively not impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.98	[0.79,1.23]	0.96	[0.77,1.19]
Reciprocity (high receiving)	0.55**	[0.37,0.81]	0.56**	[0.38,0.82]
Adequate medical services (no)			0.54***	[0.40,0.73]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.76*	[0.60,0.96]	0.76*	[0.59,0.96]
Agricultural occupation (no)	1.17	[0.96,1.44]	1.14	[0.93,1.40]
Economic independency (no)	0.93	[0.72,1.21]	0.94	[0.73,1.23]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.22***	[0.16,0.32]	0.22***	[0.16,0.31]
Female (male)	1.05	[0.82,1.33]	1.03	[0.81,1.32]
Minority ethnic (Han)	0.76	[0.49,1.18]	0.75	[0.48,1.17]
Married (not)	0.67**	[0.51,0.88]	0.65**	[0.49,0.85]
<i>Family characteristics</i>				
Number of son(s) alive	1.05	[0.98,1.14]	1.05	[0.97,1.13]
Number of daughter(s) alive	1.01	[0.94,1.09]	1.01	[0.93,1.09]
Frequent child(ren) visits	0.95	[0.88,1.03]	0.96	[0.89,1.04]
Living alone (no)	0.50***	[0.37,0.67]	0.47***	[0.34,0.63]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.63***	[1.35,1.98]	1.56***	[1.29,1.89]
Having any ADLs (no)	2.18***	[1.80,2.64]	2.21***	[1.82,2.68]
Having any chronic health conditions (no)	1.28*	[1.04,1.58]	1.29*	[1.04,1.59]
<i>Health-related behaviors</i>				
Current smoker (no)	0.82	[0.60,1.10]	0.82	[0.60,1.11]
Current alcohol consumption (no)	0.81	[0.61,1.05]	0.80	[0.61,1.06]
Current exercising (no)	0.52***	[0.41,0.66]	0.53***	[0.42,0.68]
<i>Leisure activities</i>				
Gardening (no)	0.47***	[0.32,0.68]	0.47***	[0.33,0.69]
Reading (no)	0.33***	[0.23,0.47]	0.33***	[0.23,0.48]
Playing cards (no)	0.59**	[0.42,0.83]	0.60**	[0.42,0.84]
Watching TV (no)	0.49***	[0.40,0.59]	0.49***	[0.40,0.59]

Note: $n = 5,220$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 25. Influence of Intergenerational Exchange and Adequate Nutrition on Cognitive Well-Being: Urban Subsample
(1 = cognitively impaired, 0 = cognitively unimpaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.98	[0.79,1.23]	0.97	[0.78,1.21]
Reciprocity (high receiving)	0.55**	[0.37,0.81]	0.55**	[0.38,0.81]
Adequate nutrition			0.80*	[0.66,0.96]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.76*	[0.60,0.96]	0.76*	[0.60,0.97]
Agricultural occupation (no)	1.17	[0.96,1.44]	1.16	[0.94,1.42]
Economic independency (no)	0.93	[0.72,1.21]	0.94	[0.72,1.22]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.22***	[0.16,0.32]	0.22***	[0.16,0.31]
Female (male)	1.05	[0.82,1.33]	1.05	[0.82,1.33]
Minority ethnic (Han)	0.76	[0.49,1.18]	0.78	[0.50,1.22]
Married (not)	0.67**	[0.51,0.88]	0.66**	[0.50,0.87]
<i>Family characteristics</i>				
Number of child(ren) alive	0.96	[0.87,1.06]	0.95	[0.86,1.05]
Number of son(s) alive	1.05	[0.98,1.14]	1.06	[0.98,1.14]
Number of daughter(s) alive	1.01	[0.94,1.09]	1.02	[0.94,1.10]
Frequent child(ren) visits	0.95	[0.88,1.03]	0.95	[0.88,1.02]
Living alone (no)	0.50***	[0.37,0.67]	0.49***	[0.36,0.66]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.63***	[1.35,1.98]	1.60***	[1.32,1.93]
Having any ADLs (no)	2.18***	[1.80,2.64]	2.21***	[1.83,2.68]
Having any chronic health conditions (no)	1.28*	[1.04,1.58]	1.29*	[1.04,1.59]
<i>Health-related behaviors</i>				
Current smoker (no)	0.82	[0.60,1.10]	0.81	[0.60,1.10]
Current alcohol consumption (no)	0.80	[0.61,1.05]	0.80	[0.61,1.06]
Current exercising (no)	0.52***	[0.41,0.66]	0.53***	[0.42,0.67]
<i>Leisure activities</i>				
Gardening (no)	0.47***	[0.32,0.68]	0.47***	[0.32,0.68]
Reading (no)	0.33***	[0.23,0.47]	0.33***	[0.23,0.48]
Playing cards (no)	0.59**	[0.42,0.83]	0.59**	[0.42,0.84]
Watching TV (no)	0.49***	[0.40,0.59]	0.50***	[0.41,0.60]

Note: $n = 5,220$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 26. Influence of Intergenerational Exchange and Depression on Cognitive Well-Being: Urban Subsample
(1 = cognitively impaired, 0 = cognitively not impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.98	[0.79,1.23]	0.98	[0.79,1.22]
Reciprocity (high receiving)	0.55**	[0.37,0.81]	0.55**	[0.37,0.81]
Depressed			0.95	[0.79,1.14]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.76*	[0.60,0.96]	0.76*	[0.60,0.97]
Agricultural occupation (no)	1.17	[0.96,1.44]	1.18	[0.96,1.44]
Economic independency (no)	0.93	[0.72,1.21]	0.93	[0.71,1.21]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.22***	[0.16,0.32]	0.22***	[0.16,0.32]
Female (male)	1.05	[0.82,1.33]	1.04	[0.82,1.33]
Minority ethnic (Han)	0.76	[0.49,1.18]	0.76	[0.49,1.19]
Married (not)	0.67**	[0.51,0.88]	0.67**	[0.51,0.88]
<i>Family characteristics</i>				
Number of child(ren) alive	0.96	[0.87,1.06]	0.96	[0.87,1.06]
Number of son(s) alive	1.05	[0.98,1.14]	1.05	[0.97,1.13]
Number of daughter(s) alive	1.01	[0.94,1.09]	1.01	[0.94,1.09]
Frequent child(ren) visits	0.95	[0.88,1.03]	0.95	[0.88,1.03]
Living alone (no)	0.50***	[0.37,0.67]	0.50***	[0.37,0.68]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.63***	[1.35,1.98]	1.65***	[1.36,2.00]
Having any ADLs (no)	2.18***	[1.80,2.64]	2.17***	[1.79,2.63]
Having any chronic health conditions (no)	1.28*	[1.04,1.58]	1.28*	[1.04,1.58]
<i>Health-related behaviors</i>				
Current smoker (no)	0.82	[0.60,1.10]	0.81	[0.60,1.10]
Current alcohol consumption (no)	0.80	[0.61,1.05]	0.80	[0.61,1.05]
Current exercising (no)	0.52***	[0.41,0.66]	0.52***	[0.41,0.66]
<i>Leisure activities</i>				
Gardening (no)	0.47***	[0.32,0.68]	0.47***	[0.32,0.68]
Reading (no)	0.33***	[0.23,0.47]	0.33***	[0.23,0.47]
Playing cards (no)	0.59**	[0.42,0.83]	0.59**	[0.42,0.83]
Watching TV (no)	0.49***	[0.40,0.59]	0.49***	[0.40,0.59]

