University of Southampton

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF GERONTOLOGY

Intergenerational Relations: The Changing Pattern of Economic, Social and Psychological Transfers within Chinese Families

by

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Thesis for the degree of PhD (Social Sciences) in Gerontology

September 2019

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

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INTERGENERATIONAL RELATIONS: THE CHANGING PATTERN OF ECONOMIC, SOCIAL AND PSYCHOLOGICAL TRANSFERS WITHIN CHINESE FAMILIES

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The unprecedented population ageing speed, in combination with mass urbanisation and modernisation, have exerted a great impact upon intergenerational relations within Chinese families. This study investigates the changing intergenerational economic, social and psychological support exchanges within Chinese families, as well as the impact of the changes in the living arrangements with adult children upon the provision of support to or from their parents; and upon their parents' physical and psychological health based on the Harmonised China Health and Retirement Longitudinal Study (CHARLS) (2011 - 2015).

The results indicate that the exchanges of intergenerational economic, social and psychological support have undergone changes between 2011 and 2015. The intergenerational living arrangement shows a significant association with the flows of economic, social and psychological support within Chinese families, which are linked with the health status of Chinese older people. For example, the lagged fixed-effects models show that non-co-residence with adult children was associated with a rise in receiving economic support (OR=1.38, $p<0.001$) and a decline in receiving assistance with (I)ADLs from adult children (OR=0.61, $p<0.001$) 2 years later. In addition, a change from providing economic support to adult children to not doing so between 2011-13 was associated with an improvement of older people's life satisfaction between 2013-15 (OR=0.78, $p<0.05$). Meanwhile, having weekly in-person and distant contact with one's adult children predicted the report of a better depression status among older people in rural and urban areas two years later. The policy implications of such findings need to be taken into account at the national, regional and local level in order to better support intergenerational ties and help improve older people's well-being in China.

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Research Thesis: Declaration of Authorship

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I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

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Acknowledgements

Throughout the writing of the thesis, I have received a great amount of support. First, I would like to acknowledge the support from the Economic and Social Research Council (ESRC) for funding this research. Particular thanks to the fantastic South Coast Doctoral Training Partnership (SCDTP) team – Glenn Miller, Gemma Harris, Prof. Pauline Leonard, Prof. Athina Vlachantoni and Dr. Amos Channon.

My PhD supervisors, Prof. Maria Evandrou and Prof. Athina Vlachantoni, who are experts in the field of Gerontology, have been most helpful in guiding me through each stage of the process. Their feedback and advice have contributed to the completion of the thesis and journal articles generated from my PhD.

I would also like to express my gratitude to Prof. Myrskyla Mikko and Dr. Kieron Barclay, who invited me for an institutional visit to the Max Planck Institute for Demographic Research (MPIDR) and provided me with valuable assistance on my research. I also sincerely thank Prof. Jane Falkingham and Dr. Rosalind Willis for their constructive comments on the interim thesis. My sincere thanks also go to my Master supervisor Dr. Yu Ding from Xiamen University, who encouraged me to pursue my PhD and inspired me with her academic dedication and life wisdom.

In addition, I am very thankful to my beloved parents who share their support morally and physically, my darling husband Hao who is always with me, and my baby angel due around Christmas. Finally, there are my friends, Ning Wang, Mia Tackney, Pamela Calderon, Dr. Frank Feng, Dr. Gloria Langat, Dr. Min Qin and Dr. Kathryn Wicks, who are of great support in deliberating over my problems and findings; and Edward Woolley, Margaret Hopkinson-Woolley, Dr. Sijing Liang, Jiaxi Chen, Dr. Xiaotong Zhu, Simeng Li, and Xuli Chen, who provide happy distraction to rest my mind outside of my research.

Definitions and Abbreviations

ADLs: Activities of Daily Living

CASS: Chinese Academy of Social Sciences

CES-D: Centre for Epidemiologic Studies Depression Scale

CFPS: China Family Panel Studies

CHARLS: China Health and Retirement Longitudinal Study

CHNS: China Health and Nutrition Survey

CI: Confidence Interval

CLHLS: Chinese Longitudinal Healthy Longevity Survey

CPS: Current Population Survey

CSFD: Chinese Survey of Family Dynamics

ELSA: English Longitudinal Study of Ageing

FEM: Fixed Effects Model

FES: Family Expenditure Survey

GLS: Generalised Least Square

HRS: Health and Retirement Survey

IADLs: Instrumental Activities of Daily Living

MLE: Maximum Likelihood Estimation

NBS: National Bureau of Statistics

NEET: Not Currently Engaged in Education, Employment or Training

NPFPC: National Population and Family Planning Commission

OR: Odds Ratio

QoL: Quality of Life

REM: Random Effects Model

REML: Restricted Maximum Likelihood

SE: Standard Error

SHARE: Survey of Health, Ageing and Retirement in Europe

SHLSE: Surveys of Health and Living Status of Elderly

UK: United Kingdom

UN: United Nations

US: United States

USC: University of Southern California

WAA: World Assembly on Ageing

Chapter 1 Introduction

Population ageing is one of the most significant trends and challenges of the 21st century, as population pyramids have been reshaped or are being reshaped into 'skyscrapers' in many countries all over the world (Harper, 2016). The increasing life expectancy of human beings and the changes in the population age structure have far-reaching effects on different aspects of societies. The trend of population ageing is dramatic in Asia, which is spurred by a tremendous industrialisation and urbanisation process (Chen *et al.*, 2016). China is a unique context for studying population ageing, characterised by the largest absolute number of people aged 60 or over in the world, a massive rural to urban migration trend and its Confucius culture and family centred traditions (Fei, 1983; Ao *et al.*, 2016; Ministry of Civil Affairs, 2018). Intergenerational support, which plays a crucial role in Chinese people's later life, may have undergone great transformations in the context of rapid societal changes in contemporary China (Luo and Zhan, 2012; Liang and Wu, 2014; Gruijters, 2017). The overall aim of this thesis is to examine the changes in the flows of intergenerational economic, social and psychological support within Chinese families, and to determine the effect of the living arrangements with adult children on the exchange of intergenerational support, and on their parents' health and wellbeing based on longitudinal analyses.

This thesis includes seven chapters. Chapter 1 serves as the introduction of the thesis, followed by Chapter 2 as a Literature Review. Chapter 3 clarifies the methodology used in this study, while Chapter 4 provides the descriptive results in terms of the intergenerational support and health status of older people in China. Chapters 5 and 6 examine the associations between the changes in the living arrangements with adult children and the changes in intergenerational support exchanges, and the changes in intergenerational support and older people's physical and psychological health status respectively. Chapter 7 contains a critical discussion and conclusion, emphasises on the policy implications, highlights the contributions of this study and specifies the recommendations for future research.

Chapter 1 starts with mapping the background of ageing, families and intergenerational relations in China, followed by an overview of the rural to urban migration trend. Thereafter, the rationale, aims and objectives of the study and the structure of the thesis are provided in this chapter.

1.1 Ageing, Families and Intergenerational Relations in China

1.1.1 Rapid population ageing

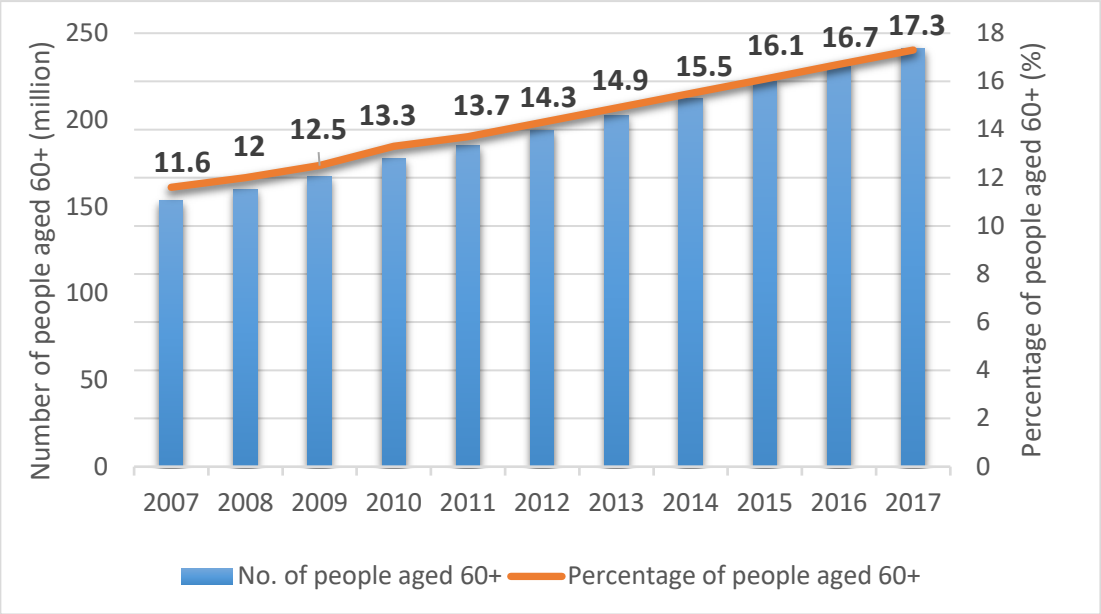
Population ageing and a series of relevant issues including changing population age structure, insufficient labour force and increasing health and social care burden have brought great challenges to both developed and developing countries (Giles *et al.*, 2010; Graham *et al.*, 2015; Gomez-Leon *et al.*, 2019). An aged nation refers to a country where the population of people aged 60 years old or over making up more than 10% of the total population[1]. According to this criterion, China has been an aged nation since 2000, when the fifth Census showed that the number of individuals aged over 60 years old in China reached 130 million and accounted for 10.2% of the total population (National Bureau of Statistics, 2002) (NBS). By the end of 2018, the number of people aged 60 or over in China was approximately 250 million (17.9% of the total population) (NBS, 2019).

As shown in Figure 1.1, the number and percentage of the older population in China have been growing every year (since 2007). In the meantime, the population's age structure is changing enormously with the drop in the fertility rate, the increase in the average life expectancy and the constant decrease in the labour force population (NBS, 2018). According to the United Nations (UN), the total fertility rate in China has declined to 1.55 in 2015 (compared to 6.11 in 1950), and the average life expectancy of the Chinese population has increased to 76.34 in 2015 (UN, 2015). The labour force population (population of people aged 15-64) in China has been reducing gradually from a population number of 1,005 million in 2013 to less than 1,000 million in 2017 (NBS, 2018). Furthermore, the old-age dependency ratio[2] of the Chinese population was projected to increase from 0.11 in 2010 to 0.25 in 2030, and 0.44 in 2050 (Population Division of UN, 2019). Although there has been a critique that the old-age dependency assumes that all people over a certain age are a burden to the society and ignores the activity and engagement of the older population, and that alternative measures for population ageing are preferable in some cases (Falkingham, 1989; Mullan, 2002; Sanderson and Scherbov, 2015), academics and practitioners are concerned that the continuous rise in the old-age dependency ratio will result in the final disappearance of the demographic dividend[3] in China soon (Jin, 2015).

[1] The criterion was adopted in the World Assembly on Ageing (WAA) in 1982 in Vienna, Austria (WAA, 1982). Another criterion for an aged society is that people aged 65 or over account for more than 7% of the total population in the region (ibid).

[2] The old-age dependency ratio here refers to the ratio of the population aged 65 or more over the population aged 15 to 64.

[3] The demographic dividend was first raised in the World Development Report in 1997 by the World Bank, which refers to the economic growth benefiting from shifts in a population's age structure, mainly when the



Source: Ministry of Civil Affairs (2018).

Figure 1.1 Number and percentage of people aged 60 or over in China

The unprecedented ageing speed in China has exerted a great impact upon the demographic characteristics, economic status, social relations and health condition of the older population, among these one crucial aspect is the family structure.

1.1.2 Changing family structure

Along with the changes in the population structure in China, great changes in the family structure have been observed (Ma *et al.*, 2011; The Statistics Portal, 2015). Prior to the formation of the People's Republic in 1949, China had a comparatively large average family size due to the dominant patriarchal culture formulated in its long history (Zeng, 1986). Parents were likely to have five or more children and tended to co-reside with their married sons (ibid). Influenced by a number of factors including modernisation, urbanisation and rural to urban migration, it is less common to have multi-generational households in China nowadays (Zimmer and Kwong, 2003; Ren and Treiman, 2015). The average size of households has reduced from 5.21 persons in 1931 to 4.43 in 1982 and 2.97 in 2014, which shows a trend of decreasing household size structure in China (The Statistics Portal, 2015).

Different dominant types of family structure have been found in urban and rural areas of China. Evidence from previous research shows decreases in the number of stem families and increases in

share of the non-working-age population (14 and younger, and 65 and older) is smaller than the share of the working-age population (15-64) (Bloom *et al.*, 2003).

the number of nuclear families and conjugal families in urban areas of China[4] (Ma *et al.*, 2011). By contrast, the number of nuclear families in rural areas has dropped significantly since the 1990s, with an increase in single-person households being observed (ibid). Out of all families in rural areas, about 50% are extended families, which is 22% higher than in urban areas (Wang, 2013) (the urban and rural differences in China are further discussed in Section 1.2.1 and Chapter 2). As co-residence and the relationship between intergenerational family members play an important role in the health and well-being of older people (e.g. Li, Song and Feldman, 2009; Zhang *et al*., 2014), urban and rural disparities in the family structure should be taken into consideration when researching the older population in China. The changes in the population and family structure have a strong association with the intergenerational relations within Chinese families, which is discussed in the next section.

1.1.3 Understanding intergenerational relations

In gerontological research, intergenerational relations refer to the relationships between generations involving older people, which are often manifested as economic, social and psychological support received or provided by older people (Wang, 2004; Izuhara, 2010). As influenced by Confucius and traditional piety values rooted in this country, intergenerational support in China is provided in both upward (from the younger to the older generation) and downward directions (from the older to the younger generation) (Fei, 1983). Chinese parents in their midlife take the responsibility to raise up their children. As they grow older, it is taken for granted that their adult children have the obligation to support them financially and instrumentally[5] out of reciprocity (Chen and Silverstein, 2000; Jiang *et al.*, 2013). This dominant value is inherited and intergenerational relations continue to play a vital role in people's later life in contemporary China, which can be perceived from the need of the economic, social and psychological support among older people. From the perspective of financial ability, the state welfare level and public pension in China is relatively low, which result in the need of receiving economic support from one's children (Huang, 2011). From the perspective of social support, the public health and social care for older people are underdeveloped in most areas of China and the vast majority of older people wish to be looked after by their own children (Cong and Silverstein,

[4] A stem family refers to a family system with grandparents, one married child and their grandchildren. A nuclear (core) family is a family system in which a couple co-resides with their unmarried or underage children. A conjugal family has similar structure as a nuclear family, while sociologists distinguish that parents in conjugal families are relatively independent of their kindred while parents in nuclear families maintain close ties with their kindred (Goode, 1963; Cherlin, 2012).

[5] Instrumental support refers to hands-on support with housework or personal care (Guo, Chi and Silverstein, 2009).

2008; Liu, 2015). In addition, although previous research has suggested that the psychological support provided by adult children is beneficial for older people's health condition (Chen and Silverstein, 2000; Guo *et al.*, 2009), the proportion of older people receiving such support exchange has reduced in contemporary China (Lin and Yi, 2011; Yi, 2014).

Overall, the exchange of intergenerational economic, social and psychological support has a significant influence on older people's health and well-being (Silverstein and Bengtson, 1997; Guo *et al.*, 2009) but is undergoing changes (Zhang and Sun, 2011; Ding, 2014; Yi, 2014). External causes including the changes in the population structure, family structure and improvement of the socioeconomic status of older people and internal causes such as the weakening of filial values have been identified for the changes in intergenerational relations (ibid). Faced with this transformation, the Chinese government has launched certain policies in order to support the intergenerational family ties. For example, the Laws on the Protection of the Rights and Interests of Senior Citizens emphasise the fulfilment of the needs of older people and outline an expectation that non-co-resident adult children visit their parents frequently (The Central People's Government, 2012). It is therefore imperative to examine the recent changes in intergenerational relations, to explore their impact on older people's wellbeing, and to make policy recommendations in the context of population ageing in China. Among the various reasons for the changes in intergeneration relations in China, rural to urban migration has been identified as an important cause (e.g. Taylor *et al*., 2003; Zhang *et al*., 2014; Graham *et al*., 2015), which is discussed in Section 1.2.

1.2 Rural to Urban Migration in China

1.2.1 Developmental and systematic urban and rural difference

Urban-rural gaps in economic and cultural development, employment opportunities and public facilities exist in all the nations across the world, and such gaps are even more noticeable in China (The Statistics Portal, 2016). Since the reform and opening-up policy in 1979, the urban areas of China have accumulated greater wealth, capital, innovative enterprises, public services and have attracted a better educated and trained labour force than rural areas as the former are influenced by higher levels of economic growth, social development and city strategy (Qiu *et al.*, 2013). According to the Gini index[6], the inequality of income distribution in China increased continuously

[6] The Gini Index is a statistical measure used for representing unequal distribution. Its value ranges between 0 and 1 (or 1 and 100). The closer the value is to 1, the greater is the inequality. 0.4 is the warning level set by the United Nations.

from 0.32 in 1980 to 0.42 in 2000, and 0.46 in 2015 (The Statistics Portal, 2016). In 2008 and 2009, China reached a score of 0.49 (ibid), which indicated a highly unequal distribution of income in urban and rural areas.

In addition to the imbalanced socioeconomic development, another urban and rural difference that should not be neglected is the Hukou (household registration) System. The Hukou system was set up in 1951, which identifies and registers Chinese individuals by their residential and administrative locations (urban versus rural), with profound consequences for the life opportunities of the residents in different Hukou categories (Wang, 2004). The urban Hukou status is a symbol of high socioeconomic status and brings benefits of better education, housing, health care and pension resources, while the rural Hukou status is often associated with under-development, agricultural work and lower education (Young, 2013). In order to reduce the inequalities resulting from the dual Hukou system, a 'unified system' treating all individuals the same in terms of household registration has been established in a number of Chinese provinces/ cities such as Zhejiang, Henan and Shanghai (ibid). A growing number of people will be registered with a unified Resident Hukou in the upcoming decades (Cui and Cohen, 2015). Yet to date and importantly, Hukou status is a commonly used index for population research in China, because it not only provides statistics of the population distribution but is also regarded as a vital barrier for internal migration and population mobility (Chan and Zhang, 1999).

1.2.2 Massive rural to urban migration

With the unique Hukou System in China, a 'formal migration' from rural to urban areas in China is not easy, which requires both a geographical change in residence (rural to urban) and a conversion in the official Hukou status (agricultural to non-agricultural) (Chan and Zhang, 1999; Whalley and Zhang, 2007; Young, 2013). Simultaneous policy conditions and 'quota' controls are the keys to changing Hukou status. The former outlines the qualifications of people entitled to a non-agricultural Hukou, whereas the latter controls the number of people obtaining a non-agricultural Hukou. Both of these prerequisites need to be documented appropriately to the public authorities in order to obtain a migration approval (Young, 2013).

The trend of modernisation and urbanisation has brought an enormous number of rural people working and residing in urban areas for a long time, yet these individuals are not 'official migrants'. According to the National Health and Family Planning Commission (NHFPC), the number of 'informal' internal migrants was about 245 million in 2016 (NHFPC, 2017). With the explanation in the previous paragraph, it is not difficult to understand why millions of rural Chinese individuals move to work in urban areas of China while being entitled to agricultural

Hukou status (Huang *et al*., 2016). These migrant workers are obliged to apply for a 'temporary residence permit' in order to take up legal contract employment and officially reside in cities (Young, 2013). The large scale of rural to urban migration, consequently, affects the family structure and intergenerational relations in China (Zimmer and Kwong, 2003).

1.2.3 Left-behind older people phenomenon

The large number of middle-aged rural migrants residing in urban areas has resulted in the increasing 'empty nests' and skip-generation households in rural areas (Zhou, 2006; Guo, 2008). In addition to this, working-age adults in medium-sized cities move to first-tier (Beijing, Shanghai, Guangzhou and Shenzhen) or second-tier cities (provincial capitals and coastal cities) for better employment opportunities with their parents being 'left behind' or 'staying behind' (Ao *et al.*, 2016; Connelly and Maurer-Fazio, 2016). Left behind or stay behind older people refer to older parents whose adult children have left the villages/ communities for more than 6 months, and the key to distinguish them is whether older people are voluntary or willing to stay in the hometown (Connelly and Maurer-Fazio, 2016). In China, older people with migrant children only are often assumed as left behind, due to the strict Hukou registration system and the discontinuity in receiving public services and welfare benefits between different regions (see further in Section 1.2.2). This study also describes this group of older people in China as 'left behind', however it is important to acknowledge that due to the scarcity of research distinguishing the two terms, whether older people are left behind or stay behind in China may be a topic worth investigation in future studies. By 2015, the proportion of people aged over 50 years old living in 'empty nest' households had reached 50% (NPFPC, 2015). Importantly, according to previous research, older parents are more likely to experience psychological issues in divided households (e.g. Biao, 2007; Chang *et al.*, 2011; Connelly and Maurer-Fazio, 2016).

The increasing number of left-behind older people has exerted an impact on the intergenerational relations in China, while the question of whether such impact is positive or negative is yet unanswered (Secondi, 1997; Xie, 2010; Zhang and Sun, 2011). This is because intergenerational relations are multidimensional and require careful investigation of different aspects. Financially speaking, a geographical separation may result in a higher chance of remittance provision if the adult children earn higher incomes and are more economically capable in immigrant cities (Cong and Silverstein, 2011; Liu, 2014). However, a geographical separation may also lead to the dissociation between generations, and result in a lower probability of bi-directional economic transfers (Foster and Rosenzweig, 2001; Guo, Chi and Silverstein, 2009). Moreover, research has shown that an increasing geographical distance has brought difficulties for adult children to provide informal care to their parents in need (Guo, Aranda and Silverstein, 2009; Guo, Chi and

Silverstein, 2009). Nevertheless, older people living in skip-generation households take the responsibility of looking after their grandchildren, by devoting a great amount of time, money and energy (Yu, 2007; Jiang *et al.*, 2013). In addition, a question remains on whether emotional ties are maintained between older parents and their migrant children regardless of geographical separation, as argued by Zhang *et al.* (2005). The mechanism that different types of intergenerational support exchange are affected and further evidence of the changes in intergenerational relations in China is demonstrated in Chapter 2. The next section moves on to discuss the rationale of this current study.

1.3 The Rationale of the Study

In the past three decades, with the progress of modernisation and globalisation, together with the changes in the country's population composition, the family structure and flows of intergenerational support (economic, social and psychological) in China have seen a dynamic change (Yi, 2014). This study is motivated by the need of the Chinese government to better understand the flows of intergenerational support provision and the well-being of older people in contemporary China.

Previous research focusing on the intergenerational economic transfers within Chinese families has presented different findings, with some studies showing a higher proportion of adult children providing (a higher level of) economic support to their parents and other studies presenting the opposite trend (e.g. Jiang *et al.*, 2013; Ning and Wang, 2015). Compared with this, the research findings in terms of the intergenerational social and psychological transfers are relatively consistent (Lin and Yi, 2011; Cong and Silverstein, 2008; Guo, Aranda and Silverstein, 2009). Most research agrees that the upward social support received by the older generation has decreased in recent years (Lin and Yi, 2011; Yi, 2014). In addition, evidence of older parents with migrant children receiving long-distance psychological support has also been found (Cong and Silverstein, 2008; Guo, Aranda and Silverstein, 2009). Overall, a research gap remains on the downward social and psychological support provided by older people, the difference in intergenerational support exchanges in rural and urban areas, and how intergenerational support exchanges may impact on older people's physical and psychological health status (see further in Chapter 2). This thesis aims to provide further evidence of the disputed topic.

1.4 Aims and Research Questions

The major aim of this thesis is to comprehensively investigate the flows of intergenerational support within Chinese families, including three types of support (economic, social and

psychological support) and two directions (upward direction from adult children to their older parents and vice versa the downward provision from older people to their adult children) of the flows. The research also aims to better picture the well-being of the older population in China and have implications for healthy ageing. Importantly, it aims to provide recommendations for the design of social welfare in China, especially for vulnerable older persons (e.g. left-behind older people). In order to achieve the research aims, this study addresses the following research questions by conducting statistical analyses based on the Harmonised China Health and Retirement Longitudinal Study (CHARLS) data.

1. What is the extent of the intergenerational support (economic, social, psychological and two directions of flows) in China today?

2. To what extent have the flows of intergenerational support in China changed over time?

3. How have changes in the living arrangements with adult children impacted upon the changes in intergenerational support exchange?

4. How have changes in the intergenerational support exchange within Chinese families impacted upon the physical and psychological well-being of older people in China?

1.5 Structure of the Thesis

The structure of this thesis is elaborated in this section. Following Chapter 1, the rest of the thesis is structured as follows:

Chapter 2 serves as a literature review for the thesis. It first clarifies the theoretical framework of this study, and then discusses important literature in the area of intergenerational relations in three sections namely: a) changes in intergenerational support in China; b) out-migration of adult children and intergenerational support; and c) intergenerational support and the health status of older people.

Chapter 3 introduces the longitudinal data CHARLS, defines the research sample, describes the key variables and explains the research methods used in the study. Ethical considerations of this study are also stated in this chapter.

Chapter 4 comprises the results from the descriptive analyses and addresses Research Questions 1 and 2 noted in Section 1.4. Based on the repeated cross-sectional analyses using the Harmonised CHARLS, this chapter provides evidence of the flows of intergenerational support provision in 2015, and how these have changed since 2011 in China. It also illustrates the changes

in the intergenerational support exchanges and respondents' health status at an individual level based on the longitudinal data.

Chapters 5 and 6 include the regression results based on the longitudinal Harmonised CHARLS and address Research Questions 3 and 4 noted in Section 1.4 respectively. Hybrid models combining fixed and random effects are employed to explore the impact of changes in the living arrangements with children on the provision and receipt of intergenerational support by older people, as well as the impact of intergenerational support exchanges on their physical and psychological health status. This helps to examine how intergenerational relations have been influenced by the out-migration of children, and is crucial in understanding the well-being of older people in China.

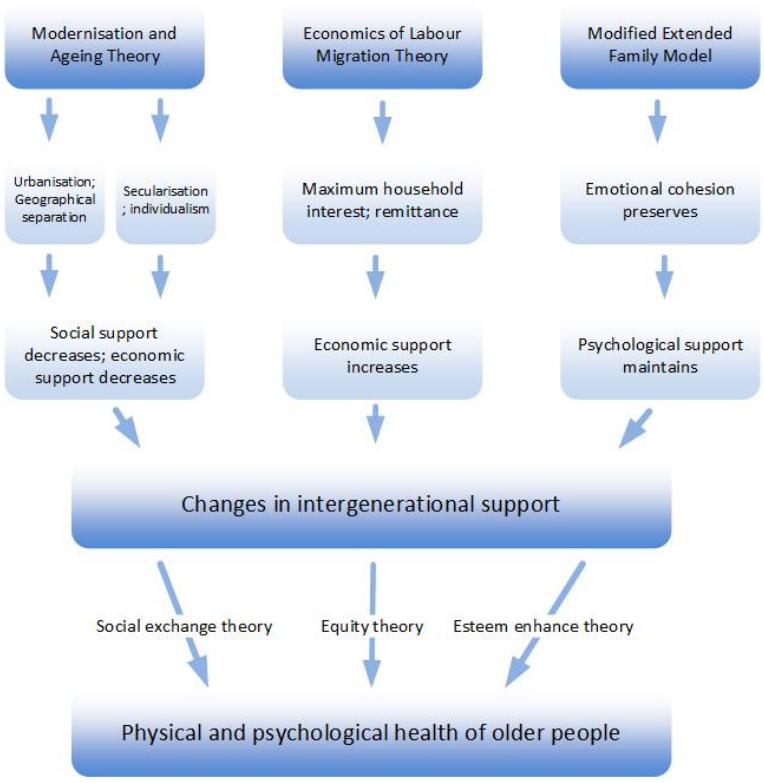
Chapter 7 provides a summary of the thesis. It consists of a critical discussion and reflection on the research results of Chapters 4- 6, and raises policy recommendations and conclusions inspired by the research findings. The limitations and their potential impact on the findings, as well as the unique contributions of this study, are also discussed in this chapter.

Chapter 2 Literature Review

This chapter synthesises the theories and evidence about intergenerational support exchanges and factors associated with the living arrangements and health of older people. Both national and international literature are examined, with a focus on the flows of intergenerational support provision and how these have changed over time in China. The theoretical framework of this study is deliberated first (Section 2.1), followed by three sections of literature review organised in the following order (Sections 2.2-2.4): changes in intergenerational support exchanges, out-migration of adult children and intergenerational support, and intergenerational support and the health of older people. Finally, Section 2.5 presents a summary of the key points discussed in this chapter, elaborates the research gaps in existing literature, and illustrates the main hypotheses of this study.

2.1 Theoretical Framework

This thesis combines three theories to construct a theoretical framework for a comprehensive understanding of the changing intergenerational support exchanges, as any of the existing theories on its own may not adequately account for the complex changes in China. Figure 2.1 presents the theoretical framework which this study adopts in order to understand the changes in intergenerational economic, social and psychological support within Chinese families. The modernisation and ageing theory and the economics of labour migration theory are employed to illustrate the changes in the exchange of intergenerational economic and social support, whilst a modified extended family model helps to study the changes in the exchange of intergenerational psychological support (Litwak, 1960; Greenwell and Bengtson, 1997; Stark and Bloom, 1985). Consequently, the exchange of intergenerational support exerts an impact on the health status of older people (Umberson, 1992; Li, Zhang and Liang, 2009; Zhang *et al*., 2014), which can be explained by the social exchange theory, equity theory and esteem enhance theory (Chen and Jordan, 2018; Peng *et al.*, 2019). The following sections aim to elaborate on these theories and combine them with the research objectives.



Source: The author.

Figure 2.1 Theoretical framework for understanding changes in intergenerational support

2.1.1 The modernisation and ageing theory

The modernisation and ageing theory, placed within the structural-functionalist paradigm, is the principal framework used for explaining the decline in intergenerational economic and social support provided to older people (Greenwell and Bengtson, 1997; Aboderin, 2004). Established and refined by Cowgill in 1972, this theory notes that modernisation accelerates population ageing and weakens the socioeconomic status of older people (Cowgill, 1972). Although Cowgill made no explicit argument about the association between modernisation and the provision of intergenerational support, he highlighted the negative impact of increasing urbanisation (geographical separation and social mobility), improved education, advanced health technology and economic development during the shift to modern society (ibid). Firstly, the trend of urbanisation causes the geographical separation of the younger from the older generation, which results in adult children focusing on their nuclear families (individualism) and the decline in the support provided to their parents (Treas and Logure, 1986). Secondly, the younger generation with higher education attainments has better access to social resources, which consequently leads to certain disadvantages in the socioeconomic status of older people (Zhang *et al.*, 2014). For example, older people receive a lower income compared to the younger generation in the competitive labour market nowadays (Cheung *et al.*, 2011). Thirdly, medical advances improve

the life expectancy of older people and accelerate the ageing of the population (Cowgill, 1972). Finally, the theory asserts that economic development and a high-tech world require new technologies and a well-trained labour force, which are more advantageous for younger people, as skills obtained by older people are obsolete (ibid).

Overall, the major aspects of the modernisation and ageing theory are parent-child geographic separation and individualism among children, which can exert an impact on the upward support received by older people (Aboderin, 2004). On the one hand, the modernisation theory holds that filial obligation is weakened with the emergence of 'isolated nuclear' family - familism decreases and individualism increases, which leads to the declines in economic support exchange (Cheung and Kwan, 2009). This is further developed into Hypothesis 1 of this thesis:

Hypothesis 1:

The proportion of adult children providing economic support to their older parents decreases over time.

On the other hand, a great number of adult children move from less to more developed areas and are geographically separated from their parents. This can result in a lower likelihood of exchanging social support/ informal care between generations (Treas and Logue, 1986; Guo, Chi and Silverstein, 2009), which helps to develop Hypothesis 3:

Hypothesis 3:

The proportion of adult children providing social support to their older parents decreases over time.

Notably, some of the arguments above may not be true in every society and have been critiqued by other researchers (e.g. Aboderin, 2004; Sereny and Gu, 2011; Gruijters, 2016). Research has shown that although the Western ideals of individualism thrive in China, it is not a monolithic value and a large number of young adults are influenced by the traditional Chinese culture (Durvasula and Lysonski, 2010). This suggests that the modernisation and ageing theory may not completely apply to the Chinese context.

Another influential argument elaborated by an Australian demographer is that the direction of transfers from the younger to the older generation in traditional societies was reversed in the process of modernisation, which redirected the flow of support towards the younger generation (Caldwell, 1976). Interestingly, there is much evidence indicating that an increasing number of older people in China provide economic support towards their adult children (see further in Section 2.2), which is in line with this argument. Moreover, with the accumulation of knowledge, experience, and updated skills, the older generations are not necessarily less likely to have good employment status compared to the younger generations (Mackett, 2015). Arguably, Aboderin's work focuses on sub-Saharan Africa, thus her research findings of the associations between modernisation and the provision of intergenerational support may not be transferrable to the Chinese context. However, this theory draws public attention to the negative influence brought by the trend of modernisation and urbanisation.

Overall, although the modernisation and ageing theory has been the most common framework for explaining changes in old age family support (Aboderin, 2004), a number of limitations and critiques have been raised against it. This theory lacks an explicit justification of the causal mechanisms for the changes and fails to consider the role of family constraints in shaping the declines in intergenerational support exchange, which is an important aspect in the context of contemporary China. Specifically, Chinese young adults are facing the challenges brought by the steep rise of commodity prices (i.e. housing price) and education costs to raise a child, under which circumstance they are hardly capable to provide economic support to their parents. Instead, their parents are increasingly likely to support them for such expenses (Yu, 2007; Wu, 2015) (see also in Section 2.2.1). It is therefore important to explore how other theories relate to the issue of intergenerational support exchange, such as the economics of labour migration theory, in order to better understand the changes in the flows of intergenerational support provision in China.

2.1.2 The economics of labour migration theory

Whereas the modernisation and ageing theory views the decline in old age support as a corollary of the modernisation process, the economics of labour migration theory provides competing explanations for the association between children's out-migration and the exchange of intergenerational economic support (Stark and Bloom, 1985; Taylor *et al.*, 2003). This theory views migration as a household decision jointly made by movers and stayers in order to pursue maximum household benefits (Stark and Bloom, 1985; Shu and Tong, 2017).

The researchers argue that individuals who are more deprived have a stronger incentive to migrate in order to improve their socioeconomic status, on which occasion the migrants and the family share the costs and benefits of migration (Stark and Bloom, 1985). Parents provide economic support to their children while they settle down in the immigrant cities during the early stage of the children's migration; at a later point, remittances are provided from the migrants to their parents left behind (Cox *et al.*, 1998; Foster and Rosenzweig, 2001). This pattern of economic transfers is explained as an inter-temporal contractual arrangement or a "calculated strategy" between adult children and their parents, which is provided bi-directionally out of a reciprocal motivation rather than guided by purely altruistic considerations (Stark and Bloom, 1985; Taylor, 1999; De Haas, 2010).

The economics of labour migration theory addresses the inconsistency of altruistic/ reciprocal behaviour within a small group (i.e. a family) and individualistic behaviour within a larger group (i.e. a marketplace), which provides an explanation for the increasing proportion and amount of intergenerational economic transfers among migrant families (Taylor, 1999). Hypothesis 2 of the thesis is thus developed from this argument (see further in Section 2.5).

Hypothesis 2:

The proportion of older people providing economic support to their adult children increases over time.

Importantly, the economics of labour migration theory views the family as an inseparable entity regardless of the geographical separation (in some cases, even dissociation) between generations in the context of urbanisation and modernisation (De Haas, 2010). In addition, by viewing the migrants and their family of origin as a 'community of interests', this theory emphasises that the flows of intergenerational economic support are driven by reciprocity, which fails to fully explain the behaviour of intergenerational support exchanges (Taylor, 1999; Ning and Wang, 2015). Another limitation of the economics of labour migration theory is that it overlooks the psychological ties between family members (De Haas, 2005). By contrast, the modified extended family model in Section 2.1.3 focuses on the exchange of intergenerational psychological support and suggests that it can be maintained despite increasing geographical distance.

2.1.3 The modified extended family model

The modified extended family model (Litwak, 1960; Greenwell and Bengtson, 1997), similarly to the modernisation and ageing theory introduced in Section 2.1.1, also employs a structural-functional perspective. This theory suggests that middle- and working-class families are capable of adjusting the living distance and intergenerational contact in order to achieve a balance between fulfilling commitments to family members and meeting the demands of modern society (Greenwell and Bengtson, 1997; Bengtson *et al*., 2002). In particular, the modified extended family model posits that with advanced transportation and communication, extended family relations and psychological cohesion between family members can be upheld over great geographical distance in modern society (Litwak, 1960; Greenwell and Bengtson, 1997; Bengtson *et al*., 2002). The decrease in intergenerational co-residence may negatively affect the receipt of informal care by older parents, nevertheless contact frequency, psychological ties, and even economic support exchanges can be maintained between migrant children and their parents (Greenwell and Bengtson, 1997; Cong and Silverstein, 2011). This theory may apply to the context of China, where the formal social safety net is incomplete (Cox and Fafchamps, 2008) and the role of the extended family is especially important, as influenced by the Confucius culture and values of filial piety (see also in Section 1.1.3). As shown in previous research, a great number of older people in China are dependent and children living far away from their parents still provide upward economic and psychological support (Mao and Chi, 2011; Zhang *et al*., 2014). Based on this theory, Hypothesis 6 of the thesis is developed.

Hypothesis 6:

The proportion of older people having intergenerational distant contact increases over time.

In addition, the modified extended family model stresses the role of adult children's social class in buffering the impact of geographical distance upon the exchange of intergenerational support (Greenwell and Bengtson, 1997). The model points out that higher-social-class adult children live further away from their parents compared to their counterparts from lower-social-class families, as their needs for higher education and well-paid employment may not be fulfilled near their home (Litwak, 1960; Bengtson, 2001; Hill, 2017). With the development of communication and transportation, higher-social-class adult children do not necessarily provide less support to their parents, yet the type and nature of intergenerational support/ contact are affected (Zhan *et al.*, 2008; Luo and Zhan, 2012) (see further in Section 2.3.3). For example, one previous research has

shown that migrant adult children provided economic support instead of instrumental support to their older parents, and older people kept evaluating the intergenerational solidarity positively (Luo and Zhan, 2012). This leads to one critique of the modified extended family model in that it focuses too much on the adult children's social class, which is constrained by the fact that the model was formulated at a time when it was commonly assumed that working-class jobs were relatively stable in nearby communities, and that middle-class careers promised upward mobility (Greenwell and Bengtson, 1997). More importantly, this model was developed in the United States (US), where a significant number of internal migrants came from middle- or working-class families (Cox and Fafchamps, 2008). The majority of internal migrants in China, however, are young adults between 18 and 40 who come from rural areas and do not obtain higher education (Wu and Logan, 2016).

Taken together, the arguments of the economics of labour migration theory and the modified extended family model are that children's out-migration has a measurable and typically positive effect on older parents through the continued exchange of intergenerational economic and psychological support (Stark and Bloom, 1985; Greenwell and Bengtson, 1997). However, the modernisation and ageing theory provides a contrary viewpoint of a 'breakdown' of intergenerational support (Aboderin, 2004), although this theory has been much debated in the literature around the world, i.e. the theory neglects other aspects of the societal change and does not apply to the Chinese culture (Mackett, 2015; Wu, 2015). These theories may not be fully transferrable to the Chinese context, nevertheless, they provide helpful insights for understanding the changing intergenerational support exchanges in China. For example, the growing provision of remittances from migrant children may be justified by the economics of labour migration theory, and the modified extended family model may explain the exchanges of emotional support, while the modernisation and ageing theory may help to understand the decline in the provision of informal care in China. The results in this current study should provide evidence for such theoretical understanding. Following the discussion of theories, the next section provides empirical evidence of the changes in the flows of intergenerational economic, social and psychological support in China.

2.2 Changes in Intergenerational Support in China

2.2.1 Changes in intergenerational economic support

Research on intergenerational support shows that prior to the 21st century, monetary support provided from adult children to their older parents was the mainstream practice both in urban and rural areas of China (Guo and Chen, 1998). Although a small segment of adult children in

urban areas did not co-reside with their parents, the filial norms of looking after parents were still inherited (ibid). The prevailing pattern of intergenerational support provision in China involved adult children taking the responsibility to support their parents by providing economic support and social care (Wang and Ma, 2002). However, this pattern has changed since the beginning of the 21st century, as highlighted by a piece of research based on the analysis of the China's Population Sampling Survey in 2004. Du and Wu (2006) noted that although economic support provided by adult children was the dominant financial source for older parents, the proportion of older people receiving such support as their primary income source has decreased since 1994 (see Table 2.1). Therefore, in consistency with the modernisation and ageing theory, it is hypothesised that the proportion of older people receiving economic support from their adult children decreases over time (Hypothesis 1). Pensions ranked second in older people's income sources with a significant difference between urban and rural areas: 60% of older people in urban areas reported pensions as their primary source of income while this proportion for older people in rural areas was only 6% (Du and Wu, 2006).

Table 2.1 Main income sources of Chinese older people, 1994-2004 %

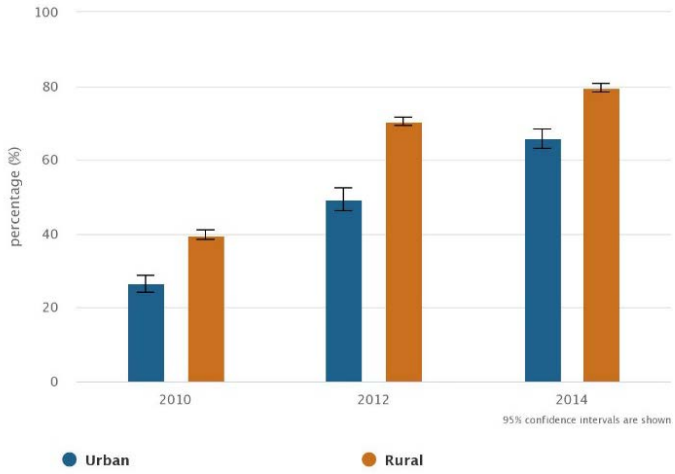
	1994			2004		
Main Income Sources	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
Earnings	25.0	37.5	13.6	19.3	25.8	13.0
Pension	15.6	22.5	9.4	31.5	39.3	24.0
Support from children and other relatives	57.1	37.9	74.7	45.0	31.4	58.2
Social Insurance	1.2	1.3	1.1	2.0	2.0	2.1
Others	1.1	0.8	1.2	2.2	1.5	2.7
Total	100	100	100	100	100	100

Source: Adjusted from Du and Wu (2006), p20.

Recent research on the exchange of intergenerational economic support has shown more evidence of significant urban and rural disparities. In urban areas, older people tend to have a higher socioeconomic status, are financially independent, and are less likely to receive economic transfers from their adult children compared to their rural counterparts (Xu, 2001). For example, a study in 2003 suggested that older people in Shanghai were well off and had relatively loose relations with their adult children (Zhang and Sun, 2011). Similarly, a survey in Beijing noted that approximately 60% of households showed no economic transfers between older people and their children (Ding, 2014). Supportive evidence was also found in other research based on less economically developed cities in China (e.g. Yuan, 2006; Wu, 2015).

Compared to living in urban areas, older people who live in rural areas are more likely to receive economic support from their adult children (Xie, 2010; Zhang and Sun, 2011). Secondi's research based on a household survey conducted in 1989 including 28 provinces demonstrated that economic transfers in rural Chinese families mainly passed from adult children to their parents (Secondi, 1997). An investigation based on the CHARLS 2008 pilot survey showed that in rural areas, about half of the households containing older people received economic support from their

adult children (Xie, 2010). This was consistent with research findings based on the provincial evidence: in rural areas of Eastern China, older people mainly relied on their children for assistance with living expenses (Wang, 2010). Most recent data from the Harmonised CHARLS has shown a consistent disparity in the receipt of economic support by older people, by demonstrating that a higher proportion of older parents in rural areas received economic support compared to those in urban areas (see Figure 2.2). In addition, people in both urban and rural areas were more likely to receive economic support provided by their adult children over time between 2010 and 2014(Gateway to Global Aging Data, 2018).



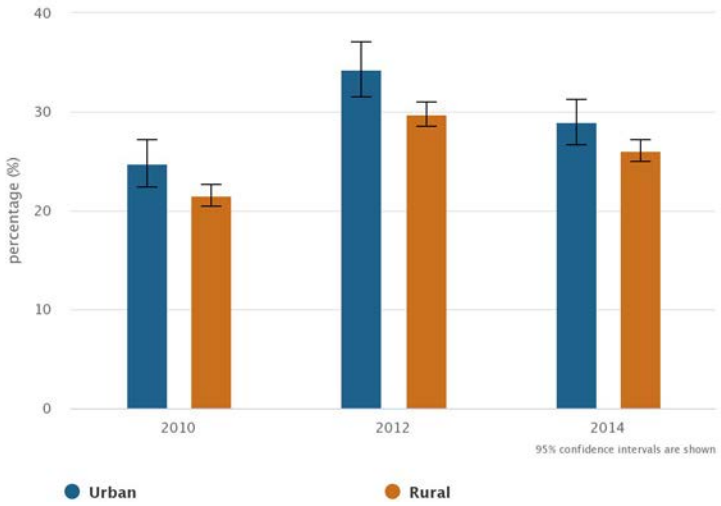
Source: Gateway to Global Ageing Data, 2018

Figure 2.2 Proportion of older people receiving economic support provided from adult children in rural and urban areas, 2010-2014

In addition to the rich literature focusing on older people's receipt of economic support provided from their adult children, there was also evidence of a reversal of the support flow in both the urban and rural areas (Xu, 2004; Yu, 2007; Wu, 2015). Since the beginning of the 21st century, the Not Currently Engaged in Education, Employment or Training (NEET) Generation in urban areas has prompted a scholarly interest. Empirical studies showed that around 85% of unmarried adult children in Shanghai needed their parents to cover some or even all of their living expenses (Xu, 2004), and about 1/3 of retirees spent part of their pensions on their children or grandchildren (Yu, 2007). Furthermore, a survey by the Chinese Academy of Social Sciences (CASS) suggested that the proportion of older people providing regular economic support to adult children in urban areas (16%) was 2.4 times greater than rural areas (7%); and the percentage of adult children

providing regular economic support to their parents in rural areas (31%) was higher than in urban areas (28%)[7] (Wu, 2015).

Recent research also reveals uneven intergenerational support exchange in rural Chinese families with a heavier burden on the parents compared to their adult children (He, 2008; Li, 2014). For instance, Xiao and Yang (2010) found that in some rural areas, the traditional pattern of adult children supporting older parents had weakened in the 21st century. Adult children only provided informal care to their parents, and the intergenerational economic support was mainly provided from older parents to their children (ibid). Further evidence showed that in rural areas of the Jiangxi Province, older people had to support themselves in light of fragile cohesion between family members (Wang, 2013). Findings from the three-wave CHARLS data also confirmed that in both urban and rural areas, older people were increasingly likely to provide economic support to their adult children between 2010 and 2014 (see Figure 2.3). Moreover, a relatively higher proportion of older people in urban areas provided such support to their adult children compared to their rural counterparts (Gateway to Global Aging Data, 2018). Based on the evidence, Hypothesis 2 that the proportion of older people providing economic support to their adult children increases over time is developed (see also Sections 2.1.2 and 2.5).



Source: Gateway to Global Ageing Data, 2018

Figure 2.3 Proportion of older people providing economic support to adult children in China, 2010-2014

[7] The proportions were relatively low because the author divided the provision of intergenerational support into three categories: never, sometimes and regularly (Wu, 2015). The figures discussed here refer to regular support only.

Having reviewed the literature on the changes in intergenerational economic support over time, the next section moves on to explore the research evidence of the changes in intergenerational social support.

2.2.2 Changes in intergenerational social support

Researchers have had a long-standing interest in different dimensions of social support, yet the definition of the term is not uniform. For example, the study by Oxman and Hull (1997) used multiple measures of social support (which included measuring the type and amount of psychological support, guidance support and tangible support[8]), to examine the association between the receipt of social support, depression and having difficulty with Activities of Daily Living (ADLs) among older people. Another study conceptualised social support from a structural, functional and appraisal perspective (Chen and Silverstein, 2000). The structural component of social support referred to the composition of one's social network and the availability of people in the network who may (but do not necessarily) help an individual. The functional component was considered as the amount of instrumental, psychological and economic help, while the appraisal component reflected the respondents' subjective evaluation of the adequacy of support or the degree of satisfaction with the support received. These studies have identified the distinct effects of different components of social support on the well-being of older people (Oxman and Hull, 1997; Chen and Silverstein, 2000). Different from such studies, this thesis has distinguished between economic support and psychological support, therefore instead of being an umbrella term, social support refers to the tangible instrumental support/ informal care transferred between generations hereafter.

Much of the literature before 2000 showed that older people in China relied on their children for social support (Wu, 1991; Krause and Liang, 1993; Ikels, 1997). For example, an earlier study based on the 1991 Survey of Health and Living Conditions in Wuhan City showed that over 80% of respondents received social support from their adult children (Krause and Liang, 1993). In the study by Krause and Liang, social support was measured by whether family members listened to older people's worries, concerned about their well-being, provided instrumental help and showed respect to them. Such measure, however, included both social and emotional support as defined in this current study and was unable to distinguish the two different support provision. Overall, previous research has established that the majority of older people co-resided with their married sons in multi-generational households, which consequently brought advantages for the receipt of social care provided from children (Zeng, 1986).

[8] Tangible support includes behaviours such as providing housing, money, or transportation.

More recent literature has presented different findings (Silverstein *et al.*, 2006; Cheng *et al.*, 2009; Chao, 2011). Some researchers have found that in the rural Anhui Province of China, the proportion of older people receiving social support from adult children was lower compared to that before 2000, mainly due to the reduction in having three-generation households (Silverstein *et al.*, 2006). A study by Cheng *et al.* (2009) has found an additional type of family network in the Chinese older population, which existed over distance with characteristics of extensive contact and support exchange with distant kin but relatively infrequent contact and low support exchange with immediate kin. The authors illustrated that the supportive functions of distant kin were very much alive in contemporary Chinese societies, especially for the older cohort in terms of receiving intergenerational support (Cheng *et al.*, 2009). Another study based on the Surveys of Health and Living Status of Elderly (SHLSE) collected between 1989 and 2003 in Taiwan shows that older individuals tended to have fewer friends as they aged, whereas their contact with family members was usually consistent and the frequency of contact was stable over time (Chao, 2011). However, this study also shows that the percentage of older persons living with a married son decreased slightly across survey years between 1989 and 2003, and the percentage of older people receiving social support increased over time (ibid). The different findings of the receipt of social support by older people may derive from the different samples included, the time data collected and the measure of social support used in the studies (Leung *et al.*, 2007). Based on the economics of labour migration theory and the literature reviewed in Section 2.2.2, it is hypothesised that the proportion of adult children providing social support to their older parents decreases over time (see Hypothesis 3 in Sections 2.1.2 and 2.5).