Note: $n = 5,220$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 27. Association between Intergenerational Financial Exchange and Mediators:
Rural Subsamples

	Adequate medical services		Adequate nutrition	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.69***	[0.58,0.82]	0.80***	[0.71,0.91]
Reciprocity (high receiving)	0.58***	[0.45,0.75]	1.08	[0.90,1.31]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.86	[0.70,1.04]	1.09	[0.96,1.25]
Agricultural occupation (no)	0.65***	[0.51,0.81]	0.82**	[0.71,0.94]
Economic independency (no)	0.82	[0.66,1.03]	0.9	[0.77,1.04]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	1	[0.82,1.22]	0.85*	[0.75,0.97]
Female (male)	1.02	[0.84,1.24]	1.02	[0.90,1.17]
Minority ethnic (Han)	0.78	[0.61,1.01]	1.44***	[1.18,1.75]
Married (not)	0.83	[0.67,1.02]	0.9	[0.78,1.03]
<i>Family characteristics</i>				
Number of child(ren) alive	1.02	[0.94,1.10]	0.96	[0.90,1.02]
Number of son(s) alive	0.93*	[0.87,0.99]	1	[0.95,1.05]
Number of daughter(s) alive	0.96	[0.90,1.02]	1.04	[0.99,1.08]
Frequent child(ren) visits	1.22***	[1.15,1.30]	1.07**	[1.03,1.12]
Living alone (no)	0.58***	[0.47,0.71]	0.61***	[0.52,0.71]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	0.46***	[0.39,0.54]	0.59***	[0.53,0.65]
Having any ADLs (no)	1.1	[0.90,1.35]	1.49***	[1.29,1.73]
Having any chronic health conditions (no)	0.76**	[0.65,0.90]	0.95	[0.85,1.05]
<i>Health-related behaviors</i>				
Current smoker (no)	0.84	[0.68,1.04]	0.99	[0.86,1.13]
Current alcohol consumption (no)	1.45***	[1.18,1.78]	1.22**	[1.07,1.39]
Current exercising (no)	1.48***	[1.20,1.83]	1.46***	[1.29,1.65]
<i>Leisure activities</i>				
Gardening (no)	1.34	[0.99,1.82]	1.1	[0.93,1.31]
Reading (no)	1.83***	[1.32,2.53]	1.34**	[1.12,1.60]
Playing cards (no)	1.51**	[1.16,1.96]	1.24**	[1.07,1.43]
Watching TV (no)	1.74***	[1.48,2.05]	1.40***	[1.24,1.57]

(Table 27 continued)

Table 27

Association between Intergenerational Financial Exchange and Mediators: Rural Subsamples (Continued)

	Depressed	
	OR	95% CI
Low receiving (high receiving)	0.91	[0.80,1.03]
Reciprocity (high receiving)	1.24*	[1.03,1.49]
<i>Individual socioeconomic status</i>		
Having some schooling (no)	0.97	[0.85,1.11]
Agricultural occupation (no)	1.06	[0.92,1.22]
Economic independency (no)	0.78**	[0.68,0.91]
<i>Individual demographic characteristics</i>		
Young-old (old-old)	1	[0.88,1.13]
Female (male)	0.98	[0.86,1.12]
Minority ethnic (Han)	1.71***	[1.40,2.10]
Married (not)	0.77***	[0.67,0.88]
<i>Family characteristics</i>		
Number of child(ren) alive	0.98	[0.92,1.04]
Number of son(s) alive	0.95*	[0.91,0.99]
Number of daughter(s) alive	0.96	[0.92,1.00]
Frequent child(ren) visits	1.02	[0.97,1.06]
Living alone (no)	1.31***	[1.13,1.53]
<i>Health conditions</i>		
Self-rated poor health (good/fair)	1.90***	[1.71,2.10]
Having any ADLs (no)	0.88	[0.76,1.02]
Having any chronic health conditions (no)	1.05	[0.94,1.16]
<i>Health-related behaviors</i>		
Current smoker (no)	0.86*	[0.75,0.98]
Current alcohol consumption (no)	0.83**	[0.73,0.94]
Current exercising (no)	0.58***	[0.52,0.66]
<i>Leisure activities</i>		
Gardening (no)	0.95	[0.81,1.12]
Reading (no)	0.98	[0.82,1.16]
Playing cards (no)	0.94	[0.82,1.08]
Watching TV (no)	0.83**	[0.74,0.94]

Note: $n = 6,800$. Category in the parentheses is the reference group for each covariate. ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 28. Influence of Intergenerational Exchange and Adequate Medical Services on Cognitive Well-Being: Rural Subsample

(1 = cognitively impaired, 0 = cognitively impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	1.19*	[1.01,1.42]	1.17	[0.99,1.39]
Reciprocity (high receiving)	0.77	[0.57,1.04]	0.74*	[0.55,1.00]
Adequate medical services (no)			0.59***	[0.49,0.72]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.65***	[0.53,0.80]	0.64***	[0.52,0.79]
Agricultural occupation (no)	1.24*	[1.01,1.53]	1.22	[0.99,1.50]
Economic independency (no)	0.70*	[0.51,0.95]	0.68*	[0.50,0.92]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.18,0.30]	0.23***	[0.18,0.30]
Female (male)	1.21*	[1.00,1.46]	1.21*	[1.00,1.46]
Minority ethnic (Han)	0.64**	[0.49,0.84]	0.63***	[0.48,0.82]
Married (not)	0.59***	[0.47,0.73]	0.58***	[0.46,0.72]
<i>Family characteristics</i>				
Number of son(s) alive	1.02	[0.96,1.08]	1.02	[0.96,1.08]
Number of daughter(s) alive	1.00	[0.94,1.06]	0.99	[0.94,1.05]
Frequent child(ren) visits	0.89***	[0.83,0.95]	0.90**	[0.85,0.96]
Living alone (no)	0.87	[0.71,1.07]	0.84	[0.68,1.03]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.76***	[1.52,2.03]	1.68***	[1.44,1.94]
Having any ADLs (no)	2.84***	[2.42,3.33]	2.89***	[2.46,3.39]
Having any chronic health conditions (no)	1.07	[0.92,1.24]	1.04	[0.90,1.21]
<i>Health-related behaviors</i>				
Current smoker (no)	1.20	[0.98,1.49]	1.20	[0.98,1.49]
Current alcohol consumption (no)	1.02	[0.84,1.23]	1.05	[0.87,1.27]
Current exercising (no)	0.69***	[0.57,0.84]	0.71***	[0.58,0.86]
<i>Leisure activities</i>				
Gardening (no)	0.61**	[0.44,0.87]	0.62**	[0.44,0.88]
Reading (no)	0.46***	[0.30,0.70]	0.47***	[0.31,0.72]
Playing cards (no)	0.58***	[0.44,0.77]	0.59***	[0.45,0.79]
Watching TV (no)	0.57***	[0.50,0.67]	0.59***	[0.51,0.68]