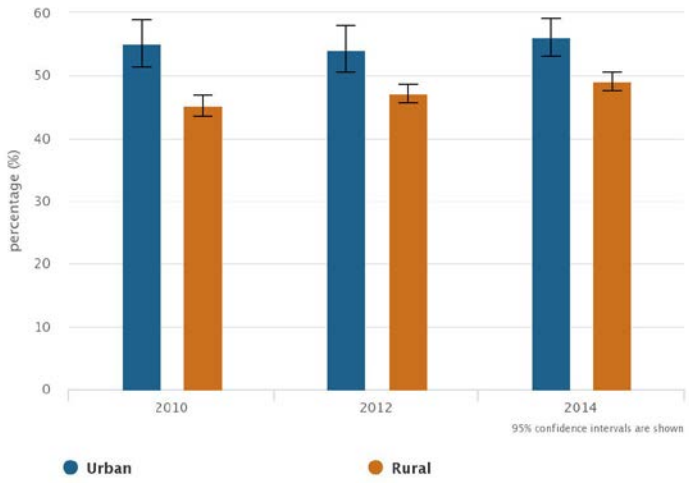
Few studies provided evidence of the provision of social support by older people to their children in China. One plausible explanation is that older people in China are often regarded as the recipients of social support and their role in providing such support has long been neglected by researchers (Chou and Chi, 2003; Leung *et al.*, 2007). Studies in the western societies have shown that older people were more involved in providing support than they were in receiving support (Morgan *et al.*, 1991; Silverstein *et al.*, 1996) and that the psychological impact of providing support to adult children was positive for the parents (Beckman, 1981; Schwarz *et al.*, 2010). Such research results have implications for studying the impact of the provision of social support by older people in China, and this research gap in investigating intergenerational support exchange in China needs to be addressed with data availability in the future.

Grandchild caring is an important form of downward social support provided by older people, and is often used as a proxy to examine the social support provision from older people to the younger generations (Chen *et al.*, 2011; Falkingham *et al.*, 2019). Figure 2.4 indicates that in general, older people in China were more likely to provide grandchild care over time between 2010 and 2014

(Gateway to Global Aging Data, 2018). A higher proportion of older people in urban areas took care of their grandchildren compared to those in rural areas (ibid). Moreover, the proportions of grandchild care provision by older people in both urban and rural areas observed a growing trend from 2010 to 2014, which is in line with other literature showing an increasing number of Chinese older people being engaged in grandchild care (e.g. Croll, 2008; Quah, 2009; Liu, 2014). Therefore, Hypothesis 4 is developed (see further in Section 2.5).

Hypothesis 4:

The proportion of older people providing care to their grandchildren increases over time.



Source: Gateway to Global Ageing Data, 2018

Figure 2.4 Proportion of older people giving care to grandchildren in China, 2010-2014

Most previous studies have used social support as an independent variable in order to examine its impact on older people's health status (Oxman and Hull, 1997; Chen and Silverstein, 2000; Chou and Chi, 2003; Leung *et al.*, 2007; Cheng *et al.*, 2009; Chao, 2011). Such research has reached a consistent conclusion that social support received by older people has a great influence on their psychological well-being; however, it fails to provide evidence of the overall changes in social support exchanges at a national or individual level, which will be addressed in this thesis. Having discussed the literature focusing on the changes in economic and social support exchanges within Chinese families, the next section illustrates the changes in the flows of intergenerational psychological support by providing evidence from existing literature.

2.2.3 Changes in intergenerational psychological support

Psychological support, also referred to as emotional support in this current study, reflecting the sharing of intimacy, trust, and confidence with others, has been found to be an important predictor of beneficial physical and psychological outcomes among older people (e.g. Chou and Chi, 2000; Chou *et al.*, 2006; Silverstein *et al.*, 2006). Similar to social support, psychological support is a multi-dimensional term in gerontological research and has been measured in several ways in different studies.

In an earlier study by Chou and Chi (2000), such support was measured based on the respondents' report of the willingness of five groups of relatives (spouse, children or children-in-law, other relatives, friends or neighbour, and others) to ''listen when [the respondent] has a problem", to "have frequent discussions about important decisions", and to "provide support when [the respondent is] ill''. In the authors' later study, information on psychological support was obtained by asking respondents whether their family members had provided them with advice in terms of personal problems, shared feelings and opinions, and whether they had participated in the respondents' recreational activities (Chou *et al.*, 2006). Overall, psychological support assessed in gerontological research includes behaviours such as comforting another person through physical affection or expressing concerns for a person's well-being (Oxman and Hull, 1997).

Some researchers noted that intergenerational psychological ties were maintained over time, as the culture of filial piety (Xiao, 孝) was dominant in China (e.g. Krause and Liang, 1993; Zhang *et al.*, 2005; Zhang *et al.*, 2014). Nevertheless, with the rapid modernisation and urbanisation in China, changes in the exchange pattern of intergenerational psychological support have been observed (Oxman and Hull, 1997; Chou and Chi, 2000; Silverstein *et al.*, 2006). A number of recent studies have shown that psychological support received by older people is reducing in China (Guo, Chi and Silverstein, 2009; Ding, 2014; Yi, 2014). For example, the study by Chou and Chi (2000) revealed smaller social networks of relatives and less psychological support received by older people compared to other age groups. In addition, older people living alone received less psychological support than their counterparts co-residing with family members (ibid). Another piece of research by Leung *et al.* (2007) indicated that older people received less emotional support from their family members, which was more important than instrumental support in predicting psychological symptoms. A more recent study showed that geographical separation was a major barrier to face-to-face intergenerational contact within Chinese households, which may be harmful to the well-being of older people (Gruijters, 2016). However, there has been research showing that the provision of psychological support between older and younger generations increases over great geographical distance (Mao and Chi, 2011; Zhang *et al*., 2014).

Evidence from these studies suggests that the size and quality of intergenerational psychological support in China have changed significantly over time since the 1990s. It is therefore hypothesised that the proportion of older people having intergenerational in-person contact with their adult children decreases over time, while the proportion of older people having intergenerational distant contact increases over time (Hypotheses 5 and 6 in Section 2.5).

Hypothesis 5:

The proportion of older people having intergenerational in-person contact with their adult children decreases over time.

Hypothesis 6:

The proportion of older people having intergenerational distant contact increases over time.

Another important piece of evidence relates to the influence of providing one type of intergenerational support upon the provision of another type. Krause and Liang (1993) found that receiving economic support from family members had a negative impact on the receipt of psychological support. Similarly, a recent study by Liu *et al*. (2017) showed that the provision of economic support by adult children had a negative association with their provision of informal care. In contrast, a study by Sheung-Tak and Chan (2005) found that adult children's financial contribution to their parents was not crucial in influencing the children's upward provision of psychological support. In addition, research also found that providing one form of intergenerational support increased the chance of providing another form of intergenerational support (Guo, Chi and Silverstein, 2009). In conclusion, the association between the provisions of different types of intergenerational support is uncertain, which deserves further investigation.

Having reviewed the changes in the flows of intergenerational economic, social and psychological support in China, this research aims to provide possible explanations for such changes. The urbanisation trend in China has led to a massive number of working-age adults seeking employment in more developed areas, whose impact on intergenerational relations has been well documented, which is elaborated in Section 2.3.

2.3 Out-Migration of Adult Children and Intergenerational Support

There are a number of reasons contributing to the changes in the flows of intergenerational support in China, one of which is the geographical separation between adult children and their

older parents (e.g. Taylor *et al*., 2003; Zhang *et al*., 2014; Graham *et al*., 2015). As suggested in Section 1.2, more than 245 million working-age adults have migrated to more developed areas for employment purposes, which results in the increasing living distance between generations, and meanwhile in the decline in adult children's co-residence with their older parents (Giles *et al*., 2010; Yasuda *et al*., 2011). Analysis based on the Chinese censuses (1982 and 1990) showed little change in the co-residence prevalence rate between people aged over 65 and their adult children over that period, which was approximately 68% for older males and 74% for females (Zeng and Wang, 2003). However, these proportions declined to 60% and 69% for men and women respectively between 1990 and 2000 (ibid), then fell to about 40% by 2006 based on data from the China Health and Nutrition Survey (CHNS) (Giles *et al*., 2010). In some villages of the Hebei and Liaoning Provinces in China, over 60% of the workforce has migrated to urban areas (Taylor *et al*., 2003).

Some researchers have treated co-residence as a kind of intergenerational support, while others have argued that co-residence may not necessarily lead to younger adults taking care of older people (e.g. Xie and Zhu, 2009; Giles *et al*., 2010) (see also Section 2.3.2). It is thus important to distinguish whether co-residence is a form of support provided by adult children or instead, it is their dependence on parents (Jiang *et al.*, 2014), which is associated with an opposite direction of support provision from older parents to their adult children. This current study supports the second view, and thus use co-residence with adult children to examine older people's living arrangement and the exchange of intergenerational support. An alternative measure for older people's living arrangement is the proximity of adult children, such as the living distance between generations. In this study, both co-residence and living distance are used for measuring the household living arrangements (see further in Section 3.4).

2.3.1 Out-migration of adult children and intergenerational economic support exchange

The increasing geographical distance between generations does not lead to a decline in the provision of economic support towards older people, which is in contrast to the modernisation and ageing theory (Xie and Zhu, 2009; Giles *et al*., 2010; Liu, 2014). A great number of studies have shown that adult migrants sent large amounts of remittances back home to their parents (e.g. Taylor *et al*., 2003; Cong and Silverstein, 2011; Graham *et al*., 2015). Although children's out-migration may also result in a decrease in agricultural production in rural households due to a reduction in the available family labour force, researchers have suggested that the remittances sent by migrants could compensate for such loss, which eventually had positive effects on the household net income (Taylor *et al*., 2003; Liu, 2014). For example, Taylor *et al*. (2003) found that having at least one migrant child increased the household per capita income by between 16% and

43% for the family members in the home regions. This may explain why older people are often supportive of their children's out-migration (Liu, 2014). Hence, it is hypothesised that the out-migration of adult children increases the receipt of upward economic support by older people (Hypothesis 7 in Section 2.5).

Hypothesis 7:

The out-migration of adult children increases the receipt of upward economic support by older people.

The out-migration of adult children also exerts an impact on the provision of intergenerational economic transfers from older people to their migrant children (Liu and Reilly, 2004; Cong and Silverstein, 2011). As an investment strategy addressed by the economics of labour migration theory, older parents assist their migrant children financially with transportation, relocation, training and start-up costs in the immigrant cities (see further in Section 2.1.2). Overall, recent studies have shown that intergenerational economic support exchange in China followed a bidirectional pattern (Chen, 2001; Sun, 2002; Zhang, 2005; Cong and Silverstein, 2011). Since older people nowadays were more economically capable compared to their older cohorts, some of them supported their adult children without expecting any financial returns (Liu, 2014) (see also in Section 2.2.1). In some cases, they even refused the offers of remittances provided from their migrant children, as they were confident in their economic conditions and did not want to add burden to their children (Xie and Zhu, 2009; Liu, 2014). Therefore, Hypothesis 8 of this thesis assumes that the out-migration of adult children increases the provision of downward economic support by older people (see further in Section 2.5).

Hypothesis 8:

The out-migration of adult children increases the provision of downward economic support by older people.

Although existing research has emphasised that a massive number of younger adults migrate from rural to urban areas of China, it is important to note that the majority of such migration is circular (Taylor *et al*., 2003), which indicates that the duration of migration can play a significant role in influencing the provision of intergenerational economic support (Graham *et al*., 2015). For instance, Chinese migrants often return to live with their older parents when they become

widowed or physically dependent (Zimmer and Korinek, 2010; Gruijters, 2016). The amount of remittance which short-term migrants provide to their parents may not fully pay back what their parents have offered to them when they settle down in urban areas. By contrast, long-term migrants are more likely to be established in the immigrant cities, have higher incomes and thus become capable of affording a larger amount of remittances (Liu and Reilly, 2004; Graham *et al*., 2015). However, it is possible that long-term migrants reduce the provision of economic support to their older parents as their commitment to their families may have weakened over time with the geographical separation (Graham *et al*., 2015). As illustrated by Cong and Silverstein (2011), migrant sons provided a large amount of economic transfers to their parents in the short term, but did not do so in the long run. It is therefore appropriate to use a longitudinal approach in order to examine the role of migration in influencing intergenerational economic support exchange. Another important piece of evidence based on life history interviews in one rural village of China showed that it was the breakdown of the network of reciprocity and interdependence which had a negative influence on the upward economic support provided to older people, rather than the action of adult children's out-migration (Liu, 2014). This result indicates that the event of out-migration may fail to predict the changes in the exchange of intergenerational economic support, which needs further investigation in future research.

2.3.2 Out-migration of adult children and intergenerational social support exchange

Although the out-migration of adult children may not exert a negative influence on the provision of intergenerational economic support, evidence has shown that it can constrain the support on daily activities received by older people (e.g. Sun, 2002; Silverstein *et al.*, 2006; Guo, Chi and Silverstein, 2009). Most research has suggested that the increase in geographical distance reduced the provision of social support[9] from adult children to their parents (e.g. Sun, 2002; Zhang and Wu, 2003; Hank, 2007; Lin and Yi, 2011). Sun (2002) found that children who lived nearby or in the same household were more likely to provide social support to their older parents, while children who lived far away from parents tended to provide economic support. On the one hand, due to the geographical separation, social norms in China do not dictate that migrant adult children provide care to their parents. On the other hand, older people left behind are less likely to expect informal care provided by their migrant adult children. A study examining older people's preference in terms of their carer based on a four-wave panel study in the Anhui Province showed that they were significantly less likely to choose the migrant children as their preferred carers

[9] As defined in Section 2.2.2., social support refers to the instrumental support or informal care provided within families.

(Cong and Silverstein, 2014). As the public social care is insufficient in China, the geographical separation between generations is problematic especially when older parents are too frail to look after themselves (Giles *et al.*, 2010).

Nevertheless, there was a piece of research showing that although the proportion of older people co-residing with their married children decreased slightly between 1989 and 2003, the proportion of older people receiving social support increased over this period of time (Chao, 2011). This research focused on assessing the impact of social support receipt upon the depressive symptoms of older people, thus did not provide sufficient evidence and explanations for the increase in the receipt of social support during this period. In addition, this study was based on secondary data from Taiwan, which could result in different findings compared to studies using data from mainland China. Another study asked older respondents to evaluate their adult children's filial piety before and after the children's migration, and found that migration had little influence on older people's perception of their children's filial behaviour (Luo and Zhan, 2012). It is true that co-residence does not necessarily lead to the practice of social support exchange, as living in the same household may be a choice because adult children are not capable of finding a place to live on their own (Logan and Bian, 1999). However, no one can deny that the increase in the living distance directly brings difficulty for the provision of social support. The study by Luo and Zhan (2012) was limited as the survey included 1,443 older adults only from the poorest areas in three provinces in China, and the co-residence with adult children may have resulted primarily from the adult children's inability to afford a house. Based on the migration and ageing theory and the contradictory findings from the previous literature, it is hypothesised that the out-migration of adult children has a negative association with the receipt of upward social support by older people (see also in Section 2.5).

Hypothesis 9:

The out-migration of adult children has a negative association with the receipt of upward social support by older people.

In terms of downward social support provided from older people to the younger generations, research in Taiwan has shown that providing social support including shopping and preparing meals by older people to their adult children had a positive influence on their health status (Silverman *et al.*, 2008; Chao, 2011). Although social support provided from older people to their adult children is largely neglected in existing research focusing on mainland China, the care provided from older people towards their grandchildren has attracted great attention. As found in

previous literature, the out-migration of adult children has led to a remarkably high proportion of skip-generation households in China, as well as the phenomenon of older parents taking care of their left-behind grandchildren (Croll, 2008; Quah, 2009; Liu, 2014) (see also in Section 1.2.3). Statistics from the CHNS data showed that about 45% of older people co-resided with grandchildren aged 0-6 from 1991 to 2003, which was four-times the proportion in the United States (US) based on the US Census Bureau 2003, and five times the average proportion in the European countries based on the Survey of Health, Ageing and Retirement in Europe (SHARE) in 2004 (Chen *et al.*, 2011). One recent study by Falkingham *et al.* (2019) has indicated that over 70% of mid-life sandwich generation provided care to their young grandchildren. According to previous literature, a large number of adult children move to cities for employment purpose while their parents and children are left behind (Chen and Liu, 2011; Baker and Silverstein, 2012; Feng and Zhang, 2018). Older people tend to look after their grandchildren in such case (ibid). Hence, this study hypothesises that with the out-migration of adult children, a higher proportion of older people provide care to their grandchildren (see Hypothesis 10 in Section 2.5).

Hypothesis 10:

The out-migration of adult children has a positive association with the provision of grandchild care by older people.

Having reviewed the evidence in terms of living arrangements with adult children and intergenerational social support exchanges, the next section moves on to discuss the literature demonstrating the associations between the out-migration of adult children and the exchange of intergenerational psychological support.

2.3.3 Out-migration of adult children and intergenerational psychological support exchange

In addition to the decline in the exchange of intergenerational social support, some literature has highlighted a negative impact of the adult children's out-migration on the exchange of intergenerational psychological support (Shuey and Hardy, 2003; Hank, 2007; Luo and Zhan, 2012). As suggested by the modernisation and ageing theory, the rapid development of urbanisation and industrialisation has weakened the traditional family values and intergenerational psychological ties in Chinese societies (Chou and Chi, 2000; Luo and Zhan, 2012). Yet, a considerable number of studies have shown findings in terms of diverse forms of

intergenerational psychological support in the context of rural to urban migration (e.g. Greenwell and Bengtson, 1997; Guo *et al.*, 2011; Guo *et al.*, 2012; Connelly and Maurer-Fazio, 2016). The study by Greenwell and Bengtson (1997) supported the modified extended family model, by showing that older people who lived at a greater geographic distance from their adult children had less frequent intergenerational in-person contact compared to their counterparts who lived closer to their adult children, especially for older people with a higher educational attainment. In addition, compared to older people who lived together with their children, those who lived in the divided households were also more likely to have distant contact between generations, such as telephone contact (Greenwell and Bengtson, 1997). One recent study by Gruijters (2016) provided consistent findings, and concluded that strong family ties can be maintained despite increasing geographic distance in contemporary China, especially with the advancement in communication technology. According to the existing literature, Hypotheses 11 and 12 of this currently study are developed (see also in Section 2.5).

Hypothesis 11:

Older people who did not have any adult child living nearby are less likely to have intergenerational weekly in-person contact.

Hypothesis 12:

Older people who did not have any adult child living nearby are more likely to have intergenerational weekly distant contact.

Guo *et al.* (2011) argued that the impact of adult children's out-migration upon the intergenerational emotional ties varied by the gender of parents and children. They found that on the one hand, having more daughters improved the mothers' perception of the closest parent-child ties. On the other hand, having more sons lowered the scores on the remotest ties by both fathers and mothers. Their following study generated five types of intergenerational relations in contemporary China based on a latent class analysis, which were 1) tight-knit, 2) nearby but discordant, 3) distant discordant, 4) distant reciprocal, and 5) distant ascending (Guo *et al.*, 2012). Connelly and Maurer-Fazio (2016) suggested that in order to assess the influence of adult children's out-migration on the exchange of intergenerational psychological support, it was necessary to distinguish between different groups of left behind older people in a more nuanced manner. The authors found that at least three groups of older people required specification in relevant research, which were 1) older people living alone without any co-resident children, 2)

older people living together with at least one non-migrant child, and 3) older people taking care of their grandchildren while the children's parents were away. The authors concluded that older people were not all equally at risk from the negative influence of children's out-migration, and that it was older people who lived alone or with their spouse only who were the most vulnerable in terms of receiving psychological support from their adult children (Connelly and Maurer-Fazio, 2016).

In addition, a number of studies showed that the negative association between the out-migration of adult children and the receipt of intergenerational psychological support may have been overstated in China (e.g. Zhan *et al*., 2008; Guo, Chi and Silverstein, 2009; Luo and Zhan, 2012; Liu, 2014). For example, one study based on a sample of 1,237 Chinese people aged over 60 suggested that older people with migrant sons received a higher amount of economic support, and felt closer with their children compared to those who did not have any migrant children (Guo, Chi and Silverstein, 2009). Another study suggested that older people's perception of children's filial piety remained similar after their children's migration (Luo and Zhan, 2012). Another supportive piece of evidence showed that the perception of psychological support received by older people had been broadened (Zhan *et al*., 2008). The authors found that older people who were placed in institutional care did not feel their children had an approach which was incompatible with filial piety (ibid). In addition, Liu's study (2014) provided evidence of the continuing provision of long-distance psychological support from adult children to their older parents. In conclusion, these studies suggested that the out-migration of adult children did not necessarily result in the erosion of intergenerational psychological support in contemporary China. Rather, intergenerational psychological transfers were undergoing a crucial transformation (Luo and Zhan, 2012). These findings challenged the modernisation theory which predicted the decline in intergenerational psychological ties, and provided evidence for understanding geographic distance and intergenerational psychological support in contemporary China based on the modified extended family model.

Despite the dispute in the changes in the receipt of psychological support provided from adult migrant children to their older parents, there are relatively few studies examining the opposite direction of flows of support, which is provided from older people towards the younger generations. Recent research has used intergenerational contact to measure the mutual psychological support and intergenerational solidarity (Gruijters, 2016). The author pointed out that although intergenerational contact has been well documented in developed countries, little has been done in China (ibid). This thesis will also use intergenerational contact as a proxy (see further in Section 3.4). Another important argument which deserves further attention is the possible reverse effect of intergenerational psychological support upon living distance. For

example, Zhang *et al.* (2014) found that adult children who had a strong sense of filial piety and a good relationship with their parents were more likely to co-reside with them. Therefore, estimating the out-migration effects on the provision of intergenerational psychological support may face reverse causality difficulties, in particular that a significant association between variables A and B cannot necessarily suggest the impact of A upon B. As argued by Graham *et al.* (2015), such a problem is one of the potential explanations for the mixed and contradictory research findings on the influence of migration. This study aims to reduce such bias by incorporating a lagged effect model, which is elaborated in Section 3.5.6.

The next section moves on to discuss the literature on the impact of intergenerational support exchanges upon the health status of older people, which helps to better perceive the potential associations and derive hypotheses before statistical analyses.

2.4 Intergenerational Support and the Health Status of Older People

Previous research has found significant associations between different types and directions of intergenerational support and the physical and psychological health condition of older people in China (e.g. Liu and Zhang, 2004; Li, Song and Feldman, 2009; Gruenewald and Seeman, 2011; Zhang *et al*., 2014). Sections 2.4.1- 2.4.3 discuss the literature illustrating the associations between intergenerational support exchanges and the self-reported health, (I)ADL functional status and psychological health status (including depressive symptoms and life satisfaction) among older people respectively.

2.4.1 Intergenerational support exchanges and the self-reported health of older people

Significant associations between different types of intergenerational support exchanges and the self-reported health condition of older people in China have been found in previous research. An important study by Li, Song and Feldman (2009) has noted that an increase in the provision of economic support from older people to their adult children was highly linked with an improvement in the support providers' subjective health, while upward economic support received by older parents had a negative impact on their self-reported well-being (Li, Song and Feldman, 2009). In addition, an increase in the receipt of upward social support by older people resulted in the deterioration in the self-reported health of older men, while that mutual psychological support improved the self-reported health status of older women in China (ibid). The authors then divided intergenerational support based on two motivations, namely reciprocal and demand-based motivations. They further argued that reciprocal support between generations, such as psychological support, contributed to the improvement in the subjective

well-being of older people, whilst the receipt of demand-based transfers by older people, such as upward economic and social support resulted in the decline of their self-reported health status. The results have also suggested different health outcomes between men and women when experiencing a similar level of intergenerational support exchange (ibid). A limitation of this research lies in the potential reverse causality bias, as the direction of causation between intergenerational support and self-reported health is unclear. For example, older people with poor self-reported health were more likely to co-reside with adult children and to receive assistance with ADLs (Zimmer and Kwong, 2003), which may also lead to an association between receiving support with ADLs and the self-rated health status of older people as evidenced in the research. The difficulty of measuring a causal impact has been found in many health-related studies (Croezen *et al.*, 2015; Graham *et al.*, 2015), which may be overcome by using a lagged longitudinal approach in this study.

Previous research has shown contrary evidence of the association between providing grandchild care and self-rated health among older people. For example, Li, Song and Feldman (2009) and Mao *et al.* (2018) found in their studies that older people who provided grandchild care were more likely to have a better self-reported health status compared to their counterparts who did not provide such care. However, another study by Chen and Liu (2011) suggested that older people providing high-intensity care for their grandchildren reported self-reported health declines. There may be two explanations for the different research findings. On the one hand, the samples in the studies were different. Li, Song and Feldman (2009) and Mao *et al.* (2018) used the same dataset of different waves, which focused on rural residents in the Anhui Province in China. By contrast, the study by Chen and Liu (2011) used the national longitudinal CHNS data, which included older people from both urban and rural areas. On the other hand, the research by Chen and Liu (2011) took into consideration the care intensity, and found an association between intensive care provision for grandchildren and the poor self-reported health among older people. The caring intensity, however, was not examined in the research by Li, Song and Feldman (2009) and Mao *et al.* (2018).

A number of authors have presented evidence of the positive influence of co-residence with adult children upon older people's self-reported health (e.g. Chou and Chi, 2000; Liu and Zhang, 2004; Chen and Short, 2008; Li, Zhang and Liang, 2009). A study in Hong Kong showed that low social support receipt and low subjective well-being were issues which concerned older people who lived alone (Chou and Chi, 2000). The authors found that older people who lived alone were more likely to rate their health as poor compared to their counterparts living with others (ibid). It is important to note that a higher percentage of older people living alone are single, divorced, or widowed, and such marital status has been shown to have a direct impact on their self-rated

health (e.g. Krochalk *et al.*, 2008). Similarly, Liu and Zhang (2004), and Chen and Short (2008) demonstrated that older people co-residing with family members reported better self-reported health compared to their counterparts living alone. In addition, Chen and Short (2008) found that older people living with an adult daughter were more likely to have a good self-reported health compared to those living with a son, which was the traditionally dominant type of living arrangement in China. Research by Li, Zhang and Liang (2009) based on a two-wave panel dataset suggested that the baseline living arrangement had a significant influence on older people's self-rated health at Wave 2, in particular older people co-residing with adult children at Wave 1 were less likely to report poor self-reported health at Wave 2. Sereny and Gu (2011) combined the information of the actual living arrangement of Chinese older people with their expectations, by creating a variable called 'concordance' based on the Chinese Longitudinal Healthy Longevity Survey (CLHLS), and concluded that for both community-residing and institutionalised older people, living arrangement concordance had a positive impact on their self-reported health (Sereny and Gu, 2011).

Overall, previous research has indicated that receiving economic support and providing grandchild care may reduce the self-rated health among older people, whilst the provision of economic support may be associated with an improvement in their self-rated health. Such findings contribute to the development of Hypothesis 13 in Section 2.5.

Hypothesis 13:

The receipt of upward economic support has a negative impact upon the self-reported health of older people.

The next section continues to explore the associations between the exchange of intergenerational support and the physical health of older people in China.

2.4.2 Intergenerational support exchanges and the (instrumental) activities of daily living of older people

For centuries, gerontologists have postulated that intergenerational support is an important determinant of older people's physical health and well-being (Gruenewald and Seeman, 2011). A large and growing body of evidence supports the hypothesis that intergenerational support exchanges are linked to physical health outcomes. However, much of such evidence focused on the association between intergenerational support provision and chronic illnesses/ morbidity/

mortality outcomes, and did not examine the influence on the (I)ADL functional ability among older people (Brown *et al.*, 2003; Lyyra and Heikkinen, 2006; Sato *et al.*, 2008).

Most literature in terms of the association between the exchange of intergenerational transfers and the reporting of difficulties with (I)ADLs has focused on one direction of this relationship, which is the impact of having difficulties with (I)ADLs upon the exchange of intergenerational support. For example, Shi (1993) found that older people having difficulties with daily activities were more likely to receive support, and to receive more support (Shi, 1993). In addition, another study also from the 1990s showed that older people having difficulties with daily activities were more likely to receive economic and social support from their adult children, and concluded that the provision of intergenerational support to older people in China was mainly needs-based (Lee and Xiao, 1998). Recent studies also showed consistent findings by demonstrating a higher possibility of receiving instrumental support from adult children among older people having difficulties with (I)ADLs, which was explained by the prevailing filial piety valued in China (Giles *et al*., 2010).

There is little research examining the impact of intergenerational support exchange upon having difficulties with activities of daily living among older people in China. The study of Oxman and Hull (1997) suggested that having regular meetings with family members after surgery was highly associated with lower ADL impairment at Month 1 and that the perception of having adequate support provided from children predicted lower ADL impairment at Month 6. Research of Li *et al*. (2008) also revealed that the living arrangement of respondents at Wave 1 predicted ADL disability at Wave 2. In particular, older people who lived alone were less likely to have difficulties with ADLs at Wave 2 compared to their counterparts living with others or in institutions. However, as noted in Section 2.4.1, the issue of self-selection should be highlighted in such studies. Respondents who had difficulty with ADLs at baseline might be more likely to co-reside with their adult children, which could lead to a reverse causal relationship between the two variables. Gruenewald *et al.* (2007) found that older people who found themselves useful to family and friends were less likely to experience the onset of ADL disabilities or die within seven years (the study was based on two-wave surveys over a seven-year follow-up period). Nevertheless, this study did not examine the provision of social support by older people directly.

Scarce literature has been found in terms of demonstrating the influence of intergenerational support exchange on the (I)ADL functional status of older people, which is fully examined in this thesis. Based on the research of Oxman and Hull (1997) and Li *et al*. (2008), this study hypothesises that the receipt of upward social support has a positive impact upon the physical functional status of older people (see also in Section 2.5).

Hypothesis 15:

The receipt of upward social support has a positive impact upon the physical functional status of older people.

Research showing the associations between intergenerational support exchange and older people's psychological health is discussed in the next section.

2.4.3 Intergenerational support exchanges and the psychological health of older people

The importance of intergenerational relations to psychological health status of older people, including depression, psychological distress, and Quality of Life (QoL) has been well documented in previous literature (e.g. Umberson, 1992; Cheng and Chan, 2006; Li *et al.*, 2005; Li, Zhang and Liang, 2009; Zhang *et al*., 2014). This thesis focuses on the measure of depression and QoL, as they are two of the psychological health challenges facing Chinese older people nowadays, and the variables of depression and QoL are provided by the CHARLS data in all three waves (Beaumaster *et al.*, 2018).

In the context of modernisation and urbanisation in China, older people left behind have reported increasing loss, loneliness, isolation, depression and abandonment (e.g. Li *et al.*, 2016; Xu *et al.*, 2016; Ni *et al.*, 2017; Qian *et al.*, 2017). In general, older women are more likely to have depressive symptoms than men in China (Chen *et al.*, 2005; Li *et al.*, 2005; Ni *et al.*, 2017). A study in 1995 (Lee *et al.*) showed that a rise in the amount of either upward or downward intergenerational economic support increased the report of depression among older people. The authors argued that older people who had support exchange with their children experienced a sense of loss of independence in their later life, which resulted in their depressive symptoms. However, a later study showed that older people having adequate social support after surgery, and having regular meetings with family members had a lower depression score (measured by the 17-item Hamilton Rating Scale for Depression) at later months (Oxman and Hull, 1997). This was supported by Chen *et al.* (2005), who noted that depressive symptoms were significantly associated with a lack of upward social support receipt. Silverstein *et al.* (2006) found that upward economic transfers received by older people reduced their depressive symptoms. Moreover, a number of studies have shown that the receipt of upward social support by older people had a positive protective effect in terms of their depression status (Siu and Phillips, 2002; Li and Liang, 2007; Li *et al.*, 2014). Another piece of research also showed consistent findings that receiving both upward social and psychological support was beneficial for older people's depressive

symptoms, and further pointed out that psychological support played a more significant role than social support in such impact (Leung *et al.*, 2007). One possible reason for these conflicting results may be that the studies were based on cross-sectional data, and could only provide findings based on association between variables, which were influenced by the causality problem as argued by Graham *et al.* (2015) (see further in Section 2.3.3). This study hypothesises that both having intergenerational weekly in-person and distant contact have a positive impact upon the depressive symptoms of older people (see further in Section 2.5).

Hypothesis 17:

Having intergenerational weekly in-person contact has a positive impact upon the depressive symptoms of older people.

Hypothesis 18:

Having intergenerational weekly distant contact has a positive impact upon the depressive symptoms of older people.

In addition to the exchange of support, the living arrangement of older people can also influence their depression status. Chinese older people living alone were more likely to report depressive symptoms than their counterparts co-residing with others (Chou and Chi, 2000). A study revealed that social support provided by adult children buffered the deleterious impact of widowhood on older people's depression status (Li *et al.*, 2005). The findings were based on a panel survey conducted in 1991 and 1994 in Wuhan, China, which had a limitation of a small sample size of 1,263 respondents being married with children. Chou and Chi (2006) examined the association between the living arrangement and one's depression status, and found that living alone resulted in high levels of depressive symptoms for older women but not for older men. In addition, the authors identified significant factors including social support receipt and health indicators which could affect and explain the link between living alone and depressive symptoms. Interestingly, other researchers found that the out-migration of adult children was associated with a lower level of depression; however, with the positive effects of intergenerational support receipt taken into consideration, the migration of adult children led to a higher level of depression among older people (Guo, Aranda and Silverstein, 2009). The research by Zhang and Li (2011) found that social support receipt, as a mediator, moderated the effect of marital status on the depressive symptoms among older people in China. These studies have shown possible relations between

intergenerational support and the depression status of older people, however many did not examine the direct association, which thus deserves further investigation.

This and the next paragraph contribute to understanding the association between the exchange of intergenerational support and life satisfaction among older people in China. Silverstein *et al*. (2006) found that older people who lived in three-generation households had a higher likelihood of providing and receiving intergenerational support, yet suggested that the exchange of social support in both directions had no association with the life satisfaction of older people (Silverstein *et al*, 2006). As argued earlier, this research only focused on the Anhui Province of China, and its results may not be transferrable to a national level. A more recent study examining the health-related quality of life among the empty-nest older people in rural areas showed that half of the respondents had severe problems in the EQ-5D health status[10] and 30% had moderate problems (Liang and Wu, 2014). The authors hypothesised that the findings were due to the reducing upward economic and social support received by the parents, especially for older people residing in the mountainous areas (ibid). However, this research is open to criticism as it did not directly investigate the association between the receipt of intergenerational support and life satisfaction among older people.

Another study explored the association between the provision of intergenerational support by older people and their life satisfaction in three countries: China, Indonesia and Germany (Schwarz *et al.*, 2010). The researchers demonstrated that the economic, social and psychological support provided by older Chinese mothers to their adult daughters did not show an association with their life satisfaction. They further revealed the significant role of culture and values in mediating the association between social support exchange and life satisfaction by showing an association between the downward economic support provided by the Indonesian mothers and their high life satisfaction, and a positive relationship between downward social support provision by older German mothers and their high life satisfaction. However, this research was based on regional data collected in Beijing, the Henan, Yunnan Provinces and the Guangxi Zhuang Autonomous Region, which may not be representable at a national level in China. Another negative side of this research is that it used cross-sectional data and could not provide definitive conclusions regarding the causality for the association between support exchanges and life satisfaction among older people. Based on the social exchange theory that people have lower levels of well-being/ life satisfaction when support provided is greater than support received (Chen and Jordan, 2018), it is

[10] The EQ-5D includes the EQ-5D health description system and the EQ-visual analogue scale (EQ-VAS) scores. The authors in this research adopted the Japanese scale scoring method instead of the British approach, concerning the social and cultural differences at the national level.

hypothesised that the provision of downward economic and social support to younger generations has a negative impact upon the life satisfaction of older people (see Hypotheses 14 and 16 in Section 2.5).

Hypothesis 14:

The provision of downward economic support has a negative impact upon the life satisfaction of older people.

Hypothesis 16:

The provision of downward social support has a negative impact upon the life satisfaction of older people.

2.5 Summary of Literature, Gaps and Hypotheses

The above four sections clarify the theoretical framework of this thesis, and review the literature regarding the changes in different types of intergenerational support within Chinese families in order to better address the research questions in Section 1.4.

The modernisation and ageing theory, the economics of labour migration theory and the modified extended family model are employed to illustrate the changes in the flows of intergenerational economic, social and psychological support provision within Chinese families (Litwak, 1960; Greenwell and Bengtson, 1997; Stark and Bloom, 1985). Any of the three theories on its own is unable to explain the mixed and complicated changes in different types of intergenerational support exchanges in China, hence a framework combining the three theories is constructed in order to better understand the changes (see Figure 2.1).

Sections 2.2-2.4 show that a considerable amount of literature has provided a wealth of information about the changes in intergenerational support flows in China, as well as the interactions between children's out-migration behaviour and older people's health status. The proportion of adult children providing economic support to their older parents seems to have decreased in the past decades, while the proportion of older people providing such support to their adult children has significantly increased (e.g. Wang and Ma, 2002; Du and Wu, 2006; Wu, 2015). In addition, there are substantial urban and rural differences in the exchange of intergenerational economic support, with a higher proportion of older people in urban areas providing economic transfers to their adult children, and a lower percentage receiving such

support from their adult children compared to their rural counterparts (Yu, 2007; Wang, 2013; Wu, 2015). Literature published before 2000 suggested that most older people in China depended on the social support provided from their adult children (Zeng, 1986; Krause and Liang, 1993), yet recent research has presented a decreasing frequency of intergenerational social contact and support exchange (e.g. Silverstein *et al*., 2006; Cheng *et al.*, 2009; Chao, 2011). Along with this, several lines of evidence suggest that the exchange of intergenerational psychological support in China is undergoing changes with competing evidence showing an increasing or declining trend (Chou and Chi, 2000; Guo, Chi and Silverstein, 2009; Yi, 2014).

Children's out-migration has a significant impact on the intergenerational support exchanges within Chinese families (e.g. Croll, 2008; Quah, 2009; Cong and Silverstein, 2011; Liu, 2014). With the massive number of internal migrants in China, growth in the provision of upward and downward intergenerational economic transfers has been observed (Chen, 2001; Sun, 2002; Zhang, 2005; Cong and Silverstein, 2011; Liu, 2014). However, the increase in the living distances reduces the social support provided from adult children to their parents (Zeng, 1986; Sun, 2002; Silverstein *et al.*, 2006; Gruijters, 2016), while a large number of older people take the responsibility to take care of their grandchildren (Croll, 2008; Quah, 2009; Liu, 2014). In addition, previous literature shows that with the increase in the variety of means of communication, the perception of psychological support in China has been broadened (Zhan *et al.*, 2008; Liu, 2014). Therefore, some research has argued that the intergenerational emotional ties among Chinese families are maintained despite the increasing geographical distances (Luo and Zhan, 2012; Liu, 2014).

The changes in intergenerational support exchange have a significant impact on the health status of older people in China. An increase in economic support from older people to their adult children improves the subjective well-being of older people in China, yet the provision of economic transfers by adult children has a negative impact on older people's self-reported health (Li, Song and Feldman, 2009). A negative association has been found between the provision of social care by adult children and older people's self-reported health, whilst mutual psychological support shows benefits for their subjective well-being (ibid). However, little research has examined the impact of intergenerational support exchange on older people's (I)ADL functional status (Gruenewald and Seeman, 2011). The provision of economic and social support from adult children to older people has been found to have a positive influence on the latter's depression status and life satisfaction (e.g. Siu and Phillips, 2000; Silverstein *et al.*, 2006; Liang and Wu, 2014). In addition, the change in the living arrangement is evidenced to have a significant effect on the physical and psychological health of older people (Liu and Zhang, 2004; Chen and Short, 2008; Guo, Chi and Silverstein, 2009; Sereny and Gu, 2011; Liang and Wu, 2014).

Prior studies have indicated possible changes in different aspects of intergenerational support provision within Chinese families, however the findings remain fragmented (Gruijters, 2016). Therefore, it is important to explore such changes in greater detail and over time. Most research has included intergenerational support as an independent variable, which fails to explore the competing views on the changes in the flows of different types of intergenerational support (Oxman and Hull, 1997; Chou *et al.*, 2006; Cheng *et al.*, 2009; Chao, 2011; Lin and Yi, 2011). Another research gap of previous studies lies in that the provision of intergenerational support by older people, especially social and psychological support is often neglected (Chou and Chi, 2003; Leung *et al.*, 2007). In addition, previous research rarely examined a broader source of intergenerational support and different types of health outcomes at the same time (Leung *et al.*, 2007). Therefore, further research is needed to investigate the effect of intergenerational support exchange on older people's physical and psychological health (Gruenewald and Seeman, 2011). Finally, although researchers admit rural and urban differences in understanding the flows of intergenerational support, most previous studies have focused on rural areas only, or treated the entire Chinese population as a whole (e.g. Giles *et al.*, 2010; Chen *et al.*, 2011; Ning and Wang, 2015). This current study aims to fill such gaps by investigating the changes in the flows of intergenerational economic, social and psychological support in both upward and downward directions, exploring the causal factors for the changes, and examining the impact of the changes on the physical and psychological health of the Chinese older population. Comparisons between rural and urban areas are provided where possible. Based on the theoretical framework and the literature review, the following hypotheses are developed as part of this study:

Hypotheses for addressing Research Questions 1 and 2:

1. The proportion of adult children providing economic support to their older parents decreases over time.
2. The proportion of older people providing economic support to their adult children increases over time.
3. The proportion of adult children providing social support to their older parents decreases over time.
4. The proportion of older people providing social support to their grandchildren increases over time.
5. The proportion of older people having intergenerational in-person contact decreases over time.
6. The proportion of older people having intergenerational distant contact increases over time.

Hypotheses for addressing Research Question 3:

7. The out-migration of adult children increases the receipt of upward economic support by older people.
8. The out-migration of adult children increases the provision of downward economic support by older people.
9. The out-migration of adult children has a negative association with the receipt of upward social support by older people.
10. The out-migration of adult children has a positive association with the provision of grandchild care by older people.
11. Older people who did not have any adult child living nearby are less likely to have intergenerational weekly in-person contact.
12. Older people who did not have any adult child living nearby are more likely to have intergenerational weekly distant contact.

Hypotheses for addressing Research Question 4:

13. The receipt of upward economic support has a negative impact upon the self-reported health of older people.
14. The provision of downward economic support has a negative impact upon the life satisfaction of older people.
15. The receipt of upward social support has a positive impact upon the physical functional status of older people.
16. The provision of downward social support has a negative impact upon the life satisfaction of older people.
17. Having intergenerational weekly in-person contact has a positive impact upon the depressive symptoms of older people.
18. Having intergenerational weekly distant contact has a positive impact upon the depressive symptoms of older people.

It is noteworthy that the difficulty of identifying a causal relationship has been widely acknowledged by scholars in the field of ageing research, particularly when examining one's education, living arrangement and health status (Li *et al.*, 2009; Sereny and Gu, 2011; Croezen *et al.*, 2015; Graham *et al.*, 2015). This is one of the reasons for the mixed findings provided by different studies so far. This thesis aims to address this research gap, by using a three-wave longitudinal dataset and a particular specification strategy in the adopted methods, such as a lagged effect model. The methodological approach of this thesis is elaborated in Chapter 3.

Chapter 3 Methodological Approach

3.1 Introduction

This chapter aims to provide justifications for the methods used in this study. Section 3.1 justifies the use of a quantitative method in this study, and Section 3.2 introduces the Harmonised CHARLS data, followed by two sections of illustrations of the sample and key variables used (Sections 3.3 and 3.4). Thereafter, the methods used to address the research questions are explained in detail in Section 3.5. Ethical considerations relating to this study is stated in Section 3.6 and a summary of this chapter is provided in Section 3.7.

This study addresses the research questions (see further in Section 1.4) based on quantitative analyses of the Harmonised CHARLS for the following three reasons. First, the chosen quantitative methodology is appropriate for addressing the research questions, as it explores the flows of intergenerational support at a national level and the potential causal relationships between the living arrangements with adult children, intergenerational support exchanges and older people's health status. Many researchers have utilised quantitative research methods to answer similar questions (e.g. Greenwell and Bengtson, 1997; Silverstein *et al.*, 2006; Guo, Aranda and Silverstein, 2009; Ao *et al.*, 2016). For example, the study of Greenwell and Bengtson (1997) adopted quantitative methods to explore the association between geographical distance and intergenerational contact in the US. In addition, Ao *et al.* (2016) used a quantitative approach to examine the influence of adult children's migration upon the health condition of their left-behind parents. A series of studies by Silverstein *et al*. have also relied upon quantitative methods to investigate the impact of intergenerational support exchanges on the health and well-being of older people in the rural Anhui Province in China (Chen and Silverstein, 2000; Silverstein *et al.*, 2006; Cong and Silverstein, 2008; Guo, Aranda and Silverstein, 2009).

Second, the research aim of this thesis is to map the changes in the flows of intergenerational support by providing nationally representative evidence. Qualitative research may explain in detail such changes within a limited sample with specific characteristics, however it fails to picture the overall changes undergoing in the entire population (Creswell and Creswell, 2003). By contrast, quantitative analysis based on nationally-representative longitudinal data is more appropriate in order to examine the changes in the flows of intergenerational support exchanges at a national level (Rowles and Schoenberg, 2001). Third, this research employs a quantitative approach because of relevant data availability in the CHARLS, which is a sister survey of international surveys such as the Rand Health and Retirement Survey (HRS) and English

Longitudinal Study of Ageing (ELSA) (Beaumaster *et al.*, 2018). An introduction to the CHARLS data, which has been used by many researchers globally, is provided in the next section.

3.2 Data

The CHARLS data aims to collect a nationally representative sample of Chinese residents aged 45 or older in order to serve the needs of scientific research on middle-aged and older adults[11]. The inclusion of respondents aged 45 or older is relatively young compared to other international datasets such as the ELSA and SHARE (e.g. Coe and Zamarro, 2011; Zanasi *et al*., 2019), because of the specific context in China. First, the compulsory retirement age in China is 50 for female workers, 55 for female cadres and male workers in certain job categories, and 60 for male cadres (Zeng, 2011). Therefore, female workers who aged 45 in 2011 may reach the compulsory retirement age in 2015. In addition, previous research has shown that the proportion of respondents aged 45- 59 accounted for more than 40% of the CHARLS sample who had at least one grandchild aged 16 years old or younger (Ko and Hank, 2013), which is also suggested in this current study (see Table 3.4). Hence, it is appropriate to include respondents aged 45 years or older in this study in order to investigate the intergenerational support exchanges.

The baseline national wave of the CHARLS was fielded in 2011 in 150 counties/district (450 villages/resident committees) and the individuals were followed up in 2013 and 2015, with a life history dataset collected in 2014. The refresh sample in 2013 and 2015 comprised new participants who fit the profiles of those who dropped out, which had the appeal of weighted and stratified repeated cross-sectional sampling without compromising the advantages of the longitudinal sample in nature (Yee and Niemeier, 1996; CHARLS, 2017). The Harmonised CHARLS dataset released in June 2018 includes the above four waves of data and contains processed variables similar to the Harmonised HRS[12], Harmonised SHARE and Harmonised ELSA (Beaumaster *et al.*, 2018). In addition, the CHARLS provides a good quality of the data and samples by using a stratified multistage (county/district-village/community-household) proportionate to population size (PPS) random sampling method (ibid).

The Harmonised CHARLS dataset provides seven cross-sectional weights and two longitudinal weights at both the household and individual level. The cross-sectional weights include two weights at the household level: one was adjusted for household non-response and the other was

[11] Please note that respondents in this thesis hereafter refer to the sample of Chinese residents aged 45 or over in the CHARLS.
[12] The RAND HRS is a cleaned version of data from eleven waves of the Health and Retirement Study data created by the RAND Centre for the Study of Ageing (Rand Corporation).

not adjusted for household non-response. At the individual level, the CHARLS produces three different weights: one without non-response adjustment, one with household non-response adjustment, and the other one with household and individual non-response adjustment; and two biomarker weights, one with household non-response adjustment and the other with household and individual non-response adjustment (CHARLS, 2017). The longitudinal weights were calculated from the baseline weights with the construction of an inverse probability weighting factor based on a logit regression of whether a respondent participated in the following wave conditional on the participation in the base line (CHARLS, 2015). This study uses the cross-sectional weight at the individual level with household and individual non-response adjustment for the cross-sectional analyses and the longitudinal weight at the individual level for the longitudinal analyses where appropriate, as the regression models test the hypotheses by using each individual as his or her own control (Chien *et al.*, 2017) (see more in Section 3.5.4).

The Harmonised CHARLS data presents some major advantages for researching this topic. First, it is a nationally representative dataset which contains information collected among 28 provinces in China, with an initial sample of 10,258 households and 17,500 individuals in 2011. As a longitudinal dataset, the CHARLS helps to track changes in intergenerational support exchanges and other variables at an individual level. For example, a recent study used the two-wave CHARLS data (2011 and 2013) to explore the relationships between the changes in depressive symptoms, drinking and tobacco smoking among middle-aged and older adults (Cheng *et al.*, 2016). The use of the latest wave of data available (2015) in this study further exploits the nature of the longitudinal CHARLS, and provides updated information about Chinese middle-aged and older people. Second, the Harmonised CHARLS data contains a rich set of interdisciplinary variables for researchers to control for in the analyses. There are seven mains sections in the CHARLS questionnaire, including Demographic Background, Family, Health Status and Functioning, Health Care and Insurance, Work, Retirement and Pension, Income, Expenditures and Assets and Housing Characteristics, which can be used for interdisciplinary research. Variables in different modules of the CHARLS have been used in relevant research (e.g. Cheng *et al.*, 2016; Liu *et al.*, 2017).

Third, previous research has used other longitudinal datasets including the CHNS and the CLHLS to explore intergenerational support exchanges within Chinese families based on fixed effects models (FEM) (Xu *et al*., 2014; Huang *et al*., 2016; Oliveira, 2016), however, no similar research has been conducted using the CHARLS dataset. It is thus helpful to conduct fixed effects and other regression models based on the Harmonised CHARLS model, as it not only provides high quality and up-to-date information, but also allows for international comparability of the findings, which is important for understanding the effect of cultural context on researching intergenerational support exchanges (Schwarz *et al.*, 2010). This is because the Harmonised CHARLS was designed

after the RAND HRS (and other sister surveys such as the ELSA and the SHARE); therefore, it contains comparable means and measures of variables with the other studies and is appropriate for conducting global research by discussing the findings in the context of international literature in this study, or conducting further comparative research beyond this PhD. Therefore, it is important to examine the changes in the flows of intergenerational support based on the Harmonised CHARLS, in order to facilitate national and international comparisons in this area.

3.3 The Samples

The Harmonised CHARLS dataset contains 25,504 observations for individuals aged 45 or over. There are 17,708 respondents in Harmonised Wave 1; 18,612 respondents in Harmonised Wave 2; 20,543 respondents in Harmonised Wave 3 (life history); and 21,097 respondents in Wave 4. The Wave 3 data was not included in the main analyses due to the lack of information about intergenerational support exchange. About 86% of respondents in 2011 also responded in 2013, about 83% of Wave 1 respondents also responded in 2015 and about 77% of participants responded at all three waves, which were relatively good as the rates were similar to other international surveys, such as the British Household Panel Survey (BHPS) (Lynn, 2006).

Table 3.1 shows the proportion of older people receiving and providing upward and downward economic transfers using the original data. Table 3.2 illustrates the percentage of respondents having weekly in-person and distant contact with adult children in 2011, 2013 and 2015 based on the same sample.

Table 3.1 Percentages of respondents providing and receiving economic and social support, original sample (2011, 2013 & 2015) %

	Wave 1 (n=17,708)		**Wave 2 (n=18,612)**		**Wave 4 (n=21,097)**	
Economic Support	From children to parents	From parents to children	From children to parents	From parents to children	From children to parents	From parents to children
Yes	32.0	16.3	54.6	30.5	73.0	48.4
No	67.4	83.0	32.2	55.2	25.7	50.1
missing	0.6	0.7	13.2	14.3	1.3	1.4
Social Support						
Yes	3.2	29.2	9.0	34.3	10.5	36.9
No	68.3	28.7	50.4	32.5	80.8	31.8
missing	28.5	42.1	40.6	33.2	8.7	31.3

Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

Table 3.2 Percentages of respondents having weekly contact with their adult children, original sample (2011, 2013 & 2015) %

	Wave 1 (n=17,708)		**Wave 2 (n=18,612)**		**Wave 4 (n=21,097)**	
Percentages	In-person	By phone/mail	In-person	By phone/mail	In-person	By phone/mail
Yes	82.0	42.0	77.0	31.9	77.1	41.0
No	15.0	29.0	18.2	28.4	21.1	29.3
missing	3.0	29.0	4.8	39.7	1.8	29.7

Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

There were relatively high proportions of missing data in Tables 3.1 and 3.2, such as the social support provision from older parents to grandchildren and weekly distant contact (about 30-40%). One of the reasons for the high rate of missing value is that filters applied in answering questions regarding intergenerational economic, social support and weekly contact (see more details in Appendix A). For example, information about social support provided from adult children only applied to respondents who needed help with (I)ADLs; while questions about grandchild care provision only applied to respondents who had grandchildren under 16 years of age. In addition, questions about weekly contact were asked of respondents with non-co-resident children only, which lead to a number of missing data as respondents who did not have non-co-resident children did not answer such questions.

Due to a relatively high proportion of missing data in the exchange of intergenerational support, it is not appropriate to include all the respondents as the analytical sample in the analysis. The survey samples were reduced prior to further analysis, due to the difficulty in obtaining the information about the support exchange among the missing sample. Only respondents who had any type of intergenerational transfers in at least one survey year were included in the analysis. Different analytical samples were selected for the cross-sectional and longitudinal analyses, which are explained in Sections 3.3.1- 3.3.2.

3.3.1 Repeated cross-sectional analyses

Table 3.3 shows the descriptive analysis of the characteristics of respondents in all three waves with reduced cross-sectional sample, which only included respondents who had at least one adult child and young grandchild, and who had a valid answer with regard to any type of the intergenerational support in at least one survey year. The last column shows comparisons of weighted proportions of loss to follow up. Chi-squared tests have been conducted and bold font indicates that there are gender differences between the loss-to-follow-up sample and those who participated in 2015. A comparison showing no significant differences between gender, Hukou, Educational attainment and work status of the repeated cross-sectional analytical sample and the full sample is provided in Appendix B. Because only respondents having at least one adult child and one young grandchild are included in the repeated cross-sectional analytical sample, there is a lower percentage of respondents aged 45-59 and a higher average age in the analytical sample compared to the full sample. In addition, the age difference also results in a lower proportion of respondents being married/ partnered, and a higher proportion of respondents being widowed in the repeated cross-sectional analytical sample compared to the full sample (see further detail in Appendix B).

Table 3.3 Descriptive analysis of the characteristics of respondents, analytical sample (2011, 2013 & 2015)

Variables	Wave 1 (n=9,532)		Wave 2 (n=8,701)		Wave 4 (n=8,417)		Difference in loss to follow up (vs. Wave 4) (n=654)		
	n/M	%/SD	n/M	%/SD	n/M	%/SD	%/M	t /SD	p
Age	63.4	10.5	65.0	10.3	66.4	10.0	65.2	10.6	<0.001
45-59	3,836	41.2	2,886	33.6	2,343	28.2	51.3		
60-74	4,132	40.2	4,153	44.7	4,267	48.4	39.6		
75 or over	1,564	18.6	1,662	21.7	1,807	23.4	9.1		
missing	0	<0.1	0	<0.1	0	<0.1	<0.1		
Gender								**-0.1**	**0.96**
Male	4,596	47.7	4,203	47.9	4,268	50.0	47.6		
Female	4,931	52.3	4,498	52.1	4,149	50.0	52.4		
missing	5	<0.1	0	<0.1	0	<0.1	<0.1		
Hukou of Respondent								-29.5	<0.001
Agricultural Hukou	7,323	70.1	6,770	72.3	6,043	66.2	2.8		
Non-Agricultural Hukou	2,152	29.2	1,817	26.0	1,734	25.7	2.7		
Others	54	0.6	92	1.1	69	1.0	9.3		
missing	3	<0.1	22	0.6	571	7.1	85.2		
Education Level								-4.4	<0.001
Illiterate	2,521	24.9	2,357	26.5	2,189	25.4	20.2		
Less than lower secondary	5,785	59.8	5,265	59.3	5,227	60.7	62.3		
Upper secondary & vocational training	9,79	11.6	1,012	13.1	839	11.2	12.1		
Tertiary	241	3.6	66	1.1	158	2.6	5.2		
missing	6	0.1	1	<0.1	4	<0.1	0.2		
Marital Status								-3.2	<0.01
Married/partnered	7,506	76.4	6,670	73.8	6,260	72.8	83.0		
Divorced/separated	207	2.7	137	2.0	127	1.5	2.3		
Widowed	1,800	20.6	1,762	22.5	1,911	24.0	13.4		
Never married	19	0.3	131	1.7	113	1.6	0.8		
missing	0	<0.1	1	<0.1	6	<0.1	0.5		
Work Status								-5.2	<0.001
Did not work last year	3,482	42.0	3,277	42.2	3,204	42.3	45.1		
Worked last year	1,149	15.6	1,045	14.6	911	12.3	27.2		
missing	4,901	42.4	4,379	43.2	4,302	45.4	27.7		

Note: only respondents who had a valid answer to intergenerational support in at least one wave were included.
Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

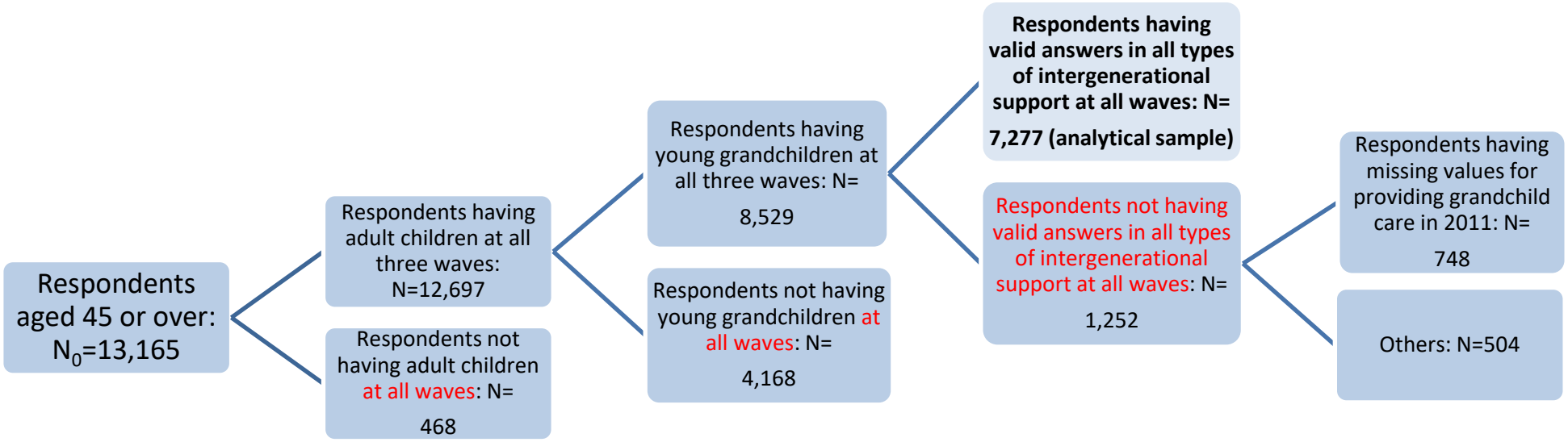
The analytical samples for the Harmonised CHARLS 2011, 2013 and 2015 were 9,532; 8,701 and 8,417 respectively. Notably, due to the nature of CHARLS data, the three cross-sectional samples contained a major subset of same respondents (the longitudinal sample) (see further discussion in Section 3.5.1). The average age of the respondents was 63, 65 and 66 in 2011, 2013 and 2015 respectively. There were slightly more female (about 52%) than male respondents (about 48%) in the sample in 2011 and 2013, and about half of the respondents were female in 2015. There were more female respondents among the loss to follow up compared to those who were surveyed in 2015. The majority of respondents had an agricultural Hukou, which accounted for 70% of the sample in 2011. This percentage increased by about 2% in 2013, and decreased by about 6% in 2015, which suggested that a small section of respondents changed their Hukou status over time. The majority of respondents had received up to lower secondary education (about 85% of the total number in each of the three waves), which resulted from a cohort effect influenced by the education reforms in China (Chen *et al.*, 2008; Zhou, 2018). Over 70% of respondents were married or partnered in each of the three waves and the distribution of the marital status variable was similar in the three waves (refer to Section 3.4 for the derivation of this variable). The percentage of respondents who did not currently work was about 42% at all survey years;

however, the proportion of respondents with missing values in this variable was quite high (between 42%-45%).

3.3.2 Longitudinal analyses

As shown in Figure 3.1, 13,165 respondents aged 45 or over who participated in all three survey years were included as the original analytical sample for the longitudinal analyses in this study. For the purpose of accurate estimations in Chapters 5 and 6, the number of the final analytical sample for the longitudinal analyses was further restricted and the restriction strategy is described as follows.

First, a subsample containing 12,697 respondents having at least one adult children were kept, because the study focused on the changes in intergenerational support and contact. In addition to this, 4,168 respondents who did not have grandchildren aged under 16 were deleted due to missing values for this group which affect the estimation in examining the changes in the provision of grandchild care. Finally, a number of 7,277 respondents who had a valid answer in all types of intergenerational support exchanges at all three waves were kept in the analyses. Among respondents who had missing values in terms of intergenerational support exchange (1,252), there were 748 (60%) Wave 1 respondents with missing values for grandchild care provision. As acknowledged in the Harmonised CHARLS release note, it is unclear why these respondents did not answer the question regarding care provision for grandchildren when the majority reported that they had grandchildren under the age of 16 (Beaumaster *et al.*, 2018).



Source: Author's analysis of the Harmonised CHARLS data.

Figure 3.1 Sample flow diagram in the Harmonised CHARLS longitudinal sub-dataset

3.4 Operationalisation of Key Variables

This section discusses the use of variables in this study. For the variable codes and original questions and whether filters applied to the questions, please refer to Appendix A. Table 3.4 shows the variable name, variable label and coding in the longitudinal CHARLS subset.

Table 3.4 CHARLS 2011-15 subset: variable name, label and coding

Variable	Variable label	Value label (coding)
ID	cross-wave person identifier	
year	survey year	2011, 2013, 2015
inw	respondent at time t	1=yes 0=no
agey	respondent age in years at time t	continuous
agec	respondent age in categories at time t	1=45-59 2=60-74 3=75 or over
rgender	respondent gender	1=males 0=females
raeduclc	education levels in 4 categories	1=illiterate 2=less than lower secondary 3=upper secondary & vocational training 4=tertiary
mstat	respondent marital status in 4 categories at time t	1=married/ partnered 2=divorced/ separated 3=widowed 4=never married
Hukou	respondent Hukou status at time t	1=agricultural Hukou 2=non-agricultural Hukou 3=others
childalive	respondent has children alive at time t	1=yes 0=no
coresdx	any child co-reside at time t	1=yes 0=no
lvnear	respondent live near children at time t	1=yes 0=no
work	respondent currently work at time t	1=yes 0=no
income	income in 2 categories at time t	1=yes 0=no
socwk	participate in social activities at time t	1=yes 0=no
shltac	respondent self-report of health in 3 categories at time t	1=good 2=fair 3=poor
lifsat	life satisfaction	1=good 2=fair 3=poor
ADLs	ADL score for respondents at time t	continuous
IADLs	IADL score for respondents at time t	continuous
ADLc	ADLs in categories at time t	1=severe functional impairment
IADLc	IADLs in categories at time t	2=moderate impairment 3=full function
chronic	chronic disease in 3 categories at time t	0=none 1= one kind of chronic disease 2=two or more kinds of chronic disease
depresl	respondent cesd: in categories at time t	1=yes 0=no
fcany	any economic transfer from a child at time t	1=yes 0=no
tcany	any economic transfer to a child at time t	1=yes 0=no
socsu	receipt of support with ADLs or IADLs	1=yes 0=no
gkcare	grandchild care at time t	1=yes 0=no
kcntf	weekly contact with a child in person	1=yes 0=no
kcntpm	weekly contact with a child- phone/email	1=yes 0=no
fcamt	the annual amount of economic transfers from a child at time t	continuous
tcamt	the annual amount of economic transfers to a child at time t	continuous
fcamtc	the annual amount of transfers from a child in categories at time t	1=0-799 (economic transfers of under 800 RMB) 2=800-2499 (economic transfers between 800 and 2500 RMB)
tcamtc	the annual amount of transfers to a child in categories at time t	3=2500-4999 (economic transfers between 2500 and 5000 RMB) 4=5000 or over (economic transfers of 5000 RMB or over)

Note: ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living. CESD refers to the Centre for Epidemiologic Studies Depression Scale, which is a self-report measure of depression. Value of all the economic transfers in the CHARLS was measured in China's currency Yuan. Unit of analysis: RMB. 1GBP= 9.616CNY (2015).
Source: Author's analysis of the Harmonised CHARLS data.

The CHARLS dataset provides two measures for the exchange of intergenerational economic support, one is binary, asking whether the respondents or their spouse provide/ receive economic support to/ from their children/ grandchildren with separate questions; and the other is

continuous, which is the amount of intergenerational monetary transfers. Previous research has used both of these indicators to measure intergenerational economic transfers and showed that the measurement was reliable (Jiang *et al.*, 2013; Wu and Li, 2014). However, a high missing rate (about 70%) was found for the amount of economic transfers based on the original sample. In order to achieve an accurate estimation, this variable was avoided to be used as a predictor in the longitudinal analysis to minimise biases. Importantly, the economic support received and provided by the older parents included both the respondents and their partner's finances. This is because much of the joint expenditure by older parents was indistinguishable, therefore it is helpful to consider the respondents and their spouse at an aggregate level for these variables (Silverstein *et al.*, 2006). It is noticeable that respondents who did not have a spouse present were also asked the same question, and their answers only referred to their own support exchange patterns. This may result in a lower proportion of, as well as a lower amount of economic transfers within the households with single/ widowed/ divorced older people compared to those with older couples.

This study merges children and grandchildren in terms of economic support exchange because of the following four reasons. Firstly, as mentioned in Section 3.1, the Harmonised CHARLS dataset has been cleaned for the purpose of ease to use by the University of Southern California (USC) team. The variables of transfers from/ to children or grandchildren are provided directly by the dataset, therefore it is not possible to distinguish transfers between children and grandchildren. Secondly, it is common for older adults to have three generations of kin either in western or Asian countries (Lei *et al.*, 2015; Margolis and Wright, 2016). Therefore, it may be problematic to separate the support exchange with children or grandchildren in three-generation households. For example, older people intending to provide economic support to their grandchildren, who are too young to make purchases independently, may provide such transfers to their adult children instead. Thirdly, it is helpful to examine the economic support provided from children or grandchildren at an aggregate level, as the receipt of support from both sources may exert an impact on older people's health as a whole. Some scholars have merged the support provided/ received by children and grandchildren in their research, which suggests the reliability of using such variables (e.g. Ploeg *et al.*, 2004; Jiang *et al.*, 2013; Lei *et al.*, 2015). Finally, much of the expenditure by adults who have children was on children (Qian and Smyth, 2011), therefore it may be helpful to combine both the adult children and grandchildren to examine the economic support provided from older people.

As elaborated in Section 2.2.2, intergenerational social support refers to the within-family care and support received and provided by older people in this study. Although social support is a multi-dimensional concept, previous research using tangible instrumental support to measure

intergenerational social provision has confirmed its validity (Oxman and Hull, 1997; Chen and Silverstein, 2000) (see also Section 2.2.2). Social support provided from adult children to their parents is measured in this study as 'whether older people obtain help from children with at least one of the (instrumental) activities of daily living ((I)ADLs)' (Katz *et al.*, 1963; Lawton and Brody, 1969). This information was not included in the Harmonised CHARLS dataset, instead, it was provided in the three waves of CHARLS datasets respectively. Such information was merged from the three separate waves into the Harmonised CHARLS dataset by using the individual ID as an identifier. The CHARLS datasets do not contain information about the social support provided from respondents to their adult children; however, this study uses grandchild caring as a proxy to examine the downward social support provided from older people or their spouse (Yu, 2007; Chen *et al.*, 2011; Falkingham *et al.*, 2019).

By taking this proxy, this study does not examine the social support provided from older people to their adult children directly. One reason is that most working-age adults are capable of caring for themselves, and the majority of older people in China do not provide social support to their adult children except for cooking and doing some house chores (Chen and Silverstein, 2000). Therefore, information about downward social support to adult children is not provided in the CHARLS datasets or other secondary datasets in China. It may be interesting and innovative to explore this direction of support provision considering data availability in the future, with the increasing share of NEETs taken into consideration (Chen *et al.*, 2011; Korinek *et al.*, 2011). Instead, as shown in Section 2.2.2, about half of older people in China provide grandchild care, which is a dominant pattern of downward social support provision within Chinese families. Notably, in this study, about 8% of Wave 1 households had missing values for grandchild care, which has been excluded from the analytical sample. As the majority of these households reported that they had grandchildren under the age of 16, it was unclear why the respondents did not provide valid responses, which requires further discussion (Beaumaster *et al.*, 2018). As demonstrated in previous literature, the provision of grandchild care is likely to have an influence on older people's health status (e.g. Schwarz *et al.*, 2010; Mao *et al.*, 2018). Therefore, it is important to examine the changes in grandchild caring over time and explore its association with potential health outcomes in this study.

As discussed in Section 2.2.3, psychological support includes the behaviour of comforting another person (Oxman and Hull, 1997). Some research examining intergenerational support provision has used social contact frequency as a proxy in order to measure the provision of psychological support and intergenerational solidarity (Oxman and Hull, 1997; Chou and Chi, 2000; Gruijters, 2017). In this study, the provision of intergenerational psychological support is reflected by the weekly in-person and distant contact (by either phone, mail or email) between respondents and

their adult children. The proportion of respondents reporting weekly in-person contact with their adult children is relatively high in this research (see Table 4.3), which is due to all respondents co-residing with their children being assumed to see their children on a weekly basis.

Based on the literature review, the out-migration of adult children is considered as an important factor to predict the change in intergenerational support exchange. However, as the Harmonised CHARLS data does not include information about children's migration status, it is considered appropriate to use the change in the co-residence status with adult children as a proxy to measure migration, as has been done in previous research (Xie and Zhu, 2009; Giles *et al*., 2010; Scheffel and Zhang, 2019; Wang *et al.*, 2019). For example, Scheffel and Zhang (2019) used the same variable from the CHARLS, and defined a child as a migrant if it was reported that the child did not live in the same household, or in a different county, or further away from their parents. In this current study, whether respondents co-reside with any child (1= yes, 0= no) is used to measure the adult child's out-migration (either at short or long distance).

Notably, the change from co-residing with an adult child to not doing so does not necessarily mean the out-migration of an adult child, due to the following two reasons. First, the child may move out of the household, but still live close to the parents. Considering this, another variable on "whether the respondents have an adult child living nearby[13]" (1= yes, 0= no) is used in addition to the co-residence variable to understand the change in the geographical distance between generations. The use of the 'living nearby an adult child' variable is especially helpful when examining the association between the living arrangements with adult children and having intergenerational in-person contact (see further discussion in Sections 5.1 and 5.2). Second, some may argue that it may be the older parents moving out of the household, which leads to the change in the co-residence status with their adult children. However, as the longitudinal sample included in the analysis was interviewed in their own household in different survey years, the possibility of older people moving out is very low. Taken together, the change in co-residing with and living nearby an adult child is used as an effective determinant for intergenerational support exchange (Jiang *et al.*, 2014). The limitation of using such proxy as the out-migration of adult children is further discussed in Section 7.4.

The original CHARLS data provides seven categories for the marital status of respondents, which includes 1) married and living with a spouse, 2) married but currently not living with a spouse, 3) partnered, 4) separated, 5) divorced, 6) widowed and 7) never married. According to the distribution of the original data and the literature review (e.g. Dou and Liu, 2017; Feng *et al.*,

[13] Living nearby refers to respondents living in the same household, community, village, town or city with their adult children.

2017), this variable was reduced to four categories: 1) married/ partnered, 2) divorced/separated, 3) widowed and 4) never married.

A number of variables are employed to assess the respondents' health condition, including their self-rated health, ADL and IADL functional status, chronic diseases, life satisfaction, and depression status. The original question of self-rated health was measured by a self-report of "excellent, very good, good, fair, or poor health". The five categories of answers were reduced to three categories (1= good, 2=fair, 3=poor) based on the distribution of the responses (only about 1.5% of respondents reported excellent self-reported health). Respondents were also asked about whether they had been diagnosed with one or more of 14 chronic diseases one by one, and this information was used to calculate the number of chronic diseases for each respondent. The new variable has three categories: 0= none, 1= one chronic disease, 2= two or more chronic diseases. This approach of categorising chronic diseases is commonly used in gerontological research because it provides an indication of the 'burden of disease' (Leung *et al.*, 2007; Li *et al.*, 2014), despite there being a critique that all diseases should not be treated as the same (Gallant, 2003; Chatterji *et al.*, 2015). The information about life satisfaction was collected by a question with five levels of answers: 1= completely satisfied, 2= very satisfied, 3= somewhat satisfied, 4= not very satisfied and 5= not at all satisfied. This was also reduced to a variable with three categories, 1= good, 2= fair, 3= poor, based on the distribution of the responses.

The concepts of ADLs (Katz *et al.*, 1963) and IADLs (Lawton and Brody, 1969) are used to measure the respondents' functional status in this study. The percentages of respondents reporting difficulty with each item of the ADLs and IADLs are shown in Appendix C. A total score was created to summarise the respondents' difficulty with ADLs and IADLs. Having difficulty with each of the tasks added one point on the respondents' dependence score. The total ADL functional score could equal to six whereas the total IADL functional score could equal to five. For the ADL scoring, a respondent who scored between 4-6 was categorised as having a severe functional impairment, a score between 1-3 reflected a moderate functional impairment, and a score of 0 suggested full functional status based on previous research (Hartigan, 2007). For the IADL scoring, a respondent who scored between 3-5 was categorised as having a severe functional impairment, 1-2 represented a moderate functional impairment, and a score of 0 indicated full functional status (Graf, 2008).

The Harmonised CHARLS data collects information on the depressive symptoms of respondents using 10 questions (see Appendix D for the original questions and the percentages of respondents for different items of the depression scale). The 10-item Centre for Epidemiologic Studies Depression Scale (CES-D 10) was first designed in 1977 (Radloff, 1977) and is widely used in epidemiological studies (Andersen *et al.*, 1994; Cheng and Chan, 2006). Table 3.5 shows the

calculation strategy for the depression status of respondents. The total score was calculated using the sum of the 10 items, ranging between 0 - 30. Similar to what researchers have found in western countries, scholars have used 10 as a cut-off point for the depression status among Chinese older people (Cheng and Chan, 2006; Cheng *et al.*, 2016; Xu *et al.*, 2016; Ni *et al.*, 2017).

Table 3.5 Calculation strategy of CES-D 10

	Rarely or none of the time (less than 1 day)	**Some or a little of the time** (1-2 days)	**Occasionally or a moderate amount of time** (3-4 days)	**All of the time** (5-7 days)
Questions 5 & 8 (reverse scoring)	3	2	1	0
All other questions	0	1	2	3

Source: Radloff, 1977.

Following the illustration of the variables used in this study, Section 3.5 aims to provide the specific methods and models used to address the research questions.

3.5 Methodology

The specific methods used to address the three research aims are displayed in Table 3.6 below. Repeated cross-sectional analyses are used to address Aim 1, and lagged hybrid methods combining fixed and random effects models (REM) are employed to address Aims 2 and 3. The analyses were conducted using the software Stata 15.

Table 3.6 Research methods according to the research aims and questions

Research aims	**Research questions**	**Research methods**	**Data types**	**The sample**
Aim 1	1. What is the extent of the intergenerational support (economic, social, psychological and two directions of flows) in China today? 2. To what extent has the flow of intergenerational support in China changed over time?	repeated cross-sectional analyses	cross-sectional data	Wave 1: N= 9,532 Wave 2: N= 8,701 Wave 4: N= 8,417
Aim 2	3. How have changes in the living arrangements with adult children impacted upon the changes in intergenerational support exchange?	a lagged hybrid method combining fixed and random effects models	longitudinal data	Longitudinal sample: N= 7,277
Aim 3	4. How have changes in intergenerational support exchange within Chinese families impacted upon the physical and psychological well-being of older adults in China?			

Source: The author.

3.5.1 Repeated cross-sectional analysis

In order to address the first research question, descriptive analyses are conducted to examine the percentages of respondents providing and receiving economic, social and psychological support, the distribution of key characteristics of respondents, and the overall health of respondents based on the 2015 wave of the Harmonised CHARLS. The analyses aim to explore the flows of intergenerational economic, social and psychological support provision at an aggregate level with the latest wave of data.

Repeated cross-sectional methods based on all three waves of the Harmonised CHARLS dataset are implemented in order to address the second research question. Repeated cross-sectional studies are recurrent surveys of the same population (not necessarily the same individuals) for a defined purpose conducted at regular or irregular intervals (Lavrakas, 2008). The surveys are designed to provide good estimates for the current population and the changes since the last survey or previous surveys at an aggregate level. A typical repeated cross-sectional survey is conducted on an annual, quarterly, or monthly basis, although a shorter or longer interval is possible. Examples of this are the Current Population Survey (CPS) in the US, the Family Expenditure Survey (FES) in the United Kingdom (UK) and the CLHLS in China.

The repeated cross-sectional design in this study consists of three repeated surveys conducted in 2011, 2013 and 2015. However, the three cross-sectional samples were not independent. The longitudinal sample introduced in Section 3.3.2 was a major subset of the three cross-sectional samples. It is difficult to determine whether the differences among the three samples reflected the cohort effect or the age effect, as the respondents from the longitudinal sample got older in the process. This study uses the three waves of the CHARLS data to conduct repeated cross-sectional analysis, because the new entry of participants helped to capture the dynamic changes in population composition (Yee and Niemeier, 1996). In addition, although the repeated cross-sectional analysis is unable to distinguish the cohort effect or the age effect, the descriptive and regression analyses based on the longitudinal sample in Section 4.2 and Chapters 5-6 help to specify and examine the age effect. Therefore, the repeated cross-sectional analysis in this study focuses on investigating the changes in the exchange of economic, social and psychological support between older people and their adult children at a national level (Goldstein, 2011). The changes in the respondents' characteristics, such as the co-residence prevalence rate or Hukou status, and the changes in their overall health condition are also examined and discussed using this method.

It is clear that different individual samples are measured at different survey years in a repeated cross-sectional study (with the practice of refresh sample), which is different from a longitudinal study where the same respondents are followed up at different waves. Another feature of the repeated cross-sectional analyses in this study is that it is regarded as descriptive because the results help to generate hypotheses for the longitudinal analyses, in contrast to the longitudinal analyses being analytical as it tests the hypotheses (Verbeek, 2008). The following sections will move to discussing the longitudinal approaches in this study.

3.5.2 Fixed effects models

Fixed effects models are commonly used in Social Sciences research, because they have been advocated as a useful approach for controlling for the impact of permanent characteristics in a longitudinal study (Gardiner *et al.*, 2009; Bell and Jones, 2015; Croezen *et al.*, 2015).

With longitudinal data we have

y_{ij} i=1, …, m j=1, …, n_j

Now consider the model

$$Y_{ij} = \beta_0 + \beta_1 X_{ij} + \varepsilon_{ij} \quad (3.1)$$

Since ε_{ij} is unlikely to be independent of ε_{jk} for j ≠ k, it is not appropriate to fit the model with standard methods. If the model includes more covariates, then:

$$Y_{ij} = \beta_0 + {X_{ij}}^T \beta + \varepsilon_{ij} \quad (3.2)$$

In Equation 3.2, the independence assumption that ε_{ij} has a mean zero and is independent for different i or j is more plausible. However, unmeasured individual factors may lead to a positive correlation between ε_{ij} and ε_{jk} for j ≠ k.

To address the above issue, consider an alternative model

$$Y_{ij} = \beta_0 + {X_{ij}}^T \beta + \mu_i + \varepsilon_{ij} \quad (3.3)$$

Where μ_i is the subject-specific residual and represents unmeasured individual factors which affect Y. It is assumed that μ_i in Equation 3.3 is fixed, and this is therefore called a fixed effects model. Fixed effects estimates are used to assess within-individual variations by discarding any information on the differences between individuals ("contaminated" variation) (Allison, 2009). A fixed effects approach can produce unbiased estimates of the parameters of interest (ibid). Such model is implemented to assess the association between the changes in the independent variables and the dependent variable within individuals, thus controlling for permanent characteristics that vary across individuals, which exploits the longitudinal nature of the data (Croezen *et al.*, 2015).

Based on the above clarification, the advantages of the fixed effects model are that 1) it makes no assumptions about how μ_i is related to X_{ij}, 2) there are no assumptions that μ_i is normally distributed, and 3) it identifies the within-subject effects of the covariates (Allison, 2009). As Research Questions 3 and 4 in this study aim to explore the association between the changes in

the co-residence with adult children, intergenerational support exchange and the health status of older people, it is appropriate to apply fixed effects models because they control for unobserved time-constant variables and subject-level covariates. However, the use of fixed effects models fails to assess the effects of time-invariant variables, such as gender and education attainment in this study[14]. Another disadvantage is that fixed effects models rely considerably on sufficient changes in the dependent and independent variables (Allison, 2009). Therefore, such models may not apply to research with insufficient variations in the variables, such as Hukou status in this study (see Table 4.11). In order to address this issue, a popular alternative to the fixed effects model, the random effects model, is considered in Section 3.5.3.

3.5.3 Random effects models

A random effects model is a particular example of a fixed effects model, and therefore is also based on Equations 3.3 used for the fixed effects models (Mundlak, 1978; Allison, 2009). The crucial difference is that random effects models assume that μ_i is random with:

- zero mean
- Var(μ_i) = ${\sigma_\mu}^2$
- Cor(μ_i, ε_{ij}) =0

The random effects models take into account the variation between individuals as well as within individuals for estimation (Croezen *et al.*, 2015). It is further distinguished from the FEMs because it can include time-invariant predictors in the models. Compared to the FEMs, some major advantages of the REMs are that: 1) they can assess the effects of time-invariant variables, 2) they have fewer parameters which lead to more efficient estimates, and 3) there is a lower effect of measurement error on the estimates (Allison, 2009). Because a REM is not a standard regression, more sophisticated methods such as generalised least square (GLS), maximum likelihood estimation (MLE) and restricted maximum likelihood (REML) estimation are required (Allison, 2009). Importantly, compared to the FEM, it is less common to use the REM in the Social Sciences research, as this method is likely to be biased due to the correlations between the unobserved and observed variables (Gardiner *et al.*, 2009; Chen, 2014).

As argued by researchers, a trade-off between bias and efficiency occurs whenever there is a choice between fixed and random effects models (Rabe-Hesketh and Skrondal, 2008; Allison, 2009). The REM leads to more efficient estimates with a prerequisite of no correlation between

[14] About 99.9% of respondents did not show any change in their education between the three waves in this study, therefore the education status is treated as time-invariant.

the unobserved and observed variables, yet the estimates may be biased if the restrictions of the model are wrong (i.e. there is a correlation between the unobserved and observed variables, which is often the case). The FEM, on the other hand, allows for any correlations between time-invariant and time-varying predictors. It is less prone to bias at the cost of some efficiency in the event that those correlations are zero (Rabe-Hesketh and Skrondal, 2008; Chen, 2014).

Given these trade-offs, it is useful to have a statistical test to compare and decide the use between the random and fixed effects models. A widely used test is the Hausman test of the null hypothesis that the random effect coefficients are identical to the fixed effects coefficients (Allison, 2009; Chen, 2014; Croezen *et al.*, 2015). This test is available in the software Stata. Such a test helps to determine whether the biases in the random effects method are small enough to ignore, or whether there is a need to move to the less restrictive fixed effects model. An alternative approach is to compare the fixed and random effects modelling results in a hybrid model (Allison, 2009), which is elaborated in Section 3.5.4.

3.5.4 A hybrid method

A hybrid method combining fixed and random effects can yield fixed effects estimates for time-varying predictors and random effects estimates for time-constant variables (Allison, 2009). In the hybrid method, the time-varying predictors are transformed into deviations from their person-specific means, but the dependent variable is not (Allison, 2009). This helps to produce the FEM estimates for the time-variant variables (Schunck, 2013). In addition, time-invariant predictors and variables that are the person-specific means for the time-varying variables are also included in the hybrid model (which are also time-invariant). Finally, a REM is used to estimate the Standard Errors (SE), which reflects the dependence among the multiple observations for each person (Allison, 2009; Schunck, 2013). This enables the hybrid model to provide the FEM estimates for time-variant variables and REM estimates for time-invariant variables.

Compared to the conventional FEMs, the hybrid approach helps to obtain the estimates for the effects of the time-invariant predictors or variables that have insufficient within-individual variations (Allison, 2009). The inclusion of time-invariant variables has no impact on the deviation variables (ibid), which means that the coefficients and standard errors for the deviation variables in the hybrid model are identical to the results from the conventional FEM. Both the mean and mean deviation coefficient for the time-varying predictors are included in the model for the following two reasons. First, it helps to obtain better REM estimates of the other time-invariant variables. Second, this gives us some insights that whether the assumptions of the REMs are correct, with the possible difference in the coefficients between the deviation variable and the

variable itself (Allison, 2009; Schunck, 2013). This suggests that the appropriateness of the REM against the FEM can be tested by comparing the equality for the two pairs of coefficients, as an alternative to the Hausman test discussed in Section 3.5.3. With regard to the hybrid method, different methods are used for different types of dependent variables, such as binary, categorical and continuous in this study, which is elaborated in the next section.

3.5.5 Methods for different types of dependent variables

In this study, the dependent variable is either binary, such as whether there is an exchange of economic, social or psychological support; categorical, such as the three-level life satisfaction of respondents; or continuous, such as the amount of economic transfers in the previous year (absolute value or log value). The main independent variable is dichotomous, be it the change in the living arrangement with adult children, or the bi-directional intergenerational transfers. The regression models used in this study are based on Equations 3.4 to 3.6 shown below.

3.5.5.1 Methods for binary dependent variables

When the dependent variable is dichotomous, a hybrid logistic model is used to assess the impact of the changes in the independent variables upon the dependent variable. Equation 3.4 illustrates an example of such model with whether respondents receiving economic support provided from adult children as the dependent variable, and co-residence status with adult children as the main independent variable (Diggle, 2002; Rabe-Hesketh and Skrondal, 2008; Allison, 2009).

$$\text{Log}\left(\frac{P_{it}}{1-P_{it}}\right)=\mu_t + \alpha_1 R_{it} + \alpha_2 X_{it} + \alpha_3 Z_i + \gamma_i, t = 1, 2, \dots, T \quad (3.4)$$

Where i stands for the respondent; t represents the year when the respondent was surveyed; and P_{it} is the probability that the dependent variable (respondents receiving economic support from adult children) is equal to 1. R_{it} stands for the co-residence status with adult children (1= yes, 0= no); and X_{it} is a vector of time-variant factors, including whether the respondents have children living nearby and other time-varying characteristics of the respondents (marital status and work status) (Cong and Silverstein, 2011; Silverstein *et al.*, 2012). Z_i is a vector of time-invariant predictors, such as the age[15], gender, Hukou and education status of respondents (Huang *et al.*, 2016; Oliveira, 2016). Finally, γ_i represents the collective effects of all unobserved variables which are constant over time.

3.5.5.2 Methods for dependent variables with more than two categories

[15] Age is included as a time-constant variable because it is perfectly correlated with time in longitudinal analysis.

Categorical dependent response variables with more than two ordered values are considered in this section, such as the ADL or IADL functional status, self-rated health and the life satisfaction of the respondents (1= good, 2= fair, 3= poor) in this study. The most common model for ordered categorical response variables is the cumulative logit model, also known as the ordered logit model (Sjösten *et al.*, 2007). The conventional maximum likelihood with robust SEs is applied in the model, in order to correct for any independence in the repeated observations for each individual (Allison, 2009).

As in Section 3.5.5.1, the person-specific means for each of the time-varying variables and the deviations from those means are calculated. Both mean variables and deviation variables are included as predictors in a cumulative logit model (Allison, 2009). In order to obtain subject-specific coefficients, conventional MLE with robust SEs is implemented. The OR coefficients for the cumulative logit model represent the change in the odds of being in a higher rather than a lower category of the dependent variable. Suppose that the values of the dependent variables are the integers (ranging from 1 to J, with the running index j). Let $P_{itj} = Prob(y_{it} = j)$. The model of using respondents' life satisfaction as a dependent variable, and changes in the proportion of respondents receiving upward economic support as an independent variable, can be written as

$$\text{Log}\left(\frac{F_{ijt}}{1-F_{ijt}}\right)=\mu_{tj} + \beta_1 S_{it} + \beta_2 X_{it} + \beta_3 Z_i + \alpha_i, j = 1, \dots, J-1 \quad (3.5)$$

Where $F_{ijt} = \sum_{m=j}^{J} P_{imt}$ is the cumulative probability of being in category j or higher on the life satisfaction of Respondent i at Time t. S_{it} stands for the proportion of respondents receiving upward economic support (1= yes, 0= no); X_{it} and Z_i are vectors that have the same representations as in Equation 3.4. β is the regression parameter and α_i represents the combined effects of all unobserved constant variables.

3.5.5.3 Methods for continuous dependent variables

Where the dependent variable is continuous, a regular ordinary least squares (OLS) FEM is used in order to examine the potential influence of the predictors (Rabe-Hesketh and Skrondal, 2008; Allison, 2009). Equation 3.6 shows an example of such a model with the amount of upward economic support received by respondents as the dependent variable, and co-residence status with adult children as the independent variable:

$$Y_{it} = \beta_0 + \gamma_1 R_{it} + \gamma_2 X_{it} + \gamma_3 Z_i + \beta_i + \varepsilon_{it} \quad (3.6)$$

Where Y_{it} is the amount of economic support received by respondents; R_{it} stands for whether respondents co-reside with any adult child; X_{it} represents a set of time-varying variables such as co-residence and marital status; and β_i and ε_{it} are the unobserved time and individual effects

respectively. In order to distinguish the two "error" terms, ε_{it} stands for each individual at each point in time, while β_i only varies across individuals, not over time (Allison, 2009). Having discussed methods used for different types of dependent variables, the next section moves to introduce the lagged effects implemented in this study.

3.5.6 Lagged effects

The above longitudinal approaches are designed to examine the association between variables, and may indicate a potential causal relationship based on the models. However, these models may be challenged with the reverse causality concept (Graham *et al.*, 2015; Liu and Zhang, 2017; Zheng and Zheng, 2017). For instance, let us suppose that the analysis based on Equation 3.4 shows an association between living near an adult child and having intergenerational distant contact. Consequently, this may suggest two possible causal relationships: 1) living near an adult child increases the likelihood of having intergenerational contact by phone/ mail/ email, which reflects the hypothesis that is tested; and 2) the opposite, the contact between respondents and their adult children increases the probability of their living nearby each other.

In order to minimise the potential impact of reverse causality (Liu and Zhang, 2017), this study implements hybrid models with lagged (by 2 years) independent variables in order to examine whether changes in the independent variable between Waves 1 and 2 are associated with changes in the dependent variable between Waves 2 and 4 (Allison, 2009; Croezen *et al.*, 2015). Another reason for implementing a model with lagged effects is based on the descriptive analyses results. For example, Figure 4.6b in Chapter 4 shows that the proportion of respondents having intergenerational weekly distant contact decreased between 2011 and 2013, but increased between 2013 and 2015. Therefore, modelling the association between changes in the co-residence as an independent variable between Waves 1 and 2, and intergenerational distant contact as a dependent variable during the same period may yield different results as compared to the modelling results of the same variables with a lagged effect (changes in the co-residence as an independent variable between Waves 1 and 2, and intergenerational distant contact as a dependent variable between Waves 2 and 4).

In conclusion, lagged models are less susceptible to reverse causality, because they relate current changes in the independent variables to subsequent changes in the dependent variable. The implementation of a lagged hybrid method combining fixed and random effects models adds strength and robustness to the statistical analyses in this study.

3.6 Ethical Considerations

As stated in Section 3.1, the Harmonised CHARLS is a secondary quantitative longitudinal dataset containing a nationally representative sample of Chinese residents aged 45 or over. Because this thesis is based on the secondary quantitative analyses of the Harmonised CHARLS data and does not include the participation of respondents directly, an ethics application form for the use of secondary analysis was submitted to the University of Southampton's Ethics Research and Governance Office at the beginning of this study. The Ethics Committee has approved the Ethics Submission of this research (21st March 2017).

The Harmonised CHARLS data is made public for re-use by the data controller and the data subjects give consent for this (Beaumaster *et al.*, 2018). The data will be used for research purposes only and the answers to the questions will be kept strictly confidential. In addition, it is theoretically impossible to identify individuals from the Harmonised CHARLS data. In order to reduce the risk of identifying respondents aged 100 years old or over, age is dealt with as a categorical variable and this group of the population falls into an age category of 75 or over. Finally, any data used in this study has been stored safely. For the email granting ethical approval from ERGO, please refer to Appendix E. For further details of the ethical considerations, please refer to Appendix F: Ethics Application Form for Secondary Data Analysis.

3.7 Summary

This chapter mainly elaborates the data, sample, variables and methods used in this study, which demonstrates the reliability and credibility of the methodological thinking on addressing the research questions.

As discussed in Section 3.1, the use of secondary quantitative analysis is appropriate for addressing the research aims. To the researcher's knowledge, there is yet no published research in the area of intergenerational support exchange using the Harmonised CHARLS data, which shows the innovation of this study in analysing the latest available data. More importantly, the Harmonised CHARLS survey uses a similar research design and contains processed variables similar to the RAND HRS, ELSA and SHARE (Chien *et al.*, 2017; Beaumaster *et al.*, 2018). It is thus appropriate to make international comparisons based on the research findings from the harmonised surveys and datasets, which are included in the Literature Review and Discussion of this thesis. Further research can make international comparisons based on the analyses of the pooled harmonised CHARLS, ELSA, SHARE and HRS datasets.

Nevertheless, there are limitations in the use of secondary data analysis. First, like all other secondary methods, problems may occur when operationalising variables because researchers can only use information which is available in the datasets. For example, it was impossible to obtain information about the social support provided from older people to their adult children from the CHARLS datasets, and a proxy of grandchild care was employed (e.g. Cheng *et al.*, 2017; Xiao, 2017; Falkingham *et al.*, 2019). The alternative of using a grandchild-care variable is important for this study, as it is a crucial aspect of familial support in contemporary China (Li and Yang, 2017; Falkingham *et al.*, 2019) (see further in Section 3.4). Second, the changes in the flows of intergenerational economic, social and psychological support cannot be examined over a prolonged period, as this study can only obtain the data over a five-year period due to the availability of the CHARLS. This limitation may be addressed by critically engaging with research findings from other representative datasets, such as the China Family Panel Studies (CFPS), CHNS and CLHLS (e.g. Xu *et al*., 2014; Huang *et al.*, 2016; Oliveira, 2016). For example, the CHNS has been collected since 1989 in nine Chinese provinces. Research based on the ten waves of the CHNS survey can add knowledge of intergenerational transfers in China since the 1990s (Huang *et al.*, 2016). Finally, as with all other longitudinal research, this study may suffer from issues of missing data and attrition. Earlier studies from the CHARLS using two waves of data (2011 and 2013) researching on the living arrangement, intergenerational transfers and depressive symptoms of Chinese people clearly demonstrate that there are no systematic patterns in the missing data (Liu, 2015; Cheng *et al.*, 2016; Wang and Chen, 2017). The analysis of the characteristics (such as sex, age and employment status) for all variables and the difference in the loss to follow up shown in Section 3.3 also suggest consistent results, which is less prone to biases in the data analysis.

Having discussed the data and methods used in this study, the next chapter presents the descriptive results based on the repeated cross-sectional and longitudinal analyses, which addresses Research Questions 1 and 2 in this study.

Chapter 4 Results I: Descriptive Analyses Based on the Repeated Cross-Sectional and Longitudinal Samples

Chapter 4 provides the descriptive results of this study. Section 4.1 includes the descriptive analyses based on the repeated cross-sectional Harmonised CHARLS data 2011, 2013 and 2015, and Section 4.2 provides the results based on the longitudinal data, which aim to serve as a fundamental basis for further econometric analyses in Chapters 5 and 6.

4.1 Repeated Cross-Sectional Analyses

This section of analyses is based on the repeated cross-sectional Harmonised CHARLS dataset, with 9,532 respondents in Wave 1, 8,701 respondents in Wave 2, and 8,417 respondents in Wave 4 (see further in Section 3.3.1). Tables 4.1 - 4.4 show the summary statistics for the percentages of respondents providing and receiving intergenerational economic and social support, and the percentages of respondents having weekly contact with their children in 2011, 2013 and 2015. Tables 4.5 - 4.6 provide descriptive results of the characteristics of respondents in the three survey years, while Table 4.7 and Figures 4.1 – 4.3 present an overview of the health status of the respondents in 2011, 2013 and 2015.

4.1.1 Intergenerational support exchange

4.1.1.1 Changes in intergenerational support exchange

Table 4.1 shows a higher proportion of adult children/ grandchildren providing economic transfers to their parents compared to such support provided in the opposite direction (from respondents/ their spouse to their adult children/ grandchildren) in each wave. About 31% of older people received economic support from their children/ grandchildren in 2011, and this percentage increased to 46% in 2013 and 59% in 2015. Such percentages were low compared with the findings from other research, where the receipt of upward economic transfers by older parents was found to be almost universal (98%) (Silverstein *et al.*, 2006). Such a difference may be derived from the different samples in the two studies. The research of Silverstein *et al*. (2006) was based on a survey of 1,561 respondents living in the rural Anhui Province in 2001, while the Harmonised CHARLS is a national dataset containing respondents

in both rural and urban areas. As discussed in Section 2.2.1, the dominant flow of intergenerational economic support in rural areas two decades ago was provided from adult children to their parents (Xie, 2010; Zhang and Sun, 2011). Therefore, this might explain the remarkably higher percentage of upward economic support provision in the research by Silverstein *et al.* (2006).

Table 4.1 Percentages of respondents providing and receiving economic and social support (2011, 2013 & 2015) %

	Wave 1 (n=9,532)		Wave 2 (n=8,701)		Wave 4 (n=8,417)	
Economic Transfers	From children to parents	From parents to children	From children to parents	From parents to children	From children to parents	From parents to children
Yes	30.9	6.0	46.1	15.2	58.7	31.5
No	68.1	93.8	53.8	84.7	41.2	68.4
missing	1.0	0.2	0.1	0.1	0.1	0.1
Social Support						
Yes	3.7	30.2	9.3	35.2	12.5	39.9
No	72.2	32.5	75.5	36.2	79.3	38.7
missing	24.1	37.3	15.2	28.6	8.2	21.4

Note: only respondents who had a valid answer in any support in at least one wave were included.
Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

There was a significant increasing trend in the percentage of downward monetary transfers, which doubled from 6% in 2011 to 15% in 2013, and increased sharply to 32% in 2015. This steep rise may result from the rising number of the 'NEET group' and skip-generation households, and the high economic demand from the younger generations in China (Chen *et al.*, 2011; Korinek *et al.*, 2011) (see also Section 2.2.3). Another explanation is that older people in China are wealthier over time and thus more capable and likely to provide economic support to their adult children (Chen *et al.*, 2005; Liu and Wang, 2014).

Table 4.1 also shows the proportions of older people receiving and providing social support between 2011 and 2015, which is measured by the assistance with (I)ADLs received by the respondents and the grandchild care they provided. The percentage of respondents receiving help with (I)ADLs from their children/ children's spouse/ grandchildren increased gradually from 4% in 2011, to 9% in 2013 and 13% in 2015. The percentages were relatively low due to the following two reasons. First, as shown in Table 4.7, the majority of respondents had a good ADL and IADL functional status, therefore they did not need assistance with their daily activities from the younger generations (see also Section 4.1.3). Second, filters applied to these questions and only respondents who reported a need for help with (I)ADLs were asked of these questions. There was a low item response rate (about 75%) in answering this question in Wave 1, which may result in an under-estimation of the provision of such support from the younger generations. A table showing the percentage of respondents who needed help with

(I)ADLs receiving social support is provided in Appendix G. The proportion of respondents who were in need of assistance with (I)ADL, and received such support from their adult children was 45%, 47% and 50% in 2011, 2013 and 2015 respectively. As the increasing trend of receiving social support using the reduced sample is similar to that using the repeated cross-sectional analytical sample, social support received by older people is analysed based on the repeated cross-sectional analytical sample in this current study in order to guarantee the sample size and reduce complexity.

In 2011, about 30% of the respondents and their partner spent time taking care of their grandchildren, and this percentage slightly increased to 35% in 2013 and 40% in 2015. The proportion of respondents with missing data in answering grandchild caring was particularly high in Wave 1, as acknowledged in Section 3.3.2 (Beaumaster *et al.*, 2018). Because the majority of respondents with missing data had grandchildren under the age of 16, an underestimation was likely to occur regarding the report of grandchild care provision in Wave 1. Previous research has demonstrated that older people who took care of their grandchildren were also more likely to have economic transfers with their adult children in both directions, and their relationships with other family members were closer (Zhang *et al*., 2005; Jiang *et al.*, 2013). The interactions between different types of intergenerational support may need to be considered in research on intergenerational solidarity in China.