Note: $n = 6,800$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 29. Influence of Intergenerational Exchange and Adequate Nutrition on Cognitive Well-Being: Rural Subsample

(1 = cognitively impaired, 0 = cognitively not impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	1.19*	[1.01,1.42]	1.18	[1.00,1.41]
Reciprocity (high receiving)	0.77	[0.57,1.04]	0.77	[0.57,1.04]
Adequate nutrition			0.84*	[0.73,0.97]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.65***	[0.53,0.80]	0.65***	[0.53,0.81]
Agricultural occupation (no)	1.24*	[1.01,1.53]	1.24*	[1.00,1.52]
Economic independency (no)	0.70*	[0.51,0.95]	0.69*	[0.51,0.94]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.18,0.30]	0.23***	[0.18,0.30]
Female (male)	1.21*	[1.00,1.46]	1.21*	[1.00,1.46]
Minority ethnic (Han)	0.64**	[0.49,0.84]	0.65**	[0.50,0.86]
Married (not)	0.59***	[0.47,0.73]	0.58***	[0.47,0.73]
<i>Family characteristics</i>				
Number of son(s) alive	1.02	[0.96,1.08]	1.02	[0.96,1.08]
Number of daughter(s) alive	1.01	[0.94,1.06]	1.01	[0.94,1.06]
Frequent child(ren) visits	0.89***	[0.83,0.95]	0.89***	[0.84,0.95]
Living alone (no)	0.87	[0.71,1.07]	0.85	[0.70,1.05]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.76***	[1.52,2.03]	1.72***	[1.48,1.99]
Having any ADLs (no)	2.84***	[2.42,3.33]	2.89***	[2.46,3.39]
Having any chronic health conditions (no)	1.07	[0.92,1.24]	1.06	[0.91,1.23]
<i>Health-related behaviors</i>				
Current smoker (no)	1.20	[0.98,1.49]	1.21	[0.97,1.48]
Current alcohol consumption (no)	1.02	[0.84,1.23]	1.03	[0.85,1.25]
Current exercising (no)	0.69***	[0.57,0.84]	0.70***	[0.58,0.86]
<i>Leisure activities</i>				
Gardening (no)	0.61**	[0.44,0.87]	0.62**	[0.44,0.87]
Reading (no)	0.46***	[0.30,0.70]	0.46***	[0.31,0.70]
Playing cards (no)	0.58***	[0.44,0.77]	0.58***	[0.44,0.77]
Watching TV (no)	0.57***	[0.50,0.67]	0.58***	[0.50,0.67]

Note: $n = 6,800$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 30. Influence of Intergenerational Exchange and Depression on Cognitive Well-Being: Rural Subsample

(1 = cognitively impaired, 0 = cognitively not impaired)

	Model 1		Model 2	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	1.19*	[1.01,1.42]	1.19*	[1.00,1.41]
Reciprocity (high receiving)	0.77	[0.57,1.04]	0.77	[0.57,1.04]
Depressed			0.89	[0.77,1.03]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.65***	[0.53,0.80]	0.65***	[0.53,0.80]
Agricultural occupation (no)	1.24*	[1.01,1.53]	1.24*	[1.01,1.53]
Economic independency (no)	0.70*	[0.51,0.95]	0.70*	[0.51,0.95]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.23***	[0.18,0.30]	0.23***	[0.18,0.30]
Female (male)	1.21*	[1.00,1.46]	1.21*	[1.00,1.46]
Minority ethnic (Han)	0.64**	[0.49,0.84]	0.65**	[0.49,0.85]
Married (not)	0.59***	[0.47,0.73]	0.58***	[0.47,0.73]
<i>Family characteristics</i>				
Number of child(ren) alive	1.03	[0.95,1.11]	1.03	[0.95,1.11]
Number of son(s) alive	1.02	[0.96,1.08]	1.02	[0.96,1.08]
Number of daughter(s) alive	1.00	[0.94,1.06]	0.99	[0.94,1.05]
Frequent child(ren) visits	0.89***	[0.83,0.95]	0.89***	[0.83,0.95]
Living alone (no)	0.87	[0.71,1.07]	0.88	[0.72,1.08]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.76***	[1.52,2.03]	1.79***	[1.54,2.08]
Having any ADLs (no)	2.84***	[2.42,3.33]	2.83***	[2.42,3.32]
Having any chronic health conditions (no)	1.07	[0.92,1.24]	1.07	[0.92,1.24]
<i>Health-related behaviors</i>				
Current smoker (no)	1.20	[0.98,1.49]	1.20	[0.97,1.48]
Current alcohol consumption (no)	1.02	[0.84,1.23]	1.02	[0.84,1.23]
Current exercising (no)	0.69***	[0.57,0.84]	0.68***	[0.56,0.83]
<i>Leisure activities</i>				
Gardening (no)	0.61**	[0.44,0.87]	0.62**	[0.44,0.87]
Reading (no)	0.46***	[0.30,0.70]	0.46***	[0.30,0.70]
Playing cards (no)	0.58***	[0.44,0.77]	0.58***	[0.44,0.76]
Watching TV (no)	0.57***	[0.50,0.67]	0.57***	[0.49,0.66]

Note: $n = 6,800$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 31. Association between Intergenerational Financial Exchange and Mediators among Cognitively Normal Older Adults at Baseline: Full Sample