In order to further illustrate the level of intergenerational economic support exchange within Chinese families, Table 4.2 below shows the amount of economic transfers between respondents and their adult children in 2011, 2013 and 2015. This analysis is based on the weighted cross-sectional Harmonised CHARLS data and the currency has been converted to 2015 prices.

Table 4.2 Amount of economic transfers between respondents and their adult children (2011, 2013 & 2015) %

Amount of Economic Transfers (%)	**Wave 1 (n=9,532)**		**Wave 2 (n=8,701)**		**Wave 4 (n=8,417)**	
	Provided from (grand)children	Provided to (grand)children	Provided from (grand)children	Provided to (grand)children	Provided from (grand)children	Provided to (grand)children
0-799	6.6	0.9	11.4	4.1	8.2	7.7
800-2499	7.6	1.0	16.5	3.8	17.4	7.5
2500-4999	3.8	0.3	9.3	1.6	12.3	3.3
5000 or more	4.4	1.9	12.6	6.0	22.6	12.9
Missing	77.6	95.9	50.2	84.5	39.5	68.6
Mean	4,682	17,000	4,577	11,301	6,574	13,097

Unit of analysis: RMB. 1GBP= 9.616CNY (2015)
Source: Author's analysis of the CHARLS data, weighted percentage, unweighted sample count.

As can be seen from Table 4.2, the proportion of respondents with missing data in answering the amount of economic exchange is considerably high, although a decline in the missing rate is observed over time. This is mainly because people are reluctant to answer questions involving the amount of wealth, money transfers and income (See also in Section 3.4). In order to achieve accurate estimates, this variable will be avoided to be used as an independent variable in the analysis in Chapter 6 due to the high missing rate, and will only be used to assess the effect of co-residence with adult children on the amount of intergenerational economic transfers in Chapter 5.

As shown in Table 4.2, the amount of intergenerational economic transfers provided by older parents is higher than they received on average. A significantly higher proportion of respondents received 5,000 Yuan or more of upward economic transfers over time, which increased from 4% in 2011, to 13% in 2013 and 23% in 2015. Similarly, the proportion of respondents receiving economic transfers between 2,500 and 4,999 Yuan increased over time, while the percentage of respondents receiving upward economic support of less than 800 Yuan decreased to 8% in 2015. Overall, the amount of upward economic transfers received by older parents has increased from 2011 to 2015, which may be partly associated with the improved economic status of Chinese citizens, and the rising average income and price level over time (Gilroy, 2013; Liu and Wang, 2014).

Similarly, the amount of economic transfers provided from older people to their children increased over time from 2011 to 2015. Compared to 2011, the percentage of downward economic support provision of 5,000 Yuan or more increased over time (from 2% in 2011 to 6% in 2013 and to 13% in 2015). Meanwhile, the percentage of downward economic provision between 2,500 and 4,999 Yuan rose in 2015 (3%) compared to 2013 (2%) and 2011 (1%). Notably, the average amount of economic support provided from older people to their adult children was about two to four times compared to such amount provided from adult children to their older parents. This confirmed with the literature review which suggested that older people tended to support their adult children with purchasing a house/ flat/ car, which led to the higher amount of downward economic support provision (see more in Section 2.2.1). Having discussed the overall changes in the intergenerational economic and social support exchange within Chinese families, Table 4.3 illustrates the percentage of respondents having weekly in-person and distant contact with adult children in 2011, 2013 and 2015.

Table 4.3 Percentages of respondents having weekly contact with their adult children (2011, 2013 & 2015) %

	Wave 1 (n=9,532)		Wave 2 (n=8,701)		Wave 4 (n=8,417)	
Percentages	In-person	By phone/mail	In-person	By phone/mail	In-person	By phone/mail
Yes	67.3	24.4	57.4	22.4	55.0	23.7
No	32.6	53.2	40.4	48.5	42.8	53.4
missing	0.1	22.4	2.2	29.1	2.2	22.9

Note: only respondents who had a valid answer in any support in at least one wave were included.
Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

As shown in Table 4.3, about two out of three respondents (67%) had in-person weekly contact with their adult children in 2011, and this percentage dropped to 57% in 2013 and 55% in 2015. A potential explanation may be the increasing geographical distance between respondents and their adult children across the three survey waves, which has been documented elsewhere in the literature (Ao *et al.*, 2016; Connelly and Maurer-Fazio, 2016) (see also Sections 1.2 and 2.3.3). The percentage of respondents having weekly distant contact (by phone/ mail/ email) with their children was lowest in 2013 (22%), when the percentage was about 24% in 2011 and 2015 respectively. The change in the proportion of having intergenerational contact by phone/mail/email seemed inconsistent, which requires further analysis based on longitudinal data (see Section 4.2.1).

Table 4.4 shows the proportion of older people having intergenerational economic, social and psychological support with their adult children/ grandchildren by their Hukou status, and presents the average amount of economic support provided bi-directionally. A higher proportion of older people in rural areas reported the receipt of economic support from their adult children compared to their urban counterparts, which increased from 35% in 2011, to 54% in 2013 and 65% in 2015 (compared to 19% in 2011, 36% in 2013 and 44% in 2015). By contrast, a higher proportion of older people in urban areas provided economic support to their adult children/ grandchildren compared to those lived in rural areas (urban: 10% in 2011, 22% in 2013 and 45% in 2015 compared to rural: 5% in 2011, 14% in 2013 and 28% in 2015). The proportion of older people providing economic support to their children/ grandchildren in both urban and rural areas of China increased over time.

Table 4.4 Percentages of respondents having intergenerational support, by Hukou status (2011, 2013 & 2015) %

Intergenerational support	Urban areas of China			Rural areas of China		
	Wave 1 (n=2,143) %/ Mean	**Wave 2 (n=1,816)** %/ Mean	**Wave 4 (n=1,307)** %/ Mean	**Wave 1 (n=7,314)** %/ Mean	**Wave 2 (n=6,766)** %/ Mean	**Wave 4 (n=5,839)** %/ Mean
Economic support from adult children	18.5	36.3	43.8	34.9	53.6	64.6
Economic support to adult children	9.6	21.5	44.9	5.0	13.9	28.1
Social support from adult children	3.3	5.9	7.2	5.3	10.9	14.3
Grandchild care to grandchildren	49.4	53.1	53.3	47.8	48.8	49.9
Weekly in-person contact	57.7	56.6	54.2	58.1	52.7	53.1
Weekly distant contact	68.3	64.9	68.0	63.6	60.5	61.5
Amount of economic support from adult children (Yuan)	7,584	7,029	8,669	4,930	4,088	6,102
Amount of economic support to adult children (Yuan)	30,367	13,431	20,577	12,906	10,432	10,615

Note: only respondents who had a valid answer in any support in at least one wave were included.
Unit of analysis: RMB. 1GBP= 9.616CNY (2015)
Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

However, although a higher proportion of older people in rural areas received economic support from their adult children, the average amount of their economic support receipt was lower compared to their urban counterparts (4,930 Yuan in 2011, 4,088 Yuan in 2013 and 6,102 Yuan in 2015 compared to urban: 7,584 Yuan in 2011, 7,029 Yuan in 2013 and 8,669 Yuan in 2015). Meanwhile, the average economic support provision by older people was higher in urban areas compared to rural areas. In addition, as shown in Table 4.4, compared to older people in urban areas, older people in rural areas had a higher probability of receiving social support from, and having weekly contact with, their adult children. Older people in urban areas were more likely to provide grandchild care and to have weekly distant contact with their adult children compared to their rural counterparts.

4.1.1.2 Summary of the results

Overall, analyses regarding the intergenerational transfers within Chinese families show that economic support provision from adult children/ grandchildren to their parents was the dominant flow of economic transfers in China. There was an increasing trend in such provision across the three waves, which does not support Hypothesis 1 (the proportion of adult children providing economic support to their older parents decreases over time) raised in Section 2.5. Meanwhile, the percentage of older people providing economic support to their adult children/ grandchildren increased between 2011 and 2015. This confirms Hypothesis 2 in Section 2.5 that older people were increasingly more likely to provide economic support to their adult children/ grandchildren in contemporary China (see also Section 2.2.1). The amount

of economic transfers from or to their adult children/ grandchildren also increased over time. Both the percentage of respondents receiving social support from their children and older people providing such support to their grandchildren rose from 2011 to 2015. This is in contrast with Hypothesis 3 (the proportion of adult children providing social support to their older parents decreases over time), but confirms Hypothesis 4 that older people were more likely to provide grandchild care in recent years, although the increasing trend was negligible. The results also suggest that the proportion of older people having intergenerational in-person contact decreased in 2013 and 2015, which supports Hypothesis 5. Nevertheless, the results do not support Hypothesis 6 by showing unclear changes in having distant contact with adult children across the three waves.

In addition, the results have demonstrated urban and rural differences in the exchange of intergenerational support in China. Older people in rural areas had a higher likelihood of receiving economic support from their adult children, however the amount of such economic support receipt was lower compared to their urban counterparts. By contrast, older people in urban areas were more likely to provide economic support to their adult children, and the amount of such economic transfers was higher compared to their rural counterparts. Both older people in urban and rural areas of China were more likely to have economic support exchange with their adult children over time between 2011 and 2015. Moreover, significant disparity between urban and rural areas exists in the provision and receipt of social support and weekly contact, which demonstrates the need to research intergenerational support by region, and to reduce the urban-rural gap in China. This will be further examined in Chapters 5 and 6, and comprehensively discussed in Section 7.3.3.

4.1.2 Characteristics of respondents

The descriptive results examining the characteristics of respondents have been provided earlier in Table 3.4. Table 4.5 shows the descriptive analysis of the characteristics of respondents by Hukou status in all three waves based on the repeated cross-sectional data. The analytical samples for rural areas were 7,323; 6,770 and 6,043 in Waves 1, 2 and 4 respectively, and for urban areas they were 2,152; 1,817 and 1,734 respectively.

Table 4.5 Descriptive analysis of the characteristics of respondents, by Hukou status (2011, 2013 & 2015)

Characteristics of respondents	Rural areas of China			Urban areas of China		
	Wave 1 (n=7,323)	Wave 2 (n=6,770)	Wave 4 (n=6,043)	Wave 1 (n=2,152)	Wave 2 (n=1,817)	Wave 4 (n=1,734)
	%/ Mean	%/ Mean	%/ Mean	%/ Mean	%/ Mean	%/ Mean
Age	63.2	64.8	66.6	63.9	65.8	67.3
45-59	41.3	34.4	27.2	41.0	30.6	24.7
60-74	40.2	44.8	49.5	39.9	45.0	47.9
75 or over	18.5	20.8	23.3	19.1	24.4	27.4
missing	0	0		0	0	0
Gender						
Male	47.5	47.8	49.7	48.5	48.4	50.6
Female	52.5	52.2	50.3	51.5	51.6	49.4
missing	0	0	0	0	0	0
Education Level						
Less than lower secondary	94.3	94.4	94.1	62.4	63.1	64.2
Upper secondary & vocational training	5.3	5.6	5.7	26.2	32.8	26.9
Tertiary	0.3	0.0	0.2	11.3	4.0	8.7
missing	0.1	0	<0.1	0.1	0.1	0.2
Marital Status						
Married/partnered	75.3	73.2	72.1	78.6	75.3	76.5
Divorced/separated	2.0	1.2	0.9	4.8	4.4	2.6
Widowed	22.4	23.5	25.1	16.5	19.8	20.4
Never married	0.3	2.1	1.9	0.1	0.4	0.5
missing	0	<0.1	0	0	0.1	0
Work Status						
Did not work last year	32.3	34.3	37.9	64.8	62.8	69.0
Worked last year	10.6	10.0	11.0	27.6	27.0	21.4
missing	57.1	55.7	51.1	7.6	10.2	9.6
Live with at least one adult child						
No	33.4	45.1	48.7	39.8	49.3	57.3
Yes	66.6	54.9	51.3	60.2	50.7	42.7
missing	0	0	0	0	0	0
Live nearby with at least one adult child						
No	29.0	13.1	15.2	40.2	13.0	16.5
Yes	71.0	86.9	84.8	59.8	87.0	83.5
missing	0	0	0	0	0	0

Note: only respondents who had a valid answer to intergenerational support in at least one wave were included.
Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

The average age of the respondents in rural areas was slightly lower than that in urban areas at all three waves. There were slightly more female (about 52%) than male respondents (about 48%) in the rural and urban sample at Waves 1 and 2, and slightly more male respondents than female respondents in urban areas at Wave 4. On average, older people in urban areas had achieved a higher education attainment compared to their rural counterparts. For example, the majority of respondents in rural areas had received less than lower secondary education (about 94%), while such proportion accounted for nearly two-thirds of urban respondents. Furthermore, almost all the respondents who received tertiary education were residing in urban areas. Over 70% of respondents were married or partnered in each of the three waves with a slightly higher proportion among older people in urban areas compared to their rural counterparts. The percentage of respondents who did not currently work was about 60-70% at

all survey years for urban respondents and about 30-40% for those in rural areas; however, the proportion of respondents with missing values in this variable was quite high for respondents from rural areas (over 50%). Finally, older people in rural areas were more likely to co-reside or live near their adult children compared to their urban counterparts. Overall, clear differences in the characteristics of rural and urban respondents have been observed from the CHARLS sample, and significant differences have also been found in terms of intergenerational support exchange in China (as shown in Table 4.4). Analysis with regard to intergenerational support exchange in China should acknowledge and address such differences where possible (see Sections 5.4 and 6.4).

Certain demographic variables such as gender, Hukou status and education level are significantly associated with the age of older people, therefore the descriptive analysis of these variables by age were conducted and the results are displayed in Table 4.6. Table 4.6 shows that there were more female respondents aged 75 or over than male respondents at all three waves, which might result from the female advantage in the life expectancy in China (Zeng and Vaupel, 2003). Interestingly, there were more male respondents aged 60-74 compared to female respondents at all three waves. This may be associated with the fact that people aged 60-74 were those who have retired and were more likely to be available when being interviewed, therefore male respondents would participate in the CHARLS survey due to the dominant patriarchal culture in China. The cross-tabulation of Hukou status and age group suggests that across all three waves, respondents were more likely to have agricultural Hukou in all the age groups. Respondents in the higher age groups were more likely to have non-agricultural Hukou, and less likely to have agricultural Hukou across three survey years, which may suggest a positive association between age and Hukou status of respondents. Looking at the educational level of respondents by age, people aged over 75 had the highest rate of low educational attainment. As the education level of older people has a strong association with their employment (before retirement), income levels and the provision/ receipt of intergenerational support (Guo, Chi and Silverstein, 2009), further analyses should take into consideration cohort effects (Sorkin and Katzel, 2010).

Table 4.6 Characteristics of respondents by age (2011, 2013 & 2015) %

Variables	Wave 1 (n=9,532)			Wave 2 (n=8,701)			Wave 4 (n=8,417)		
Age group	45-59	60-74	75 or over	45-59	60-74	75 or over	45-59	60-74	75 or over
Gender		***			***			***	
Male	43.4	53.7	45.7	39.6	54.4	48.1	42.1	56.1	49.1
Female	56.6	46.3	54.3	60.4	45.6	51.9	57.9	43.9	50.9
Total	100	100	100	100	100	100	100	100	100
	(3,835)	(4,129)	(1,563)	(2,883)	(4,150)	(1,662)	(2,343)	(4,267)	(1,807)
Hukou of		***			**			***	
Respondent	78.1	76.4	75.0	79.7	78.0	75.2	77.7	76.1	72.5
Agricultural	21.4	22.9	24.6	19.2	21.0	23.9	20.1	21.0	24.9
Non-Agricultural	0.5	0.7	0.4	1.1	1.0	0.9	2.2	2.9	2.6
Others	100	100	100	100	100	100	100	100	100
Total	(3,835)	(4,131)	(1,563)	(2,879)	(4,143)	(1,657)	(2,343)	(4,265)	(1,963)
Educational Level		***			***			***	
Less than lower	79.5	91.5	94.5	79.3	91.0	93.4	81.0	89.8	94.5
secondary	17.1	6.6	3.3	19.9	8.4	5.5	16.4	8.6	4.8
Upper secondary	3.4	1.9	2.2	0.8	0.6	1.1	2.6	1.6	1.7
Tertiary	100	100	100	100	100	100	100	100	100
Total	(3,835)	(4,131)	(1,560)	(2,886)	(4,153)	(1,661)	(2,343)	(4,265)	(1,963)

Note: ***p<0.001; weighted percentage, unweighted sample count.
Source: Author's analysis of the CHARLS data.

4.1.3 Health status of respondents

Table 4.7 shows the health status of respondents based on the analyses of the cross-sectional Harmonised CHARLS 2011, 2013 and 2015. Over all three waves, a higher percentage of respondents aged 45-59 reported good self-rated health compared to those aged 60 or over. A lower percentage of people aged 45-59 reported good self-rated health in 2013 and 2015 than in 2011. Meanwhile, a higher percentage of people aged 60 or over reported good self-rated health in 2011 and 2013 than in 2015. Overall, the chronic disease prevalence rate increased from 2011 to 2015 for respondents across all age groups. In addition, the older age group people belonged to, the more likely they were to report two or more chronic illnesses.

Table 4.7 also shows the percentages of respondents having difficulties with ADLs and IADLs by age. It is apparent that reporting difficulties with ADLs and IADLs is significantly associated with age. The older people were, the more likely they were to report severe functional impairment in terms of ADLs and IADLs. The respondents' ADL functional status slightly deteriorated in 2015, with the lowest percentages of respondents in all three age groups (87%, 76% and 62%) reporting full ADL functional status this year. Results in terms of the IADL functional status showed a similar trend. A considerable majority of respondents reported full IADL functional status across all three waves for people aged 45-59, which was 87% in 2011, 88% in 2013 and 85% in 2015; while more than three quarters of people aged 60-74 reported full IADL functional status with a slight decrease in 2015 (from 78% to 76%); and finally 57% of respondents aged 75 or over reported full IADL functional status in 2011, with 61% in 2013, and 57% in 2015. Table 4.7 also illustrates that respondents in all three age groups reported

higher life satisfaction in 2013 and 2015 compared to 2011, and the percentage of respondents with high life satisfaction almost doubled in 2015. The results reflect the overall health status of older Chinese people between 2011 and 2015, however these do not necessarily present the pattern of health changes among older people as the samples in the three waves were not exactly same people (see further elaborations in Section 3.5.1). The changes in the health condition of the respondents deserve further investigation based on longitudinal analyses, the results of which are provided in Section 4.2.3.

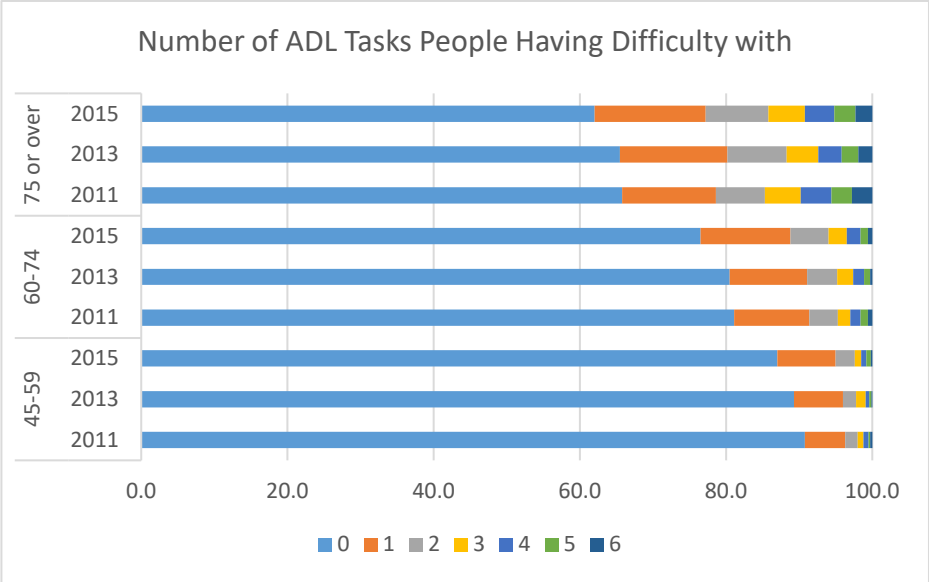
Table 4.7 Health and Activities of Daily Living of respondents by age (2011, 2013 & 2015) %

Variables	Wave 1 (n=9,532)			Wave 2 (n=8,701)			Wave 4 (n=8,417)		
	45-59	60-74	75 or over	45-59	60-74	75 or over	45-59	60-74	75 or over
Self-rated Health		***			***			***	
Good	29.7	21.0	22.3	25.3	21.2	24.3	24.8	18.8	19.8
Fair	49.5	46.3	41.3	50.3	50.7	44.6	49.0	50.1	44.8
Poor	20.8	32.7	36.4	24.4	28.1	31.1	26.2	31.1	35.4
Total	100	100	100	100	100	100	100	100	100
	(1,938)	(1,962)	(819)	(1,409)	(2,055)	(817)	(1,146)	(2,080)	(811)
Chronic disease		***			***			***	
None	38.2	26.9	26.3	30.5	21.8	19.4	23.3	14.1	11.1
One	30.1	28.8	28.9	29.7	27.5	27.3	28.2	22.4	21.2
Two or more	31.7	44.3	44.8	39.8	50.7	53.3	48.5	63.5	67.7
Total	100	100	100	100	100	100	100	100	100
	(3,836)	(4,132)	(1,564)	(2,693)	(4,147)	(1,658)	(2,181)	(4,259)	(1,803)
ADLs		***			***			***	
Severe impairment	1.2	2.9	9.8	0.9	2.6	7.4	1.5	3.4	9.1
Moderate impairment	8.0	15.9	24.4	9.8	17.0	27.1	11.5	20.1	28.8
Full function	90.8	81.2	65.8	89.3	80.4	65.5	87.0	76.5	62.1
Total	100	100	100	100	100	100	100	100	100
	(3,836)	(4,132)	(1,564)	(2,879)	(4,141)	(1,657)	(2,338)	(4,260)	(1,806)
IADLs		***			***			***	
Severe impairment	2.3	6.7	21.4	2.0	3.9	14.1	3.2	6.6	17.3
Moderate impairment	10.5	15.1	21.8	10.5	16.8	25.3	12.2	17.7	26.0
Full function	87.2	78.2	56.8	87.5	79.3	60.6	84.6	75.7	56.7
Total	100	100	100	100	100	100	100	100	100
	(3,836)	(4,132)	(1,564)	(2,879)	(4,141)	(1, 657)	(2,338)	(4,260)	(1,806)
Life satisfaction		***			***			***	
Good	18.8	23.0	27.4	20.6	24.0	33.1	39.3	38.4	45.7
Fair	62.2	62.3	60.4	62.2	62.4	56.1	49.9	52.4	46.1
Poor	19.0	14.7	12.2	17.2	13.6	10.8	10.8	9.2	8.2
Total	100	100	100	100	100	100	100	100	100
	(3,478)	(3,710)	(1,139)	(2,779)	(4,021)	(1,349)	(2,286)	(4,164)	(1,563)

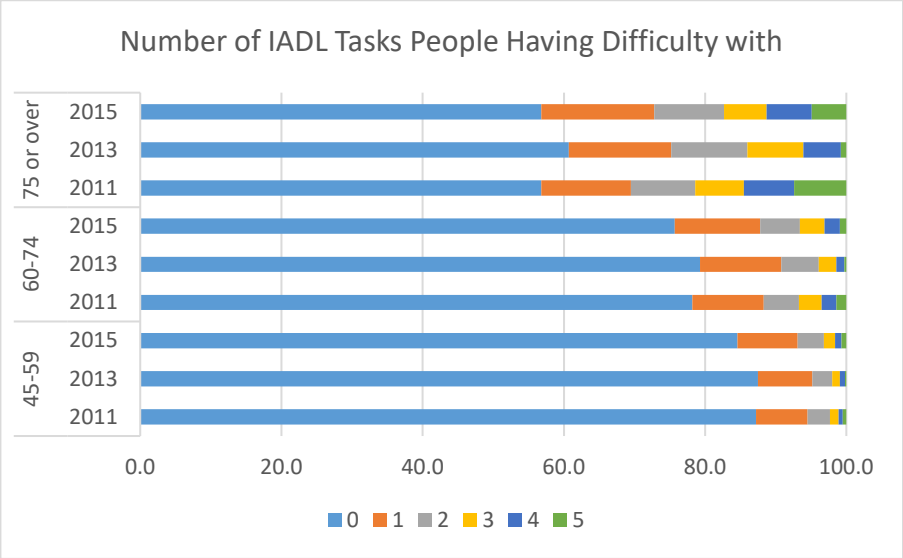
Note: ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living. Significance level: ***, showing that the age group of respondents and their health status were significantly different at p<0.001 based on the Chi-squared test.
Source: Author's analysis of the CHARLS data, weighted percentage, unweighted sample count.

Figures 4.1 and 4.2 present the number of ADL and IADL tasks respondents having difficulty with by age groups. In general, compared with the world average, the majority of Chinese older people had relatively good ADL and IADL functional status across all three waves (Wu *et al*., 2017; Zeng *et al.*, 2017; Zhou *et al.*, 2018). Over 85% of respondents aged between 45 and 59 did not have difficulties with any ADL tasks, and the proportion was almost 80% for respondents aged 60-74 and over 60% for those aged 75 or over. More than 85% of

respondents aged between 45 and 59 did not have difficulties with any IADL tasks, and the proportion was 75-80% for respondents aged 60-74 and 56-61% for those aged 75 or over.



Note: ADL: Activities of Daily Living.
Source: authors' own analysis based on the CHARLS data.
Figure 4.1 Distribution of the number of ADL tasks people having difficulty with (2011, 2013 & 2015)



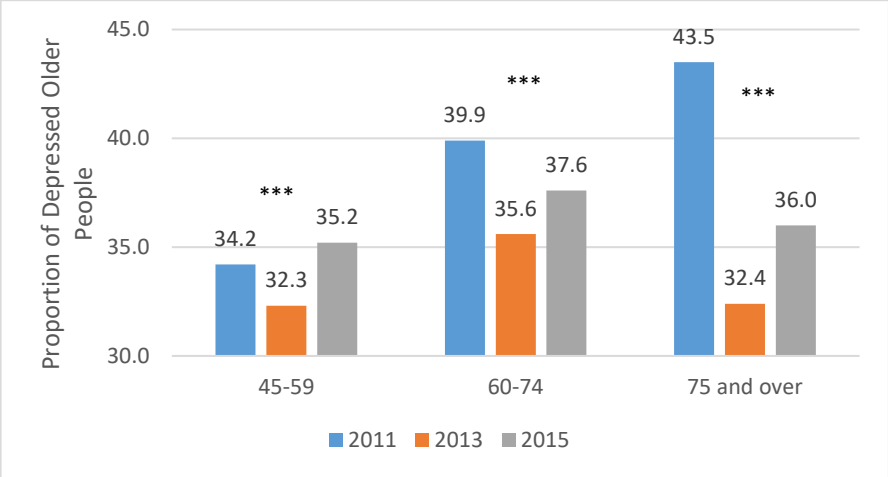
Note: IADL: Instrumental Activities of Daily Living.
Source: Authors' own analysis based on the CHARLS data.
Figure 4.2 Distribution of the number of IADL tasks people having difficulty with (2011, 2013 & 2015)

Figures 4.1 and 4.2 also show that the older people were, the more likely they were to encounter difficulties with ADLs and IADLs, and the associations between (I)ADL functional

status and age were highly significant (χ^2, p<0.001). The proportion of respondents aged 75 or over having difficulties with (I)ADLs was three times that among respondents aged 45-59, and two times that among those aged 60-74.

As suggested by previous research, the health status of respondents showed a strong association with the exchange of intergenerational transfers (e.g. Guo, Aranda and Silverstein, 2009; Xie, 2010). For example, poor functionality with ADLs may increase the need for care, and result in a rise in the receipt of economic transfers and informal care provided by adult children (e.g. McGarry and Schoeni, 1995; Lee and Xiao, 1998; Xie, 2010). Receiving and providing intergenerational support can also benefit the psychological health of older people (e.g. Chen and Silverstein, 2000; Cong and Silverstein, 2008; Guo, Aranda and Silverstein, 2009). Therefore, this study aims to investigate the health status of the respondents across waves with a longitudinal approach (in Section 4.2.3), and examine the association between the changes in intergenerational transfers and older people's health condition (see further in Chapter 6).

Figure 4.3 provides the information on the depression status of respondents in 2011, 2013 and 2015. At all three survey years, respondents were more likely to report depressive symptoms with increasing age, except for people aged 75 or over in 2013 and 2015. Typically, respondents in all three age groups were least likely to report being depressed in 2013. It is unclear whether there was an improvement in the mental health status among Chinese older people with the cross-sectional analysis, which requires evidence based on the longitudinal analysis (See Section 4.2.3).



Note: ***: cross-tabulations between depression status and age groups of respondents, p<0.001.
Source: Authors' own analysis based on the CHARLS data.

Figure 4.3 Percentages of respondents reporting depressive symptoms (2011, 2013 & 2015)

Previous literature has shown mixed results of the association between age and the prevalence of depression (Beekman *et al.*, 1999; Magnil *et al.*, 2008; Djukanović *et al.*, 2015). A meta-analysis of the published literature by Zhao *et al*. (2012) asserted that old age was an important risk factor for depression in the population aged below 80 years old, but not for the oldest population. The remarkable decline in the percentage of depressed respondents aged 75 or over in 2013 and 2015 compared to 2011 may result from a gender effect. For example, a longitudinal study based on the CHARLS data found a lower percentage of female respondents having mild depression in both 2011 (43%) and 2013 (45%) compared to their male counterparts, and a higher percentage of female respondents had severe depression in both 2011 (54%) and 2013 (59%) (Ni *et al.*, 2017). In general, respondents were less likely to be depressed in 2013 compared to 2011 in all three age groups, while the changes in reporting depressive symptoms in 2015 were not consistent for the three age groups of respondents. Further analyses need to explore the changes in the depression status of older people based on the longitudinal data (see Section 4.2.3).

In summary, the overall self-reported health status of respondents improved between 2011 and 2015. It is important to explore the exchange of intergenerational support and its influence on the changes in individuals' self-reported health status, which will be implemented in Chapter 6. In addition, the percentage of respondents reporting full functional ADL and IADL functional status has decreased over time across the three waves. Respondents were more satisfied with life in 2013 and 2015 compared to 2011, and the percentage of people who had a high life satisfaction was particularly high in 2015 (over 38%). It is unclear whether there was an improvement in the depression status of Chinese older people, which needs further evidence based on longitudinal analyses (see Section 4.2).

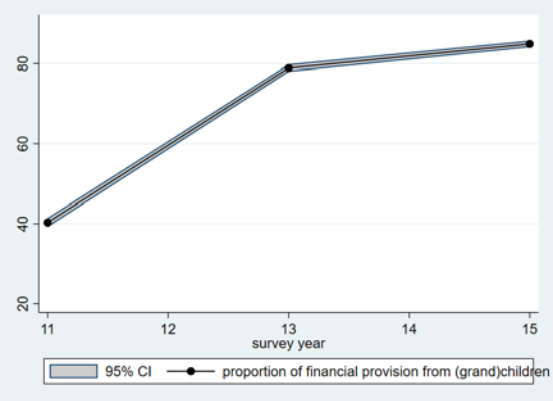
4.2 Longitudinal Analyses

The purpose of this section is to provide results based on the longitudinal analyses, which examine changes in the intergenerational support exchange, characteristics and health status of respondents at an individual level and serve as a fundamental basis for further econometric analysis addressing Research Questions 3 and 4 in Chapters 5 and 6. As discussed in Section 3.3.2, the longitudinal sample includes 7,277 respondents who had a valid answer in all types of intergeneration support at all three survey years.

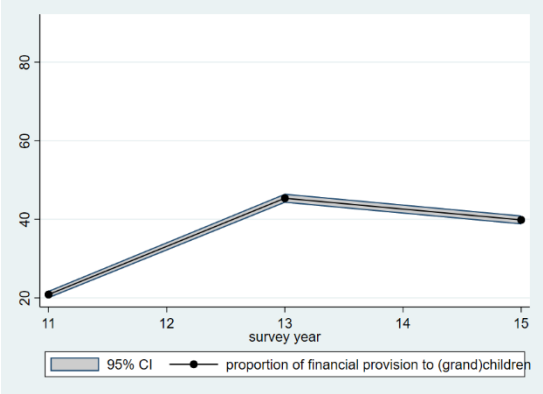
4.2.1 Intergenerational support exchange

4.2.1.1 Changes in intergenerational support exchanges

Figures 4.4a & 4.4b display the mean and 95% Confidence Interval (CI) of the percentages of the older parents reporting upward and downward intergenerational economic transfers in 2011, 2013 and 2015. About 40% of respondents or their partner received economic support from their adult children in 2011, and this percentage increased to 80% in 2013 and 85% in 2015. Meanwhile, about 20% of respondents or their partner provided economic support to their children or grandchildren in 2011, which increased to 45% in 2013 and slightly decreased to 40% in 2015. In summary, there was a higher likelihood for older people to have upward and downward economic transfers with their adult children/ grandchildren as time passed. However, older people were less likely to provide economic support to their adult children in 2015 compared to 2013.



(4.4a)



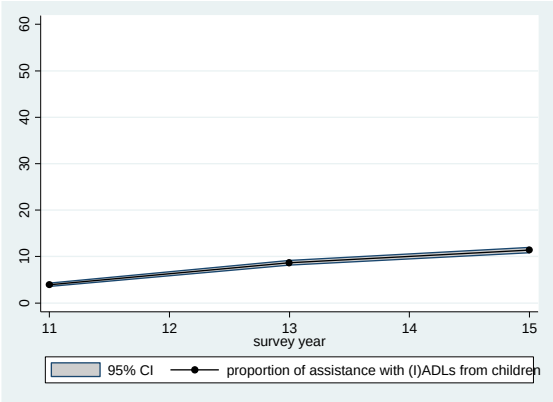
(4.4b)

Source: Author's analysis of the longitudinal CHARLS data 2011, 2013 and 2015.

Figure 4.4a & 4.4b Percentages of respondents receiving or providing economic support by year

Compared to the statistics based on the repeated cross-sectional sample (see Table 4.1), a higher proportion of respondents received/ provided economic support from/ to their adult children based on the longitudinal sample. This is because that people were two years older in the successive year with a longitudinal sample, which had a positive association with the exchange of intergenerational economic transfers (see further discussion about repeated cross-sectional and longitudinal approaches in Section 3.5). Similar differences can be found in the flows of the provision in social support and weekly contact between repeated cross-sectional and longitudinal samples.

Figures 4.5a and 4.5b show the mean and 95% CI of the percentages of older parents receiving and providing social support between 2011 and 2015 respectively. About 4% of respondents received support with ADLs or IADLs from their children in 2011, which doubled to 9% in 2013 and increased to 11% in 2015. One possible explanation for the rising trend is that the older people were, the more likely they were to be in need of support with ADLs and IADLs, and thus more likely to receive such assistance. Meanwhile, about half of the older parents provided grandchild care at each of the three waves, with a slight increase across the three survey years.



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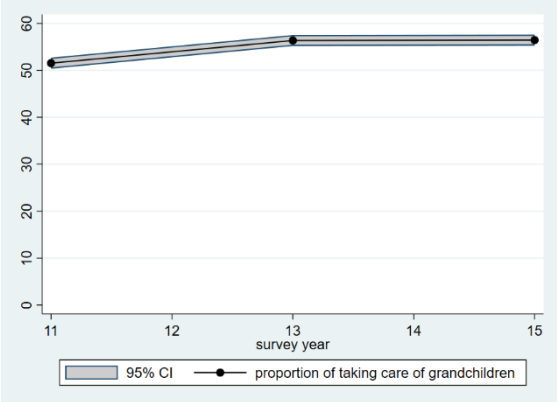
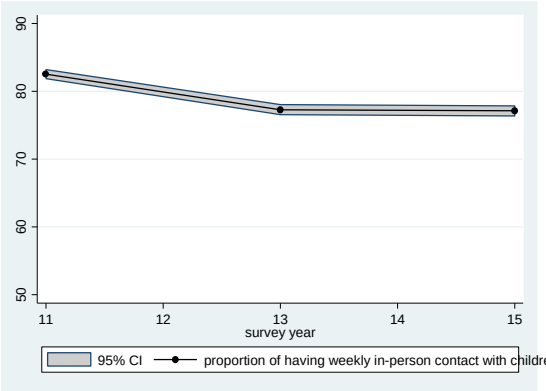


(4.5b)

Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.5a & 4.5b Percentages of respondents receiving or providing social support by year

Figures 4.6a & 4.6b show the mean and 95% CI of the percentages of respondents having weekly in-person and distant contact with their adult children in 2011, 2013 and 2015. About four-fifths (82%) of respondents had weekly in-person contact with their children in 2011, which declined to 77% in 2013 and 2015. Meanwhile, more than half of respondents (57%) had weekly distant contact with their adult children in 2011, which decreased to 52% in 2013, yet slightly increased to 54% in 2015. In summary, respondents were less likely to have weekly intergenerational in-person contact from 2011 to 2015, less likely to have weekly intergenerational distant contact from 2011 to 2013, but more likely to do so from 2013 to 2015. The inconsistent changes in the weekly distant contact with children between 2011 and 2015 are further discussed in Section 7.2.1.



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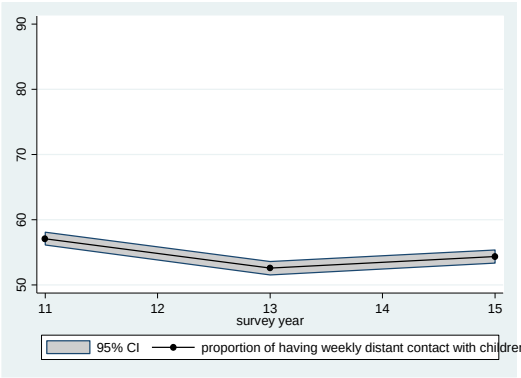
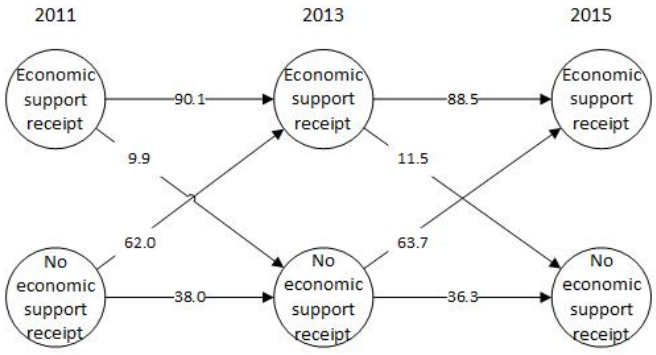


(4.6b)

Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.6a & 4.6b Percentages of respondents having weekly contact with children by year

Figures 4.7-4.12 show the overtime transition probabilities in different types of intergenerational support exchange. Figure 4.7 provides the transition matrices of the intergenerational economic support received by older parents, which showed a similar trend from 2011 to 2013 and from 2013 to 2015. About 62% of older parents who did not receive economic support from children/ grandchildren in 2011 received such support in 2013, and about 64% of those who did not receive economic support from children/ grandchildren in 2013 had such experience in 2015. In addition, about 90% of older parents who received economic transfers from children/ grandchildren in 2011 also received such support in 2013, which slightly decreased to 89% between 2013 and 2015. Overall, older people were increasingly more likely to receive economic transfers from their adult children/ grandchildren from 2011 to 2015.

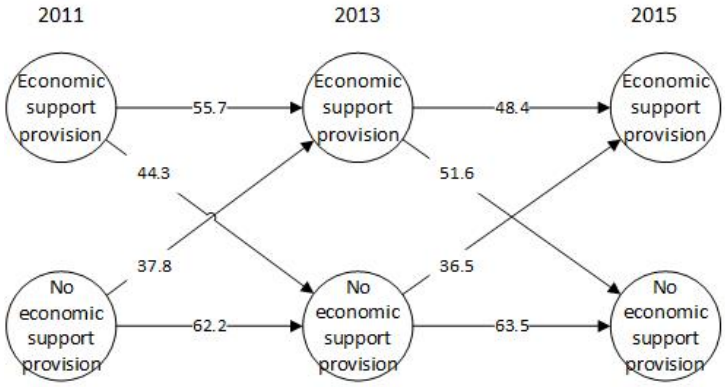


Source: Author's analysis of the Harmonised CHARLS data.

Figure 4.7 Intergenerational economic transfers from (grand)children (%, the CHARLS 2011-15)

As shown in Figure 4.8, a higher percentage of older parents provided economic support to their children/ grandchildren in 2015 compared to 2013. Among older parents who did not

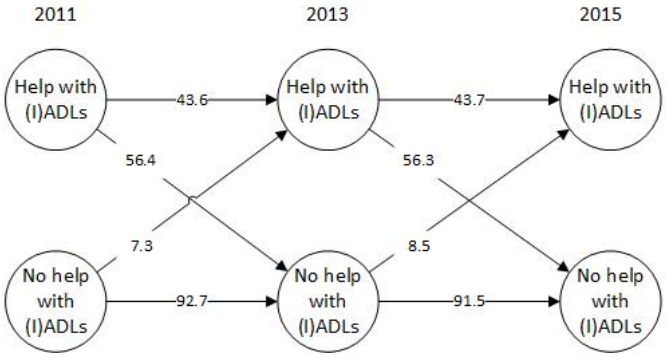
provide economic transfers to their adult children/ grandchildren in 2011, 38% did so in 2013; which slightly decreased between 2013 and 2015. In addition, about 56% of older parents who provided economic support to their children/ grandchildren in 2011 also did so in 2013, while almost half of the older parents who provided such support to their children/ grandchildren in 2013 did so in 2015. In summary, there was a higher likelihood of older parents providing economic support to their children in 2015 compared to 2011 and 2013.



Source: Author's analysis of the Harmonised CHARLS data.

Figure 4.8 Intergenerational economic transfers to (grand)children (%, the CHARLS 2011-15)

Figure 4.9 shows that the share of respondents receiving support with ADLs or IADLs from their adult children increased over time. About 7% of respondents who did not receive such support from their adult children in 2011 had such experience in 2013, and about 9% of respondents who did not receive such support from their children in 2013 received this in 2015. In addition, about 44% of respondents who received support with ADLs or IADLs from their adult children in 2011 also received such support in 2013, and this proportion remained similar between 2013 and 2015.

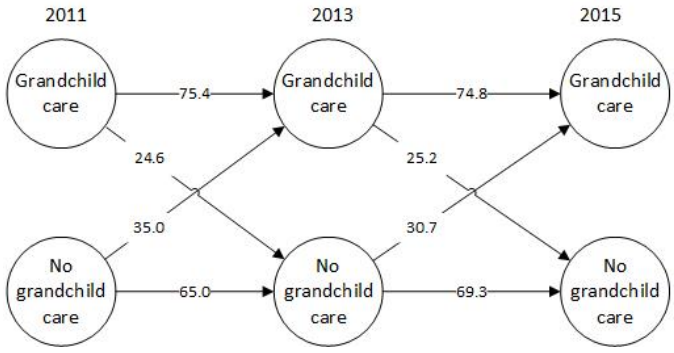


Source: Author's analysis of the Harmonised CHARLS data.

Figure 4.9 Intergenerational social support from adult children (%, the CHARLS 2011-15)

As shown in Figure 4.10, among older parents who did not provide grandchild care in 2011, 35% did so in 2013; and among those who did not look after their grandchildren in 2013, about

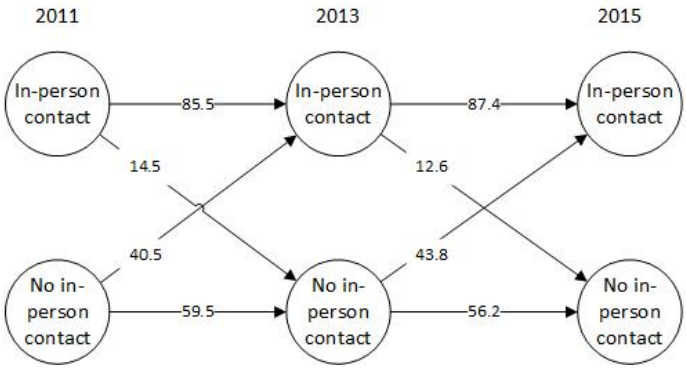
31% did so in 2015. In addition, about three-quarters of older parents who provided grandchild care in 2011 also did so in 2013, whereas the equivalent percentage between 2013 and 2015 was similar. As the analysis was based on the longitudinal CHARLS dataset, older people were less likely to change from not providing grandchild care to providing such care between 2013 and 2015 compared to between 2011 and 2013, probably because respondents were older in the following waves.



Source: Author's analysis of the Harmonised CHARLS data.

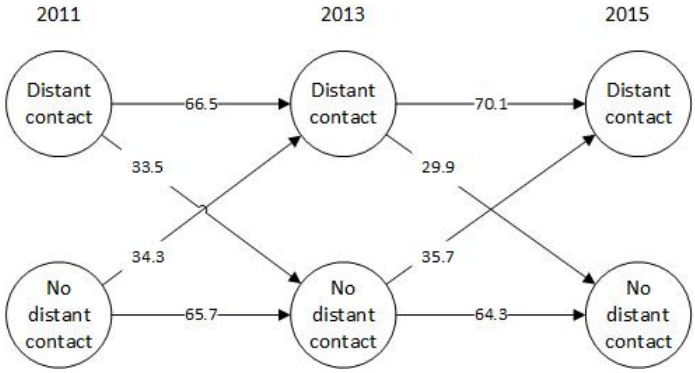
Figure 4.10 Intergenerational social support to grandchildren (%, the CHARLS 2011-15)

Figures 4.11 & 4.12 illustrate that the share of respondents having weekly contact with their adult children increased over time. About 40% of respondents had no weekly in-person contact with their adult children in 2011, but had such contact in 2013. The equivalent percentage was about 43% between 2013 and 2015. By contrast, about 15% of respondents had weekly intergenerational in-person contact in 2011, but did not have such contact in 2013. Such percentage decreased to 13% from 2013 to 2015. About one-third of respondents (34%) had no weekly distant contact with their adult children in 2011, yet had such contact in 2013, and about 36% of respondents had no such contact in 2013 but did so in 2015. About 66% of respondents who had weekly distant contact with their children in 2011 also had such contact in 2013, and such percentage was about 70% between 2013 and 2015.



Source: Author's analysis of the Harmonised CHARLS data.

Figure 4.11 Weekly contact with adult children in person (%, the CHARLS 2011-15)



Source: Author's analysis of the Harmonised CHARLS data.

Figure 4.12 Weekly Contact with adult children by phone/ mail/ email (%, the CHARLS 2011-15)

Table 4.8 presents the transition patterns of intergenerational support over the three survey years.

Table 4.8 Transition patterns of intergenerational transfers

Pattern	N Number (N=7,277)	Percentage (%)	N Number (N=7,277)	Percentage (%)
	Transition patterns for receiving economic support from (grand)children		Transition patterns for providing economic support to (grand)children	
000	441	6.1	2,257	31.0
111	2,487	34.2	479	6.6
100	49	0.7	383	5.3
010	417	5.7	1,373	18.9
001	837	11.5	1,039	14.3
101	207	2.8	294	4.0
011	2,648	36.4	1,090	15.0
110	191	2.6	362	5.0
	Transition patterns for receiving support with (I)ADLs from adult children		Transition patterns for providing grandchild care	
000	5,985	82.4	1,663	22.9
111	45	0.6	2,233	30.7
100	116	1.6	484	6.7
010	349	4.8	436	6.0
001	536	7.4	592	8.1
101	45	0.6	440	6.0
011	162	2.2	839	11.5
110	26	0.4	590	8.1
	Transition patterns for having weekly in-person contact		Transition patterns for having weekly distant contact	
000	520	7.1	1,579	21.7
111	4,466	61.4	2,208	27.6
100	439	6.0	728	10.0
010	187	2.6	495	6.8
001	286	3.9	589	8.1
101	514	7.1	626	8.6
011	391	5.4	604	8.3
110	474	6.5	648	8.9

Note: a code of 1 indicates support and a code of 0 indicates no support; respondents who did not have children or grandchildren were not included in the transition analysis.
Source: Author's analysis of the Harmonised CHARLS data.

The first transition patterns described over time economic transfers provided from adult children/ grandchildren to their parents. As can be seen in the table, the highest proportion of transition pattern was older people who did not receive economic transfers from their adult

children/ grandchildren in 2011, but received this in 2013 and 2015 (36%). Almost 40% of older parents did not experience changes in the status of receiving economic transfers from their adult children/ grandchildren, with about 6% not receiving economic transfers from their children/ grandchildren at all three waves, and about 34% receiving economic support at all three waves. This suggests that the economic transfers received by respondents were not very stable over time (in a study based on the HRS 1998-2002, 90% of respondents did not experience changes in the receipt of monetary support over three survey years) (Sheng and Killian, 2009). Older parents who received economic support from their adult children/ grandchildren in 2015, but not in 2011 or 2013 accounted for 12% of all the transition patterns. Overall, among older parents who experienced changes in the status of receiving economic support from their adult children/ grandchildren, there was a higher proportion of older parents transiting from not receiving to receiving, rather than the opposite.

In regard to the economic transfers provided from older parents to their adult children/ grandchildren, stability characterized about 38% of cases, with 31% of older parents not providing economic transfers at all three waves, and 7% doing so at all the waves. About 40% of older parents provided economic transfers to their adult children/ grandchildren at a single time point (i.e., '100', '010', or '001'). Specifically, about 14% of older parents did not provide economic support to their adult children/ grandchildren in 2011 or 2013, but did so in 2015; and about 19% of older parents provided downward economic support in 2013, but not in 2011 or 2015. In other words, most parents (69%) had the experience of providing economic support to their adult children/ grandchildren at least in one survey year, and among older parents who provided downward economic support, a substantive proportion experienced the transition from non-provision to provision.

The majority of respondents (82%) did not receive help with (I)ADLs from adult children at any wave, which suggested the low provision of such support (see further discussion in Section 4.1). However, there was a relatively high likelihood for respondents experiencing change from not receiving support with (I)ADLs in 2011 to receiving such support in the successive survey years (about 7% for '001', 5% for '010' and 2% for '011') compared to the transition from receiving such support in 2011 but not so in 2013 or 2015 (no more than 2% each for '100', '101' and '110').

In terms of the provision of grandchild care, stability characterised about more than half of cases (54%). Specifically, nearly one-third of older parents took care of their grandchildren at all three waves, and about 23% of older parents did not take care of their grandchildren in any

of the survey years. In addition, about 12% of older parents experienced a transition from not providing grandchild care in 2011 to providing such support in 2013 and 2015. About 8% of older parents did not take care of their grandchildren in 2011 or 2013, but did so in 2015. Overall, for older parents who experienced changes in grandchild caring status, a higher proportion experienced changes from being a non-carer to being a carer compared to the opposite.

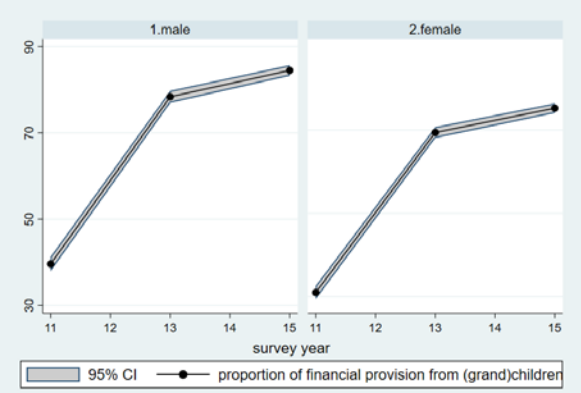
A substantial proportion of respondents (61%) had weekly in-person contact with their adult children at all three survey years. Such high proportion was because all respondents co-residing with their adult children were assumed to have mutual weekly contact in person (see further in Section 4.1). More than 15% of respondents had weekly in-person contact with their adult children but reported not having such contact in the successive years (7% for '110', 6% for '100' and 3% for '010'), which showed some loss of intergenerational in-person contact. This may result from the increasing living distances between generations (see also Section 2.3).

Compared with weekly in-person contact, a higher proportion of respondents experienced changes in having weekly distant contact with their adult children. Specifically, almost half of respondents did not experience changes in this, with 28% of respondents having weekly contact by phone/ mail/ email with their non-co-resident adult children at all three waves. Another half of respondents experienced changes in having weekly distant contact, and the proportions seemed relatively even for each transition pattern. The transition patterns for having intergenerational weekly distant contact was not as stable as having weekly in-person contact, which requires further investigation in Chapter 5. The next section explores the changes in intergenerational support by gender between 2011 and 2015.

4.2.1.2 Changes in intergenerational support by gender

Previous literature has indicated gender differences in the provision and receipt of intergenerational support (see Chapter 2), for example, women were more likely to be a recipient rather than provider in terms of intergenerational economic transfers compared to men (Cong and Silverstein, 2011). Figure 4.13 shows an increasing trend in the percentages of respondents receiving economic transfers from their adult children/ grandchildren over time by gender. Almost 40% of male respondents received economic support from their children/ grandchildren in 2011, which increased to 78% in 2013 and 85% in 2015. Meanwhile, about 30% of female respondents received economic support from their adult children/ grandchildren in 2011, and this percentage increased to 70% in 2013 and 75% in 2015. Male

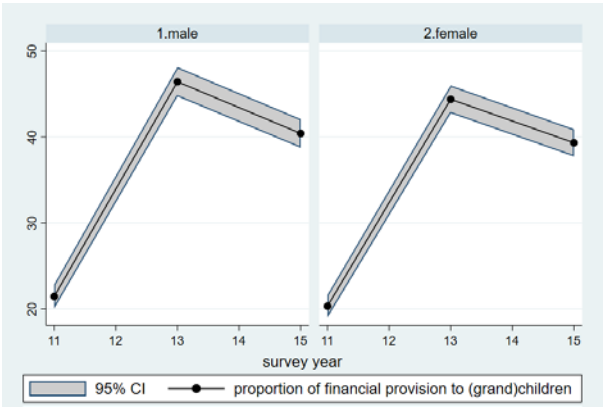
respondents were slightly more likely to receive economic support from their adult children/ grandchildren compared to their female counterparts across all three waves (10% higher).



Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.13 Mean and 95% Confidence Interval of the percentages of older people receiving economic support by year and gender

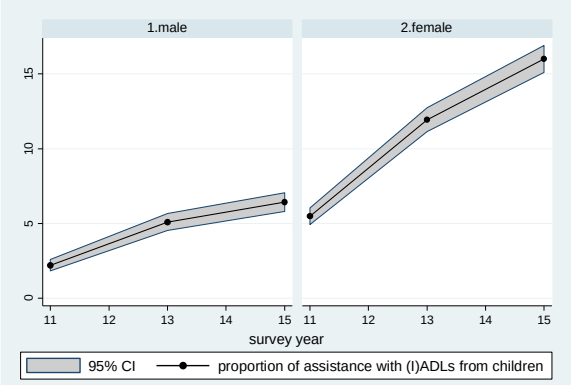
Figure 4.14 shows an increasing trend in the percentage of respondents providing economic transfers to their children/ grandchildren from 2011 to 2013 by gender, and a decreasing trend of such provision between 2013 and 2015. About 22% of male respondents provided economic support to their children/ grandchildren in 2011, which rose to 47% in 2013 and decreased to 40% in 2015. Meanwhile, about 20% of female respondents provided economic support to their children/ grandchildren in 2011, and this percentage increased sharply to 44% in 2013 and decreased to less than 40% in 2015. Male respondents were slightly more likely to provide economic transfers to their children/ grandchildren compared to their female counterparts across all three waves. For example, 22% of male respondents provided economic support to their children/ grandchildren in 2011, compared to 20% of female respondents.



Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.14 Mean and 95% Confidence Interval of the percentages of older people providing economic support by year and gender

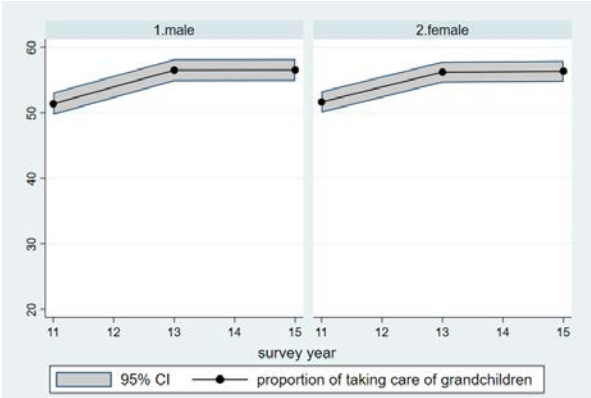
Figure 4.15 shows an increasing trend in the percentage of respondents receiving support with ADLs and IADLs from their adult children over time by gender. Almost 3% of male respondents received such support in 2011, and this percentage increased to 5% in 2013 and 6% in 2015. Meanwhile, about 5% of female respondents received such support from their children in 2011, which increased to 12% in 2013 and 16% in 2015. A higher percentage of female respondents received support with ADLs and IADLs from their children compared to their male counterparts across all three waves. For example, about 3% of male respondents compared to 5% of female respondents received support with ADLs or IADLs in 2011; the difference was more remarkable in 2015, with 6% of male respondents compared to 16% of female respondents receiving support with ADLs or IADLs from their adult children.



Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.15 Mean and 95% Confidence Interval of the percentages of older people receiving social support by year and gender

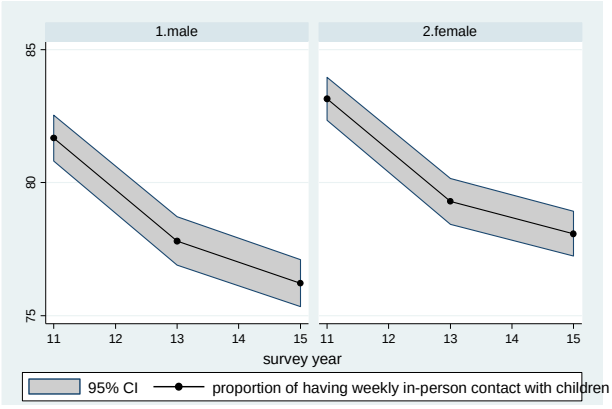
Figure 4.16 shows the changing percentage of respondents taking care of grandchildren from 2011 to 2015 by gender. About half (51%) of male respondents provided grandchild care in 2011, which slightly increased to 56% in 2013 and 2015. Similarly, female respondents were more likely to take care of grandchildren across the three waves, with an increase in the proportion from about 52% in 2011 to 56% in 2013 and 2015. A slightly higher proportion of female respondents compared to male respondents provided grandchild care in 2011, however men were as likely to do so as their female counterparts in 2013 and 2015.



Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.16 Mean and 95% Confidence Interval of the percentages of older people providing grandchild care by year and gender

Figure 4.17 shows a decreasing trend in the percentage of respondents having weekly in-person contact with their adult children over time by gender. A majority of male respondents (82%) had weekly in-person contact with their children in 2011, and such percentage decreased to 77% in 2013 and 76% in 2015. Meanwhile, about 83% of female respondents had weekly in-person contact with their children in 2011, which decreased to 79% in 2013 and 78% in 2015. The proportion of female respondents having weekly in-person contact with their adult children was slightly higher than male respondents in each of the waves (about 83% for women compared to 82% for men in 2011; 79% for women compared to 77% for men in 2013; and 78% for women compared to 76% for men in 2015). In summary, both male and female respondents were less likely to have such contact with their adult children as time passed.

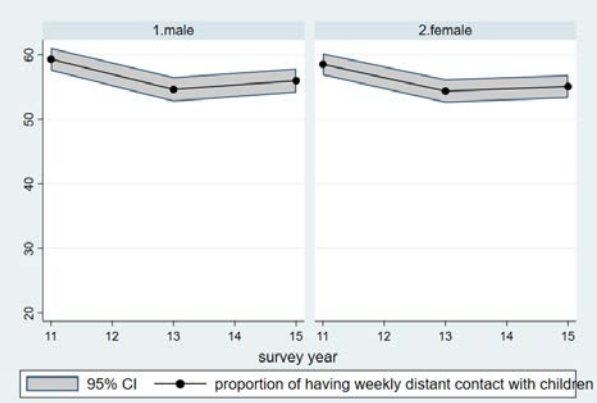


Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.17 Mean and 95% Confidence Interval of the percentages of older people having weekly in-person contact with children by year and gender

Figure 4.18 shows a decreasing trend in the percentage of respondents having weekly distant contact with their adult children from 2011 to 2013, and an increasing trend in such

percentages from 2013 to 2015 for both male and female respondents. More than half of male respondents (58%) had weekly distant contact with a non-co-resident child in 2011, which declined to 53% in 2013 but increased to 55% in 2015. Meanwhile, about 57% of female respondents had weekly distant contact with their non-co-resident children in 2011, which dropped to 52% in 2013, but rose to 54% in 2015. Men were slightly more likely to have weekly distant contact with their non-co-resident adult children compared to women at all waves.

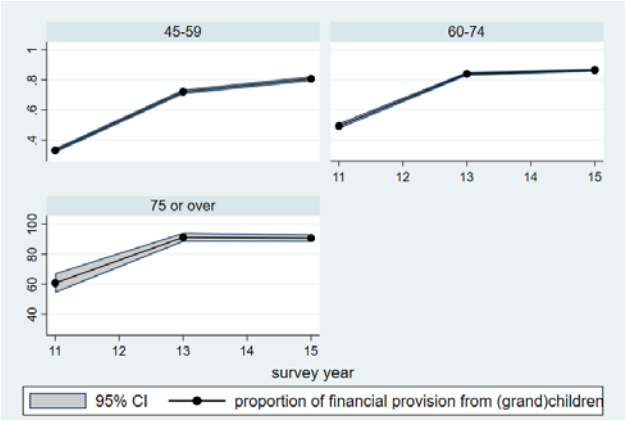


Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.18 Mean and 95% Confidence Interval of the percentages of older people having weekly distant contact with non-co-resident children by year and gender

4.2.1.3 Changes in intergenerational support by age group

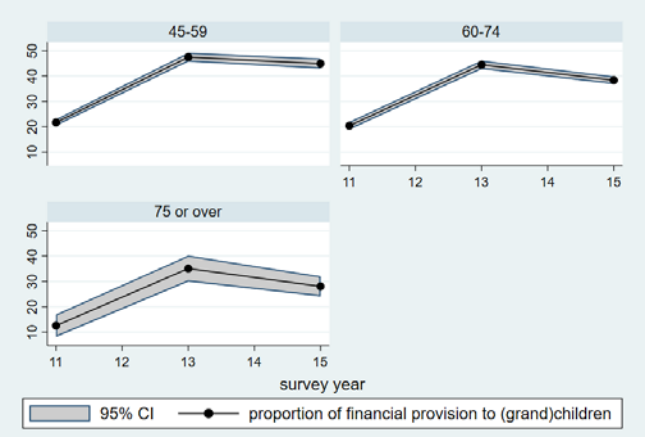
Figure 4.19 shows an increasing trend in the percentage of older people, by age group, receiving economic transfers from adult children/ grandchildren over time. About one-third of older people (30%) aged 45-59 in 2011 received upward economic support in 2011, which increased to 70% in 2013 and 80% in 2015. About 50% of older people aged 60-74 received upward economic support in 2011, which increased to 82% in 2013 and 86% in 2015. Meanwhile, more than 60% of older people aged 75 or over received upward economic support provided in 2011, which increased to 90% in 2013 and 2015. In summary, older people in all the age groups were more likely to receive economic support from their children/ grandchildren as they aged, however the growth rate slowed down for those in the higher age groups.



Note: Age group measured at baseline.
Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.19 Mean and 95% Confidence Interval of the percentages of receiving economic support provided by children by year and age group

Figure 4.20 shows that the proportion of older people in different age groups providing economic support to their adult children/ grandchildren rose from 2011 to 2013, but declined in 2015 compared to 2013. About 20% of older people aged 45-59 provided economic support to their children/ grandchildren in 2011, which increased to 48% in 2013 and decreased to 45% in 2015. About 20% of older people aged 60-74 provided economic support to their children in 2011, which doubled to 45% in 2013 and declined to 39% in 2015. Meanwhile, about 12% of older people aged 75 or over provided economic support to their children in 2011, which increased to 35% in 2013 and declined to 28% in 2015.

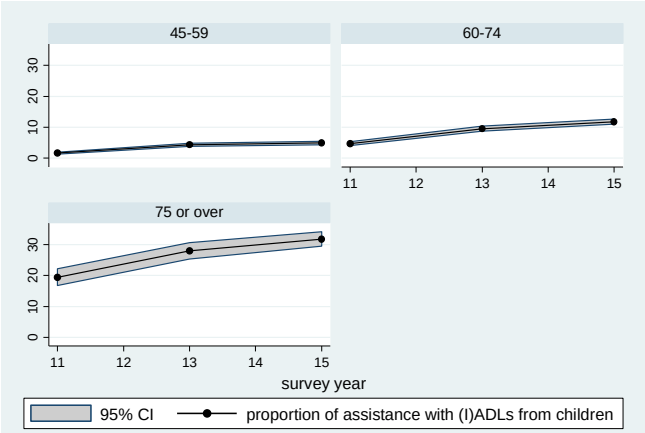


Note: Age group measured at baseline.
Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.20 Mean and 95% Confidence Interval of the percentages of providing economic support to children by year and age group

Figure 4.21 shows an increasing trend in the percentage of receiving support with ADLs or IADLs provided by children over time by age group. About 2% of respondents aged 45-59

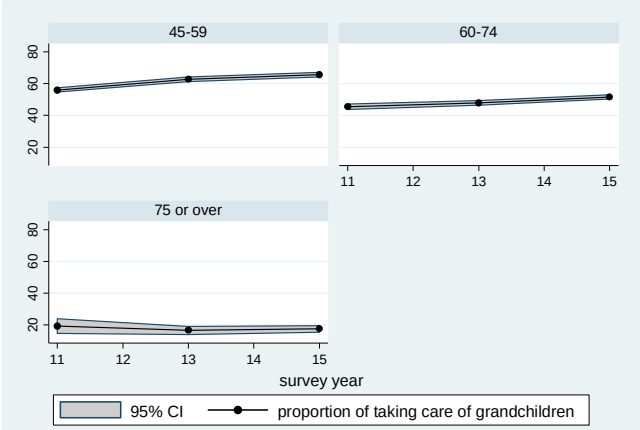
received support with ADLs or IADLs from their children in 2011, which increased to 4% in 2013 and 5% in 2015. About 5% of respondents aged 60-74 received such support from their children in 2011, which increased to 10% in 2013 and 12% in 2015. Meanwhile, about 20% of respondents aged 75 or over received support with ADLs or IADLs from their children in 2011, which increased to 28% in 2013 and 32% in 2015. In summary, respondents in all three age groups were more likely to receive support with ADLs or IADLs from their children as they aged; and people in the older age groups (60 or over) were remarkably more likely to receive such support from their adult children.



Note: Age group measured at baseline.
Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.21 Mean and 95% Confidence Interval of the percentages of receiving social support from children by year and age group

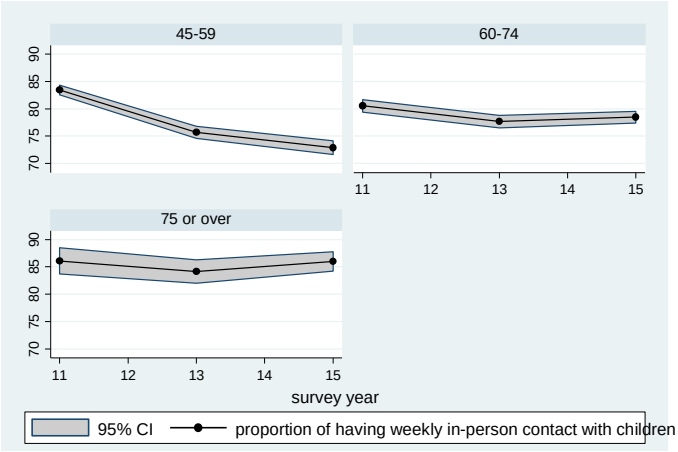
Figure 4.22 shows an increasing trend in the percentage of older people taking care of grandchildren over time by age group. More than half of the respondents (58%) aged 45-59 provided grandchild care in 2011, which increased to 60% in 2013 and 62% in 2015. About half of respondents aged 60-74 took care of grandchildren in 2011, which increased to 52% in 2013 and 56% in 2015. Meanwhile, about 20% of respondents aged 75 or over provided grandchild care in 2011, and this decreased to 15% in 2013 and 2015. In summary, less than 20% of people aged 75 or over took care of their grandchildren, which was significantly lower than among people aged 45-74 (40%-60%). In addition, respondents in the youngest age group (45-59) were more likely to provide grandchild care as they aged, while such trend for respondents in the older age groups (60 or over) slowed down. This may be associated with the health status, well-being and socioeconomic status of respondents in different age groups. For example, it was found that people who were older were less likely to provide grandchild care, and that older people who had a higher educational attainment were more likely to provide such care (Chen *et al.*, 2011).



Note: Age group measured at baseline.
Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.22 Mean and 95% Confidence Interval of the percentages of taking care of grandchildren by year and age group

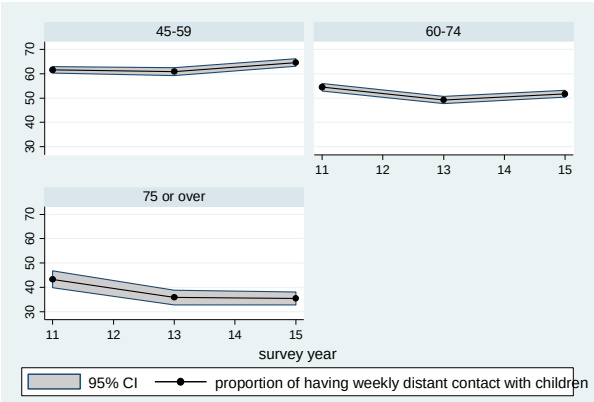
Figure 4.23 shows an overall decreasing trend in the percentage of respondents having weekly intergenerational in-person contact between 2011 and 2015 by age group. The vast majority of respondents aged 45-59 in 2011 (84%) had weekly in-person contact with their adult children in 2011, which decreased to 76% in 2013 and 73% in 2015. About 80% of respondents aged 60-74 had weekly in-person contact with their children in 2011, which decreased to 78% in 2013 and levelled in 2015. Meanwhile, the proportion of respondents aged 75 or over who had weekly in-person contact with their children was about 86% in 2011, which decreased to 85% in 2013 and slightly increased to 86% in 2015. Overall, respondents in all three age groups were less likely to have weekly in-person contact with their adult children as they aged; and people aged 60-74 were the least likely to have such contact with children compared to those in the other age groups.



Note: Age group measured at baseline. Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.23 Mean and 95% Confidence Interval of the percentages of having weekly in-person contact with children by year and age group

Figure 4.24 shows a mixed trend in the percentage of respondents having weekly distant contact with their adult children over time by age group. Respondents in the younger age group were more likely to have weekly distant contact with their children. About 62% of respondents aged 45-59 had weekly distant contact with their children in 2011, which decreased to 60% in 2013 and rose to 64% in 2015. The percentages of respondents aged 60-74 who had weekly distant contact with their adult children were about 55% in 2011, 48% in 2013 and 52% in 2015; and such percentages among respondents aged 75 or over were 42% in 2011, 35% in 2013 and 2015. Respondents in all three age groups were less likely to have weekly distant contact with their adult children between 2011 and 2013, and slightly more likely to do so between 2013 and 2015.



Note: Age group measured at baseline. Source: Author's analysis of the longitudinal CHARLS data.

Figure 4.24 Mean and 95% Confidence Interval of the percentages of having weekly distant contact with children by year and age group

4.2.1.4 Summary of the results

Results in Section 4.2.1 show that there was a higher likelihood of intergenerational economic and social support provided in both directions as time passed. Interestingly, the percentage of respondents reporting weekly in-person contact with their children fell from 2011 to 2015, whilst the likelihood of having weekly distant contact with their children fell from 2011 to 2013, but rose from 2013 to 2015. This trend was consistent with the results found in the repeated cross-sectional data. This may suggest a longitudinal or lagged effect of having weekly intergenerational distant contact, as a different trend in this variable starts to show over a longer time period. In addition, there were significant gender and age differences in the provision and receipt of the intergenerational economic, social and psychological support, which should be taken into consideration in further analyses. The next section moves on to explore the changes in the characteristics of respondents, which is helpful for including these variables in further analysis.

4.2.2 Characteristics of respondents

Table 4.9 shows the changes in the percentage of respondents co-residing with their adult children from 2011 to 2015.

Table 4.9 Cross-wave co-residence trajectory variable (2011, 2013 & 2015)

Co-residence transition variable	**Co-reside with a child at Wave n**			**% among all respondents**
	Wave 1 (2011)	**Wave 2** (2013)	**Wave 4** (2015)	
No change	-	-	-	55.7
Co-residence with a child at all waves	1	1	1	31.5
Non-co-residence with a child at all waves	0	0	0	24.2
Non-co-residence at W3 only	1	1	0	8.9
Non-co-residence at W2 only	1	0	1	7.6
Non-co-residence at W2 & W3	1	0	0	10.3
Co-residence at W3 only	0	0	1	8.3
Co-residence at W2 only	0	1	0	3.3
Co-residence at W2 & W3	0	1	1	6.0
Total				100

Source: Author's analysis of the longitudinal CHARLS data; 1: yes; 0: no.

More than half of respondents (56%) had the same co-residence status with their children across all three waves. About one-quarter of respondents co-resided with at least a child in 2011, but did not live together with a child in either 2013 or 2015. The share of respondents co-residing with at least a child in 2011 and 2015, but not in 2013 was 8%. About 18% of respondents did not co-reside with a child in 2011, but did so in either 2013 or 2015. In summary, among respondents who experienced changes in the co-residence with their children, a higher percentage saw a shift from co-residence to non-co-residence. In addition, the variation in the co-residence status with their adult children is sufficient enough to explore the association between the changes in co-residence and intergenerational support exchange with the fixed effects models (Allison, 2009) (see also Section 3.5.2).

Table 4.10 shows the changes in the percentage of respondents living near their adult children from 2011 to 2015. About 82% of respondents lived near at least one child across all three waves, and 3% of respondents did not have a child living nearby at any wave. Approximately 15% of respondents experienced a change in this variable in at least one survey year. The second-highest percentage of the group in Table 4.10 (5%) was older people who had a child living nearby in 2011 and 2013, but did not have a child living nearby in 2015. About 2% of respondents had children living nearby in 2011, but not in 2013 or 2015, and the same percentage of respondents did not have a child living nearby in 2011, but did so in 2013 or 2015.

Table 4.10 Cross-wave living distance trajectory variable (2011, 2013 & 2015)

Living distance transition variable	**The living distance at Wave n**			**% among all respondents**
	Wave 1 (2011)	**Wave 2** (2013)	**Wave 4** (2015)	
No transition	-	-	-	84.9
Living near at all waves	1	1	1	82.3
Not living near at all waves	0	0	0	2.6
Not living near at W3 only	1	1	0	4.9
Not living near at W2 only	1	0	1	3.0
Not living near at W2 & W3	1	0	0	2.4
Living near at W3 only	0	0	1	1.7
Living near at W2 only	0	1	0	0.7
Living near at W2 & W3	0	1	1	2.4
Total				100

Source: Author's analysis of the longitudinal CHARLS data; 1: yes; 0: no.

Table 4.11 shows the change in the Hukou status of respondents between 2011 and 2015. The majority of respondents (95%) had the same Hukou status across the three waves. The percentage of respondents having a non-agricultural Hukou in 2011 and changing to an agricultural Hukou status in 2013 was 0.5%. About 1% of respondents had an agricultural Hukou in 2011 and changed to a non-agricultural Hukou status in 2013, while more than 3% of respondents who had an agricultural Hukou in 2011 and 2013, changed to a non-agricultural Hukou status in 2015.

Table 4.11 Cross-wave Hukou trajectory variable (2011, 2013 & 2015)

Hukou status transition variable	**Hukou status at Wave n**			**% among all respondents**
	Wave 1 (2011)	**Wave 2** (2013)	**Wave 4** (2015)	
No transition	-	-	-	95.4
Non-agricultural at all waves	1	1	1	11.6
Agricultural at all waves	0	0	0	83.8
Agricultural at W2 & W3	1	0	0	0.5
Non-agricultural at W3 only	0	0	1	3.1
Non-agricultural at W2 & W3	0	1	1	1.0
Total				100

Source: Author's analysis of the longitudinal CHARLS data; 1: Non-agricultural; 0: Agricultural.

Overall, Section 4.2.2 shows that a considerable proportion of respondents (27%) experienced a change from co-residence to non-co-residence with their adult children, which is useful for examining the impact of children's out-migration upon intergenerational economic and social support exchanges. Whether respondents having a child living nearby is considered as an important variable for examining the living arrangement with one's adult children and its association with intergenerational contact. The Hukou status of respondents did not see much changes between 2011 and 2015, thus is included as a time-invariant variable in further analysis.

4.2.3 Health status of respondents

This section shows the self-rated health status, chronic illnesses, difficulties with (I)ADLs, life satisfaction and depression status of respondents between 2011 and 2015 and how these changed over time, based on the analyses of the longitudinal CHARLS data (Tables 4.12 and 4.13). In addition, Table 4.14 focuses on comparing the health status of respondents in rural and urban areas.

Table 4.12 presents the proportion of respondents in different health status between 2011 and 2015 by age. Older people were more likely to report poor health with the increase in age, and older people in the higher age groups were more likely to have poorer health status compared to those in the lower age groups, which is similar to what has been demonstrated based on the repeated cross-sectional sample (see further in Section 4.1.3). Interestingly, the longitudinal sample reported poorer physical health (chronic illness and difficulties with (I)ADLs) compared to the cross-sectional sample. For example, the proportion of people aged 45-59 having two or more chronic illnesses increased from 38% in 2011 to 58% in 2015 based on the longitudinal sample, while the equivalent percentages were 32% and 49% respectively based on the repeated cross-sectional sample. By contrast, the longitudinal sample had better self-reported and psychological health (higher life satisfaction and lower depressive symptoms) compared to the cross-sectional sample. Specifically, a lower proportion of longitudinal sample reported poor self-rated health, life satisfaction and depressive symptoms compared to the cross-sectional sample, in the majority of age groups and survey years.

Table 4.12 Health and Activities of Daily Living of respondents by age (2011, 2013 & 2015) %

Variables	Wave 1 (n=7,277)			Wave 2 (n=7,277)			Wave 4 (n=7,277)		
	45-59	60-74	75 or over	45-59	60-74	75 or over	45-59	60-74	75 or over
Self-rated Health		***			***			***	
Good	28.1	22.5	24.7	23.7	21.6	24.4	23.4	20.3	21.9
Fair	48.7	47.8	43.4	55.1	53.6	53.6	55.2	52.6	49.2
Poor	23.2	29.7	31.9	21.2	24.8	22.0	21.4	27.1	28.9
Total	100	100	100	100	100	100	100	100	100
	(2,976)	(2,086)	(166)	(4,074)	(2,778)	(209)	(4,069)	(2,708)	(187)
Chronic disease		***			***			***	
None	32.2	23.8	23.2	26.9	20.2	19.2	17.4	11.4	9.4
One	30.2	28.9	29.5	29.6	27.0	27.7	25.1	22.1	22.8
Two or more	37.6	47.3	47.3	43.5	52.8	53.1	57.5	66.5	67.9
Total	100	100	100	100	100	100	100	100	100
	(4,188)	(2,865)	(224)	(4,188)	(2,865)	(224)	(4,188)	(2,865)	(224)
ADLs		***			***			***	
Severe impairment	1.7	3.3	6.7	1.4	3.7	5.4	2.4	5.6	9.8
Moderate impairment	10.5	17.4	27.5	12.3	18.3	29.0	15.9	23.4	29.9
Full function	87.8	79.3	65.8	86.3	78.0	65.6	81.7	71.0	60.3
Total	100	100	100	100	100	100	100	100	100
	(4,141)	(2,844)	(222)	(4,167)	(2,861)	(224)	(4,175)	(2,864)	(224)
IADLs		***			***			***	
Severe impairment	4.1	7.4	16.9	3.0	7.3	17.0	4.8	9.1	17.9
Moderate impairment	12.9	17.5	22.8	15.2	23.5	33.0	17.6	24.6	33.5
Full function	83.0	75.1	60.3	81.8	69.2	50.0	77.6	66.3	48.6
Total	100	100	100	100	100	100	100	100	100
	(4,188)	(2,865)	(224)	(4,182)	(2,861)	(224)	(4,187)	(2,865)	(224)
Life satisfaction		***			***			***	
Good	22.1	23.1	31.3	24.1	26.6	35.3	43.2	42.7	45.7
Fair	62.5	61.9	55.8	62.3	61.8	56.7	48.9	49.8	47.4
Poor	15.4	15.0	12.9	13.6	11.6	8.0	7.9	7.5	6.9
Total	100	100	100	100	100	100	100	100	100
	(3,561)	(2,468)	(163)	(3,918)	(2,677)	(187)	(4,042)	(2,731)	(175)
Depression 10		***			***			***	
Yes	31.9	37.4	41.0	28.2	29.0	24.9	29.8	34.1	27.9
No	68.1	62.6	59.0	71.8	71.0	75.1	70.2	65.9	72.1
Total	100	100	100	100	100	100	100	100	100
	(3,912)	(2,717)	(205)	(3,941)	(2,698)	(193)	(4,062)	(2,758)	(183)

Note: ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living. Significance level: ***, showing that the age group of respondents and their health status were significantly different at p<0.001 based on the Chi-squared test.
Source: Author's analysis of the longitudinal CHARLS data.

Table 4.13 presents the changes in the health status of respondents between 2011 and 2015 by age. As chronic diseases are not curable and it was impossible for respondents to have fewer types of chronic diseases in the latter waves (Lynn and Adamson, 2003), the changes in the chronic disease prevalence rate were not shown in Table 4.13. A higher percentage of respondents reported the same level of self-rated health status in time Period 2 (2013-2015) compared to Period 1 (2011-2013) for all three age groups. Within time Period 1, about 15% of respondents aged 45-59, 17% of respondents aged 60-74 and 19% of those aged 75 or over had a better self-rated health status[16], while such percentages for the respondents in time

[16] A better self-rated health includes the categories of respondents who had poor self-rated health in the previous survey year, and reported fair or good in the next survey year; or those who had improved self-rated health from

Period 2 were 19%, 18% and 16% respectively. A considerably lower percentage of respondents reported a worse health status[17] in time Period 2 in all the age groups compared to Period 1. Compared to people aged below 75 (18-19%), a lower share of respondents aged 75 or over reported better self-rated health status in Periods 2 (16%), which was reversed in Period 1.

Table 4.13 Changes in the health status of respondents (2011, 2013 & 2015) %

Category	Period 1 (2011-2013)			Period 2 (2013-2015)			
	The same	better	worse	The same	better	worse	Total
Self-rated health* **							
45-59α	38.9	15.2	45.9	56.4	18.8	24.8	100 (4,188)
60-74 α	38.7	17.4	43.9	54.6	17.9	27.5	100 (2,865)
75 or over α	37.5	19.2	43.3	43.8	15.6	40.6	100 (224)
ADL functioning* **							
45-59α	80.7	8.3	11.1	79.5	7.4	13.1	100 (4,188)
60-74 α	74.2	11.8	14.0	72.6	9.8	17.6	100 (2,865)
75 or over α	67.0	16.1	16.9	67.0	12.5	20.5	100 (224)
IADL functioning* **							
45-59α	74.2	12.5	13.3	75.5	9.8	14.7	100 (4,188)
60-74 α	65.6	14.9	19.5	65.6	15.3	19.1	100 (2,865)
75 or over α	49.1	21.4	29.5	57.1	20.6	22.3	100 (224)
Life satisfaction* **							
45-59α	49.1	17.5	33.4	50.7	30.5	18.8	100 (4,188)
60-74 α	47.4	19.5	33.1	50.3	27.9	21.8	100 (2,865)
75 or over α	32.6	18.3	49.1	38.0	20.5	41.5	100 (224)
Depression * **							
45-59α	64.7	13.7	21.6	68.7	10.9	20.4	100 (4,188)
60-74 α	64.2	16.7	19.1	66.8	10.2	23.0	100 (2,865)
75 or over α	51.8	21.4	26.8	67.6	10.6	21.8	100 (224)

Note: ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living. Better: improved health category; worse: deteriorated health category. Significance level: ***p<0.001; α, age of respondents in 2011.
Source: Author's analysis of the longitudinal CHARLS data.

In Period 1, about 8% of respondents aged between 45 and 59, 12% of respondents aged between 60 and 74, and 16% of those aged 75 or over had a better ADL functional status[18]. Such percentages decreased to 7%, 10% and 13% respectively in Period 2, which suggests that the respondents' ADL functional status may have deteriorated between 2013 and 2015 compared to between 2011 and 2013. Moreover, respondents in the older age groups were more likely to report a change in the ADL functional status over time. The percentages of

fair to good between two surveys years. This applies to a higher life satisfaction and depression throughout this section.

[17] A worse self-rated health includes the categories of respondents who had good self-rated health in the previous survey year, and reported fair or poor in the next survey year; or those whose self-rated health deteriorated from fair to poor between two surveys years. This applies to a lower life satisfaction and depression throughout this section.

[18] A better ADL functional status includes the categories of respondents who had severe ADL impairment in the previous survey year, and had moderate impairment or full functioning in the next survey year; or those whose ADL functional status improved from moderate impairment to full function between two surveys years. This applies to a better IADL functional status throughout this section.

respondents having a worse ADL functional status[19] were 11% for people aged 45-59, 14% for people aged 60-74, and 17% for people aged 75 or over in Period 1, and 13% for people aged 45-59, 18% for people aged 60-74, and 21% for people aged 75 or over in Period 2. Older people in all three age groups were more likely to report a worse ADL functional status in Period 2 compared to Period 1, which may be associated with their higher ages in Period 2.

The respondents' IADL functional status deteriorated in Period 2 compared to Period 1. About 13% of respondents aged between 45 and 59, 15% of respondents aged between 60 and 74, and 16% of those aged 75 or over had better IADL functional status in Period 1. Such percentages decreased to 10%, 15% and 21% respectively in Period 2. Similar to what was found for the ADL functional status, respondents in the older age groups were more likely to have a better IADL functional status. Meanwhile, respondents in the older age groups were also more likely to have worse IADL functional status (13% for people aged 45-59, 20% for people aged 60-74, and 30% for people aged 75 or over in Period 1, and 15% for people aged 45-59, 19% for people aged 60-74, and 22% for people aged 75 or over in Period 2).

A higher percentage of respondents reported the same level of life satisfaction in time Period 2 compared to Period 1 for all age groups. A significantly higher percentage of respondents reported a higher life satisfaction in time Period 2 in all age groups (31% of respondents aged 45-59, 28% of respondents aged 60-74, and 21% of those aged 75 or over) compared to time Period 1 (18% of respondents aged 45-59, 20% of respondents aged 60-74, and 18% of those aged 75 or over). Within time Period 1, about 33% of respondents aged 45-59, 33% of respondents aged 60-74, and 49% of those aged 75 or over reported a lower life satisfaction, while such percentages in time Period 2 were 19%, 22% and 42% respectively. The percentage of respondents having a lower life satisfaction was lower in Period 2 compared to Period 1 for all the age groups.

Table 4.13 also shows the changes in the depression status of respondents. The majority of respondents (50%-70%) had the same depression status between Periods 1 and 2. A higher proportion of respondents aged 60 or over had better depression status compared to those aged 45-59 (more than 17% compared to 14%) in Period 1, while a less significant opposite trend was found in Period 2. This indicates that depression status may be positively associated

[19] A worse ADL functional status includes the categories of respondents who had full ADL functional status in the previous survey year, and had moderate or severe impairment in the next survey year; or those whose ADL functional status deteriorated from moderate to severe impairment between two surveys years. This also applies to a worse IADL functional status throughout this section.

with age in Period 1, but negatively associated with age in Period 2. Interestingly, for the longitudinal sample, respondents were two years older in Period 2 compared to Period 1, and thus the results may suggest a reverse U-Shape association between depression and the age of respondents. This requires further analysis based on the regression models, which is demonstrated in Chapters 5 and 6. Meanwhile, respondents aged 75 or over were more likely to have a worse depression status in Period 1 (27%) compared to Period 2 (22%). The results suggest that people who were in the older age groups were more likely to have depression, particularly in Period 1 (2011- 2013).

In order to better understand the health status of older people in rural and urban areas, Table 4.14 shows the proportion of the respondents with different categories of self-rated health status, difficulties with (I)ADLs, life satisfaction and depression status between 2011 and 2015, by age and Hukou status based on the analysis of the longitudinal CHARLS data. Overall, older people were more likely to report poor health with the increase in age, and older people in the higher age groups were more likely to have poorer health status compared to those in the lower age groups, which was statistically significant for respondents in rural areas.

Specifically, a higher proportion of respondents in rural areas reported poor self-rated health compared to their counterparts in urban areas. For older people in both rural and urban areas, the older they were, the more likely they were to have poor self-rated health. Older people's physical health (having difficulties with the (I)ADLs) deteriorated with the increase in age between 2011 and 2015, which was statistically significant for respondents in both rural and urban areas. For example, less than 2% of respondents aged 45-59 had difficulties with ADLs in rural areas in 2011, and this was about 4% for those aged 60-74 and 7% for those aged 75 or over. In addition, the proportion of older people having a poorer (I)ADL functional status was slightly higher in rural areas compared to urban areas.

In addition, older people in the older age group were more likely to have a high life satisfaction. For example, 22% among those aged 45-59 in rural areas in 2011 reported high life satisfaction, and this was about 24% for those aged 60-74 and 31% for those aged 75 or over. Moreover, older people in rural areas were more likely to have a high life satisfaction compared to their counterparts in urban areas. Regarding the depression status among older people, respondents aged 45-59 were less likely to have depressive symptoms compared to those in the older age groups at all three waves in both rural and urban areas. Meanwhile, a higher proportion of older people reported depressive symptoms in rural areas compared to urban areas.

Table 4.14 Health and Activities of Daily Living of respondents, by age and Hukou status (2011, 2013 & 2015) %

Variables	Wave 1 (n=6,751)			Wave 2 (n=6,751)			Wave 4 (n=6,751)		
	45-59	60-74	75 or over	45-59	60-74	75 or over	45-59	60-74	75 or over
Rural Hukou status									
Self-rated Health		***			**			***	
Good	28.0	22.7	21.2	23.9	21.1	21.1	23.8	20.2	20.9
Fair	48.5	45.9	39.8	54.2	53.5	50.2	54.8	53.5	43.8
Poor	23.5	31.4	39.0	21.9	25.4	28.7	21.4	26.3	35.3
Total	100	100	100	100	100	100	100	100	100
	(2,456)	(1,595)	(123)	(2,704)	(2,698)	(247)	(2,032)	(3,246)	(345)
ADLs		***			***			***	
Severe impairment	1.7	3.8	7.1	1.4	3.3	7.6	2.2	4.8	9.8
Moderate impairment	11.0	18.1	28.8	12.1	18.3	29.3	14.6	21.9	27.7
Full function	87.3	78.1	64.1	86.5	78.4	63.1	83.2	73.3	62.5
Total	100	100	100	100	100	100	100	100	100
	(3,441)	(2,200)	(170)	(2,771)	(2,771)	(224)	(2,092)	(3,337)	(387)
IADLs		***			***			***	
Severe impairment	4.2	8.4	17.0	3.0	6.8	17.1	4.3	8.3	15.8
Moderate impairment	13.7	18.5	24.6	15.2	24.4	35.4	15.7	24.6	34.9
Full function	82.1	73.1	58.5	81.8	68.8	47.5	80.0	67.1	49.3
Total	100	100	100	100	100	100	100	100	100
	(3,478)	(2,219)	(171)	(2,784)	(2,771)	(263)	(2,097)	(3,340)	(387)
Life satisfaction					**			**	
Good	21.7	23.8	31.4	23.7	26.2	34.1	43.2	42.1	53.2
Fair	62.4	59.8	53.7	61.8	60.8	55.7	48.3	49.9	39.5
Poor	15.9	16.4	14.9	14.5	13.0	10.2	8.5	8.0	7.3
Total	100	100	100	100	100	100	100	100	100
	(2,936)	(1,890)	(121)	(2,596)	(2,601)	(226)	(2,024)	(3,200)	(329)
Depression 10		***						***	
Yes	33.0	40.0	46.5	28.9	31.6	27.8	30.0	34.7	31.4
No	67.0	60.0	53.5	71.1	68.4	72.2	70.0	65.3	68.6
Total	100	100	100	100	100	100	100	100	100
	(3,252)	(2,101)	(155)	(2,612)	(2,617)	(234)	(2,030)	(3,235)	(341)
Urban Hukou status									
Self-rated Health									
Good	31.2	26.1	38.7	24.1	26.7	20.0	24.4	26.6	27.5
Fair	51.0	50.3	54.8	59.5	57.8	61.7	53.6	57.3	50.0
Poor	17.8	23.6	6.5	16.4	15.5	18.3	22.0	16.1	22.5
Total	100	100	100	100	100	100	100	100	100
	(314)	(334)	(31)	(336)	(502)	(60)	(209)	(583)	(80)
ADLs		***			**			***	
Severe impairment	2.2	1.4	2.9	1.7	1.7	4.8	2.4	5.6	9.8
Moderate impairment	5.6	15.2	20.6	9.4	12.5	24.2	15.9	23.4	29.9
Full function	92.2	83.4	76.5	88.9	85.8	71.0	81.7	71.0	60.3
Total	100	100	100	100	100	100	100	100	100
	(411)	(427)	(34)	(341)	(520)	(62)	(4,175)	(2,864)	(224)
IADLs		***			***			***	
Severe impairment	3.6	3.5	11.4	1.4	3.5	17.7	2.6	3.5	14.3
Moderate impairment	7.6	14.2	14.3	8.5	10.6	21.0	12.8	11.3	20.9
Full function	88.8	82.3	74.3	90.1	85.9	61.3	84.6	85.2	64.8
Total	100	100	100	100	100	100	100	100	100
	(419)	(2,865)	(35)	(342)	(5,201)	(62)	(234)	(602)	(91)
Life satisfaction					**				
Good	21.2	21.1	27.6	21.4	23.9	42.8	43.6	41.7	42.3
Fair	68.6	68.7	65.5	70.5	68.7	55.4	52.0	52.6	53.9
Poor	10.2	10.2	6.9	8.1	7.4	1.8	4.4	5.7	3.8
Total	100	100	100	100	100	100	100	100	100
	(373)	(384)	(29)	(322)	(485)	(56)	(225)	(582)	(78)
Depression 10									
Yes	21.5	26.4	41.0	18.6	17.3	21.4	20.9	23.3	29.5
No	78.5	73.6	59.0	81.4	82.7	78.6	79.1	76.7	70.5
Total	100	100	100	100	100	100	100	100	100
	(390)	(406)	(205)	(323)	(485)	(56)	(225)	(583)	(78)

Note: ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living. Significance level: **: p<0.01; ***: p<0.001. The number of the sample (N = 6,751) was slightly lower compared to the longitudinal sample (N = 7,277) as respondents who had unified Hukou and other Hukou were further excluded in the analysis.

Source: Author's analysis of the longitudinal CHARLS data, weighted percentage, unweighted sample count.

In summary, this section shows that a higher percentage of older people had better self-rated health and life satisfaction in Period 2 compared to Period 1. However, their physical health including their ADL and IADL functional status, deteriorated in Period 2 compared to Period 1. For respondents aged 75 or over, the depressive symptoms improved in Period 2 compared to Period 1. Furthermore, older people in rural areas were more likely to have poor self-rated health, difficulties with (I)ADLs, and depressive symptoms compared to their urban counterparts, but they were less likely to have low life satisfaction compared to older people in urban areas. Previous research has suggested that respondents' health status is associated with the provision of intergenerational transfers in both directions (Chen and Silverstein, 2000; Cong and Silverstein, 2008; Guo, Aranda and Silverstein, 2009; Xie, 2010). For example, poor physical health status may increase the need for care, and hence result in the increase in economic transfers and informal care received by older people (McGarry and Schoeni, 1995; Lee and Xiao, 1998; Xie, 2010). Such support may consequently have an influence on the psychological health of the respondents (see also Section 2.4.3) (Chen and Silverstein, 2000; Cong and Silverstein, 2008; Guo, Aranda and Silverstein, 2009). Therefore, it is worth examining the complex association between the changes in the exchange of intergenerational support and the physical and psychological health status of older people with a longitudinal approach, which is provided in Chapters 5 and 6. Chapter 5 aims to explore the potential impact of the living arrangements with adult children upon different types of intergenerational support exchange, whilst Chapter 6 focuses on examining the influence of intergenerational support exchange upon the physical and psychological health of older people in China.

Chapter 5 Regression Results I: Living Arrangements and the Exchange of Intergenerational Support

Chapter 4 has demonstrated descriptive results based on repeated cross-sectional and longitudinal analyses examining the changes in the living arrangement, intergenerational support and the health status of respondents. Chapter 4.2.1 revealed increasing probability in receiving and providing economic transfers by/ from the respondents, with inconsistent changes in having intergenerational weekly distant contact. In addition, Chapter 4.2.2 showed considerable changes in respondents' living arrangements with their adult children (co-residence/ living nearby with an adult child). The purpose of this chapter is to explore the causal relationships between one's living arrangement with their adult children and the exchange of intergenerational support, which addresses Research Question 3 (*How have changes in the living arrangements with children impacted upon the changes in intergenerational support exchange*).

The results provided in this chapter are based on three steps of analyses of the Harmonised CHARLS dataset. First, basic logistic regression models were employed to examine the associations between the changes in the living arrangement with adult children and the changes in different types of intergenerational support exchange. Only age and time (survey year) were controlled for in the basic regressions due to the data's longitudinal nature (Croezen *et al.*, 2015). Second, hybrid models combining fixed and random effects were used to further estimate the associations (see further in Section 3.5.4). Changes in co-residence with adult children or having adult children living nearby were used as independent variables (the decisions in using either co-residence or living nearby with any adult child are justified in Section 5.1) and changes in the exchange of intergenerational economic, social and psychological support were included as dependent variables, with a number of control variables taken into consideration. These included time-varying variables such as one's marital status and work status; and time-invariant variables such as one's Hukou status and education attainment which did not show sufficient variations over time (see a critical discussion of this in Section 5.2). Moreover, based on the analyses in Sections 5.1 and 5.2, a lagged variable of changes in the co-residence/ living nearby with adult children was included in the models, in order to explore whether within-person changes in the respondents' living arrangement with adult children between Waves 1 and 2 were associated with within-person changes in intergenerational support exchange between Waves 2 and 4. As elaborated in Chapter 3, the lagged effect models help to minimise the potential impact of reverse causality. Finally, whether the influence of the living arrangements with adult children on

the exchange of intergenerational support differs in rural and urban areas is examined in Section 5.4.

The final analytical sample in the following analyses includes 7,277 respondents who had at least one adult child and grandchild alive at all three survey years (see further details in Section 3.3). Weights are not applied in the models used in Chapters 5 and 6, as weighting is potentially harmful to precision and unnecessary for consistency in the analyses (Solon *et al.*, 2015). Moreover, previous research has shown that estimates from weighted fixed-effects models are very imprecise (Croezen *et al.*, 2015). Therefore, results in Chapters 5 and 6 are based on unweighted regression estimates.

5.1 Basic Logistic Regressions: How have changes in the living arrangements with children impacted upon the changes in intergenerational support?

Fixed effects models were adopted to assess the association between the changes in respondents' living arrangement with adult children and the changes in bidirectional economic, social and psychological support provision respectively. In order to simplify the analysis, the basic model only included dependent, independent variables and two control factors: age and time (survey year) (Croezen *et al.*, 2015). Importantly, a binary variable showing whether respondents co-resided with any of their adult children was used as an independent variable for the first four models (Models 5.1-5.4), where changes in intergenerational economic and social support were studied. However, as respondents who had at least one co-resident adult child were assumed to have weekly in-person contact with their children (see further discussion of this point in Section 3.4), it would be biased to explore the association between co-residing with adult children and having weekly in-person contact. In order to reduce the bias, for Models 5.5-5.6, whether respondents had an adult child living nearby was employed as an independent variable to examine its association with the changes in having intergenerational weekly contact.

Table 5.1 Simple Logistic Regression of economic, social support and weekly contact on the living arrangement with adult children, the CHARLS (2011, 2013 & 2015)

Models	Dependent variables	Independent variables	OR	SE
Model 5.1	Economic support from (grand)children	Co-residence with adult children (ref:0-0-0)	0.504***	0.025
Model 5.2	Economic support to (grand)children	Co-residence with adult children (ref:0-0-0)	0.689***	0.033
Model 5.3	Help with (I)ADLs from adult children	Co-residence with adult children (ref:0-0-0)	1.561***	0.148
Model 5.4	Care provided to grandchildren	Co-residence with adult children (ref:0-0-0)	1.130*	0.061
Model 5.5	Weekly in-person contact with adult children	Living nearby to adult children (ref:0-0-0)	5.144***	1.041
Model 5.6	Weekly distant contact with adult children	Living nearby to adult children (ref:0-0-0)	0.821*	0.078

Notes: OR: Odds Ratio; SE: Standard Error. * denotes significance at 5%; *** denotes significance at 0.1%. N = 7,277. For independent variables, 1: yes; 0: no; 0-0-0 means did not co-reside with any child in 2011, 2013 or 2015.
Pseudo R-square for Models 5.1-5.6 are 0.48, 0.12, 0.17, 0.01, 0.65 and 0.01 respectively.
Source: Author's analysis of the longitudinal CHARLS data.

Table 5.1 shows the basic logistic regression results based on fixed effects models using the Harmonised CHARLS 2011-15. In Models 5.1-5.4, the reference category is respondents who did not co-reside with any adult children at all waves (0-0-0), whereas in Models 5.5-5.6, the reference category is respondents who did not have any adult children living nearby at all waves (0-0-0). The results demonstrate that the within-person changes in the living arrangements with adult children were significantly associated with the within-person changes in having intergenerational economic and social support exchange, and weekly contact.