	Adequate medical services		Adequate nutrition		Depressed	
	OR	95% CI	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.63***	[0.53,0.75]	0.81***	[0.73,0.90]	0.86**	[0.78,0.95]
Reciprocity (high receiving)	0.67**	[0.52,0.86]	1.11	[0.95,1.29]	0.98	[0.85,1.11]
Urban (rural)	1.43***	[1.19,1.72]	1.20***	[1.08,1.33]	0.94	[0.85,1.03]
<i>Individual socioeconomic status</i>						
Having some schooling	0.79*	[0.66,0.95]	1.13*	[1.02,1.27]	0.96	[0.86,1.06]
Agricultural occupation	0.58***	[0.47,0.71]	0.72***	[0.64,0.80]	1.18**	[1.06,1.31]
Economic independency	1.05	[0.85,1.29]	1.01	[0.89,1.12]	0.77***	[0.69,0.85]
<i>Individual demographic characteristics</i>						
Young-old (old-old)	0.86	[0.72,1.03]	0.85**	[0.76,0.94]	0.92	[0.83,1.01]
Female (male)	1.01	[0.83,1.22]	1.03	[0.92,1.15]	0.95	[0.85,1.05]
Minority ethnic (Han)	0.82	[0.62,1.07]	1.60***	[1.33,1.93]	1.57***	[1.32,1.82]
Married (not)	0.69***	[0.57,0.85]	0.87*	[0.78,0.97]	0.78***	[0.70,0.86]
<i>Family characteristics</i>						
Number of son(s) alive	0.94	[0.88,1.01]	1.04	[0.99,1.08]	0.93***	[0.89,0.97]
Number of daughter(s) alive	0.92*	[0.86,0.99]	1.05*	[1.01,1.10]	0.95*	[0.91,0.99]
Frequent child(ren) visits	1.28***	[1.21,1.36]	1.05**	[1.01,1.10]	1.01	[0.97,1.05]
Living alone (no)	0.43***	[0.35,0.53]	0.66***	[0.58,0.75]	1.30***	[1.14,1.47]
<i>Health conditions</i>						
Self-rated poor health (good/fair)	0.43***	[0.37,0.51]	0.64***	[0.59,0.70]	1.90***	[1.74,2.06]
Having any ADLs (no)	1.04	[0.83,1.30]	1.43***	[1.25,1.63]	0.88*	[0.77,1.00]
Having any chronic health conditions (no)	0.88	[0.75,1.04]	0.99	[0.90,1.09]	1.05	[0.96,1.14]
<i>Health-related behaviors</i>						
Current smoker (no)	0.77*	[0.63,0.95]	0.98	[0.87,1.10]	0.83***	[0.74,0.92]
Current alcohol consumption (no)	1.30*	[1.06,1.60]	1.16*	[1.04,1.29]	0.87**	[0.78,0.96]
Current exercising (no)	1.47***	[1.22,1.78]	1.45***	[1.31,1.60]	0.58***	[0.53,0.63]
<i>Leisure activities</i>						
Gardening (no)	1.23	[0.96,1.58]	1.10	[0.98,1.25]	0.99	[0.89,1.10]
Reading (no)	1.97***	[1.51,2.56]	1.41***	[1.24,1.61]	0.96	[0.85,1.07]
Playing cards (no)	1.27*	[1.02,1.59]	1.15*	[1.03,1.28]	0.89*	[0.80,0.98]
Watching TV (no)	1.78***	[1.51,2.11]	1.50***	[1.35,1.68]	0.84**	[0.76,0.92]

Note: $N = 9,935$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 32. Effects of Adequate Medical Services on the Association between Intergenerational Financial Exchange and Onset of Cognitive Impairment: Full Sample

	Became cognitively impaired vs.		Died vs.	
	Remained cognitively normal		Remained cognitively normal	
	RRR	95% CI	RRR	95% CI
Low receiving (high receiving)	0.87	[0.72,1.06]	0.92	[0.80,1.06]
Reciprocity (high receiving)	1.07	[0.82,1.39]	1.07	[0.88,1.29]
Adequate medical services (no)	0.99	[0.76,1.29]	0.89	[0.73,1.08]
Urban (rural)	1.03	[0.86,1.23]	1.02	[0.89,1.16]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.69***	[0.56,0.84]	0.92	[0.80,1.06]
Agricultural occupation (no)	1.01	[0.82,1.21]	0.95	[0.82,1.10]
Economic independency (no)	0.79*	[0.63,0.98]	0.73***	[0.63,0.86]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.17***	[0.14,0.21]	0.18***	[0.16,0.21]
Female (male)	1.13	[0.93,1.37]	0.61***	[0.53,0.70]
Minority ethnic (Han)	0.62**	[0.45,0.85]	0.80*	[0.64,0.99]
Married (not)	0.78*	[0.64,0.96]	0.68***	[0.59,0.78]
<i>Family characteristics</i>				
Number of son(s) alive	0.99	[0.93,1.06]	1	[0.94,1.05]
Number of daughter(s) alive	0.96	[0.90,1.03]	1.03	[0.97,1.08]
Frequent child(ren) visits	0.98	[0.92,1.05]	0.98	[0.93,1.03]
Living alone (no)	0.97	[0.78,1.21]	0.89	[0.75,1.05]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.14	[0.98,1.34]	1.14*	[1.02,1.28]
Having any ADLs (no)	1.95***	[1.56,2.42]	2.85***	[2.41,3.37]
Having any chronic diseases(no)	0.99	[0.84,1.16]	1.02	[0.91,1.15]
<i>Health-related behaviors</i>				
Current smoker (no)	0.93	[0.75,1.16]	0.94	[0.81,1.09]
Current alcohol consumption (no)	1	[0.82,1.22]	0.99	[0.86,1.14]
Current exercising (no)	0.9	[0.75,1.07]	0.81***	[0.71,0.91]
<i>Leisure activities</i>				
Gardening (no)	1.03	[0.83,1.29]	0.89	[0.76,1.05]
Reading (no)	0.88	[0.69,1.13]	0.86	[0.73,1.02]
Playing cards (no)	0.79*	[0.64,0.97]	0.70***	[0.60,0.82]
Watching TV (no)	0.74***	[0.62,0.88]	0.74***	[0.65,0.85]

(Table 32 continued)

Table 32

Effects of Adequate Medical Services on the Association between Intergenerational Financial Exchange and Onset of Cognitive Impairment: Full Sample (Continued)

	Lost vs. Remained cognitively normal	
	RRR	95% CI
Low receiving (high receiving)	1.08	[0.94,1.24]
Reciprocity (high receiving)	1.01	[0.84,1.20]
Adequate medical services (no)	1.14	[0.91,1.43]
Urban (rural)	1.51***	[1.32,1.72]
<i>Individual socioeconomic status</i>		
Having some schooling (no)	1.06	[0.92,1.22]
Agricultural occupation (no)	0.72***	[0.62,0.83]
Economic independency (no)	0.74***	[0.64,0.86]
<i>Individual demographic characteristics</i>		
Young-old (old-old)	0.60***	[0.53,0.69]
Female (male)	1.05	[0.91,1.21]
Minority ethnic (Han)	0.30***	[0.21,0.41]
Married (not)	0.78***	[0.68,0.90]
<i>Family characteristics</i>		
Number of son(s) alive	0.96	[0.90,1.02]
Number of daughter(s) alive	0.98	[0.92,1.04]
Frequent child(ren) visits	1.07*	[1.01,1.13]
Living alone (no)	0.84*	[0.70,1.00]
<i>Health conditions</i>		
Self-rated poor health (good/fair)	1.06	[0.95,1.19]
Having any ADLs (no)	2.28***	[1.90,2.74]
Having any chronic diseases(no)	0.9	[0.80,1.01]
<i>Health-related behaviors</i>		
Current smoker (no)	0.95	[0.82,1.10]
Current alcohol consumption (no)	0.99	[0.86,1.14]
Current exercising (no)	1.08	[0.96,1.22]
<i>Leisure activities</i>		
Gardening (no)	1.07	[0.93,1.23]
Reading (no)	1.09	[0.93,1.27]
Playing cards (no)	1.03	[0.90,1.17]
Watching TV (no)	0.81**	[0.70,0.95]