Model 5.1 indicates that a change from not co-residing with any adult children to co-residing with at least one adult child was associated with a 50% decrease in the probability of receiving upward economic support provided from adult children/ grandchildren (OR=0.504, $p<0.001$). Similarly, Model 5.2 shows that a transition from non-co-residence to co-residence with adult children was significantly associated with a 30% reduction in the probability of providing economic transfers to adult children/ grandchildren (OR=0.689, $p<0.001$). Overall, the co-residence with adult children implied a decline in both the receipt and provision of intergenerational economic transfers among respondents.

In terms of social support, respondents who experienced a non-co-residence to co-residence (with adult children) transition were more likely to receive support with (I)ADLs from their adult children, and also more likely to provide grandchild care compared to respondents who did not co-reside with any adult child at all three waves. Specifically, Model 5.3 shows that a change from not co-residing with any adult children to co-residing with at least one adult child was associated with a 50% increase in the odds of receiving assistance with (I)ADLs from their adult children (OR=1.561, $p<0.001$). Model 5.4 shows that a transition from non-co-residence to co-residence with adult children was significantly associated with a 13% increase in the odds of grandchild care provision (OR=1.130, $p<0.05$). In general, the co-residence with adult children was associated with an increase in both the intergenerational social support received/ provided by respondents.

Models 5.5 and 5.6 show that living near an adult child was associated with much higher probabilities of having weekly in-person contact and lower probabilities of having weekly distant contact with adult children. A change from not living nearby with any adult child to living nearby with at least one adult child was associated with a four-times increase in the odds of having weekly in-person contact with adult children (OR=5.144, $p<0.001$). This suggests that respondents who had children living closer were much more likely to have intergenerational weekly in-person contact. By contrast, a change from not living nearby with any adult children to living nearby with at least one adult child was associated with an 18% decrease in the odds of having weekly distant contact with adult children (OR=0.821, $p<0.05$). Importantly, the sample in Model 5.5 only included respondents who did not have any co-resident adult child and those who had at least

one adult child living nearby, as it may be biased to include respondents who had co-resident adult children in the analysis regarding having weekly in-person contact. Specifically, all respondents who had at least one co-resident adult child were considered to have weekly in-person contact with their adult child, and should therefore be excluded from the sample when estimating the association between the living arrangement with adult children and having intergenerational in-person contact (see also in Section 3.4). Otherwise, the OR measuring the association between living nearby with an adult child and having intergenerational weekly in-person contact would be remarkably large.

Overall, the basic logistic regression models show that having at least one co-resident adult child was associated with lower probabilities of receiving and providing intergenerational economic transfers. In addition, it was associated with higher probabilities of receiving assistance with (I)ADLs from adult children and providing grandchild care. Having adult children living nearby was associated with an increase in having weekly in-person contact and a decline in having weekly distant contact. Following the basic models, models incorporating controls for time-variant and time-invariant variables are considered in Section 5.2.

5.2 Logistic Regression with a Hybrid Method: How have changes in the living arrangements with children and other sociodemographic factors impacted upon the changes in intergenerational support?

As discussed in Section 3.5.4, a hybrid method combining fixed effects estimates for time-varying factors and random effects estimates for time-invariant variables is employed in this section (Allison, 2009). The hybrid models used the same dependent variables as those included in Models 5.1-5.6. In terms of independent variables, there were four time-varying factors considered in the hybrid models. Co-residence and living nearby with adult children, used in the basic logistic regressions in order to measure the living arrangements with adult children, were two of the time-variant factors. In addition, the change in the respondents' marital status was considered as an important predictor for the changes in intergenerational support exchange (Zhang and Li, 2011). Another time-variant variable was the respondents' current work status, which may be associated with one's income status, and thus has an influence upon the exchange of intergenerational transfers (Cong and Silverstein, 2011; Silverstein *et al.*, 2012).

In addition to the time-variant factors, three types of variables were treated as time-invariant factors in the models. The first group of time-invariant variables included the survey year and age groups of the respondents. As age was perfectly correlated with time in a longitudinal study, it was appropriate for it to be included as a time-constant variable (Sheng and Killian, 2009).

Second, some variables did not show sufficient changes over the three waves, such as the Hukou status, education attainment, the number of children alive and the number of chronic illnesses respondents had. For example, as illustrated in Table 4.11, more than 95% of respondents did not experience any changes in their Hukou status over the three survey years. These variables were regarded as time-invariant and estimated with a random effects approach (fixed effects models require sufficient changes in the predictors) (Allison, 2009) (see further in Section 3.5.2). Finally, the gender of the respondents does not usually change with time and was therefore estimated by random effects. Overall, time-invariant variables in the hybrid models include the survey year, respondents' age, gender, Hukou status, education attainment, the number of chronic illnesses and the number of children they had.

Table 5.2 shows the regression results of the bi-directional economic, social support provision and weekly contact with the use of a hybrid method combining fixed and random effects (See Section 3.5.4 for an introduction of this method). The coefficients of the results are plotted and presented in Figures 5.1 and 5.2. In order to estimate the FEM, the time-varying predictors were transformed into deviations from their person-specific means, as (D)co-residence, (D)living nearby, (D)marital status and (D)work shown. The ORs for the deviation variables are functionally equivalent to fixed effects ORs because they were estimated using only within-person variation. (M)co-residence, (M)living nearby, (M)marital status and (M)work refer to the person-specific mean of variables and their coefficients are equivalent to random-effects estimates.

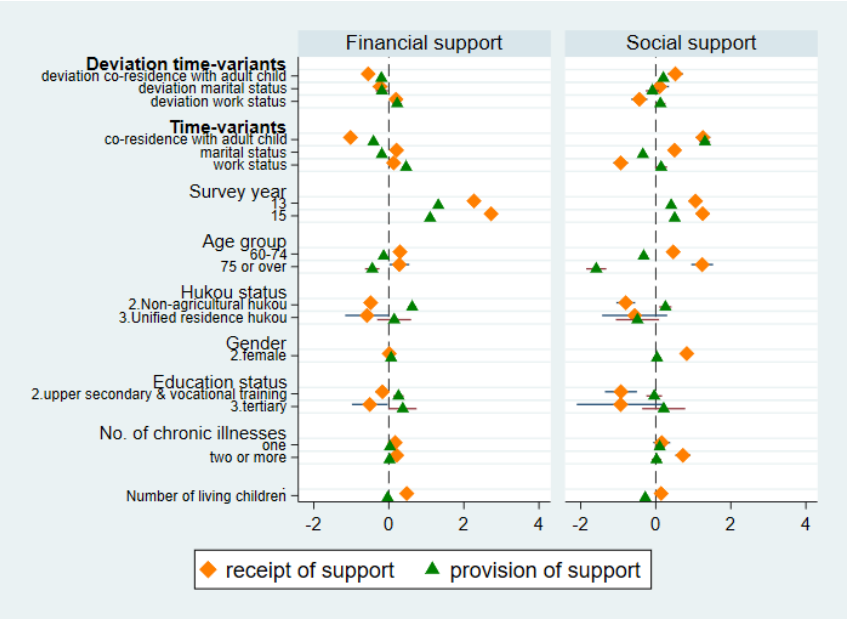
Table 5.2 Regression of economic, social support and weekly contact on co-residence, the CHARLS (2011, 2013 & 2015)

	Model 5.7		Model 5.8		Model 5.9		Model 5.10		Model 5.11		Model 5.12	
Dependent variables	**Economic support from (grand)children**		**Economic support to (grand)children**		**Help with (I)ADLs from adult children**		**Care to grandchildren**		**Weekly in-person contact with adult children**		**Weekly distant contact with adult children**	
Independent variables	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE
(D)Co-residence	0.578***	0.036	0.822***	0.042	1.683***	0.170	1.225***	0.068				
(D)Living nearby									7.845***	1.394	0.751**	0.071
(D)Marital Status	0.793*	0.079	0.826*	0.069	1.131	0.141	0.917	0.082	1.142*	0.197	1.015	0.093
(D)Currently work	1.213**	0.093	1.248***	0.080	0.649***	0.071	1.133	0.078	0.933	0.126	0.986	0.072
(M)Co-residence	0.361***	0.023	0.666***	0.032	3.502***	0.346	3.704***	0.269				
(M)Living nearby									4.231***	0.975	0.617***	0.069
(M)Marital Status	1.229***	0.056	0.830***	0.029	1.651***	0.085	0.710***	0.036	0.826*	0.078	0.681***	0.032
(M)Currently work	1.136	0.083	1.586***	0.089	0.394***	0.039	1.153	0.094	0.263***	0.040	0.844*	0.066
Year (11)												
13	2.678***	0.513	3.742***	0.157	2.879***	0.256	1.510***	0.066	0.924	0.075	0.830***	0.038
15	3.253***	0.935	3.007***	0.133	3.486***	0.316	1.656***	0.079	0.962	0.088	0.926	0.045
Age (45-59)												
60-74	1.348***	0.069	0.873***	0.035	1.593***	0.132	0.726***	0.039	1.435***	0.141	0.714***	0.038
75 or over	1.323*	0.181	0.644***	0.063	3.437***	0.509	0.205***	0.028	1.707*	0.383	0.378***	0.046
Hukou (agricultural)												
Non-agricultural	0.616***	0.046	1.864***	0.107	0.450***	0.057	1.295**	0.107	2.320***	0.354	1.605***	0.135
Gender (Male)												
Female	1.013	0.051	1.064	0.041	2.285***	0.182	1.037	0.059	1.093	0.111	1.045	0.057
Education (less than lower secondary)												
Upper secondary	0.843	0.077	1.296***	0.091	0.396***	0.086	0.961	0.103	1.343	0.266	1.586***	0.170
tertiary	0.602*	0.146	1.451*	0.274	0.393	0.235	1.237	0.362	1.684	0.844	2.067*	0.651
Chronic illnesses (none)												
One	1.186**	0.074	1.032	0.052	1.172	0.135	1.110	0.074	0.848	0.106	0.963	0.064
Two or more	1.235***	0.073	1.020	0.048	2.063***	0.213	1.022	0.067	0.855	0.103	0.995	0.063
No. of children	1.612***	0.035	0.970*	0.015	1.155***	0.031	0.756*	0.016	1.153***	0.046	1.011	0.021

Notes: (D) represents results based on fixed effects estimates, and (M) represents results based on random effects estimates. * denotes significance at 5%; ** denotes significance at 1%; *** denotes significance at 0.1%. OR: Odds Ratio; SE: Standard Error. N = 7,277.

Pseudo R-square for Models 5.1-5.6 are 0.74, 0.53, 0.38, 0.32, 0.82 and 0.34 respectively.

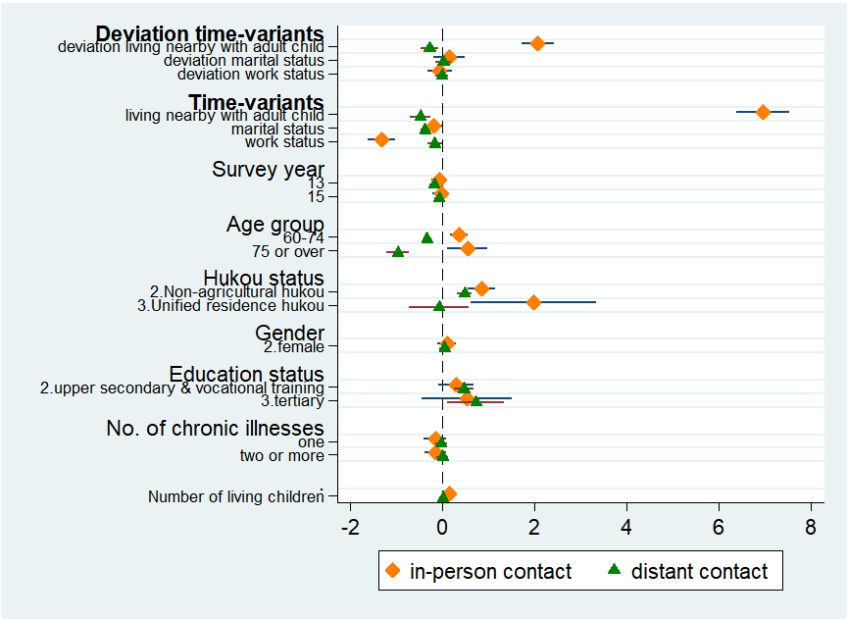
Source: Author's analysis of the longitudinal CHARLS data.



Note: results of deviation time-variants are based on fixed effects estimates, and results of mean time-variants are based on random effects estimates. The reference group for the control variables are: survey year: 2011; age group: 45-59; Hukou status: agricultural Hukou; Gender: Male; Education status: less than lower secondary; No. of chronic illnesses: none.

Source: Author's analysis of the Harmonised longitudinal CHARLS data.

Figure 5.1: Determinants of bidirectional economic and social support provision (2011, 2013 & 2015)



Note: results of deviation time-variants are based on fixed effects estimates, and results of mean time-variants are based on random effects estimates. The reference group for the control variables are: survey year: 2011; age group: 45-59; Hukou status: agricultural Hukou; Gender: Male; Education status: less than lower secondary; No. of chronic illnesses: none.

Source: Author's analysis of the Harmonised longitudinal CHARLS data.

Figure 5.2: Determinants of intergenerational weekly in-person and distant contact (2011, 2013 & 2015)

Model 5.7 presents the regression results by using the proportion of older people receiving economic transfers from adult children/ grandchildren as a dependent variable. The results suggest that the odds of receiving upward economic support reduced by 42% for respondents who experienced a change from non-co-residing with any of their adult children to co-residing with at least one child (OR=0.578, p<0.001). In addition, Model 5.8 suggests that the odds of respondents providing economic support to their adult children/ grandchildren reduced by 18% when they experienced a change from a non-co-residence to co-residence status with adult children (OR=0.822, p<0.001). Therefore, the modelling results show that respondents who had at least one adult child moving back home were less likely to have economic transfers with their adult children/ grandchildren in both directions.

In addition, the odds of receiving upward economic support reduced by 20% for respondents who became widowed/ divorced/ separated (OR=0.793, p<0.05). Meanwhile, the odds of providing economic support from respondents to their adult children/ grandchildren decreased by 17% when respondents became widowed/ divorced/ separated (OR=0.826, p<0.05). This indicates that respondents were less likely to have bi-directional economic transfers with their adult children when they experienced the separation from, or loss of, their partner. A change from not working to currently working was associated with a 21% increase in the probability of receiving upward economic transfers (OR=1.213, p<0.01) and a 25% increase in the probability of providing economic transfers to their adult children/ grandchildren (OR=1.248, p<0.001). Overall, older people were more likely to have economic support exchange with their adult children if they were currently working.

Whilst the fixed-effects estimates above are based on within-individual variation, the random-effects estimates take into consideration of between-individual differences and are expressed in the ORs of (M)co-residence, (M)marital status and (M)work. The odds of receiving upward economic support among respondents who co-resided with at least one child were 0.36 times the odds among respondents who did not have any co-resident adult children (OR=0.361, p<0.001). This was consistent with previous findings showing that adult children's out-migration was associated with an increase in their provision of economic support to their parents (Taylor *et al.*, 2003; Xie, 2010; Liu, 2014). Respondents who had at least one co-resident adult child were also less likely to provide downward economic support compared to their counterparts who had no co-resident adult children (OR=0.666, p<0.001).

In addition, Models 5.7 and 5.8 demonstrate that the odds of receiving upward economic support were multiplied by 1.2 times for older people who had the other marital status (widowed/ divorced/

separated) compared to their counterparts who were married and living with their spouse (OR=1.229, p<0.001). Previous research also suggests that older people who were not married or living with a spouse were more likely to receive economic transfers from their children (Zhang and Li, 2011). Respondents with such characteristics were found to be in vulnerable circumstances such as older age and poorer health, and thus had a higher need for, and perhaps also the probability to receive, economic support from their adult children (see also Section 2.4.3). Meanwhile, older people who were widowed/ divorced/ separated were less likely to provide economic support to their adult children/ grandchildren compared to those who were married and living with their spouse (OR=0.830, p<0.001). Respondents who currently worked were much more likely to provide economic support to their adult children compared to their counterparts who did not work (OR=1.586, p<0.001), which may be due to the fact that respondents who worked had relatively sufficient economic resources.

Model 5.7 demonstrates that older people were much more likely to receive economic support from their adult children/ grandchildren in 2013 and 2015 compared to 2011 (OR=2.678, p<0.001 and OR=3.253, p<0.001 respectively). This was due to the fact that the analysis was based on longitudinal data, where individuals were older with the passage of time, and therefore might be more likely to receive monetary support from their adult children as argued before (see also Figure 4.4a in Section 4.2.1). Meanwhile, respondents were more likely to provide economic support to their adult children/ grandchildren in 2013 and 2015 compared to 2011 (OR=3.742, p<0.001 and OR=3.007, p<0.001 respectively). Respondents in the higher age groups (60-74, 75 or over) were more likely to receive upward economic support compared to those aged 45-59 (OR=1.348, p<0.001 and OR=1.323, p<0.05 respectively), but less likely to provide such support to their adult children/ grandchildren (OR=0.873, p<0.001 and OR=0.644, p<0.001 respectively). The results are consistent with previous descriptive findings in Chapter 4 (see also Figures 4.19 and 4.20 in Section 4.2.1).

Compared to respondents who had an agricultural Hukou status, those who had a non-agricultural Hukou were less likely to receive economic support from their adult children/ grandchildren (OR=0.616, p<0.001), and almost twice as likely to provide such support to their adult children (OR=1.864, p<0.001). This supports the previous findings showing urban and rural differences in intergenerational economic support provision in China, where older people in urban areas were less likely to receive economic support from their adult children (Xu, 2001; Zhang and Sun, 2011) and more likely to provide such support to their adult children (Xu, 2004; Yu, 2007) compared to their rural counterparts. Such differences are further examined in Section 5.4. There was no significant

association between the respondent's gender and the provision/ receipt of intergenerational economic support. In terms of the educational attainment of respondents, those who had attained higher education were less likely to receive economic support from their adult children/ grandchildren, but more likely to provide such support to them compared to their counterparts who had obtained less than lower secondary education. As stated in Section 2.2.1, having a higher education level is negatively linked to the receipt of upward economic transfers and positively associated with the provision of downward economic support, largely due to the benefits of better employment, higher income and SES brought by higher education attainment (Guo, Chi and Silverstein, 2009) (see also Section 2.2.1).

Model 5.7 also shows a significant association between the number of chronic illnesses respondents had and the receipt of economic support from their adult children/ grandchildren. The odds of receiving upward economic transfers were 1.2 times among respondents who had one chronic illness/ two or more chronic illnesses compared to their counterparts who had no chronic illnesses (OR=1.186, $p<0.001$ and OR=1.235, $p<0.001$). This indicates an association between a poor physical health status of respondents and a higher likelihood in receiving upward economic support. However, there was no statistically significant association between the chronic illnesses of respondents and the provision of economic support from older people to their adult children. The more adult children respondents had, the more likely they were to receive economic support from their adult children/ grandchildren (OR=1.612, $p<0.001$), and the less likely they were to provide such support to their adult children/ grandchildren (OR=0.970, $p<0.05$).

The following section continues to explore the relationship between co-residence with one's adult children and the exchange of intergenerational economic support. In addition to whether respondents received or provided any economic transfers from/ to their adult children/ grandchildren, another important consideration is the amount of such transfers. As elaborated in Section 3.4, the dependent variable measuring the amount of economic transfers provided bi-directionally is continuous in Models 5.9 and 5.10. In order to estimate the effect of co-residence upon the amount of economic transfers, the first step was to transform the dependent variables into their log value (Allison, 2009). Then, an OLS model with a hybrid method was used to examine such effect (see further discussion about this method in Section 3.5.5). This study used the exponentiated regression coefficients so that it is clear to the readers that the outcome variable itself was influenced by a one-unit increase in the independent variable (e.g. Sloan *et al.*, 2002; Gruijters, 2017). Table 5.3 presents the results of such estimates, with a note of the exponentiated regression coefficients, standard errors and significance levels.

Table 5.3 Associations between changes in co-residence with adult children and changes in the amount of economic support exchanges, the CHARLS (2011, 2013 & 2015)

	Model 5.13		Model 5.14	
Dependent variables	**Amount of economic support from (grand)children**		**Amount of economic support to (grand)children**	
Independent variables	Exp(Coef.)	SE	Exp(Coef.)	SE
(D)Co-residence[a]	0.802***	0.030	0.466***	0.059
(D)Marital Status	0.948	0.046	0.701	0.105
(D)Currently work	0.941	0.037	0.632	0.075
(M)Co-residence[a]	0.636***	0.037	0.539***	0.054
(M)Marital Status	0.872***	0.025	0.516***	0.042
(M)Currently work	0.709***	0.042	0.411***	0.066
Year (11)				
13	1.448***	0.026	1.110***	0.049
15	2.260***	0.028	2.299***	0.052
Age (45-59)				
60-74	0.903***	0.028	0.388***	0.045
75 or over	0.683***	0.062	0.083***	0.118
Hukou (agricultural)				
Non-agricultural	1.139**	0.044	1.762***	0.063
Gender (Male)				
Female	0.991	0.029	0.694	0.044
Education (less than lower secondary)				
Upper secondary	1.300***	0.057	1.334***	0.075
tertiary	1.480*	0.161	1.629***	0.194
Chronic illnesses (none)				
One	0.996	0.036	0.617	0.057
Two or more	1.036	0.035	0.624	0.053
No. of children	1.166***	0.011	0.687	0.018

Notes: (D) represents results based on fixed effects estimates, and (M) represents results based on random effects estimates. * denotes significance at 5%; ** denotes significance at 1%; *** denotes significance at 0.1%. Exp(Coef.): the exponentiated value of the coefficient; SE: Standard Error. For both models, N = 7,277.
Pseudo R-square for Models 5.13-5.14 are 0.57 and 0.49 respectively.
Source: Author's analysis of the longitudinal CHARLS data.

Models 5.13 and 5.14 show that based on the fixed effects estimates, co-residing with one's adult children was associated with about a 20% of reduction in the amount of economic support received by older people (exp=0.802, p<0.001), and with almost 50% of reduction in the amount of economic support provided to adult children/ grandchildren (exp=0.466, p<0.001). The random effects estimates reveal consistent findings. The amount of economic support provided from adult children/ grandchildren was 36% less for respondents who co-resided with at least one child compared to their counterparts who did not co-reside with any child (exp=0.636, p<0.001). Meanwhile, respondents who co-resided with their adult children also provided a lower amount of economic transfers to their adult children compared to those who did not co-reside with their adult children (exp=0.539, p<0.001).

Among respondents who were widowed/ divorced/ separated, the amount of economic support received by older parents was 13% less compared to their counterparts who were married and living with their spouse (exp=0.872, p<0.001), and the amount of such support provided to their adult

children/ grandchildren was about half compared to their counterparts who were married and living with a spouse (exp=0.516, p<0.001). For the variable of working status, respondents who were currently working received a lower amount of economic support from their adult children (exp=0.709, p<0.001), and also provided a lower amount of such transfers to their adult children/ grandchildren (exp=0.411, p<0.001).

Table 5.3 also suggests that the amount of economic transfers provided bi-directionally increased in both 2013 and 2015 compared to 2011. Moreover, older people in the higher age groups received and provided a lower amount of economic transfers compared to those aged 45-59. For instance, the amount of upward economic transfers received by respondents aged 75 or over was 32% lower compared to that among those aged 45-59 (exp=0.683, p<0.001). The most pronounced difference was that the average amount of economic support provided from respondents who aged 75 or over to their adult children was 90% lower compared to that among those aged 45-59 (exp=0.083, p<0.001).

The respondent's Hukou status was also associated with the amount of economic transfers provided from/ to their adult children. Those with a non-agricultural Hukou received 14% more economic transfers from their adult children (exp=1.139, p<0.01), and provided 76% more such support to their adult children compared to their counterparts who had an agricultural Hukou (exp=1.762, p<0.001). The respondents' gender was not significantly associated with the amount of economic transfers they received/ provided. Compared to respondents who had received less than lower secondary education, those who had attained upper secondary tertiary or tertiary education received a higher amount of upward economic transfers (exp=1.300, p<0.001 and exp=1.480, p<0.05 respectively), and also provided more to their adult children (exp=1.334, p<0.001 and exp=1.629, p<0.001 respectively). Whether respondents had any chronic illnesses seemed to have no significant association with the amount of economic support received from/ provided to adult children. Finally, with every additional child they had, respondents received 17% higher economic transfers from their adult children/ grandchildren (exp=1.166, p<0.001).

Turning back to Table 5.2, Models 5.9 and 5.10 show the effects of co-residence with adult children and some socioeconomic factors on the receipt and provision of intergenerational social support. The results suggest that a transition from non-co-residence to co-residence (with adult children) was associated with a 68% increase in the odds of receiving support with (I)ADLs from adult children (OR=1.683, p<0.001). The returning home of adult children was significantly associated with older parents receiving assistance with (I)ADLs. One potential explanation may be that it is convenient and practical for children to provide support with ADLs or IADLs to their parents who live in the same

household. In addition, Model 5.10 suggests that the odds of grandchild care provision rose by 23% if older respondents experienced a change from non-co-residence to co-residence with adult children (OR=1.225, p<0.001). This may due to the fact that when older people live with their adult children, they are also more likely to co-reside with their grandchildren, and thus more likely to take care of them especially when their parents are out for work. To sum up, the modelling results show that respondents who had at least one adult child returning home were more likely to receive support with (I)ADLs, and to provide grandchild care compared to respondents who had no co-resident adult children at all waves.

In addition, there was no significant association between the changes in the marital status of respondents and the receipt of support with (I)ADLs from their adult children, and also no significant association between the changes in the marital status of respondents and their grandchild care provision. Interestingly, respondents who experienced a change from non-working to currently working status were less likely to receive support with (I)ADLs from their adult children (OR=0.649, p<0.001). This may be explained by the following two reasons. On the one hand, if respondents were happy to start working again after spending some time in a non-working status, they might be likely to have had an improvement in their health status as working requires a basic health and functional status (Opree and Kalmijn, 2012), and therefore, less likely to receive assistance with (I)ADLs from their adult children. On the other hand, respondents might have had to start working again if they did not have enough income, economic or social support provided from their adult children. For example, the adult children's out-migration may leave the agricultural work for their older parents to do, and in the meantime results in the reduction in the assistance with the (I)ADLs provided by adult children because of the geographical separation. There was no significant association between the change in the work status of respondents and their provision of grandchild care.

As stated earlier in this section, the ORs of (M)work, (M)co-residence and (M)work indicate between-individual differences. Compared to respondents who did not have any co-resident adult children, those who co-resided with at least one child were much more likely to receive support with (I)ADLs from their adult children (OR=3.502, p<0.001). This was consistent with previous findings indicating that the co-residence with adult children was positively associated with assistance with (I)ADLs provided by adult children (Silverstein *et al.*, 2006; Lin and Yi, 2011). It is known that a short geographical distance between older people and their adult children may increase older people's receipt of social support, as their children are able to provide such support to their parents at lower time, money and energy costs (Giles *et al*., 2010; Cong and Silverstein, 2014). Moreover,

respondents who co-resided with at least one adult child were also more likely to take care of their grandchildren (OR=3.704, p<0.001). This may result from the fact that the co-residence with any adult children strongly implies the co-residence with their grandchildren.

Models 5.9 and 5.10 also demonstrate that older people who had the other marital status (widowed/ divorced/ separated) were more likely to receive assistance with (I)ADLs from their adult children compared to their counterparts who were married and living with their spouse (OR=1.651, p<0.001). One possible explanation may be that people who were married and living with a spouse had a lower average age and better health status compared to their counterparts who had the other marital status (Liu and Guo, 2007). In addition, they were also able to receive support with (I)ADLs from their spouse when in need, hence were less likely to receive such support from their adult children compared to older people who were widowed/ divorced/ separated (Zhang and Li, 2011). By contrast, older people who had other marital status were less likely to look after their grandchildren compared to those who were married and living with their spouse (OR=0.710, p<0.001). A possible explanation for this was that people who were widowed/ divorced/ separated had a higher average age and were more likely to be in a vulnerable situation, hence were less likely to be able to provide grandchild care (ibid). Respondents who currently worked were much less likely to receive support with (I)ADLs from their adult children compared to their counterparts who did not work (OR=0.394, p<0.001). As suggested before in this section, being able to work may indicate a relatively good health status of respondents, which may thus influence the receipt of support with (I)ADLs from their adult children. No significant association was found between the working status of respondents and their provision of grandchild care.

In addition, Model 5.9 demonstrates that older people were more likely to receive support with (I)ADLs from their adult children in 2013 and 2015 compared to 2011 (OR=2.879, p<0.001 and OR=3.486, p<0.001 respectively). Again, this was due to the fact that respondents were older with the passage of time in longitudinal analysis, and thus were also more likely to encounter difficulty with (I)ADLs and more likely to receive support with this (see also Figure 4.5a in Section 4.2.1). Meanwhile, respondents were more likely to provide grandchild care in 2013 and 2015 compared to 2011 (OR=1.510, p<0.001 and OR=1.656, p<0.001 respectively). Respondents in the higher age groups (60-74, 75 or over) were more likely to receive support with (I)ADLs from their adult children compared to those aged 45-59 (OR=1.593, p<0.001 and OR=3.437, p<0.001 respectively), but less likely to take care of their grandchildren (OR=0.726, p<0.001 and OR=0.205, p<0.001 respectively). The results are consistent with Figures 4.21 and 4.22 in Section 4.2.1. This may due to the fact that respondents who were older were more likely to have limited functional capability and less healthy

status, thus being more likely to receive social support from their adult children and less likely to be able to take care of their grandchildren.

Compared to respondents who had an agricultural Hukou status, those had a non-agricultural Hukou were less likely to receive support with (I)ADLs from their adult children (OR=0.450, p<0.001), and more likely to provide support to their grandchildren (OR=1.295, p<0.01). This demonstrates the urban and rural differences in intergenerational social support exchange in China, where older people in urban areas were less likely to receive support with (I)ADLs from their adult children and more likely to take care of their grandchildren than their rural counterparts. As found in Chapter 2, older people who had a non-agricultural Hukou status were less dependent on their adult children, and were also less likely to have their adult children living nearby, which may explain the lower odds of receiving support with (I)ADLs from their adult children. In addition, respondents with a non-agricultural Hukou status were more likely to have more economic and social resources, which may result in the higher likelihood of grandchild care provision (Chen *et al.*, 2011). Another reason may be that respondents who had an agricultural Hukou status mainly lived in rural areas of China, with a large number of their children having migrated to live in urban areas. This may result in longer geographical distance between respondents and their grandchildren, and the lower odds in providing grandchild care by older people. Taking account the differences found in this section, the associations between older people's living arrangement with adult children and the exchange of intergenerational economic, social and psychological support are examined separately in rural and urban areas for further comparison.

Compared to their male counterparts, women were twice as likely to receive assistance with (I)ADLs from their adult children (OR=2.285, p<0.001). This evidence was consistent with previous findings showing that older women had a higher probability of receiving social support from adult children compared to older men (Leung *et al.*, 2007). On the one hand, female respondents were often more likely to undertake the role of a carer compared to their male counterparts (Khan, 2013). Therefore, male respondents in need of informal care were more likely to receive social support from their female partner rather than their adult children. By contrast, female respondents were more likely to receive such support from their adult children rather than their male partner (Zhao and Luo, 2017). On the other hand, this may be because female respondents had a higher life expectancy and were more likely to become dependent later in life compared to their male counterparts, therefore they were more likely to receive support with ADLs or IADLs from their adult children (Zeng and Vaupel, 2003). There was no significant association between the respondents' gender and their provision of

grandchild care. The education attainment of respondents seemed to have no association with the respondents' provision or receipt of social support. The only significant result was that respondents who had upper secondary education attainment were less likely to receive support with (I)ADLs from their adult children compared to their counterparts who had attained less than lower secondary education.

Model 5.9 also shows that respondents who had two chronic illnesses or more were twice as likely to receive support with (I)ADLs from their adult children compared to their counterparts who had no chronic illness (OR=2.063, $p<0.001$). This may result from a positive association between having poor chronic health and having poor (I)ADL functional status of respondents (Sands *et al.*, 2002). The more adult children respondents had, the more likely it was that they received support with (I)ADLs from their adult children (OR=1.155, $p<0.001$), and the less likely it was that they provided support to their grandchildren (OR=0.756, $p<0.001$).

Models 5.11 and 5.12 show the regression results by including 'having intergenerational weekly in-person/ distant contact' as a dependent variable. As clarified in this chapter earlier, whether respondents had any adult child living nearby, rather than having any co-resident adult child, was included in Models 5.11 and 5.12 in order to reduce the estimation biases (see also Section 5.1) and explore the impact on the changes in having weekly contact with adult children. In this thesis, older people having adult children living nearby referred to those living in the same household, community, village, town or city with their adult children (see further in Section 3.4).

The results suggest that a change from not living nearby with any adult children to living nearby with at least one child was associated with an increase in having weekly in-person contact with their adult children (OR=7.845, $p<0.001$). The high OR indicates the significant positive association between living within a short geographic distance and having intergenerational weekly in-person contact. In addition, Model 5.12 suggests that the odds among respondents of having weekly distant contact with their adult children reduced by 25% if they had at least one adult child moving closer to them (OR=0.751, $p<0.01$). It is worth noting that whether respondents had weekly distant contact with their adult children is only asked of those who had at least one non-co-resident child. Therefore, the result relating to having weekly distant contact may be underestimated. In sum, the modelling results show that respondents who had at least one adult child moving geographically closer were more likely to have weekly in-person contact with their adult children, and less likely to have weekly distant contact with them.

Model 5.12 also shows no significant association between the changes in the marital status of respondents and the weekly distant contact they had with their adult children. However, respondents who became widowed/ divorced/ separated were 14% more likely to report weekly in-person contact with their adult children compared to when they were married and living with their spouse (OR=1.142, $p<0.05$). There was no statistically significant association between the change in respondents' working status and having weekly in-person/ distant contact with their adult children.

Compared to respondents who did not have any adult children living nearby, those who had at least one child living nearby were much more likely to have weekly in-person contact with their adult children (OR=4.231, $p<0.001$). On the one hand, a short geographical distance is convenient for respondents and their adult children to visit each other on a weekly basis (Lin and Yi, 2011). On the other hand, respondents who had children living nearby may be more likely to remain in close relationship with their children due to a shorter geographical distance, and are thus more likely to remain in weekly in-person contact compared to their counterparts who did not have any adult children living nearby. In addition, respondents who had at least one adult child living nearby were less likely to have weekly distant contact with their adult children compared to their counterparts who did not have any adult children living nearby (OR=0.617, $p<0.001$). Model 5.12 also demonstrates that older people who had the other marital status (widowed/ divorced/ separated) were less likely to have contact with their adult children by phone/ mail/ email compared to their counterparts who were married and living with their spouse (OR=0.826, $p<0.05$). Respondents who currently worked were significantly less likely to have weekly in-person or distant contact with their adult children compared to their counterparts who did not work (OR=0.263, $p<0.001$ and OR=0.844, $p<0.05$ respectively).

In addition, Model 5.11 shows no statistically significant association between the survey years and having intergenerational weekly in-person contact. Model 5.12 demonstrates that older people were less likely to have distant contact with their adult children in 2013 compared to 2011 (OR=0.830, $p<0.001$). However, there were no significant differences in having weekly distant contact between 2011 and 2015. This was partly consistent with previous descriptive results where respondents were found to be less likely to have weekly distant contact in 2013 compared to 2011, but then more likely to do so in 2015 (see also Figure 4.6b in Section 4.2.1). This may again suggest a lagged effect of one's living arrangement with their adult children on having intergenerational weekly distant contact, and this hypothesis is examined in Section 5.3. Respondents in the higher age groups (60-74, 75 or over) were more likely to have weekly in-person contact (OR=1.435, $p<0.001$ and

OR=1.707, p<0.05 respectively), and less likely to have weekly distant contact with their adult children (OR=0.714, p<0.001 and OR=0.378, p<0.001 respectively) compared to respondents who aged 45-59. The results are in accordance with Figures 4.23 and 4.24 in Section 4.2.1. The findings indicate that the older people were, the less likely they were to have distant contact with their adult children, which may have a negative impact on the health and well-being of older people. Analyses relating to the relationship between changes in intergenerational support exchange and the health status of respondents is further explored in Chapter 6.

Compared to respondents who had an agricultural Hukou status, those who had a non-agricultural Hukou were more likely to have in-person and distant contact with their adult children (OR=2.320, p<0.001 and OR=1.605, p<0.001 respectively). A plausible explanation is that resulting from the massive rural to urban migration (NHFPC, 2017), a considerably large proportion of respondents who had an agricultural Hukou status lived far away from their adult children, thus were unlikely to see their children on a weekly basis due to a long geographical distance. No significant differences were found in having weekly in-person and distant contact with adult children between male and female respondents. There was also no significant association between the educational attainment of respondents and having weekly in-person contact with adult children. However, respondents who had attained a higher education were more likely to remain in weekly distant contact with their adult children. Specifically, respondents who had received upper secondary and tertiary education had a higher probability of having weekly distant contact with their adult children compared to those who had less than lower secondary attainment of education (OR=1.586, p<0.001 and OR=2.067, p<0.05 respectively).

Models 5.11 and 5.12 also show that there was no association between the number of chronic illnesses respondents had and their weekly contact with adult children. Each additional adult child respondents had was associated with a 15% increase in the odds of having weekly in-person contact with their adult children (OR=1.153, p<0.001). However, no significant association was found between the number of adult children the respondents had and having intergenerational weekly distant contact.

To sum up, the fixed-effects estimates show that having non-co-resident adult children moving back home was associated with a reduction in having economic support transfers provided bi-directionally, and an increase in receiving help with (I)ADLs from one's adult children and in providing grandchild care. Having at least one child living geographically closer to older parents was associated with an increase in having weekly in-person contact and a decrease in having weekly distant contact with their adult children. Meanwhile, being older, having an agricultural Hukou

status, lower education attainment, more chronic illnesses and more children were positively associated with receiving economic support from one's adult children/ grandchildren. Respondents of a younger age, with a non-agricultural Hukou status, higher education attainment and fewer children were more likely to provide economic transfers to their adult children/ grandchildren. In terms of social support, being older, female, having an agricultural Hukou status, two or more chronic illnesses and more children were positively associated with receiving support with (I)ADLs from their adult children, whereas those who were of a younger age, with a non-agricultural Hukou status and more children were more likely to take care of their grandchildren. Respondents of a younger age, having a non-agricultural Hukou status, two or more chronic illnesses and more adult children were more likely to have weekly contact with their adult children, whilst respondents of a younger age, with a non-agricultural Hukou status and higher education attainment were more likely to have weekly distant contact with their adult children.

The regression models in Section 5.2 have investigated the associations between changes in the living arrangement with adult children and changes in intergenerational support exchange over the same period of time. In order to enhance the ability to interpret the direction of causality in the associations between variables, the inclusion of a lagged effect is considered in Section 5.3. The results included in Section 5.3 are based on Models 5.15-5.20. This section examines the association between the changes in the living arrangement with adult children between Waves 1 and 2 and the changes in intergenerational support exchange between Waves 2 and 4 by incorporating a lagged independent variable. The results of the lagged models can also be used to compare with the results from Models 5.7-5.12, in order to estimate whether there is a consistent influence of the predictors over time.

5.3 Logistic Regression with a Lagged Effect: How have changes in the living arrangements with children impacted upon the changes in intergenerational support two years later?

As discussed earlier, a lagged model expresses that the dependent variable is affected by the independent variable at an earlier point of time (see further in Section 3.5.6). Among Models 5.15-5.20, only the lagged effects of co-residence or living nearby with adult children were estimated. The lagged effects of other predictors were not included in the models, as it would unnecessarily complicate the discussion (Allison, 2009). Table 5.4 only presents the ORs, SEs and significance levels of the main independent variable: co-residence or living nearby with any adult children. Estimates

for other variables such as gender, educational attainment and marital status were included in the models, but are not reported in Table 5.4, as they are very similar to Table 5.2.

Table 5.4 Two-year lagged associations between changes in the living arrangement with adult children and changes in economic, social support and weekly contact among respondents, the CHARLS (2011, 2013 & 2015)

Models	Dependent variables (13-15)	Independent variables (11-13)	Transition	OR	SE
		Co-residence with adult	0-0	1.384***	0.110
Model 5.15	Economic support from (grand)children	children (ref:1-1)	1-0	1.522***	0.151
			0-1	1.467**	0.189
		Co-residence with adult	0-0	0.998	0.058
Model 5.16	Economic support to (grand)children	children (ref:1-1)	1-0	0.820**	0.058
			0-1	0.815*	0.075
		Co-residence with adult	0-0	0.614***	0.057
Model 5.17	Help with (I)ADLs from adult children	children (ref:1-1)	1-0	0.626***	0.716
			0-1	0.626**	0.934
Model 5.18	Grandchild care provided from	Co-residence with adult	0-0	0.459***	0.027
	respondents	children (ref:1-1)	1-0	0.763***	0.054
			0-1	0.853	0.078
Model 5.19	Weekly in-person contact with adult	Living nearby to adult children	0-0	0.094***	0.012
	children	(ref:1-1)	1-0	0.151***	0.017
			0-1	0.308***	0.045
Model 5.20	Weekly distant contact with adult	Living nearby to adult children	0-0	1.360*	0.170
	children	(ref:1-1)	1-0	1.344**	0.149
			0-1	1.125	0.167

Notes: N = 7,277. * denotes significance at 5%; ** denotes significance at 1%; *** denotes significance at 0.1%. OR: Odds Ratio; SE: Standard Error. For independent variables, 1: yes; 0: no; 1-1 means co-residing with at least one child in both 2011 and 2013; 1-0 means co-residing with at least one child in 2011, but not doing so in 2013; etc.
Pseudo R-square for Models 5.15-5.20 are 0.78, 0.61, 0.42, 0.38, 0.79 and 0.37 respectively.
Source: Author's analysis of the longitudinal CHARLS data.

Model 5.15 shows that the changes in co-residing with adult children between 2011 and 2013 were positively associated with the changes in receiving economic support from adult children/ grandchildren between 2013 and 2015. Specifically, compared to respondents who co-resided with at least one adult child in both 2011 and 2013 (the reference group), their counterparts who did not co-reside with any adult child in 2011 or 2013 were more likely to receive upward economic support between 2013 and 2015 (OR=1.384, p<0.001). Moreover, respondents who had at least one co-resident child in 2011, and did not have any co-resident child in 2013 (1-0) had a higher probability than the reference group (1-1) to receive upward economic transfers between 2013 and 2015 (OR=1.522, p<0.001). The odds of receiving upward economic support between 2013 and 2015 among respondents who did not have any co-resident adult child in 2011 but had at least one such child in 2013 (0-1) were 1.5 times the odds among the reference group (1-1) (OR=1.467, p<0.01).

Model 5.16 suggests that the changes in the co-residence status with adult children between 2011 and 2013 predicted a decline in providing economic support to one's adult children/ grandchildren between 2013 and 2015. Compared to the reference group (1-1), their counterparts who had at least one of their adult child out-migrating (1-0) or moving back home (0-1) were less likely to provide economic support to their adult children/ grandchildren two years later (OR=0.820, p<0.01 and OR=0.815, p<0.05 respectively).

Compared with the reference group (1-1), their counterparts who had other status of co-residence with adult children (0-0, 1-0, 0-1) showed a lower probability of receiving help with (I)ADLs from their adult children (OR=0.614, p<0.001; OR=0.626, p<0.001 and OR=0.626, p<0.01 respectively). This indicates that respondents who co-resided with adult children were more likely to receive upward social support.

In addition, Model 5.18 demonstrates that the reference group (1-1) were the most likely to take care of their grandchildren. Compared to the reference group (1-1), respondents who did not co-reside with any adult child in 2011 or 2013 (0-0), and those who had at least one co-resident adult child in 2011, and no co-resident adult children in 2013 (1-0) had a lower probability of providing grandchild care (OR=0.459, p<0.001 and OR=0.763, p<0.001 respectively).

Model 5.19 shows that the reference group (1-1) were the most likely to have weekly in-person contact with their adult children. Not having any adult children living nearby between 2011 and 2013 implied a decline in having weekly in-person contact between 2013 and 2015. Additionally, Model 5.20 suggests that respondents who did not have any adult child living nearby between 2011 and 2013 were more likely to have weekly distant contact with their adult children compared to the reference group (OR=1.360, p<0.05). Moreover, respondents who lived nearby with their adult child in 2011, but did not have any child living nearby in 2013 were also more likely to have weekly distant contact with their adult child between 2013 and 2015 compared to the reference group (OR=1.344, p<0.01).

Overall, Section 5.3 has presented evidence to support the results found in Section 5.2, regarding the associations between the changes in the living arrangement with adult children and the exchanges of intergenerational support. The lagged effects considered in Section 5.3 have effectively strengthened the interpretation of the causal relationships in the analysis. Section 5.4 moves on to examine the associations between older people's living arrangement with adult children and the exchange of intergenerational economic, social and psychological support in rural and urban areas respectively, aiming to compare the flows of intergenerational support exchange in different regions and how they are influenced by older people's living arrangement with adult children in different regions.

5.4 Logistic Regression with a Hybrid Method: How have changes in the living arrangements with children and other sociodemographic factors impacted upon the changes in intergenerational support in rural and urban areas of China?

As discussed in the literature review and analysis in previous sections (see Chapters 2, 4 and 5), differences have been found in intergenerational support exchange in rural and urban areas, hence the models examined in Sections 5.2 and 5.3 may generate different results if implemented in rural and urban areas separately. Table 5.5 provides the modelling results based on the samples in rural and urban areas separately. Models 5.21 and 5.22 estimate the influence of living together with an adult child on older people's receipt of economic support in rural and urban areas respectively. Similarly, Models 5.23 - 5.28 estimate the influence of living together with an adult child on the provision of economic support from older people to their adult children/ grandchildren, the receipt of support with (I)ADLs from adult children, and the provision of grandchild care in rural and urban areas respectively. Finally, Models 5.29 – 5.32 estimate the influence of living nearby with an adult child on having weekly in-person and distant contact in rural and urban areas respectively.

The results in Table 5.5 show that the direction of the association between the living arrangement with adult children and the exchange of economic and social support were the same for older people in rural and urban areas. The odds of receiving upward economic support reduced for respondents who experienced a change from non-co-residing with any of their adult children to co-residing with at least one child in both rural and urban areas (OR=0.58, $p<0.001$ and OR=0.52, $p<0.001$ respectively). In addition, the odds among respondents of providing economic support to their adult children/ grandchildren reduced when they experienced a change from a non-co-residence to a co-residence status with their adult children in both rural and urban areas (OR=0.83, $p<0.001$ and OR=0.61, $p<0.001$ respectively). Therefore, the modelling results show that respondents who had at least one adult child moving back home were less likely to have economic transfers with their adult children/ grandchildren in both directions, regardless of their Hukou status.

Table 5.5 Regression of economic, social support and weekly contact on the living arrangement, by Hukou status, the CHARLS (2011, 2013 & 2015) %

Dependent variables	Model 5.21 Economic support from (grand)children	Model 5.22	Model 5.23 Economic support to (grand)children	Model 5.24	Model 5.25 Help with (I)ADLs from adult children	Model 5.26[a]	Model 5.27 Care to grandchildren	Model 5.28[a]	Model 5.29 Weekly in-person contact with adult children	Model 5.30	Model 5.31 Weekly distant contact with adult children	Model 5.32[a]
	Rural Hukou	Urban Hukou	Rural Hukou	Urban Hukou	Rural Hukou	Urban Hukou	Rural Hukou	Urban Hukou	Rural Hukou	Urban Hukou	Rural Hukou	Urban Hukou
Independent variables	**N=5,750**	**N=1,001**	**N=5,750**	**N=1,001**	**N=5,750**	**N=1,001**	**N=5,750**	**N=1,001**	**N=5,750**	**N=1,001**	**N=5,750**	**N=1,001**
Co-residence	0.58***	0.52***	0.83***	0.61***	1.63***	2.63***	1.17***	1.67**				
Living nearby									8.82***	5.70***	0.75**	0.51
Marital Status	0.78*	0.99	0.84*	0.86	1.16	1.41*	0.96	0.77	1.49***	0.78	1.06	0.71**
Currently work	1.24**	1.11	1.25**	1.22	0.65***	0.72	1.18*	0.94	0.88	0.92	1.00	0.80
Year (11)												
13	9.28***	13.20***	3.72***	3.62***	2.91***	2.55***	1.48***	1.82***	0.66***	0.66*	0.85***	0.72*
15	15.22***	17.16***	2.91***	3.50***	3.55***	2.73***	1.68***	1.58***	0.92	0.93	0.99	0.56***
Age (45-59)												
60-74	1.31***	1.66***	0.79***	1.62***	1.66***	1.02	0.74***	0.60***	0.74***	0.60*	0.71***	0.76
75 or over	1.28	1.67	0.51***	1.78**	3.31***	3.24**	0.20***	0.16***	0.76	0.48	0.35***	0.58
Gender (Male)												
Female	0.99	1.26	1.07	1.05	2.30***	2.49***	1.05	1.06	0.94	1.88**	1.02	1.27
Education (less than lower secondary)												
Upper secondary	0.80*	0.92	1.17	1.65***	0.36***	0.41*	1.07	0.70	1.26	1.20	1.46**	1.40
tertiary	0.82	0.67	1.37	1.36	0.39	0.57	1.22	1.14	0.66	1.70	2.03	1.41
Chronic illnesses (none)												
One	1.19**	1.20	1.01	1.13	1.19	0.93	1.06	1.49*	0.85	0.82	0.92	1.40
Two or more	1.25***	1.19	1.03	1.02	2.02***	2.39	1.02	1.08	0.80*	0.81	0.96	1.41
No. of children	1.61***	1.64***	0.99	0.93	1.13***	1.40***	0.77***	0.69***	1.15***	0.99	1.01	1.03
Pseudo R-square	0.65	0.39	0.42	0.35	0.48	0.43	0.29	0.41	0.79	0.68	0.36	0.42

Notes: Odds Ratio provided in the table. a: Models 5.26, 5.28 and 5.32 were estimated with random effects models based on the Hausman test results; all other models were estimated with a hybrid method combining fixed and random effects. * denotes significance at 5%; ** denotes significance at 1%; *** denotes significance at 0.1%.

Source: Author's analysis of the longitudinal CHARLS data.

Table 5.5 also shows the associations between co-residence with adult children and the receipt/ provision of social support. A transition from non-co-residence to co-residence (with adult children) was associated with an increase in the odds of receiving support with (I)ADLs from adult children, for respondents in both rural and urban areas (OR=1.63, $p<0.001$ and OR=2.63, $p<0.001$ respectively). Moreover, for both rural and urban areas, the odds of grandchild care provision rose if older respondents experienced a change from non-co-residence to co-residence with adult children (OR=1.17, $p<0.001$ and OR=1.67, $p<0.01$ respectively). To sum up, respondents who had at least one adult child returning home were more likely to receive support with their (I)ADLs, and to provide grandchild care, compared to respondents who had no co-resident adult children at all waves. The direction of such association was the same for older people in rural and urban areas.