Note: $n = 9,935$. Category in the parentheses is the reference group for each covariate. ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

Table 33. Effects of Nutrition on the association between Intergenerational Financial Exchange and Onset of Cognitive Impairment: Full Sample

	Became cognitively impaired vs.		Died vs.	
	Remained cognitively normal		Remained cognitively normal	
	RRR	95% CI	RRR	95% CI
Low receiving (high receiving)	0.88	[0.72,1.07]	0.94	[0.82,1.08]
Reciprocity (high receiving)	1.06	[0.82,1.39]	1.07	[0.88,1.29]
Adequate nutrition (no)	1.09	[0.93,1.27]	1.23***	[1.09,1.39]
Urban (rural)	1.03	[0.86,1.22]	1.01	[0.88,1.15]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.68***	[0.56,0.84]	0.92	[0.80,1.06]
Agricultural occupation (no)	1	[0.82,1.22]	0.96	[0.83,1.11]
Economic independency (no)	0.79*	[0.63,0.98]	0.73***	[0.63,0.86]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.17***	[0.14,0.21]	0.18***	[0.16,0.21]
Female (male)	1.13	[0.92,1.37]	0.61***	[0.53,0.70]
Minority ethnic (Han)	0.61**	[0.44,0.84]	0.78*	[0.63,0.97]
Married (not)	0.78*	[0.64,0.96]	0.68***	[0.59,0.79]
<i>Family characteristics</i>				
Number of son(s) alive	0.99	[0.92,1.06]	0.99	[0.94,1.05]
Number of daughter(s) alive	0.96	[0.90,1.03]	1.02	[0.97,1.08]
Frequent child(ren) visits	0.98	[0.92,1.05]	0.97	[0.92,1.02]
Living alone (no)	0.98	[0.79,1.22]	0.91	[0.77,1.08]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.15	[0.99,1.35]	1.17**	[1.04,1.32]
Having any ADLs (no)	1.94***	[1.55,2.41]	2.81***	[2.38,3.32]
Having any chronic diseases (no)	0.99	[0.84,1.16]	1.03	[0.91,1.16]
<i>Health-related behaviors</i>				
Current smoker (no)	0.93	[0.75,1.16]	0.94	[0.81,1.09]
Current alcohol consumption (no)	1	[0.82,1.22]	0.98	[0.85,1.13]
Current exercising (no)	0.89	[0.75,1.06]	0.79***	[0.70,0.90]
<i>Leisure activities</i>				
Gardening (no)	1.03	[0.82,1.29]	0.89	[0.76,1.04]
Reading (no)	0.88	[0.68,1.13]	0.85	[0.72,1.00]
Playing cards (no)	0.78*	[0.63,0.97]	0.70***	[0.60,0.81]
Watching TV (no)	0.73***	[0.61,0.87]	0.72***	[0.63,0.83]

(Table 33 continued)

Table 33

Effects of Nutrition on the association between Intergenerational Financial Exchange and Onset of Cognitive Impairment: Full Sample (Continued)

	Lost vs.	
	RRR	95% CI
Low receiving (high receiving)	1.08	[0.94,1.24]
Reciprocity (high receiving)	1	[0.83,1.19]
Adequate nutrition (no)	1.16*	[1.03,1.31]
Urban (rural)	1.51***	[1.32,1.72]
<i>Individual socioeconomic status</i>		
Having some schooling (no)	1.05	[0.91,1.22]
Agricultural occupation (no)	0.72***	[0.63,0.84]
Economic independency (no)	0.74***	[0.64,0.86]
<i>Individual demographic characteristics</i>		
Young-old (old-old)	0.60***	[0.53,0.69]
Female (male)	1.05	[0.91,1.21]
Minority ethnic (Han)	0.29***	[0.21,0.41]
Married (not)	0.78***	[0.68,0.90]
<i>Family characteristics</i>		
Number of son(s) alive	0.96	[0.90,1.02]
Number of daughter(s) alive	0.98	[0.92,1.04]
Frequent child(ren) visits	1.07*	[1.01,1.13]
Living alone (no)	0.84	[0.70,1.00]
<i>Health conditions</i>		
Self-rated poor health (good/fair)	1.07	[0.95,1.20]
Having any ADLs (no)	2.26***	[1.88,2.71]
Having any chronic diseases (no)	0.9	[0.80,1.01]
<i>Health-related behaviors</i>		
Current smoker (no)	0.95	[0.82,1.10]
Current alcohol consumption (no)	0.98	[0.85,1.13]
Current exercising (no)	1.07	[0.95,1.21]
<i>Leisure activities</i>		
Gardening (no)	1.06	[0.93,1.22]
Reading (no)	1.08	[0.93,1.27]
Playing cards (no)	1.03	[0.90,1.17]
Watching TV (no)	0.80**	[0.69,0.94]

Note: $n = 9,935$. Category in the parentheses is the reference group for each covariate. ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 34. Mediating Effects of Depression on the association between Intergenerational Financial Exchange and Onset of Cognitive Impairment: Full Sample

	Became cognitively impaired vs.		Died vs.	
	Remained cognitively normal		Remained cognitively normal	
	RRR	95% CI	RRR	95% CI
Low receiving (high receiving)	0.88	[0.73,1.07]	0.93	[0.81,1.07]
Reciprocity (high receiving)	1.07	[0.82,1.39]	1.07	[0.89,1.30]
Depressed (no)	1.21*	[1.03,1.41]	1.05	[0.93,1.17]
Urban (rural)	1.03	[0.87,1.23]	1.01	[0.89,1.16]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.69***	[0.56,0.84]	0.93	[0.80,1.07]
Agricultural occupation (no)	0.99	[0.81,1.20]	0.95	[0.82,1.10]
Economic independency (no)	0.79*	[0.64,0.99]	0.74***	[0.63,0.86]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.17***	[0.14,0.21]	0.18***	[0.16,0.21]
Female (male)	1.13	[0.93,1.38]	0.61***	[0.53,0.70]
Minority ethnic (Han)	0.60**	[0.44,0.83]	0.80*	[0.64,0.99]
Married (not)	0.79*	[0.65,0.97]	0.68***	[0.59,0.79]
<i>Family characteristics</i>				
Number of son(s) alive	0.99	[0.93,1.07]	1	[0.95,1.05]
Number of daughter(s) alive	0.96	[0.90,1.03]	1.03	[0.97,1.08]
Frequent child(ren) visits	0.98	[0.92,1.05]	0.97	[0.93,1.02]
Living alone (no)	0.96	[0.78,1.20]	0.89	[0.76,1.05]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	1.11	[0.95,1.30]	1.14*	[1.02,1.28]
Having any ADLs (no)	1.96***	[1.57,2.45]	2.85***	[2.41,3.37]
Having any chronic disease (no)	0.98	[0.84,1.15]	1.02	[0.91,1.15]
<i>Health-related behaviors</i>				
Current smoker (no)	0.94	[0.76,1.17]	0.94	[0.81,1.09]
Current alcohol consumption (no)	1.01	[0.83,1.23]	0.99	[0.86,1.14]
Current exercising (no)	0.92	[0.77,1.10]	0.81**	[0.71,0.92]
<i>Leisure activities</i>				
Gardening (no)	1.03	[0.82,1.29]	0.89	[0.76,1.05]
Reading (no)	0.88	[0.69,1.13]	0.86	[0.73,1.01]
Playing cards (no)	0.79*	[0.64,0.98]	0.70***	[0.60,0.82]
Watching TV (no)	0.74**	[0.62,0.89]	0.74***	[0.65,0.85]

(Table 34 continued)

Table 34

Mediating Effects of Depression on the association between Intergenerational Financial Exchange and Onset of Cognitive Impairment: Full Sample (Continued)

	Lost vs.	
	RRR	95% CI
Low receiving (high receiving)	1.08	[0.94,1.24]
Reciprocity (high receiving)	1	[0.84,1.20]
Depressed (no)	1.09	[0.98,1.23]
Urban (rural)	1.51***	[1.33,1.73]
<i>Individual socioeconomic status</i>		
Having some schooling (no)	1.06	[0.92,1.22]
Agricultural occupation (no)	0.71***	[0.62,0.82]
Economic independency (no)	0.74***	[0.64,0.86]
<i>Individual demographic characteristics</i>		
Young-old (old-old)	0.60***	[0.53,0.69]
Female (male)	1.05	[0.91,1.21]
Minority ethnic (Han)	0.29***	[0.21,0.41]
Married (not)	0.78***	[0.68,0.90]
<i>Family characteristics</i>		
Number of son(s) alive	0.96	[0.90,1.02]
Number of daughter(s) alive	0.98	[0.92,1.04]
Frequent child(ren) visits	1.07*	[1.02,1.13]
Living alone (no)	0.83*	[0.69,0.98]
<i>Health conditions</i>		
Self-rated poor health (good/fair)	1.04	[0.93,1.17]
Having any ADLs (no)	2.29***	[1.90,2.74]
Having any chronic disease (no)	0.9	[0.80,1.01]
<i>Health-related behaviors</i>		
Current smoker (no)	0.95	[0.82,1.10]
Current alcohol consumption (no)	0.99	[0.86,1.14]
Current exercising (no)	1.1	[0.97,1.24]
<i>Leisure activities</i>		
Gardening (no)	1.07	[0.93,1.23]
Reading (no)	1.1	[0.94,1.28]
Playing cards (no)	1.03	[0.91,1.18]
Watching TV (no)	0.82*	[0.70,0.96]

Note: $n = 9,935$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. RRR = relative risk ratio. CI = confidence interval.

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

Table 35. Association between Intergenerational Financial Exchange and Mediators among Cognitively Normal Older Adults at Baseline: Urban Subsample

	Adequate medical services		Adequate nutrition	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.51***	[0.37,0.71]	0.77**	[0.65,0.91]
Reciprocity (high receiving)	0.83	[0.50,1.37]	1.11	[0.88,1.39]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.69*	[0.48,0.99]	1.16	[0.97,1.39]
Agricultural occupation (no)	0.58**	[0.41,0.81]	0.69***	[0.59,0.82]
Economic independency (no)	1.66**	[1.13,2.44]	1.16	[0.96,1.39]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.63*	[0.44,0.90]	0.84*	[0.71,0.99]
Female (male)	1.01	[0.71,1.44]	1.08	[0.91,1.29]
Minority ethnic (Han)	0.81	[0.44,1.49]	2.15***	[1.45,3.18]
Married (not)	0.57**	[0.39,0.84]	0.85	[0.71,1.01]
<i>Family characteristics</i>				
Number of son(s) alive	0.92	[0.80,1.06]	1.09*	[1.01,1.18]
Number of daughter(s) alive	0.89	[0.77,1.02]	1.11**	[1.03,1.20]
Frequent child(ren) visits	1.44***	[1.29,1.60]	1.03	[0.96,1.09]
Living alone (no)	0.26***	[0.18,0.39]	0.74**	[0.60,0.92]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	0.37***	[0.27,0.51]	0.72***	[0.62,0.83]
Having any ADLs (no)	0.91	[0.63,1.33]	1.37**	[1.13,1.66]
Having any chronic health conditions (no)	1.07	[0.77,1.48]	1.02	[0.88,1.19]
<i>Health-related behaviors</i>				
Current smoker (no)	0.77	[0.53,1.13]	0.94	[0.79,1.14]
Current alcohol consumption (no)	0.94	[0.64,1.38]	1.11	[0.92,1.33]
Current exercising (no)	1.69**	[1.21,2.36]	1.45***	[1.25,1.69]
<i>Leisure activities</i>				
Gardening (no)	1.26	[0.84,1.90]	1.09	[0.92,1.30]
Reading (no)	2.13***	[1.39,3.27]	1.51***	[1.25,1.82]
Playing cards (no)	1.17	[0.79,1.74]	1.11	[0.94,1.32]
Watching TV (no)	1.4	[0.99,1.98]	1.52***	[1.26,1.83]

(Table 35 continued)

Table 35. Association between Intergenerational Financial Exchange and Mediators among Cognitively Normal Older Adults at Baseline: Urban Subsample (Continued)