The results further suggest that a change from not living nearby with any adult children to living nearby with at least one child was associated with an increase in the odds of having weekly in-person contact with their adult children, for respondents both in rural and urban areas. In addition, Table 5.5 shows that the odds of having weekly distant contact with their adult children reduced among respondents living in rural areas if they had at least one adult child moving closer to them. This association, however, did not hold for respondents in urban areas. In sum, respondents in both rural and urban areas who had at least one adult child moving geographically closer were more likely to have weekly in-person contact with their adult children, whereas only rural residents were less likely to have weekly distant contact with their children.

Moreover, among respondents in rural areas, the odds of receiving upward economic support reduced by about 20% for those who became widowed/ divorced/ separated. In addition, among older people in rural areas, those who were widowed/ divorced/ separated were also less likely to provide economic transfers to their adult children compared to their counterparts who were married and living with a spouse. This indicates that respondents in rural areas were less likely to have bi-directional economic transfers with their adult children when they experienced the separation from, or loss of, their partner. Meanwhile, married respondents in rural areas were more likely to have weekly in-person contact with their adult children. The marital status of respondents did not have a significant association with the exchange of intergenerational economic support for urban residents. However, respondents who were currently married in urban areas had lower odds of having weekly distant contact with their adult children compared to those having the other marital status.

A change from a not working to a currently working status was associated with an increase among rural residents in the probability of receiving upward economic transfers from their children/

grandchildren, providing economic transfers to their adult children/ grandchildren, and providing grandchild care. These respondents were less likely to receive support with (I)ADLs from their adult children compared to those who were not working currently. Among respondents in rural areas, those in the higher age groups (60-74, 75 or over) were more likely to receive upward economic support compared to those aged 45-59, but less likely to provide such support to their adult children/ grandchildren. However, among respondents in urban areas, the odds of providing economic support to their adult children were higher among those in the older age groups, compared to those aged between 45- 59. People in the older age groups were more likely to receive support with (I)ADLs from their adult children, and less likely to provide grandchild care in both rural and urban areas. Moreover, among respondents in rural areas, the older they were, the less likely they were to remain in weekly in-person contact with their adult children.

Older people with higher educational attainment were less likely to receive support with (I)ADLs from their adult children. In addition, for respondents in rural areas, the more chronic illnesses they had, the more likely they were to receive economic support from their adult children/ grandchildren; and the more adult children respondents had, the more likely they were to receive or provide economic support from/ to their adult children/ grandchildren. In addition, for both rural and urban residents, the more adult children respondents had, the more likely they were to receive informal care from their adult children, and the less likely they were to provide grandchild care.

To conclude the rich results provided in this chapter, the lagged fixed-effects models indicate that co-residing with adult children was associated with a decline in receiving upward economic support, a rise in receiving assistance with (I)ADLs from their adult children, and an increase in providing downward economic support and grandchild caring 2 years later. The above findings support Hypothesis 7 (the out-migration of adult children has a positive association with the receipt of upward economic support by older people), Hypothesis 8 (the out-migration of adult children reduces the provision of downward economic support by older people), and Hypothesis 9 (the out-migration of adult children has a negative association with the receipt of upward social support by older people), but does not support Hypothesis 10 (the out-migration of adult children has a positive association with the provision of grandchild care by older people). In addition, living nearby with at least one adult child implied a rise in having weekly in-person contact with their adult children, and a reduction in having weekly distant contact with their adult children 2 years later, which are consistent with Hypotheses 11 and 12. Importantly, older people in rural and urban areas of China experienced different receipt/ provision levels of intergenerational support exchanges, and their

living arrangements with adult children and a number of socio-demographic factors contributed to understanding such differences. The results are further discussed in combination with evidence from existing literature and policy implications in Chapter 7. Next, Chapter 6 aims to assess the impact of the exchange of intergenerational support on the physical and psychological health of older people, which addresses Research Question 4 of this study.

Chapter 6 Regression Results II: Intergenerational Support and Health among Older People

Chapter 2 has presented evidence from previous research, and revealed research gaps remained in examining changing intergenerational support and its impact upon older people's health status in China, such as the impact on older people's physical health, and rural and urban differences in such impact (e.g. Li, Song and Feldman, 2009; Sereny and Gu, 2011; Zhang *et al*., 2014). Having explored the associations between the changes in the living arrangement with adult children and intergenerational support exchanges in Chapter 5, this chapter aims to examine the potential associations between intergenerational support and the health status of respondents based on the Harmonised longitudinal CHARLS (e.g. Cong and Silverstein, 2008; Li *et al.*, 2014; Ni *et al.*, 2017; Qian *et al.*, 2017). This addresses Research Question 4 (*How have changes in intergenerational support within Chinese families impacted upon the physical and psychological well-being of older people in China?*).

Similar to Chapter 5, the results in this chapter are based on three steps of analyses of the Harmonised CHARLS. The first step involved basic binary and ordered logistic regression models, using the changes in respondents' health status as dependent variables and the changes in different types of intergenerational support as independent variables. The second step of analyses adopted random effects models in order to further estimate the predicting factors of the health status of respondents by including a number of control variables. Variables such as respondents' gender, marital status and co-residence with adult children were considered in the models. The final step further included lagged variables of intergenerational support, in order to explore whether changes in intergenerational support between 2011 and 2013 were associated with changes in respondents' self-rated health, (I)ADL functional status, life satisfaction and depression between 2013 and 2015. In addition, results focusing on rural and urban differences were shown in Section 6.4. As elaborated in Chapter 5, weights were not applied in the models in order to avoid imprecise estimations (see further in Chapter 5).

6.1 Basic Logistic Regressions: How have changes in intergenerational support within Chinese families impacted upon the physical and psychological well-being of older people in China?

Section 6.1 explores whether within-person changes in intergenerational support were associated with within-person changes in the respondents' health status with fixed effects models. Each of

the basic models included one dependent variable and six independent variables (which were the different types and directions of intergenerational support). Self-rated health (1=good, 2=fair, 3=poor), ADL and IADL functional status (1=severe functional impairment, 2=moderate impairment, 3=full function), life satisfaction (1=good, 2=fair, 3=poor) and depression (1=yes, 0=no) were adopted in order to measure the health condition of respondents (see Section 3.4 for further explanation for the measures of these variables). An ordered logistic regression model was used to estimate the associations for ordinal outcomes such as the respondents' self-rated health, having difficulties with (I)ADLs and life satisfaction (refer to Table 3.4 in Section 3.4 for further details about the variables); whilst a basic logistic regression model was employed for binary outcomes like depression status.

Table 6.1 shows the basic logistic regression results based on fixed effects models using the Harmonised CHARLS 2011-15. The results demonstrate that the within-person changes in intergenerational support exchange were significantly associated with the within-person changes in the respondents' health status, which are interpreted below.

Table 6.1 Logistic Regression of health status of respondents on economic, social support and weekly contact, the CHARLS (2011, 2013 & 2015)

	Model 6.1		**Model 6.2**		**Model 6.3**		**Model 6.4**		**Model 6.5**	
Dependent variables	Poorer self-rated health		Poorer ADL functional status		Poorer IADL functional status		Lower life satisfaction		Having depression	
Independent variables	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE
Economic support from (grand)children	1.148***	0.041	1.489***	0.069	1.285***	0.055	0.694***	0.025	0.982	0.040
Economic support to (grand)children	0.839***	0.027	0.915*	0.037	0.838***	0.032	0.887***	0.029	0.815***	0.032
Help with (I)ADLs from adult children	2.353***	0.140	5.164***	0.299	15.912***	0.908	1.003	0.062	2.514***	0.156
Care provided to grandchildren	0.939*	0.029	0.800***	0.031	0.818***	0.030	1.009	0.031	0.970	0.035
Weekly in-person contact with adult children	0.882***	0.030	0.913*	0.040	0.974	0.041	0.905**	0.032	0.836***	0.034
Weekly distant contact with adult children	0.862***	0.027	0.882***	0.034	0.804***	0.029	0.816***	0.025	0.821***	0.030

Notes: * denotes significance at 5%; ** denotes significance at 1%; *** denotes significance at 0.1%. OR: Odds Ratio; SE: Standard Error. N=7,277.
Pseudo R-square for Models 6.1-6.5 are 0.23, 0.12, 0.14, 0.19 and 0.31 respectively.
Source: Author's analysis of the longitudinal CHARLS data.

Specifically, Model 6.1 indicates that the receipts of economic and social support from adult children were positively associated with poorer self-rated health among the respondents. In particular, the receipt of upward economic support was associated with an increase in the odds of reporting poor self-rated health by 15% (OR=1.148, $p<0.001$), while the receipt of support with (I)ADLs was associated with higher odds of reporting poor self-rated health (OR=2.353, $p<0.001$). By contrast, Model 6.1 also shows that providing economic support to one's adult children

(OR=0.839, p<0.001), taking care of one's grandchildren (OR=0.939, p<0.05), and reporting weekly in-person/ distant contact (OR=0.882, p<0.001 and OR=0.862, p<0.001 respectively) were associated with lower odds of reporting poor self-rated health. Overall, receiving economic and social support from one's adult children/ grandchildren were associated with reporting poorer self-rated health among the respondents, whilst providing economic, social support to adult children/ grandchildren and having weekly in-person/ distant contact were associated with their better self-rated health. Notably, the evidence from Model 6.1 (also Models 6.2-6.5) is not strong enough to indicate a causal relationship between intergenerational support and the respondents' health status, a point which is addressed later in Section 6.3.

Models 6.2 and 6.3 provide the ordered logistic regression results on the associations between intergenerational support and the respondents' physical health status (having difficulties with (I)ADLs). As explained in Section 3.4, having a worse (I)ADL functional status refers to respondents who had a higher (I)ADL score in the successive wave, which indicates having a severer functional impairment. The results show that receiving economic and social support from one's adult children was associated with a worse (I)ADL functional status of older people, while providing economic and social support to one's adult children, and having weekly distant contact with them were associated with a lower likelihood of a poorer (I)ADL functional status. Specifically, the receipt of upward economic transfers was associated with higher odds of a poor ADL/ IADL functional status (OR=1.489, p<0.001 and OR=1.285, p<0.001 respectively). In addition, the odds of having a poor ADL/ IADL functional status were multiplied by 5 and 16 times respectively for older people who received support with ADLs/IADLs compared to when they did not receive such support (OR=5.164, p<0.001 and OR=15.912, p<0.001 respectively). The high ORs are likely to result from a reverse causal relationship (e.g. having poor physical health status increases the receipt of social support with (I)ADLs provided by adult children). Therefore, it is not appropriate to infer the impact of receiving support with (I)ADLs upon the respondents' (I)ADLs based on Models 6.2 and 6.3. Further investigation is required to strengthen the interpretation of such an analysis. Section 6.3 aims to achieve this by testing whether the associations hold with the inclusion of a lagged effect in the models.

In addition, providing economic and social support to adult children was associated with an 8% and 20% reduction in the odds of having poor ADL functional status (OR=0.915, p<0.05 and OR=0.800, p<0.001 respectively), and with a 16% and 18% reduction in the odds of having poor IADL functional status for older people (OR=0.838, p<0.001 and OR=0.818, p<0.001 respectively). Having weekly in-person and distant contact was associated with a decline in the odds of having poor ADL functional status (OR=0.913, p<0.05 and OR=0.882, p<0.001 respectively), and having

weekly distant contact was associated with a reduction in the odds of having poor IADL functional status among respondents (OR=0.804, p<0.001).

Model 6.4 shows that having bi-directional intergenerational economic transfers and weekly in-person/ distant contact was associated with lower probabilities of reporting a low life satisfaction. Receiving upward economic support was associated with lower odds of having a low satisfaction with life (OR=0.694, p<0.001). Providing economic support to one's adult children/ grandchildren was significantly associated with reporting a low life satisfaction (OR=0.887, p<0.001). Receiving support with (I)ADLs and providing grandchild care were not significantly associated with the report of life satisfaction. In addition, having weekly in-person/ distant contact with one's adult children were related to a reduction in the odds of reporting a low life satisfaction (OR=0.905, p<0.01 and OR=0.816, p<0.001).

Model 6.5 suggests that providing economic transfers to one's adult children/ grandchildren and having weekly in-person/ distant contact with one's adult children had a protective effect on older people's depression status (measured by whether respondents being depressed or not based on the CESD-10, see more in Section 3.4). The provision of economic support to one's adult children/ grandchildren was linked with lower odds of reporting depressive symptoms (OR=0.815, p<0.001). In addition, having weekly in-person/ distant contact with one's adult children was associated with lower odds of being depressed (OR=0.836, p<0.001 and OR=0.821, p<0.001). However, the receipt of support with (I)ADLs was significantly associated with an increase in the odds of reporting depressive symptoms (OR=2.514, p<0.001). Again, such findings deserve further exploration by comparing the results with the inclusion of control variables and a lagged effect in Sections 6.2 and 6.3 in order to strengthen the interpretation.

Overall, the basic logistic regression models show that receiving economic and social support from one's adult children was associated with higher probabilities of reporting poor self-rated health, and poor ADL and IADL functional status among older respondents. By contrast, providing economic and social support to adult children, and having weekly in-person and distant contact with adult children were associated with an improvement in the odds of reporting good self-rated health and good (I)ADL functional status. In terms of the respondents' psychological health, the higher life satisfaction of respondents was associated with having bidirectional economic transfers and weekly in-person/ distant contact with adult children; whilst reporting depressive symptoms was associated with receiving support with (I)ADLs from one's adult children. Moreover, the provision of economic support to one's adult children, and having weekly in-person/ distant contact with one's adult children were both linked with a reduction in the risk of reporting depression. Following the basic models, models incorporating controls for time-variant and time-invariant variables are elaborated in Section 6.2.

6.2 Logistic Regression with Random Effects: How have changes in intergenerational support and other sociodemographic factors impacted upon the physical and psychological well-being of older people in China?

As introduced at the beginning of this chapter, this section includes logistic regression models using the same dependent variables as those included in Models 6.1-6.5. In addition to the six variables measuring the different types and directions of intergenerational support, ten control variables were considered in the model. These were: survey year, age group respondents belonged to, co-residence with one's adult children, respondents' marital status, work status, Hukou status, gender, educational attainment, the number of chronic illnesses, and the number of children respondents had. The inclusion of these variables was based on the discussion in Chapters 2 and 5. Before modelling the associations, a Hausman test was conducted to assess whether the random effects coefficients were identical to the fixed effects coefficients (see further about this method in Section 3.5.3) (Allison, 2009). The test conducted in Stata 15 produced a p-value which was higher than 0.05, suggesting some evidence in favour of the random effects models. Therefore, unlike in Section 5.2, random effects regression models were employed for the estimates in this section.

Table 6.2 shows the ORs and SEs of the influence of the factors upon the self-rated health, ADL and IADL functional status, and the psychological health status of respondents based on the random effects models. The coefficients of the results are plotted and presented in Appendix H. Model 6.6 shows the influencing factors of respondents' self-rated health. The results suggest that the odds of having poor self-rated health were lower among respondents who provided economic support to their adult children compared to their counterparts who did not provide such support (OR=0.889, $p<0.001$). Moreover, respondents who had weekly in-person/ distant contact with their adult children were less likely to report poor self-rated health compared to their counterparts who did not have such contact (OR=0.795, $p<0.001$ and OR=0.873, $p<0.001$ respectively). However, the odds of reporting poor self-rated health were 1.8 times the odds among respondents who received support with (I)ADLs from their adult children compared to their counterparts who did not receive such support (OR=1.751, $p<0.001$). Receiving economic support from one's adult children and providing grandchild care were not significantly associated with the respondents' self-rated health, *ceteris paribus*.

Table 6.2 Regression of health status of respondents on intergenerational support, the CHARLS (2011, 2013 & 2015)

	Model 6.6		Model 6.7		Model 6.8		Model 6.9		Model 6.10	
Dependent	Poorer self-rated health		Poorer ADL functional status		Poorer IADL functional status		Lower life satisfaction		Having depression	
Independent	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE
Economic support from (grand)children	1.051	0.043	1.236***	0.066	1.082	0.053	0.859***	0.035	0.959	0.046
Economic support to (grand)children	0.889***	0.030	1.044	0.046	0.962	0.039	0.907**	0.031	0.904*	0.038
Help with (I)ADLs from adult children	1.751***	0.112	3.780***	0.239	12.714***	0.776	1.081	0.071	1.926***	0.131
Care provided to grandchildren	0.992	0.032	0.924*	0.038	0.920*	0.036	0.984	0.032	1.006	0.039
In-person contact with adult children	0.795***	0.036	0.812***	0.046	0.887*	0.048	0.879**	0.039	0.788***	0.043
Distant contact with adult children	0.873***	0.028	0.916*	0.038	0.842***	0.032	0.791***	0.026	0.833***	0.032
Year (11)										
13	0.859***	0.037	0.810***	0.044	0.908*	0.046	0.927	0.039	0.701***	0.036
15	0.717***	0.031	0.920	0.049	0.862**	0.044	0.433***	0.019	0.760***	0.038
Age (45-59)										
60-74	0.953	0.034	1.305***	0.062	1.372***	0.061	0.907**	0.033	1.049	0.046
75 or over	0.784**	0.065	1.614***	0.150	1.856***	0.164	0.587***	0.050	0.691***	0.072
Co-residing with children	1.100*	0.044	0.992	0.050	1.016	0.048	1.096*	0.043	1.044	0.051
Marital status (married)										
Divorced/ separated	0.997	0.199	0.897	0.233	0.730	0.185	2.153***	0.432	1.925**	0.414
widowed	0.905	0.050	0.914	0.059	0.678***	0.042	1.172**	0.066	1.450***	0.088
Never married	4.881**	2.988	1.916	1.304	1.564	0.985	1.675	0.908	0.868	0.596
Currently in work	0.641***	0.025	0.559***	0.025	0.547***	0.023	1.039	0.040	0.980	0.044
Hukou (agricultural)										
Non-agricultural	0.663***	0.035	0.670***	0.047	0.511***	0.036	0.928	0.048	0.646***	0.046
Gender (Male)										
Female	1.258***	0.041	1.228***	0.052	1.532***	0.061	1.029	0.034	1.883***	0.076
Education (less than lower secondary)										
Upper secondary	0.765***	0.048	0.778**	0.076	0.578***	0.058	1.010	0.063	0.569***	0.056
Tertiary	0.696*	0.126	0.582	0.168	0.361**	0.127	1.087	0.195	0.550	0.179
Chronic illnesses (none)										
One	1.944***	0.088	1.834***	0.137	1.273***	0.076	1.243***	0.056	1.664***	0.104
Two or more	5.055***	0.218	3.889***	0.258	2.104***	0.112	1.570***	0.064	3.065***	0.173
No. of children (cont.)	1.079***	0.015	1.082***	0.018	1.048**	0.016	0.990	0.014	1.033*	0.017

Notes: * denotes significance at 5%; ** denotes significance at 1%; *** denotes significance at 0.1%. OR: Odds Ratio; SE: Standard Error. N=7,277.
Pseudo R-square for Models 5.7-5.12 are 0.54, 0.32, 0.33, 0.32 and 0.68 respectively.
Source: Author's analysis of the longitudinal CHARLS data.

In addition, respondents were less likely to report poor self-rated health in 2013 and 2015 compared to 2011 (OR=0.859, p<0.001 and OR=0.717, p<0.001 respectively). Interestingly, the odds of reporting poor self-rated health were significantly lower among respondents aged 75 or over compared to their counterparts who were aged between 45-59 (OR=0.784, p<0.001). Moreover, being never married, female, co-residing with at least one adult child, and having chronic illnesses were associated with reporting poor self-rated health. Specifically, the odds of reporting poor self-rated health among respondents who were never married were 4.9 times the odds among their

counterparts who were married and living with their spouse (OR=4.881, p<0.01). The odds of reporting poor self-rated health were 26% higher among female respondents compared to their male counterparts (OR=1.258, p<0.001), and such odds were 10% higher among respondents who co-resided with at least one adult child compared to their counterparts who did not co-reside with any adult child (OR=1.110, p<0.05). Compared to their counterparts who did not have any chronic illnesses, respondents who had one chronic illness were twice as likely to report poor self-rated health (OR=1.944, p<0.001), and those who had two or more chronic illnesses were 5 times as likely to do so (OR=5.055, p<0.001). Finally, the more children respondents had, the more likely they were to report poor self-rated health (OR=1.079, p<0.05).

By contrast, working, having a non-agricultural Hukou status and having higher educational qualifications were associated with lower likelihoods of reporting poor self-rated health. The odds of reporting poor self-rated health among currently working respondents were 0.6 times the odds among those who were not working (OR=0.641, p<0.05). Meanwhile, respondents with a non-agricultural Hukou status had a lower probability of reporting poor self-rated health compared to their counterparts with an agricultural Hukou status (OR=0.663, p<0.001). In addition, compared to respondents who had received less than lower secondary education, the odds of reporting poor self-rated health decreased by 23% among respondents who had attained upper secondary education (OR=0.765, p<0.001) and by 30% among respondents who had attained tertiary education (OR=0.696, p<0.05).

Models 6.7 and 6.8 demonstrate the determinants of the ADL and IADL functional status of respondents with ORs and SEs generated from the random effects estimates. The results suggest that the odds of having difficulties with (I)ADLs increased among respondents who received economic and social support from their adult children compared to those who did not receive such support, and reduced among respondents who had weekly in-person/ distant contact with their adult children compared to their counterparts who did not have such contact. For example, the odds of reporting poor ADL functional status among respondents who received upward economic support were 1.2 times the odds among their counterparts who did not receive such support (OR=1.236, p<0.001). The odds of having a poor ADL functional status among respondents who received support with (I)ADLs were 3.8 times the odds among those who did not receive such support (OR=3.780, p<0.001). Meanwhile, respondents who had weekly in-person/ distant contact with their adult children were less likely to report having difficulties with ADLs/IADLs compared to their counterparts who did not have such contact (ORs ranged between 0.8-0.9, all statistically significant).

As shown by Models 6.7 and 6.8, respondents were less likely to report poor ADL and IADL functional status in 2013 and 2015 compared to 2011 (ORs ranged between 0.8-0.9, all statistically significant). In addition, respondents who were aged 60 or over (including those who were aged 60-74, and 75 or over) were more likely to report poor ADL and IADL functional status compared to those who were aged between 45-59 (ORs ranged between 1.3 and 1.9, all statistically significant). Moreover, working, having a non-agricultural Hukou status and having received a higher education were associated with lower likelihoods of having difficulties with ADLs and IADLs. The odds of reporting poor ADL and IADL functional status among currently working respondents were 0.6 and 0.5 times the odds among those who were not working (OR=0.559, $p<0.001$ and OR=0.547, $p<0.001$ respectively). Meanwhile, respondents with a non-agricultural Hukou had a lower probability of reporting poor ADL and IADL functional status compared to their counterparts with an agricultural Hukou (OR=0.670, $p<0.001$ and OR=0.511, $p<0.001$ respectively). In addition, compared to respondents who had received less than lower secondary education, the odds of reporting poor ADL functional status decreased by 22% among respondents with upper secondary education (OR=0.778, $p<0.01$). Meanwhile, compared to respondents who had received less than lower secondary education, the odds of reporting poor IADL functional status decreased by 42% among respondents who had attained upper secondary education and by 64% among those with tertiary education (OR=0.578, $p<0.001$ and OR=0.361, $p<0.01$ respectively).

Being female and having chronic illnesses were associated with a higher likelihood of reporting poor ADL and IADL functional status. Specifically, the odds of reporting difficulties with ADLs and IADLs among female respondents were 1.2 and 1.5 times the odds among their male counterparts (OR=1.228, $p<0.001$ and OR=1.532, $p<0.001$ respectively). In addition, compared to their counterparts who did not have any chronic illness, respondents who had one chronic illness were almost twice as likely to report poor ADL functional status (OR=1.834, $p<0.001$), and those having two chronic illnesses or more were 3.9 times more likely to do so (OR=3.889, $p<0.001$). Similarly, respondents having one chronic illness were 1.3 times as likely to report poor IADL functional status (OR=1.273, $p<0.001$), and those who had two or more chronic illnesses were twice as likely to do so compared to their counterparts who did not have any chronic illnesses (OR=2.104, $p<0.001$). Finally, the more children respondents had, the more likely they were to have poor ADL and IADL functional status (OR=1.082, $p<0.001$ and OR=1.048, $p<0.01$ respectively).

Models 6.9 and 6.10 present the results on the associations between intergenerational support exchanges and the respondents' psychological health status. Model 6.9 shows that receiving/ providing economic support from/ to one's adult children and having weekly in-person/ distant contact with them were associated with a lower likelihood of reporting a low life satisfaction. For

example, the odds of reporting a low life satisfaction were lower among respondents who received upward economic support compared to their counterparts with no such support receipt (OR=0.859, p<0.001). Respondents providing economic support to their adult children were also less likely to have a low life satisfaction compared to those who did not make such provision (OR=0.907, p<0.001). Among respondents who had weekly in-person and distant contact with adult children, the odds of having a low life satisfaction were 0.9 and 0.8 times respectively the odds among their counterparts who did not have such contact (OR=0.879, p<0.01 and OR=0.791, p<0.001 respectively).

Meanwhile, respondents were less likely to report a low life satisfaction in 2015 (OR=0.433, p<0.001) compared to 2011. Respondents in the higher age groups were also less likely to report a low life satisfaction. The odds of having a low life satisfaction among those who were aged 60-74 and 75 or over were 0.9 and 0.6 times the odds among respondents aged 45-59 (OR=0.907, p<0.01 and OR=0.587, p<0.001 respectively). In addition, co-residing with any adult child, being divorced/ separated/ widowed and having at least one chronic illness were associated with a higher likelihood of reporting a low life satisfaction. Specifically, the odds of reporting a low life satisfaction among respondents who co-resided with at least one adult child were 1.1 times the odds among those who did not co-reside with any adult child (OR=1.096, p<0.05). Respondents who were divorced/ separated were twice as likely to report a low life satisfaction (OR=2.153, p<0.001) and those who were widowed were slightly more likely to have a low life satisfaction (OR=1.172, p<0.01) compared to their counterparts who were married and living with their spouse. Moreover, compared to their counterparts who did not have any chronic illnesses, respondents who had one chronic illness were more likely to report a low life satisfaction (OR=1.243, p<0.001), and those with two or more chronic illnesses were 1.5 times as likely to do so (OR=1.570, p<0.001).

Model 6.10 illustrates that providing economic support to one's adult children and having weekly in-person/ distant contact with them were associated with a lower likelihood of reporting depressive symptoms. For example, the odds of having depressive symptoms reduced by 10% among respondents who provided downward economic support (OR=0.904, p<0.05), while the same odds among respondents who had weekly in-person and distant contact with adult children were both 0.8 times (OR=0.788, p<0.001 and OR=0.833, p<0.001 respectively) the odds among those who did not have such contact. By contrast, respondents who received support with (I)ADLs were almost twice as likely to report being depressed (OR=1.926, p<0.001).

Meanwhile, respondents were less likely to report depressive symptoms in 2013 and 2015 compared to 2011 (OR=0.701, p<0.001 and OR=0.760, p<0.001 respectively). Respondents who were aged 75 or over were also less likely to have depressive symptoms compared to respondents who were aged 45-59 (OR=0.691, p<0.001). In addition, being female, divorced/ separated/ widowed and having at least one chronic illness were associated with a higher likelihood of reporting depressive symptoms. Specifically, the odds of having depressive symptoms for female respondents were 1.8 times the odds among male respondents (OR=1.883, p<0.05). Respondents who were divorced/ separated were twice as likely to be depressed (OR=1.925, p<0.01) and those who were widowed were 1.5 times as likely to be depressed, compared to their counterparts who were married and living with their spouse (OR=1.450, p<0.001). Moreover, compared to their counterparts who did not have any chronic illnesses, those who had one chronic illness were more likely to have depressive symptoms (OR=1.664, p<0.001), and those with two or more chronic illnesses were three times as likely to do so (OR=3.065, p<0.001). Moreover, the more children respondents had, the more likely they were to have depressive symptoms (OR=1.033, p<0.001).

By contrast, respondents with a non-agricultural Hukou status and upper secondary education attainment were less likely to have depressive symptoms compared to their counterparts with an agricultural Hukou/ less than lower secondary education attainment. Compared to respondents who had an agricultural Hukou status, the odds of being depressed were 0.6 times the odds among their counterparts who had a non-agricultural Hukou status. In addition, the odds of having depressive symptoms reduced by 50% for respondents with upper secondary education attainment compared to their counterparts who had received less than lower secondary education.

To sum up, the random effects estimates show that receiving upward economic support was associated with a deterioration in the ADL functional status and an improvement in the life satisfaction among respondents. Meanwhile, the provision of downward economic support was associated with better self-rated health and life satisfaction among respondents. In addition, respondents who provided economic support to their adult children/ grandchildren were less likely to report depressive symptoms. Not surprisingly, the receipt of support with (I)ADLs was highly associated with respondents' ADL and IADL functional status. The results also suggest that receiving support with (I)ADLs was associated with an increase in the odds of reporting poor self-rated health and having depressive symptoms. Providing grandchild care was positively associated with good ADL and IADL functional status among respondents. Importantly, positive associations were found between having intergenerational in-person/ distant contact and all types of good health status among respondents.

Models 6.6-6.10 demonstrate significant associations between intergenerational support exchanges and the health status of respondents, however such results may be challenged with the possibility of a reverse causal relationship between the variables (Liu and Zhang, 2017; Zheng and Zheng, 2017). For example, there was a positive association between providing grandchild care and respondents' good ADL/IADL functional status. Two potential interpretations may explain such association. On the one hand, older people might be more likely to take care of their grandchildren as they had better ADL/IADL functional status. On the other hand, the provision of grandchild care might be beneficial for older people's physical health and result in an improvement in their ADL/IADL functional status (Zhou *et al.*, 2017). This uncertainty about the direction of causal relationships also applies to other results in Tables 6.1 and 6.2.

In order to strengthen the interpretation for the direction of causality in the associations between variables, a lagged effect is considered in Section 6.3. As elaborated in Chapter 3, models including lagged effects examine the association between the changes in intergenerational support between Waves 1 and 2 and the changes in the health status of respondents between Waves 2 and 4. This strategy strengthens the power of predictors in Models 6.6-6.10, and the comparison between the results in Sections 6.2 and 6.3 can help to examine whether the influence of the predictors was consistent over time.

6.3 Logistic Regression with a Lagged Effect: How have changes in intergenerational support impacted upon the physical and psychological well-being of older people in China two years later?

Among Models 6.11-6.15, the lagged effects of different types and directions of intergenerational support and weekly contact were estimated in order to examine the effects upon the respondents' health status. Respondents who did not receive or provide intergenerational support between 2011 and 2013 were treated as the reference group (0-0 indicating no receipt/ provision at both time points), while their counterparts who had the support exchange in at least one survey year (1-0 indicating receipt in 2011 but no receipt in 2013/ 0-1 indicating no receipt in 2011 and receipt in 2013/ 1-1 indicating receipt at both time points) were compared to the reference group in order to assess the impact of the changes in intergenerational support exchanges. Similar to Section 5.3, estimates for the control variables such as respondents' gender, educational attainment and marital status are not reported in Table 6.3, as they are almost identical to those in Table 6.2. Table 6.3

shows results on the two-year lagged associations between the changes in intergenerational support and health status of respondents.

Table 6.3 Two-year lagged associations between changes in intergenerational support and changes in the health status of respondents, the CHARLS (2011, 2013 & 2015)

Dependent variables (13-15)		**Model 6.11**		**Model 6.12**		**Model 6.13**		**Model 6.14**		**Model 6.15**	
		Poorer self-rated health		**Poorer ADL functional status**		**Poorer IADL functional status**		**Poorer life satisfaction**		**Having depression**	
Independent variables (11-13)	Transition	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE
Economic support from (grand)children (ref:0-0)	0-1	1.014	0.098	0.791	0.095	0.943	0.108	0.942	0.091	0.792*	0.093
	1-0	1.103	0.190	0.967	0.205	0.893	0.182	1.073	0.186	0.655	0.137
	1-1	1.067	0.104	0.930	0.112	1.083	0.124	0.920	0.090	0.735**	0.087
Economic support to (grand)children (ref:0-0)	0-1	0.852	0.054	0.893	0.069	0.853	0.627	1.004	0.072	0.931	0.068
	1-0	0.737**	0.070	0.614	0.080	0.787*	0.911	0.779*	0.082	0.890	0.098
	1-1	0.834	0.075	0.711**	0.081	0.639***	0.981	1.010	0.101	0.920	0.096
Help with (I)ADLs from adult children (ref:0-0)	0-1	1.281	0.148	1.691***	0.227	2.489***	0.274	1.096	0.127	1.240	0.172
	1-0	1.523	0.289	1.255	0.388	1.364***	0.257	1.224	0.231	1.416	0.339
	1-1	2.887	0.884	1.881*	1.011	2.718***	1.656	0.839**	0.256	1.191	0.532
Care provided to grandchildren (ref:0-0)	0-1	1.095	0.091	0.946	0.096	0.905	0.087	1.031	0.077	0.996	0.091
	1-0	0.838	0.076	0.866	0.096	0.728*	0.080	1.269	0.088	0.855	0.084
	1-1	0.983	0.067	0.872	0.073	1.049	0.079	1.377**	0.067	1.048	0.080
In-person contact with children (ref:0-0)	0-1	0.846	0.115	0.748	0.124	1.040	0.160	1.016	0.139	0.903	0.142
	1-0	1.005	0.131	1.139	0.181	1.051	0.160	0.895	0.116	0.861	0.138
	1-1	0.893	0.101	0.807	0.112	0.821	0.108	0.849	0.096	0.821	0.103
Distant contact with children (ref:0-0)	0-1	1.026	0.091	1.097	0.118	0.823*	0.082	0.770**	0.068	0.938	0.100
	1-0	1.151	0.096	1.036	0.104	0.836	0.080	0.904*	0.071	1.053	0.106
	1-1	0.980	0.069	1.025	0.896	0.794**	0.064	0.761***	0.051	0.886*	0.076

Notes: * denotes significance at 5%; ** denotes significance at 1%; *** denotes significance at 0.1%. OR: Odds Ratio; SE: Standard Error. For independent variables, 1: yes; 0: no; 1-1 means receiving/ providing support in both 2011 and 2013; etc. N=7,277.

Pseudo R-square for Models 5.15-5.20 are 0.78, 0.61, 0.48, 0.51 and 0.75 respectively.

Source: Author's analysis of the longitudinal CHARLS data.

Many of the associations between intergenerational support exchange and health of respondents shown in Table 6.2 do not hold in the lagged effects models in Table 6.3. Model 6.11 shows that the changes in respondents' provision of economic support had an influence on the changes in their self-rated health. Specifically, compared to respondents who did not provide economic support in both 2011 and 2013, those who provided such support to their adult children in 2011 but did not do so in 2013 were less likely to report a deterioration in their self-reported health status between 2013 and 2015, after controlling for all confounders (OR=0.737, $p<0.01$). This indicates that a reduction in the provision of economic support to their adult children was associated with an improvement in the respondents' self-rated health two years later, which may be explained by the lessening in older people's economic pressure.

Model 6.12 shows that compared to respondents who did not provide economic support in both 2011 and 2013, those who provided such support to their adult children in either 2011 or 2013 were

less likely to report a deterioration in the ADL functional status between 2013 and 2015 (OR=0.711, p<0.01). This shows that the provision of economic support by respondents was associated with their better ADL functional status two years later. In addition, results also suggest that compared to respondents who did not receive any support with (I)ADLs (0-0), those who received such support in 2013 (0-1/ 1-1) were more likely to report worse ADL functional status between 2013 and 2015 (OR=1.691, p<0.001 and OR=1.881, p<0.05 respectively).

Similarly, Model 6.13 shows that compared to respondents who did not provide economic support in both 2011 and 2013, those who provided such transfers to their adult children in both years were less likely to have a deterioration in their IADL functional status between 2013 and 2015 (OR=0.639, p<0.001). Furthermore, compared to respondents who did not receive support with (I)ADLs in both 2011 and 2013, their counterparts who received such support in either 2011 or 2013 were more likely to report a deterioration in their IADL functional status between 2013 and 2015 (ORs ranged between 1.3 and 2.8, all statistically significant). However, as the respondents' receipt of social support is measured by the assistance with (I)ADLs they received, this variable is contaminated, thus is highly likely to be significantly associated with the ADL or IADL functional status of respondents due to endogeneity despite a lagged effect being considered in the models. Meanwhile, compared to respondents who did not have weekly contact with their adult children in both 2011 and 2013, older people who had weekly distant contact with their adult children in 2013 (0-1/ 1-1) were less likely to report poorer IADL functional status between 2013 and 2015 (OR=0.823, p<0.05 and OR=0.794, p<0.01 respectively).

Model 6.14 also demonstrates that compared to respondents who did not provide economic support in both 2011 and 2013, those who provided such support in 2011 but did not do so in 2013 were less likely to have a low life satisfaction between 2013 and 2015 (OR=0.779, p<0.05). This indicates an experience from providing economic support to adult children/ grandchildren to not doing so was associated with an improvement of older people's life satisfaction two years later. In addition, Model 6.14 suggests that compared to respondents who did not receive support with (I)ADLs in both 2011 and 2013, their counterparts who received such support in both years were less likely to have a lower life satisfaction between 2013 and 2015 (OR=0.839, p<0.01). This shows that the receipt of support with (I)ADLs was beneficial for the life satisfaction among older people two years later (although receiving help with (I)ADLs was not found to have a positive effect on older people's physical health). In addition, providing grandchild care in both 2011 and 2013 was associated with the report of lower life satisfaction between 2013 and 2015 (OR=1.377, p<0.01),

while having frequent distant contact with one's adult children was associated with a reduction in reporting lower life satisfaction (ORs ranged between 0.7 and 0.9, all statistically significant).

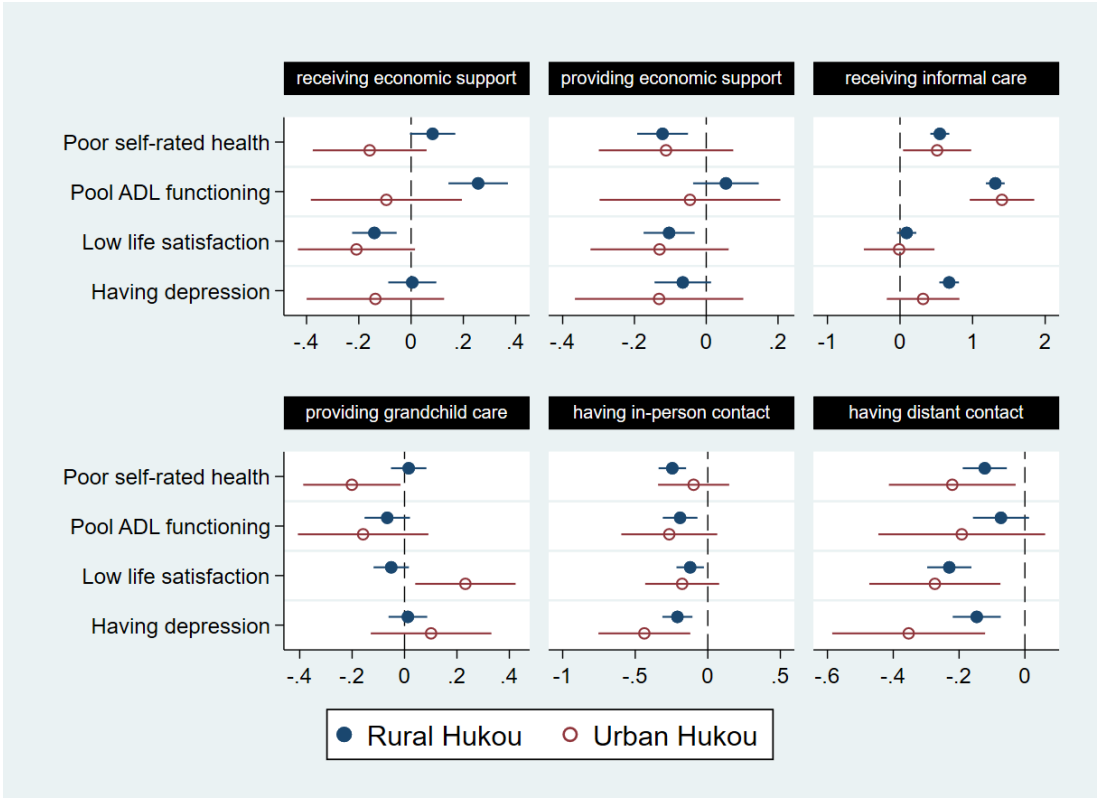
Model 6.15 suggests that compared to respondents who did not receive economic support from their adult children in both 2011 and 2013, their counterparts who received such support in 2013 (0-1/ 1-1) were less likely to report a depression status between 2013 and 2015 (OR=0.792, $p<0.05$ and OR=0.735, $p<0.01$ respectively). This shows that the receipt of economic support from adult children/ grandchildren was associated with the improvement of depressed status among older people two years later. In addition, older people who had weekly distant contact with their adult children in 2011 and 2013 were less likely to report depressive symptoms between 2013 and 2015 (OR=0.886, $p<0.05$).

It is important to note that only some of the associations between the intergenerational support/ contact and the respondents' health status hold among Models 6.11-6.15, which is different from the results in Section 6.2, where lagged effects were not included in the model estimation. This may suggest that some of the modelling results in Table 6.2 were influenced by reverse causality, which is further discussed in Chapter 7. The next section moves on to investigate the rural and urban differences in the influence of intergenerational support exchange on the physical and psychological health status of older people in China.

6.4 Logistic Regression with Random Effects: How have changes in intergenerational support and other sociodemographic factors impacted upon the physical and psychological well-being of older people in rural and urban areas of China?

The direction and strength of the associations between different types of intergenerational support exchange and the health condition of older people may vary according to the areas where older people live in (Luo *et al.*, 2017). Figure 6.1 presents the results of the four models examining the influence of intergenerational support exchange on the self-rated health, ADL functional status, life satisfaction and depression status of older people by coefficients plots. The figure does not show the modelling results of older people having difficulties with IADL functional status, as these were very similar to the results of having ADL functional difficulties. The model estimation includes covariates such as respondents' age, gender, marital status, educational attainment, whether currently working, co-residing with at least one adult child, the number of chronic illnesses and the number of children alive, however these were omitted in Figure 6.1 for the clarity of result visualisation.

Figure 6.1 shows that the receipt of economic support by older people was associated with the report of high life satisfaction and poor physical health (ADL functional status) in rural areas. Specifically, for older people in rural areas, the odds of reporting poor ADL functional status increased among older people who received economic support from their adult children; whereas the odds of having low life satisfaction reduced among those who received such support. However, receiving economic transfers from adult children did not have a significant association with the health status of older people in urban areas.



Note: covariates such as the age, gender, marital status, educational attainment, whether currently working, co-residing with at least one adult child, the number of chronic illnesses and children were also included in the models, however these were omitted in Figure 6.1 for the clarity of result visualisation. N=6,751 for rural models and N=1,001 for urban models.
Source: Author's analysis of the longitudinal CHARLS data.

Figure 6.1 Influence of the exchange of intergenerational support on the health status of older people in rural and urban areas

In addition, the odds of having poor self-rated health and low life satisfaction reduced among older people who provided economic support to their adult children/ grandchildren in rural areas, which indicates that the provision of economic support to one's adult children was positively associated with older people's self-rated health and life satisfaction in rural areas. However, the provision of downward economic support did not have any significant association with the health status of older people in urban areas. The results suggest that the health of older people in urban areas was less

likely to be influenced by the exchange of economic support, which may due to the fact that respondents in urban areas had more economic resources and were less economically dependent on their adult children compared to their rural counterparts (Ma *et al.*, 2011).

For older people in rural areas, the odds of reporting poor self-rated health were higher among respondents who received support with (I)ADLs from their adult children compared to their counterparts who did not receive such support. Moreover, receiving support with (I)ADLs from one's adult children was associated with having poor ADL functional status and reporting depressive symptoms among older people in rural areas. Similar associations between receiving support with (I)ADLs and the respondents' self-rated health/ ADL functioning were also found among older people in urban areas. This could be explained by the fact that receiving support with (I)ADLs is often associated with the loss of independence and deterioration in one's health condition, which is further discussed in Chapter 7.

Interestingly, the provision of grandchild care did not have significant associations with older people's health status in rural areas. However, this was associated with a reduction in the odds of reporting a poor self-rated health, and an increase in the odds of reporting a low life satisfaction among older people in urban areas. Overall, grandchild care provision was a stronger predictor for the health of older people in urban areas compared to those in rural areas.

Having weekly in-person or distant contact with one's adult children improved older people's report of self-rated health, ADL functional status, life satisfaction and depression in rural areas. For example, rural respondents who had weekly in-person contact with their adult children were less likely to report poor self-rated health compared to their counterparts who did not have such contact. In addition, having weekly in-person contact showed a protective effect in terms of reporting depression among older people in both rural and urban areas. Meanwhile, having distant contact with adult children was negatively associated with older people's report of poor self-rated health, low life satisfaction and depression in both rural and urban areas.

To conclude, the lagged effects models in this chapter show no significant association between the receipt of upward economic support and an improvement in respondents' self-rated health, which does not support Hypothesis 13. In addition, the results further reveal the positive association between the provision of downward economic support and the respondents' (I)ADL functional status two years later, which is a unique contribution of this research compared to existing literature. Meanwhile, the provision of downward economic support was associated with a low life satisfaction among respondents two years later, which is consistent with Hypothesis 14. Moreover, Hypothesis 15 proposed a positive association between the receipt of social support and an improvement in the

(I)ADL functional status among older people. This current study does not provide evidence for this hypothesis, but demonstrates that receiving the support with (I)ADLs from adult children was associated with a low likelihood of reporting poorer life satisfaction two years later. Meanwhile, the results provide further support for Hypothesis 16, by showing a significant association between grandchild care provision and low life satisfaction among older people. Having weekly in-person and distant contact with adult children was associated with a reduction in reporting depressive symptoms among older people in rural and urban areas two years later, which provides evidence for Hypotheses 17 and 18. Overall, older people in rural areas were more vulnerable compared to their urban counterparts, as their health was more likely to deteriorate if the receipt of intergenerational support reduced. Importantly, older people's health was more likely to be influenced by the provision of grandchild care in urban areas compared to rural areas.

The following chapter discusses the findings from this current study, and critically evaluates how these findings can provide further support or contrary evidence for the previous research investigating intergenerational support in China, and address the research gaps manifested in Chapter 2. The contributions of this current study, its limitations and policy implications are also discussed in Chapter 7.

Chapter 7 Discussion and Conclusion

This chapter mainly serves two functions. On the one hand, it considers the results of this current study, critically compares them with existing literature, and addresses the research questions of the thesis. On the other hand, this chapter aims to summarise the main arguments covered in the previous chapters, discuss the key policy implications, acknowledge the limitations and contributions of the study and make recommendations for future research directions. These are presented in five main sections. The chapter starts with a restatement of the study aims, followed by a summary of current study findings in response to the four research questions, along with a critical discussion about the consistencies and differences between the current findings and the existing literature (Sections 7.1 and 7.2). The third section deliberates the policy implications and recommendations of this study (Section 7.3). Following this, the limitations, contributions and recommendations for future work are considered in Sections 7.4 - 7.6. To finish, Section 7.7 includes a final conclusion of this thesis.

7.1 Revisiting the Aim of this Thesis

The irreplaceable role of intergenerational support within Chinese families is attributed to the Chinese culture (Lin and Yi, 2011). China is a country where the Confucius culture and family centred values are rooted, hence mutual support provided between generations is regarded as moral and reciprocal behaviour (Fei, 1983). From some older people's perspective, it is important for adult children to co-reside or live nearby their older parents, and provide support to them whenever necessary (Luo and Zhan, 2012). Nonetheless, familial attitudes adjust with the passage of time, especially taking the economic, sociodemographic and cultural changes into consideration (Chen *et al.*, 2011; Liu and Wang, 2014). Consequently, a widespread concern has been that the younger generations in China are no longer as willing and responsible to look after their older parents nowadays (e.g. Giles, 2010; Yi, 2014; Graham *et al*., 2015).

Existing literature has shown that since the beginning of the 21st century, the unprecedented population ageing trend in China has been accelerating and evoking concerns about its inherent challenges (Giles *et al.*, 2010; Graham *et al.*, 2015; Gomez-Leon *et al.*, 2019). According to the statistics, the number of people aged 60 years old or over in China will reach 400 million by 2050, accounting for more than 30% of the total population (Feng *et al.*, 2012; UN, 2019). The expansion of the older population inevitably increases the demand for old-age care services in China (Du and Wang, 2016). Nevertheless, the pension and social care scheme for older people only provides limited coverage and security, and the level of such support remains relatively low in rural areas

of China despite policy reforms taken place over the last decade (Salditt *et al.*, 2008; Lei *et al.*, 2016; Ringen and Ngok, 2017). As revealed by a 'quality of death' survey assessing end-of-life care in 80 countries all over the world, China was in the bottom 10 of the list due to its unaffordable health care, the lack of hospice facilities and insufficient community support (Economist Intelligence Unit, 2015). Under these circumstances, the informal support provided by adult children to their older parents is a vital source of income and care for the majority of older people in China (Cai *et al.*, 2006; Guo *et al.*, 2017; Chen and Jordan, 2018).

Along with the trend of rapid population ageing, there has been a dramatic trend of modernisation and urbanisation in China. A massive number of internal migrants move from rural to urban areas of China in order to seek better employment opportunities or to re-join family members (Young, 2013; Ao *et al.*, 2016). In addition to this, recent changes in the Chinese family structure have led to a proliferation of studies in this field. The average family household size was 5.2 persons in 1930s, which had reduced to 2.9 in 2010s (Zimmer and Kwong, 2003; The Statistics Portal, 2015). This results from the decreasing fertility rate, as well as the out-migration of adult children within the families, and leads to the rising proportion of empty nest and skip-generation households in China (Guo, 2008; Jiang *et al.*, 2013; Liu, 2014). All of these societal changes in contemporary China result in challenges to the provision of intergenerational support and contact, which requires further investigation.

As revealed in the Literature Review (Chapter 2), most current studies on intergenerational support exchanges in China have focused on the upward support provided by adult children to older people (Lin and Yi, 2011), with a relatively small body of literature exploring the social and psychological support provided from older people to their adult children (Silverstein *et al.*, 2006). Moreover, most of the research was based on cross-sectional analysis, and was challenged with reverse causality biases (Graham *et al.*, 2015). In addition, although researchers admit rural and urban differences in understanding the flows of intergenerational support provision, most previous studies have focused on rural areas only, or treated the entire Chinese population as a whole (e.g. Giles *et al.*, 2010; Chen *et al.*, 2011; Ning and Wang, 2015) (see further discussion about research gaps in Section 2.5). Hence, the main goal of this study was to examine the changes in the flows of intergenerational economic, social and psychological support within Chinese families, and to determine the effect of the living arrangement with adult children on the provision of support to or from their older parents, and on their parents' health and wellbeing based on longitudinal analyses. Rural and urban differences are also examined in the analyses where possible.