	Depressed	
	OR	95% CI
Low receiving (high receiving)	0.83*	[0.71,0.97]
Reciprocity (high receiving)	0.81*	[0.66,0.99]
<i>Individual socioeconomic status</i>		
Having some schooling (no)	1	[0.84,1.17]
Agricultural occupation (no)	1.32***	[1.13,1.55]
Economic independency (no)	0.74***	[0.63,0.87]
<i>Individual demographic characteristics</i>		
Young-old (old-old)	0.87	[0.75,1.02]
Female (male)	0.92	[0.79,1.08]
Minority ethnic (Han)	1.03	[0.75,1.41]
Married (not)	0.80**	[0.68,0.94]
<i>Family characteristics</i>		
Number of son(s) alive	0.93*	[0.87,1.00]
Number of daughter(s) alive	0.94	[0.88,1.01]
Frequent child(ren) visits	1.01	[0.96,1.08]
Living alone (no)	1.32**	[1.08,1.62]
<i>Health conditions</i>		
Self-rated poor health (good/fair)	1.88***	[1.65,2.14]
Having any ADLs (no)	0.87	[0.73,1.03]
Having any chronic health conditions (no)	1.12	[0.97,1.29]
<i>Health-related behaviors</i>		
Current smoker (no)	0.82*	[0.69,0.97]
Current alcohol consumption (no)	0.94	[0.79,1.10]
Current exercising (no)	0.60***	[0.52,0.69]
<i>Leisure activities</i>		
Gardening (no)	1.03	[0.89,1.20]
Reading (no)	0.92	[0.78,1.09]
Playing cards (no)	0.85*	[0.73,0.98]
Watching TV (no)	0.97	[0.81,1.17]

Note: $n = 4,423$. Category in the parentheses is the reference group for each covariate.

ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Table 36. Association between Intergenerational Financial Exchange and Mediators among Cognitively Normal Older Adults at Baseline: Rural Subsample

	Adequate medical services		Adequate nutrition	
	OR	95% CI	OR	95% CI
Low receiving (high receiving)	0.69***	[0.56,0.85]	0.84*	[0.73,0.97]
Reciprocity (high receiving)	0.61***	[0.45,0.82]	1.1	[0.90,1.35]
<i>Individual socioeconomic status</i>				
Having some schooling (no)	0.83	[0.67,1.03]	1.11	[0.97,1.28]
Agricultural occupation (no)	0.62***	[0.48,0.81]	0.77**	[0.66,0.90]
Economic independency (no)	0.82	[0.64,1.04]	0.86	[0.74,1.01]
<i>Individual demographic characteristics</i>				
Young-old (old-old)	0.95	[0.76,1.18]	0.86*	[0.75,0.99]
Female (male)	1.02	[0.81,1.28]	0.99	[0.86,1.15]
Minority ethnic (Han)	0.82	[0.60,1.11]	1.43**	[1.15,1.78]
Married (not)	0.76*	[0.60,0.96]	0.89	[0.77,1.03]
<i>Family characteristics</i>				
Number of son(s) alive	0.95	[0.88,1.02]	1.02	[0.97,1.07]
Number of daughter(s) alive	0.93	[0.86,1.00]	1.03	[0.97,1.08]
Frequent child(ren) visits	1.22***	[1.13,1.31]	1.07**	[1.02,1.13]
Living alone (no)	0.53***	[0.41,0.67]	0.61***	[0.52,0.73]
<i>Health conditions</i>				
Self-rated poor health (good/fair)	0.45***	[0.38,0.55]	0.59***	[0.52,0.66]
Having any ADLs (no)	1.08	[0.81,1.43]	1.44***	[1.19,1.74]
Having any chronic health conditions (no)	0.83	[0.68,1.00]	0.96	[0.86,1.08]
<i>Health-related behaviors</i>				
Current smoker (no)	0.78*	[0.62,0.99]	1.01	[0.87,1.17]
Current alcohol consumption (no)	1.47**	[1.15,1.87]	1.19*	[1.03,1.37]
Current exercising (no)	1.35*	[1.07,1.71]	1.42***	[1.25,1.63]
<i>Leisure activities</i>				
Gardening (no)	1.18	[0.86,1.63]	1.1	[0.93,1.32]
Reading (no)	1.80***	[1.28,2.52]	1.29**	[1.08,1.55]
Playing cards (no)	1.34*	[1.02,1.77]	1.18*	[1.01,1.37]
Watching TV (no)	1.90***	[1.56,2.31]	1.47***	[1.29,1.68]

(Table 36 continued)

Table 36

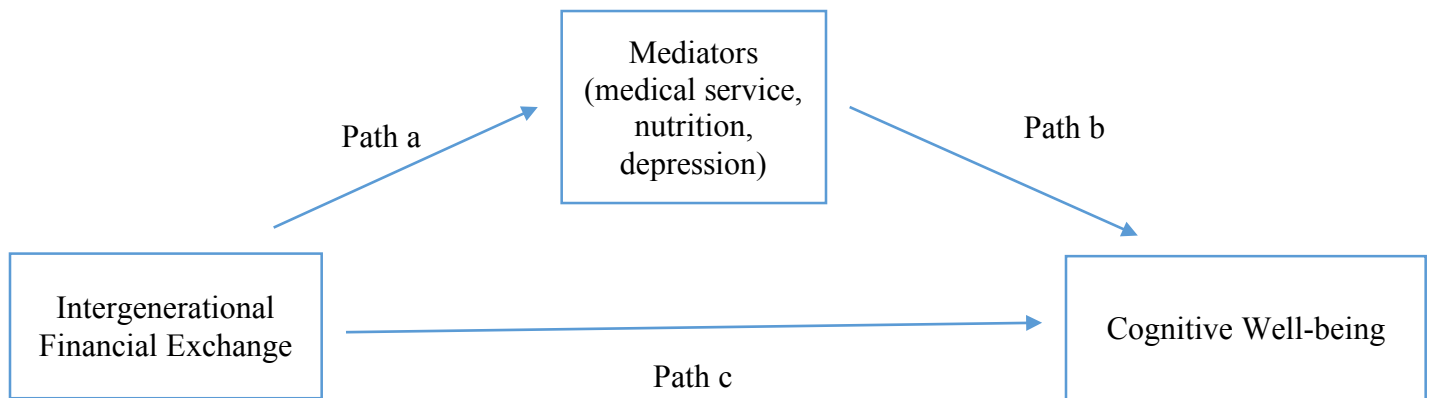
Association between Intergenerational Financial Exchange and Mediators among Cognitively Normal Older Adults at Baseline: Rural Subsample (Continued)

	Depressed	
	OR	95% CI
Low receiving (high receiving)	0.88	[0.76,1.02]
Reciprocity (high receiving)	1.21	[0.99,1.48]
<i>Individual socioeconomic status</i>		
Having some schooling (no)	0.94	[0.82,1.08]
Agricultural occupation (no)	1.05	[0.90,1.22]
Economic independency (no)	0.80**	[0.69,0.94]
<i>Individual demographic characteristics</i>		
Young-old (old-old)	0.96	[0.84,1.10]
Female (male)	0.98	[0.85,1.13]
Minority ethnic (Han)	1.94***	[1.55,2.43]
Married (not)	0.77***	[0.66,0.88]
<i>Family characteristics</i>		
Number of son(s) alive	0.92**	[0.88,0.98]
Number of daughter(s) alive	0.95	[0.90,1.01]
Frequent child(ren) visits	1	[0.95,1.06]
Living alone (no)	1.29**	[1.09,1.54]
<i>Health conditions</i>		
Self-rated poor health (good/fair)	1.93***	[1.72,2.17]
Having any ADLs (no)	0.9	[0.75,1.09]
Having any chronic health conditions (no)	1.02	[0.91,1.15]
<i>Health-related behaviors</i>		
Current smoker (no)	0.83*	[0.72,0.96]
Current alcohol consumption (no)	0.83**	[0.72,0.95]
Current exercising (no)	0.57***	[0.50,0.65]
<i>Leisure activities</i>		
Gardening (no)	0.94	[0.79,1.11]
Reading (no)	1	[0.84,1.20]
Playing cards (no)	0.94	[0.81,1.09]
Watching TV (no)	0.79***	[0.69,0.90]

Note: $n = 5,512$. Category in the parentheses is the reference group for each covariate. ADL = activities of daily living. OR = odds ratio. CI = confidence interval.

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

Figure 1. Path diagram for the mediational model of cognitive well-being



Notes: Path a represents association between intergenerational exchange and a mediator.
Path b represents association between intergenerational exchange, adequate nutrition, and cognitive well-being
Path c represents direct association between intergenerational exchange and cognitive well-being.

Figure 2. 3-Class Solution of Intergenerational Financial Exchange Patterns

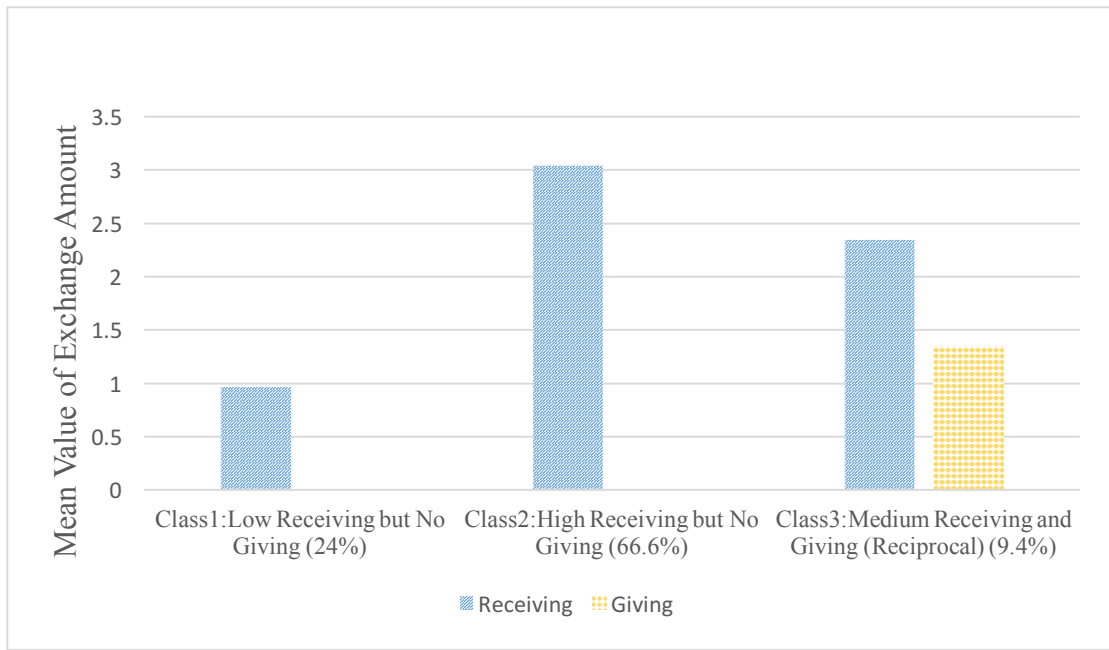
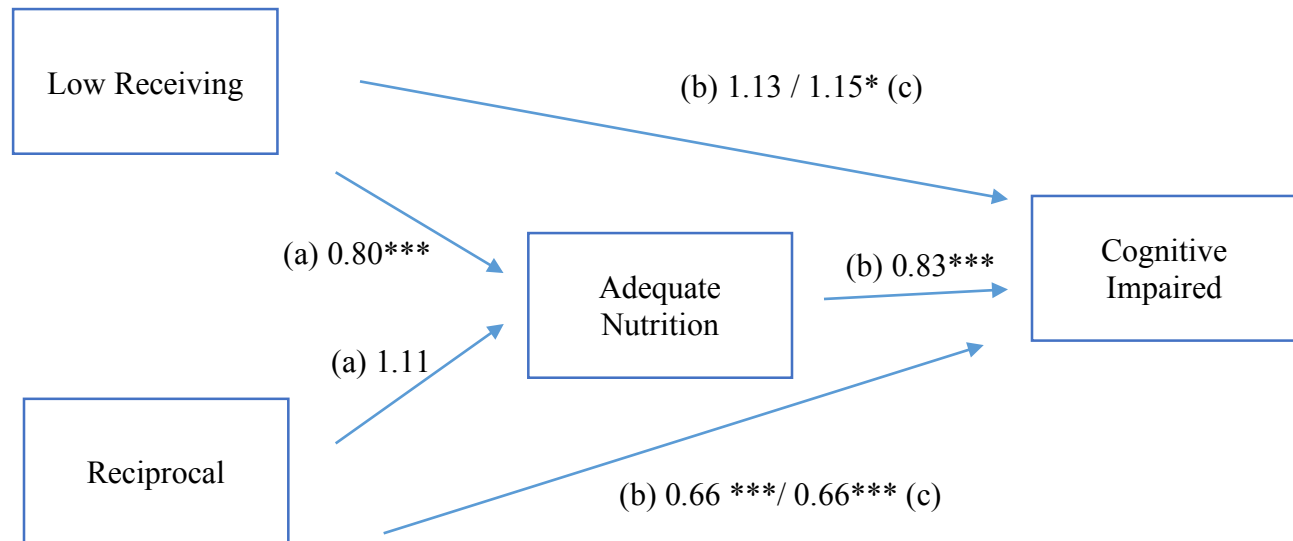


Figure 3. The mediating role of adequate nutrition on cognitive well-being



Notes: Depicted are adjusted logistic regression odds ratios. *** $p < .001$. ** $p < .01$. * $p < .05$.

(a) represents association between intergenerational exchange and adequate nutrition.

(b) represents association between intergenerational exchange, adequate nutrition, and cognitive well-being

(c) represents direct association between intergenerational exchange and cognitive well-being.

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