Section 7.2 addresses the four research questions accordingly, by critically discussing the findings within a broader context, showing the consistencies and differences with existing literature, and drawing a solid conclusion based on the evidence from this research.

7.2 Addressing the Research Questions

The central questions in this thesis ask about the extent of intergenerational economic, social and psychological support in China nowadays (*Research Question 1*), and how this has changed over time from 2011 to 2015 (*Research Question 2*). The study also seeks to investigate the associations between older people's living arrangements with adult children and intergenerational support exchange (*Research Question 3*), and examine how the changes in intergenerational support may have an effect on the health status of older Chinese people (*Research Question 4*) (see Section 1.4 for the research questions in full).

Sections 7.2.1-7.2.3 address the four research questions accordingly. Based on the discussion about current findings and existing literature, these sections help to provide insight into changing intergenerational support, to contribute to a deeper understanding of this growing area of research and to identify the uniqueness of this study. Sub-section 7.2.1 starts with investigating the current level of intergenerational economic, social and psychological support provided bi-directionally. This sub-section also addresses *Research Question 2* in order to understand how different types and directions of intergenerational support have changed over time based on the repeated cross-sectional analyses from Chapter 4. Sub-section 7.2.2 assesses how the changes in the living arrangements with adult children exert an impact on the intergenerational support exchanges based on the longitudinal analyses from Chapter 5 (*Research Question 3*). Finally, sub-section 7.2.3 focuses specifically on the findings of the effect of intergenerational support exchange upon older people's physical and psychological health status derived from Chapter 6 (*Research Question 4*).

7.2.1 Research Questions 1 & 2: What is the extent of the intergenerational support (economic, social, psychological and two directions of flows) in China today and to what extent have the flows of support changed over time?

This section discusses the extent of the provision of intergenerational economic, social and psychological support from adult children to their older parents and vice versa, from older people to their adult children in China between 2011 and 2015. The changes in the exchange of different types of intergenerational support over time, whether they are consistent with previous literature and the potential reasons for such changes are elaborated throughout the text.

7.2.1.1 The extent of intergenerational economic support

Traditionally, economic support provided by adult children to their older parents represented the mainstream flow of intergenerational economic transfers in China (Guo and Chen, 1998). Chen *et al*. (2014) found in their literature review that the majority of older people reported economic transfers from adult children as a major source of income between 1998 and 2010 (Chen *et al*., 2014). Over the past two decades, a mounting number of studies have indicated a declining trend of such support. A few researchers identified that older people nowadays were more likely to benefit from the pension system, and that adult children were less likely to provide economic transfers to their older parents (Du and Wu, 2006; Ding, 2014; Wu, 2015). Moreover, older people tended to provide economic support to their children for a number of reasons, from childbearing and education attainment, to employment seeking, house purchasing, marriage preparation and grandchild care (Xu, 2004; Yu, 2007; Wu, 2015).

Table 4.1 in Chapter 4 showed that a growing proportion of older people received economic support from their adult children over time between 2011 and 2015 (from 31% in 2011 to 46% in 2013 and 59% in 2015), which is contrary to previous studies showing a declining trend of upward economic support provision (e.g. Du and Wu, 2006; Ding, 2014; Wu, 2015). A possible explanation for the prevalence of the upward economic support might be the increasing provision of remittances provided by adult children. As discussed in Section 2.3, the massive number of internal migrants in China has resulted in an increasing receipt of remittances by older people (Taylor *et al*., 2003; Cong and Silverstein, 2011; Graham *et al*., 2015). On the one hand, migrants tend to earn a higher income in the destination cities and therefore are inclined to provide economic support to their older parents (Liu, 2014). On the other hand, adult children may provide economic transfers to their older parents as a way of compensating for the lack of physical support, since the increasing geographical distance between adult children and their parents reduces the provision of informal care to older people (Liu *et al.*, 2017). Another possible explanation for this finding is that the average age of respondents in the three survey years was slightly different, as it was 63.4 in 2011, 65.0 in 2013 and 66.4 in 2015 (see further details in Table 3.4). Existing research has shown that the older people were, the more likely they were to receive economic support from their adult children (e.g. Zuo *et al.*, 2011). The observed increase in the proportion of upward economic support could also be attributed to the Chinese government's efforts of supporting family cohesion. For example, the Laws on the Protection of the Rights and Interests of Senior Citizens encourage non-co-resident adult children to visit their parents regularly, and fulfil the needs of their older parents (The Central People's Government, 2012). In

addition, the local government and communities have launched a series of events to enhance awareness about filial piety and caring for older people (e.g. Zhang and Liu, 2011; Ding and Yang, 2015). All of these factors may contribute to the increasing proportion of older people receiving economic support from their adult children.

At the same time, this research showed that the proportion of respondents providing economic transfers to their adult children presented an increasing trend between 2011 and 2015 (from 6% in 2011 to 15% in 2013 and 32% in 2015). This corroborates earlier findings of Cong and Silverstein (2011), Liu (2014) and Graham *et al.* (2015), who suggested a growing likelihood of older people providing downward economic support. Several factors could explain this observation. First, older parents often support their adult children financially for relocation, marriage and other large-amount expenses (Liu and Wang, 2014). For instance, many Chinese young adults endeavour to have their own house by the age of 30. Despite the rapid rising house prices, the average age of Chinese adults buying a house property was 27, which was about 10 years younger than the average age in some Western and Asian countries (the average age of adults buying a house was 42 in Japan and Germany, 36 in Taiwan and over 30 in the US) (Ma, 2016). Older Chinese parents often have to support their children with such purchase, which contributes to the relatively high proportion and amount of economic transfers provided from older people to their adult children. Moreover, in relation to the traditional family values, a large number of older people in China centre their lives on their adult children and grandchildren. They regard their offspring as their life treasure, provide economic support to them whenever necessary, and pursue happiness from such behaviour (Jin and Liu, 2017).

This study also suggests that in each survey year, a higher proportion of respondents received economic support provided by their adult children compared to those who provided such support to their adult children (see further in Section 4.1), which was consistent with previous research showing the traditional mainstream of upward economic support in China (Guo and Chen, 1998; Du and Wu, 2006; Wang and Chen, 2017). This evidence shows that, influenced by the traditional filial culture, the provision of economic support from adult children to their older parents still plays an important role in Chinese families.

In addition to the growing proportions of economic support received and provided by older people, this current study showed that the amount of such transfers has also increased between 2011 and 2015. As shown in Table 4.2, the proportion of older people receiving economic transfers of 5,000 Yuan (516 Pound sterling) or more rose between 2011 and 2015, and the proportion of older people providing such transfers to their adult children also increased over time (the currency in different survey years has been converted to 2015 prices). The result may be

explained by the fact that the economy in China has been developing rapidly, and Chinese residents were wealthier in 2015 compared to 2011 (China Statistical Yearbook, 2017). This also accords with earlier observations from Liu (2014), which showed that migrants have been sending large amounts of remittances back home to their older parents (Liu, 2014).

Another important finding of this study was the urban and rural differences in older people providing and receiving economic transfers in China. As shown in Table 4.4, a higher proportion of respondents in rural areas of China received economic support provided by adult children compared to their urban counterparts, whilst a higher proportion of respondents in urban areas provided such support to their adult children compared to those in rural areas in 2015. These findings support the work of other studies elaborated in Section 2.2.1 (Xu, 2001; Zhang and Sun, 2011; Ding, 2014). A higher proportion of older people in urban areas were entitled to decent employment, pensions and had better economic status than their rural counterparts, therefore they were less likely to receive economic transfers from their adult children and instead more likely to provide such transfers to them (Xu, 2001). However, the provision of downward economic support can exert a financial burden on older people. In addition, the phenomenon of the NEET generation has aroused wide concerns that due to the consistent support provided by older people, a group of young adults are not willing to work and rely on their parents for a living (Xu, 2004; Liu and Wang, 2014; Wu, 2015).

An unanticipated finding from this study is that although a larger share of rural residents received economic support provided by their adult children, they did not receive as large amounts of such transfers compared to their urban counterparts. This may due to the fact that the adult children of rural parents had a lower socioeconomic status on average, and earned lower levels of income than their urban counterparts (Jia *et al.*, 2017). A key policy priority should therefore be to increase the level of public or private economic transfers towards older parents in rural areas, which is discussed in greater detail in Section 7.3.3. As indicated by the findings, respondents in urban areas received slightly larger amounts of economic transfers from their adult children, and provided about 4,000 Yuan more (416 Pound sterling) to their adult children compared to their rural counterparts on average (see further in Section 4.1.1). These results reflect those of Wu (2015) who also found that urban older residents were more likely to provide regular economic support to their adult children, and that the average amount of such transfers to adult children was higher in urban compared to rural areas (Wu, 2015). Because older people in rural areas were economically dependent on their adult children, their physical and psychological health may be negatively influenced if the upward economic support they receive reduces in the future (Luo *et*

al., 2017). It is therefore important to strengthen the resilience of older people in rural areas, so that they will be more independent and capable of facing potential changes in the receipt of intergenerational support, which will be further discussed in Section 7.3.3.

7.2.1.2 The extent of intergenerational social support

Intergenerational social support in this thesis refers particularly to the informal care and instrumental support exchanged between older people and the younger generations (see further in Section 3.4). Existing literature has shown that social support provided by adult children plays a vital role in older people's later life, especially for those who have difficulties in their daily living (Silverman *et al.*, 2008). There are two main reasons for this. An important factor is that public social care for Chinese older people is insufficient and even unavailable in some areas. According to previous research, three crucial contradictions exist in old-age social services in China (Zhen, 2016). First, the provision of such care services largely fails to satisfy the demands of older people (Zhu and Walker, 2018). Second, the government has been the most important capital provider for old-age social care services, which is not a sustainable way of maintaining the public social care system (Ding and Yang, 2015). Third, social care in China lacks employers with professional qualifications to provide good services (Xu *et al.*, 2018). All of these factors contribute to older people's need for informal care provided by their close family members. Another factor contributing to the importance of intergenerational social support is the filial norms and patrilineal culture in Chinese society. Older people expect their adult children to provide them with care and support, which they believe is the result of proper and decent reciprocity for having raised their children (Fei, 1983; Schwarz *et al.*, 2010). As a matter of fact, the obligation of providing social support to one's older parents is stipulated in the marriage laws in China (Yang, 1996). To sum up, social support provided by adult children is needed and expected by older Chinese parents, and the reduction in such support can be detrimental to older people's physical and psychological health status (e.g. Li *et al.*, 2005; Li, Zhang and Liang, 2009; Zhang *et al*., 2014). However, it is projected that social support provided from adult children to their older parents has decreased over time with a large number of adult children moving out and seeking employment in relatively economically developed regions (Silverstein *et al.*, 2006; Hank, 2007; Lin and Yi, 2011). This has been further supported by the findings from this study (see further in Chapter 5).

As can be seen from Table 4.1, the proportion of older people receiving assistance with (I)ADLs from their adult children remained low at all three survey years, which were 4%, 9% and 13% in 2011, 2013 and 2015 respectively. This result is inconsistent with a number of studies arguing that older people in China were less likely to receive informal care from their adult children due to the

weakened family ties (e.g. Silverstein *et al.*, 2006; Guo, Chi and Silverstein, 2009). However, it supports the findings of Chao (2011) which showed increasing social support received by older people from their married adult children in Taiwan. The low proportions of respondents receiving social support from their adult children in this current study are associated with the measure and sample used, as the statistics calculate the proportion of all older people (having at least one adult child and one young grandchild) receiving support with (I)ADLs from adult children, including those who had difficulties with (I)ADLs, and also those who did not have such difficulties. As shown in Appendix A, filters were applied to the questions about receiving support with (I)ADLs from adult children (CHARLS, 2017). Only respondents who reported a need for support with (I)ADLs were asked if they received social support with (I)ADLs and from whom. Additional analysis has revealed that among respondents who reported having difficulty with at least one (I)ADL item, the proportion of receiving social support from their adult children was 45% in 2011, 47% in 2013 and 50% in 2015 (see more in Appendix G).

The results from this study indicate that adult children who co-reside with or live nearby their older parents have a higher likelihood of providing social support to their parents compared to their counterparts who do not live close to parents, as the geographical proximity facilitates daily visits. At the same time, the further the children live, the higher time and commuting costs they have to undertake when going back home to assist their parents with daily living activities (Sun, 2002). In fact, a number of researchers believe that family separation resulting from the large scale migration, together with the 'one child' policy, have largely reduced the number of potential family carers in China (see further discussion about this in Section 7.2.2). Due to this, a low proportion of older people can benefit from the social support provided by adult children nowadays (e.g. Li and Tracy, 1999; Philips *et al.*, 2008; Chen *et al.*, 2014).

As shown in previous research, social support provided by adult children, as well as the support provided by one's spouse, have accounted for the major sources of social support received by older people (Chen *et al.*, 2014). The results from this study confirm that social support provided by adult children plays an important role for respondents who need support with (I)ADLs, yet the out-migration of adult children has reduced such support receipt by older people. One way to supplement the social support received by older people and to alleviate the burden of informal social care on spouse and adult children is to provide similar support by other organisations, such as community-based care. Community-based care services often cover assistance with walking, feeding, bathing, meal preparation and medications, and are based in the family and community, provided directly from professional organisations, and funded/ supported by government

purchase, social participation or NGOs (Zhang and Liu, 2011). The shift of the main social care provider from family to community can help to fulfil the growing demand for social care services among older people and reduce the pressure on family members (Wong, 2013). The recommendations about the development of community-based care services in China will be discussed in Section 7.3.2.

Although the percentage of Chinese older people receiving care from their adult children is relatively low, a large and growing proportion of them are providing such support to their grandchildren (Gateway to Global Aging Data, 2018) (see further in Section 2.2.2). In Table 4.1, there is a clear trend of an increasing proportion of grandchild care provision by older people, which is consistent with other studies discussed in Section 2.3.2 (e.g. Croll, 2008; Quah, 2009; Liu, 2014). The growing number of older people taking care of their grandchildren could be attributed to at least three reasons. First, the majority of older respondents in the CHARLS dataset (85%) have retired/ had informal work such as agricultural/ family-related business or never worked (Beaumaster *et al.*, 2018). Thus, this segment of the population has a relatively flexible timetable and can provide such support at a lower time cost. Second, this may be explained by the close family ties in China. Older people generate their happiness from raising their grandchildren, and have a feeling that such behaviour proves themselves useful regardless of the money and time cost they may need to invest (Sheng, 1991). Finally, it has been conclusively shown in the literature that grandparents act as 'kin keepers' by taking care of their grandchildren when their adult children migrate away (Liu, 2014). With the growing number of migrants in China, the proportion of older people offering grandchild care has consequently become larger (Quah, 2009; Liu, 2014).

Overall, as shown in this study and previous literature, older people have always been an important care provider for their grandchildren. So far, such phenomenon has attracted much debate at different levels in China. Some researchers believe that it is valuable and helpful for the family as a whole if older people provide grandchild care, which reduces much childbearing pressure on the adult children (Chen *et al*., 2011). In addition, grandchild caring is beneficial for intergenerational relations as it improves the probability and level of economic and emotional support provided from adult children to their older parents (ibid). Third, it is suggested that grandchild care provision is good for older people's health and well-being, which could reduce their feeling of loneliness, and improve their cognition and subjective well-being (Kim *et al.*, 2017; Zhou *et al.*, 2018). At the same time, the provision of grandchild care may also present certain challenges. On the one hand, recent studies have indicated conflicts about different understandings of child-rearing by older people and adult children. Older people often feel unvalued and disrespected from such conflicts, which can result in feelings of pressure and a low

life satisfaction among them (Kim *et al.*, 2017). On the other hand, as a result of the economic migration of adult children, older people may have to leave their hometown and co-reside with their adult children in order to look after their grandchildren. The change in their living environment and isolation to the new community can be detrimental to their health and well-being (Zhou *et al.*, 2018). Furthermore, older people may suffer from the burden of household chores, grandchild care and communicating problems (ibid). The health risks relating to grandchild caring should be prioritised by adult children and the community, which is further discussed in 7.3.1.

The results from this study also show that older people in urban areas of China were more likely to have the experience of grandchild caring compared to their rural counterparts, which is consistent with previous literature (Chen *et al.*, 2011; Xiao, 2017). The findings of the prevalence in grandchildren caring in urban areas may be explained by the fact that respondents living in urban areas tend to have more economic and social resources, which leads to their higher likelihood of providing care to grandchildren (Chen *et al.*, 2011). Another reason may be that older people who live in rural areas are more likely to have migrant children who move to urban areas (Young, 2013). Among these young and middle-aged internal migrants with children in the stage of compulsory education (about age 7- 16), a slightly higher proportion (55%) settles in urban areas with their children (Ministry of Education, 2017). In such case, the geographical separation between rural older residents and their grandchildren can result in the lower odds of grandchild care provision (ibid). In reviewing the literature, previous research showed a high level of grandchild care provision in both urban and rural areas of China (Chen *et al.*, 2011; Feng and Zhang, 2018). However, no research has been conducted to explicitly compare the characteristics of grandchild care between urban and rural areas, which has been investigated in Sections 6.4 and will be further discussed in Section 7.2.2.

The next section moves on to discuss the flows of intergenerational weekly contact within Chinese families and how this changes over time in China.

7.2.1.3 The extent of intergenerational weekly contact

Another important aspect of intergenerational relations measured in this study is the proportion of older people having weekly in-person and distant contact (by either phone, mail or email) with their adult children. As discussed throughout this thesis, filial devotion is deeply rooted in China, where intergenerational ties and mutual support are highly valued (Zeng, 1986). Therefore, it is

not surprising that over half of Chinese older people reported weekly in-person contact with their adult children at all three survey years (see further in Section 4.1.1).

A previous study found that about 12% of young adults had not visited their parents in years while one-third of young adults saw their parents just once a year (Coonan, 2013). This suggests that reducing in-person contact between older people and their adult children may be of concern in the future. Table 4.3 shows that the proportion of respondents having weekly in-person contact with their adult children decreased in 2013 and 2015 compared to 2011, which accords with observations of other researchers. For example, a survey involving more than 184,000 respondents in China showed about half of the older population living in empty-nest households not regularly seeing their adult children in 2015 (NPFPC, 2015). Another study found that adult children who lived in a different province visited their parents once a year or even less frequently (Gruijters, 2017). The author noted that the reduction in intergenerational weekly in-person contact was due to structural and cultural reasons (ibid). Structural explanations referred to the barriers to intergenerational contact. The unprecedented modernisation and urbanisation trend in China and the massive scale of adult children's out-migration have resulted in the geographic separation between generations, which has consequently reduced face- to- face contact according to the modernisation and ageing theory (Cowgill, 1972; Bao, 2017; Gruijters, 2017). Cultural explanations, on the other hand, related to individuals' changing preferences and social norms which were affected by factors including children' gender, marital status and education level (Gruijters, 2017). As found in the study, married sons were more likely to have in-person and distant contact with their older parents, while the gender difference was significantly dependent on the children's educational attainment (ibid). Some researchers have also found that with the demographic and socioeconomic changes over decades, the traditional family values and intergenerational psychological ties have weakened in China (Chou and Chi, 2000; Luo and Zhan, 2012).

Meanwhile, the trend of intergenerational weekly distant contact, as shown in Table 4.3, shows a complex picture. Specifically, the proportion of respondents having weekly distant contact with their adult children declined between 2011 and 2013, but increased between 2013 and 2015 (see further details in Section 4.1.1). Partly in accordance with the present results, previous studies have demonstrated that intergenerational distant contact showed an increasing trend in recent years (Gruijters, 2017; Jackson and Liu, 2017). The increase in the prevalence of weekly distant contact in 2015 may be due to the widespread use of the smartphone and the mobile app 'WeChat'. WeChat is a social app launched by China's Tencent Communications in 2013, which resembles functions of WhatsApp, Facebook and Twitter in western countries (Wei *et al.*, 2018). This app attracted over 100 million users in its first 15 months, which snowballed to 760 million by

early 2016 (Emarkerter, 2016). According to the statistics, the number of social media users of different age groups in China rose between 2014 and 2016, and the proportion of older users aged 60 or over represented the most significant growth compared to other age groups between 2015 and 2016 (3.7% [15-19], 1.9% [20-29], 6.3% [30-39], 12.1% [40-49], 28.3% [50-59], 38.2% [60+]) (Guo, 2016; Guo, 2017). The popularisation of WeChat has enabled older people to communicate with their adult children over distance and with ease, as even those who are illiterate can send audio messages instead of typing texts.

Another reason which may explain the inconsistent changes in having weekly distant contact with adult children is the cohort differences in migration patterns and urban settlements. As elaborated in Section 1.2, temporary migration has been an important pattern of internal migration in China, as the Hukou system has largely restricted the number of permanent migrants (Young, 2013). However, this pattern may have changed more recently as evidenced by existing research. A study by Tang and Feng (2015) distinguished the migrants into two groups, with migrant workers born during and after the 1980s being categorised as the younger generation, and those who were born prior to the 1980s belonging to the older generation. The authors found that compared to the older generation who based settlement decisions on the family as a whole, the younger generation made the decision while being influenced by features of the urban destination and their own desires, and tended to settle in urban areas rather than return to their rural hometowns in due course (Tang and Feng, 2015). This has probably exerted an influence on the patterns of intergenerational weekly in-person and distant contact. More specifically, older people are more likely to have weekly in-person contact with their adult children if their migrant children return home, and vice versa, a higher likelihood of retaining weekly distant contact may occur if their adult children settle in urban areas/ larger cities.

Above all, it has been elaborated that the patterns of intergenerational economic, social and psychological support exchanges in China have experienced changes between 2011 and 2015. Results from this study show that there was an increasing trend in the proportion of older people receiving upward economic transfers across the three waves, which does not support Hypothesis 1 (the proportion of adult children providing economic support to their older parents decreases over time) raised in Section 2.5. Meanwhile, the percentage of respondents providing downward economic support increased between 2011 and 2015. This confirms Hypothesis 2.2 that older people are increasingly more likely to provide economic support to their adult children/ grandchildren in contemporary China. Both the percentage of respondents receiving social support from their children and older people providing such support to their grandchildren rose

from 2011 to 2015. This is in contrast with Hypothesis 3 (the proportion of adult children providing social support to their older parents decreases over time), but confirms Hypothesis 4 that older people being more likely to provide grandchild care in recent years. The results also suggest that the proportion of having intergenerational in-person contact decreased in 2013 and 2015, which supports Hypothesis 5. The inconsistent change in having intergenerational distant contact between three survey years does not support Hypothesis 6, which predicts a rising trend in having distant contact with adult children.

Together these results provide important insights into the changes in different aspects of intergenerational support within Chinese families, and it is hypothesised that the modernisation trend and the out-migration of adult children are directly associated with such changes. A considerable amount of literature has been published on the associations between children's out-migration/ living arrangement and intergenerational support exchanges in China (Taylor *et al*., 2003; Guo, Chi and Silverstein, 2009; Graham *et al*., 2015). The following section aims to sum the results found in Chapter 5 about the causal relationships between the changes in older people's living arrangements with their adult children (co-residence or living nearby) and intergenerational support exchanges, and discuss the mechanisms and potential consequences of these in detail.

7.2.2 Research Question 3: How have changes in the living arrangements with children impacted upon the change in intergenerational support exchange?

This section discusses the findings in relation to the third research question (*How have changes in the living arrangements with children impacted upon the change in intergenerational support exchange*) and places the results in a broader context, by comparing the similarities and differences with other existing literature.

7.2.2.1 Co-residence with adult children and intergenerational economic support

Models 5.15-5.20 estimated the impact of the changes in the living arrangements with adult children upon the changes in intergenerational support exchange based on the lagged hybrid models. The results suggested that the change in the co-residence status with adult children between 2011 and 2013 was a strong predictor for the change in the receipt of economic support provided by adult children between 2013 and 2015. Compared to respondents who co-resided with at least one adult child in both 2011 and 2013, their counterparts in other groups (those who experienced a change in co-residence with children between 2011 and 2013, and who did not co-reside with any adult child in 2011 or 2013) were more likely to receive economic support from their adult children. These results are in line with those of previous studies which found that respondents not co-residing with adult children had a higher likelihood in receiving economic

transfers/ remittances provided by adult children compared to those who co-resided with at least one adult child (Taylor *et al*., 2003; Cong and Silverstein, 2011; Graham *et al*., 2015; Liu, 2015). More specifically, the findings further support the idea that adult children's out-migration positively affects incomes for the household of origin, based on a larger sample size of more than 7,000 respondents compared to about 800 farm households in the study of Taylor *et al.* (2003). The results are also in agreement with Cong and Silverstein (2011) who based their conclusions on a longitudinal sample between 2001 and 2003, by providing updated evidence using the three-wave-data of the Harmonised CHARLS collected in 2011, 2013 and 2015.

Previous research has suggested a reverse causal relationship, which is the receipt of upward economic support by older people influencing their decision of co-residing with their adult children. For example, Zhang *et al.* (2014) found that married adult children were more likely to co-reside with their parents who needed economic support and those who had provided grandchild care than those who did not have these experience (Zhang *et al.*, 2014). This current study has presented evidence by contrast and suggested that it was the adult child's out-migration which led to the higher probability of older people receiving economic transfers provided by their adult children. The findings from this current study are more convincing in the following two ways. First, Zhang *et al.* (2014) based their study on one wave of the cross-sectional CLHLS, thus their findings could only suggest an association between older parents' co-residence with adult children and their receipt of economic support due to the limitation of the cross-sectional data used. On the contrary, this study has exploited the longitudinal nature of the CHARLS by following the characteristics and behaviour of the same individual over time. Second, Model 5.15 in Section 5.3 assessed the effect of the changes in co-residence with adult children in Period 1 (2011 and 2013) upon the changes in respondents' receipt of economic support in Period 2 (2013 and 2015). In essence, the FEMs used each individual as his or her own control, by comparing whether the respondent's status of receiving economic support changed when exposed to a change in the co-residence status with their adult children. More importantly, using the main predictor variable in Period 1 and the response variable in Period 2 has allowed this analysis to minimise the potential impact of reverse causality and strengthen the confidence in the interpretation of the results. Taken together, the evidence provided by Model 5.15 has demonstrated that the adult children's out-migration is a positive predictor for upward economic transfers received by older people, which supports the idea of the economics of labour migration theory (Stark and Bloom, 1985) (see further in Section 2.1.2).

Results in Section 5.3 also showed that the change in the co-residence with adult children in Period 1 predicted a decline in the provision of downward economic support in Period 2. More

specifically, compared to respondents who had at least one co-resident adult child in both 2011 and 2013, their counterparts whose adult child moved back home in Period 1 were less likely to provide economic support to their non-co-resident adult children/ grandchildren in Period 2. This may be explained by two facts. First, a large number of migrants who base their decision to work in urban areas on the family as a whole would return home as soon as they have accumulated a certain amount of wealth in urban areas, since they have sufficient cash to support the agricultural work or family business (Tang and Feng, 2015). In such case, older people do not need to provide economic support to their adult children as the children have adequate income. Second, migrant adult children may return home because they have to take care of their older parents. This often happens when older people are suffering from serious illnesses, mobility difficulties or are hospitalised (Giles and Mu, 2007). Older people are not likely to provide economic transfers to their adult children as they are severely ill and demand care from their adult children. So far there has been no similar research showing the association between the returning home of adult children and the economic support from adult children, and this is an area which requires further evidence in the future.

Interestingly, older respondents who had at least one co-resident adult child in 2011, but did not have any co-resident adult child in 2013, were less likely to provide economic support to their adult children between 2013 and 2015 compared to those who co-resided with at least one adult child in both 2011 and 2013. Looking at the results from the Model 5.8, it is clear that older people who had an adult child migrating/ moving-out were more likely to provide economic support to their adult children over the same period of time (see further in Table 5.2). Taken together, the current findings suggest that older people were more likely to provide economic transfers to their adult child when the children first migrated/ moved out, but less likely to do so two years later once their child had settled down. A possible explanation for this might be that older people often offer a one-off payment to their migrant child who either starts a job in another city (for relocation) or gets married and sets up a separate conjugal household (for marriage costs) (Zhang, 2005). Once the adult child has settled down and has their own income, their parents no longer provide such support to them. Instead, at that point, the migrant child usually provides economic transfers/ remittances to their older parents as a sign of reciprocity (Schwarz *et al.*, 2010), which was evidenced by Model 5.15. Therefore, this study has generated an evidenced argument that the impact of an adult child's out-migration on older people's provision of downward economic support is not the same over time, rather such impact differs according to the stage of the migration process that the adult child is in. These findings help our understanding of the relationship between co-residence with adult children and the provision of economic support provided by older people to adult children, and explain some of the contradictory findings from other research (Yu, 2007; Wu, 2015). Yu (2007) found that more than

30% of older people provided economic support to their adult children/ grandchildren, while Wu's study showed that adult children who migrated out were less likely to receive economic transfers provided by their older parents compared to their co-resident siblings (ibid). The contrary findings may result from the different timing of adult children's migration in the two studies.

Overall, the findings from this study have proved Hypothesis 7 by showing that the out-migration of adult children is associated with the receipt of upward economic support by older people. However, Hypothesis 8 partly stands, as this current study shows that the impact of out-migration upon the provision of economic support from older people to their adult children is mediated by the stage of the migration process that the adult child is in.

7.2.2.2 Co-residence with adult children and intergenerational social support

Results in Section 5.3 found that compared with respondents who had at least one co-resident adult child in both 2011 and 2013, those who did not co-reside with any adult child in either 2011 or 2013 were less likely to receive help with (I)ADLs from their adult children between 2013 and 2015. This further supports the hypothesis of an association between older people's co-residence with an adult child and a high probability of receiving assistance with (I)ADLs from one's adult children.

Previous literature discussed in Section 2.3.2 was in line with the findings from this study. As elaborated earlier, intergenerational co-residence can largely facilitate the process of social support provided from adult children to their older parents (e.g. Silverstein *et al.*, 2006; Guo, Chi and Silverstein, 2009; Lin and Yi, 2011). As shown in this study, non-co-residence with adult children in 2013 was associated with a lower likelihood of receiving assistance with (I)ADLs between 2013 and 2015 (compared to their counterparts who had at least one co-resident adult child in both 2011 and 2013). As shown in the co-residence transition table (Table 4.9), a much higher proportion of respondents who did not have any co-resident adult child in 2011 and 2013 reported not having any co-resident adult child rather than doing so in 2015. Similarly, respondents who had a co-resident adult child in 2011 but did not have one in 2013 were more likely to have no co-resident adult child than having one in 2015. Taken together, these findings indicate that the two groups of older people were less likely to have a co-resident adult child in 2015, which consequently reduced the likelihood of older people receiving social support provided by their adult children.

In addition, respondents who did not co-reside with any adult child in 2011 and did so in 2013 were also less likely to receive social support from their adult children in 2015 compared to their

counterparts who had at least one co-resident adult child in both 2011 and 2013. A possible explanation may be that an adult child who has the experience of residing in other cities is not as close to their parent compared to those who have always co-resided with their older parents. Although migrant adult children tend to return to their hometown, their filial norms may have weakened and their obligation or commitment to care for older parents may be weaker (Graham *et al*., 2015).

The results from this current study, to some extent, support the notion of reduced social care received by older people as denoted by the modernisation and ageing theory and further indicate the importance of encouraging younger Chinese adults to co-reside with or live closer to their older parents. Older people in China are still in need of upward social support, not simply because the level of social care system in China cannot fulfil the care demand of the growing number of older persons, but also because Chinese older people expect and enjoy being taken care of by their children (e.g. Zhang, 2005; Zhu and Walker, 2017; Hu, 2019). Nevertheless, according to the statistics, the number of internal migrants has reached 245 million in 2016, and the majority of these migrants live far away from their older parents (NHFPC, 2017). The evidence in this study shows that the out-migration of adult children has largely reduced the upward social support received by older people, which should be acknowledged by the Chinese government, and the policy implications of this are further discussed in Section 7.3.1.

Consistent with previous literature, the lagged hybrid models in Section 5.3 showed that respondents who co-resided with at least one adult child were more likely to take care of their grandchildren compared to their counterparts who did not have any co-resident adult child (Chen *et al.*, 2011; Zhang *et al.*, 2014; Feng and Zhang, 2018). As it is often assumed, co-residence with an adult child facilitates the provision of grandchild care. Older people are more likely to help with tasks such as preparing meals, giving the grandchild a shower and taking them to school due to the geographical proximity (Zhang *et al.*, 2014; Li *et al.*, 2018).

This study has been one of the first attempts to thoroughly examine the impact of co-residence with adult children on the provision of grandchild care with advanced quantitative methods. For example, Chen *et al.* (2011) found that older people who co-resided with their grandchildren were more likely to provide grandchild care compared to those who did not co-reside with any grandchild. The authors did not discuss the impact of older people's co-residence with adult children on grandchild care provision, although it was mentioned that about 5% of households in the survey were skip-generation households, and about 45% of grandparents co-resided with their grandchildren aged 0-6 (Chen *et al.*, 2011). It can be inferred from this statement that the majority of older people co-residing with their grandchild also lived together with their adult children, which could contribute to the outcome of providing grandchild care. In another study,

Zhang *et al.* (2014) assessed the association between older people's co-residence with adult children and grandchild caring based on the 2002 wave of the Chinese Survey of Family Dynamics (CSFD) and the CLHLS. The authors found a positive association between co-residing with an adult child and the provision of grandchild care by older people, however it was acknowledged that a reverse causality might be possible to explain such association due to the limitation of using a cross-sectional dataset (Zhang *et al.*, 2014). The results based on a lagged hybrid method in this current study add to the conclusions of these previous studies, by providing a deeper insight into the impact of co-residence with adult children upon the provision of grandchild care.

The findings from this study support Hypothesis 9 by providing evidence of the negative influence of adult children's out-migration on social support received by older people. However, this current study has found a positive effect of co-residence with adult children upon grandchild care provision, which is in contrast to Hypothesis 10. As stated in Section 7.2.1.2, there has been an ongoing intense debate about the growing trend of grandchild caring by older people (e.g. Kim *et al.*, 2017; Zhou *et al.*, 2017; Zhou *et al.*, 2018). Thus, it is important to understand the effect of grandchild care provision on older people's health and well-being, which is discussed in Section 7.2.3.

7.2.2.3 Living nearby adult children and intergenerational weekly contact

This current study supports evidence from previous research (e.g. Bian *et al.*, 1998; Zhan *et al.*, 2008; Lei *et al.*, 2015; Bao, 2017) that respondents who lived near their adult children were more likely to have weekly in-person contact with their adult children compared to those who did not live close to their adult children. For example, the study by Bian *et al.* (1998) found that older respondents who lived nearby their adult children had a higher likelihood of having frequent face-to-face contact with their adult children. Lei *et al.* (2015) further supported this argument, stating that older people who had adult children living nearby were more likely to maintain frequent contact including in-person visits and communications with their adult children. Similarly, Bao (2016) found that within the same family, children who lived further had the least contact with their older parents compared to their siblings who lived closer to their parents. Such literature seems to support the idea that the out-migration of adult children has exerted a negative influence on weekly in-person contact, and possibly even worse, the psychological ties between generations within Chinese families (Chou and Chi, 2000; Shuey and Hardy, 2003; Hank, 2007).

However, this current study challenges the above idea with an additional piece of evidence, showing that respondents who lived nearby their adult children were less likely to have weekly distant contact with them compared to those who did not have any adult child living nearby.

Therefore, it can be assumed from the results that while the out-migration of adult children reduces weekly in-person contact, it can also enhance weekly distant contact between generations. These results reflect those of Luo and Zhan (2012) who discovered that psychological support received by older people took various forms and the understanding of such support has been broadened. There are also similarities between these results and those described by Liu (2014), who found that long-distance psychological support provided by adult children to their older parents was maintained after the child's out-migration. With the unprecedented trend of urbanisation and the advanced development in technology, the traditional forms of intergenerational psychological support are undergoing changes. As adult children living further away, the traditional ways of in-person contact are being replaced by distant contact via phones, texts and emails. As discussed in Section 7.2.1, the launch and popularisation of the Mobile App WeChat have been demonstrated to be a technology revolution in China, which allow a vast majority of Chinese people, including the middle and old-aged people, to communicate via the application. To sum up, intergenerational contact in China has been experiencing a transformation, which is consistent with the modified extended family model and suggests that a reduction in one form of communication may not necessarily indicate a deterioration in intergenerational relations or filial norms.

According to the CHARLS data, more than 90% of older people had either a mobile phone or a landline connection at home (Gruijters, 2017). Another survey found that almost all older people had a Smart Mobile with the WeChat app, and the majority of those had several WeChat Groups so that they could communicate with their family members and relatives via the app (Wang *et al.*, 2018). It is therefore important to understand older people's attitudes and opinions about the transformation from in-person contact towards distant contact with their adult children, and case studies help to reflect such opinions. In one case, Ms Zhao was a widow, whose late husband had died from cancer 10 years ago. Ms Zhao's adult daughter and son were working in Beijing and Shanghai respectively. She has always been actively responding to the audio messages in her family WeChat Group, reminding her son to have dinner while working late, and praising her grandchild for getting a top score in the exams. She commented that it was convenient and cost-saving by using WeChat Groups to communicate with her offspring (ibid). Another case showed that Mr Wu (aged 70) moved from Shanxi to Nanjing to co-reside with his son and help to take care of his grandchild (ibid). In the beginning, he felt he had lost contact with his relatives in the hometown. This difficulty was alleviated since his son taught him to use WeChat and created a family group of about 30 family members. He said the interactions with family members via the WeChat Group had enabled him to feel closer to his relatives, and he loved the idea of knowing the daily activities of his relatives through the WeChat app (ibid). Communication via the WeChat

has proved to be an effective way to enhance family ties, especially for those who do not live in the same region.

However, distant contact cannot completely replace the role of in-person contact and may also become a challenge in older people's daily life (Gruijters, 2017). Some older people commented that 'despite texting with my children/ grandchildren every day, I am too old to follow the rapid IT and mobile development. It is tiring to follow everything up and I feel lonely at the bottom of my heart' (Life, 2016). In addition, some people revealed that they had face-to-face meetings with their relatives less frequently since they used WeChat, and were unhappy about the fact that online chatting has crowded out in-person contact (ibid). Therefore, it is important to meet with older people in person and regularly, so that psychological support and comfort can be provided to older people in various forms, and that any change in the characteristics such as forgetfulness, cognitive impairment and depressive emotions can be detected in early stages.

Above all, the findings from this study have supported Hypotheses 11 and 12, by presenting a positive influence of having children living nearby on the report of having intergenerational weekly in-person contact, and a positive effect of not having any child living nearby upon reporting intergenerational weekly distant contact. Further research in this area is needed to understand how such transformations in intergenerational contact may have an impact on older people's psychological health. Section 7.2.3 moves on to discuss how the changes in having economic, social support and weekly contact within Chinese families can affect the health and well-being of older people in China.

7.2.3 Research Question 4: How have changes in intergenerational support within Chinese families impacted upon the physical and psychological well-being of older people in China?

This section discusses the findings in relation to the fourth research question (*How have changes in intergenerational support within Chinese families impacted upon the physical and psychological well-being of older people in China)*. Sections 7.2.3.1 – 7.2.3.3 discuss the impact of intergenerational support upon older people's self-rated health, physical health and psychological health respectively.

7.2.3.1 Intergenerational support and self-reported health of older people

Model 6.11 showed that the provision of economic support by older people was associated with a deterioration in older parents' self-rated health two years later, which is contrary to Li *et al.*

(2009) who found a positive effect of providing economic support to adult children on older women's self-rated health. Two explanations may help to understand the different findings. First, Li *et al.* (2009) based their study on a longitudinal dataset 'Well-being of Elderly in the Anhui Province' (2001, 2003 and 2006) and examined the association between intergenerational support provision and the self-reported health of older people in rural areas of China (Li *et al.*, 2009). Despite using a longitudinal approach to assess the association, the authors acknowledged that their study was challenged with a risk of reverse causality. More specifically, the problem may arise if older respondents who had good self-reported health were predisposed to provide economic support to their adult children. The use of a lagged FEM approach in this current study has strengthened the direction of causation between intergenerational support provision and self-rated health among older people, thus provided more convincing evidence compared to the study of Li *et al.* (2009). Second, the results from this current study were based on a longitudinal sample which includes both rural and urban residents in China. By contrast, the study of Li *et al.* focused only on rural residents (Li *et al.*, 2009). As there are substantial differences between urban and rural areas of China, different results may be found from the two studies covering different regions of the sample.

Meanwhile, the provision of grandchild care by respondents was associated with an improved self-rated health among older people in urban areas two years later, but not for those living in rural areas, after controlling for all confounders. The finding was in contrast to the previous findings by Liu *et al.* (1995), Chen and Liu (2011), and partly consistent with the evidence shown by Li *et al.* (2009) and Mao *et al.* (2018). Liu *et al*. (1995) found that the provision of downward social support was associated with a poor self-reported health among older people, however the study was based on a cross-sectional survey in the Wuhan City, China, which was less generalisable. Chen and Liu (2011) found that high-intensity grandchild caring was correlated with older people's poor self-reported health. The authors (2011) assessed the impact of grandchild care provision on the self-reported health by the grandparent's gender as well as by different intensity levels of grandchild care, concluding that such impact depended on the intensity level of caregiving and was further shaped by individual characteristics such as gender. The results imply the importance of the different intensity level of support provision in influencing the self-reported health among older people (Chen and Liu, 2011).

In contrast to the above two findings, Li *et al.* (2009) found that downward social support provided by older people was beneficial for their self-reported health. On the one hand, the results by Li *et al.* (2009) only focused on rural residents. This current study provides supporting evidence among urban older residents. On the other hand, different measures of social support were used in the two studies. Li *et al.* (2009) used the support provided by older people to their

adult children to measure social support, while the downward social support in this current study refers to the grandchild care provided by older people. Therefore, it is likely that the different measures of social support in the two studies have contributed to the different findings regarding the rural samples. Specifically, this current study did not find significant associations between the provision of downward social support and self-rated health among older people in rural areas, which was reflected in the study of Li *et al.* (2009). Mao *et al.* (2018) included the provision of grandchild care as one type of social support provided by older people (as well as the provision of household-chore/ personal-care help to children and children-in-law), and found that in rural areas, there was no significant association between the provision of social support by older people and their self-reported health. However, one risk of this analysis is that different types of social support provided by older people may exert different impacts upon the self-rated health status of respondents, which can lead to an uncertain outcome due to buffering and counteracting effects. Future studies should consider the above differences in the conceptualisation and measures of social support in their research design, which is discussed in Section 7.6.

7.2.3.2 Intergenerational support and activities of daily living of older people

Models 6.12 and 6.13 estimated the influence of the changes in the intergenerational support exchange with adult children upon the physical health of older people, which was measured by the ADL and IADL functional status of respondents. Results have shown that the receipt of economic support was associated with a poor ADL functional status among respondents in rural areas two years later. According to the author's knowledge, this current study provides the first comprehensive assessment of the association between the receipt/ provision of intergenerational economic support and the ability of older people to perform (I)ADLs. As noted in Section 2.4.2, a much smaller body of research has examined the impact of intergenerational support exchange upon older people's (I)ADL functional status. The analyses and results in this current study address such research gap and provide new insights into understanding the (I)ADL functional status of older people.

Previous studies in this area showed that rural-urban differences existed in terms of the impact of intergenerational support receipt on the physical status of older people (Luo *et al.*, 2017). Specifically, rural older residents who did not receive upward economic transfers were more likely to have difficulty with ADLs compared to their urban counterparts (ibid). As found based on the descriptive analysis of this current study, the receipt of upward economic transfers was associated with the good ADL functional status among rural older residents ($\chi^2 = 28.8$, $p<0.001$;

see further in Section 4.1.3). However, this association reversed when being examined with a lagged regression model, showing that receiving economic support from one's adult children predicted the report of poor ADL functional status among rural older people two years later (see Figure 6.1 for further details). The study by Luo *et al.* (2017) was based on the cross-sectional CHARLS 2013, therefore the results only demonstrated the association between receiving economic support from one's adult children and the good ADL functional status among older people (rather than a causal relationship). This current study challenges the findings by Luo *et al.* (2017), with the use of a lagged effect model based on a longitudinal approach.

Compared to respondents who did not receive support with (I)ADLs in 2011 or 2013, those who did not receive such support in 2011, but received support in 2013, were more likely to report a deterioration in their (I)ADL functional status in Period 2. The findings do not support the early observations that receiving adequate instrumental support from adult children predicted a lower ADL impairment later (Oxman and Hull, 1997). However, the results provide further evidence in terms of previous research findings by Seeman *et al.* (1996) and Gruenewald and Seeman (2010). For example, Seeman *et al.* (1996) found in their longitudinal research that a more frequent receipt of social support was associated with increased risks of ADL limitations among men. Notably, the time and intensity levels of social support examined in the two studies are different. It was likely that the majority of respondents in this current study who did not receive support with (I)ADLs in 2011 but received such support in 2013 were those who just began to have difficulties with (I)ADLs, which means that their level of (I)ADL limitations was not very severe. By contrast, the longitudinal study of Seeman *et al.* (1996) suggested that respondents who received more frequent social support were more likely to have relatively severe difficulties with (I)ADLs. From this point of view, the findings from the study of Seeman *et al.* (1996) and this current study provide complementary evidence for each other, and demonstrate the complex association between different levels of social support receipt and the (I)ADL functional status of respondents.

A sizeable body of literature has demonstrated that having difficulties with (I)ADLs among older people was correlated with the receipt of support provided by one's adult children (Shi, 1993; Lee and Xiao, 1998; Giles *et al*., 2010) (see further in Section 2.4.2). It is clear that such findings support the Altruism model, which asserts that the provision of support within families intends to fulfil the needs of family members (e.g. Arrondel and Masson, 2002; Ho, 2015). This current study, however, indicates an inverse relationship, by suggesting that the receipt of social support is predictive for older people's poor (I)ADL functional status. This leads to a self-selection issue which needs to be acknowledged in the analysis, that while using the assistance with (I)ADLs received by respondents to measure the receipt of social support, this variable is contaminated when conducting regression analyses using (I)ADL functional status as an outcome variable. Due

to endogeneity, the dependent variable (having difficulties with (I)ADLs) and independent variable (receiving social support) are highly likely to be significantly associated with each other. In spite of this, the lagged FEM method used in the models reduces the risk of a reverse causal relationship and strengthens the conclusion that the social support received by respondents predicts a poor (I)ADL functionality status among respondents two years later.

7.2.3.3 Intergenerational support and psychological health of older people

Results in Section 6.4 further showed a significant association between the receipt/ provision of economic support to adult children/ grandchildren and the report of a high life satisfaction among older people in rural areas two years later. The findings broadly extend the work of other studies in this area linking intergenerational support and life satisfaction among older people (Schwarz *et al.*, 2010; Liang and Wu, 2014). Schwarz *et al.* (2010) demonstrated a positive association between economic transfers provided by older German mothers and their life satisfaction, yet failed to provide evidence for the correlation between intergenerational support and life satisfaction among Chinese mothers. The authors proposed the role of the different culture and values in explaining the results. In addition to the cultural variance, the insignificant results from the Chinese study may be due to the limited dataset which was collected in four regions of China (Bejing, Henan, Yunnan and Guangxi) and the fact that the participants were females only (207 mothers). Moreover, the data were cross-sectional so that the causal relationship between the receipt of intergenerational support and life satisfaction among older people was not fully explored. Liang and Wu (2014) found that about half of the older people in the empty-nest households in rural areas reported low levels of life satisfaction and hypothesised that this was associated with the reduction of economic and social support provided by adult children. However, the authors failed to directly examine the association between intergenerational support and life satisfaction among older people. This current study provides an empirical investigation into this area and expands our understanding of the association between the economic support exchange and life satisfaction among older people. As discussed in Section 7.2.1, a growing number of older people receive/ provide economic support from/ to their adult children (Yu, 2007; Wu, 2015). The findings suggest that such economic support exchange is beneficial for older people's life satisfaction, which highlights the importance of additional attention paid to the health and well-being of the segment of the population who lack economic transfers with their adult children.

Figure 6.1 also suggests that the receipt of support with (I)ADLs provided by adult children was associated with a high risk of reporting depression among older people in rural areas two years

later. The findings further support the argument of Lee *et al.* (1995), showing that the receipt of support increased the report of depression among older people, which may due to their sense of loss of independence. However, they are in contrast of other research findings linking intergenerational support receipt and a better depression status of older people (e.g. Oxman and Hull, 1997; Chen *et al.*, 2005; Li and Liang, 2007; Li *et al.*, 2014). For example, Chen *et al.* (2005) found that older people lacking social support provided by their adult children were more likely to have depressive symptoms. The different findings may be explained by the different samples and measures of the social support used, as discussed in Section 7.2.2.

The research findings of this current study further suggest that having weekly in-person and distant contact with one's adult children had a positive influence on reporting a high life satisfaction and not being depressed among older people in rural areas, and that having distant contact with one's adult children had a protective effect on the depression status among older people in urban areas (see Figure 6.1 for further details). As shown in Chapter 5, the out-migration of adult children has made it challenging for older people to remain frequent in-person contact with their children. Therefore, it is crucial for the Chinese government to realise the importance of strengthening intergenerational in-person contact and enhance the traditional filial values in various ways (Luo *et al.*, 2017). Recently, new laws and filial regulations in China have explored approaches to motivate adult children to visit their older parents frequently in China (The All-China Women's Federation, 2012; The Central People's Government, 2012). With the research findings from this study in mind, a more realistic way would be to encourage adult children to contact their older parents via phone/ mail/ email more often, since having frequent distant contact with one's adult children is also beneficial for older people's psychological health. This is further discussed in Section 7.3.4.

To conclude, the receipt and provision of intergenerational support have a significant impact on older people's self-rated health, (I)ADL functional status and psychological health. The findings from this study support Hypotheses 14, 16, 17 and 18. Older people who provide economic support to their adult children are more likely to report a low life satisfaction compared to their counterparts who do not provide such support (Hypothesis 14). As proposed in Hypothesis 16, older people who provide care to their grandchildren are more likely to report a low life satisfaction compared to their counterparts who do not provide such support. In addition, the findings not only confirm that having weekly in-person contact is associated with better psychological health among older people in rural areas (Hypothesis 17), but also shows that having intergenerational distant contact is beneficial for older people's depressive symptoms (Hypothesis 18). This current study does not provide evidence to validate the association between receiving economic support and older people's self-rated health (Hypothesis 13), and the

association between receiving social support and a better physical health among older people (Hypothesis 15).

Based on the fruitful findings, this study should be of value to practitioners and policymakers wishing to improve the health and well-being of the older population in China. The next section of the thesis will deliberate the policy implications and recommendations of this study.

7.3 Policy Implications and Recommendations

The findings in this current study suggest several courses of action for both practitioners and policy-makers in China, which include policy implications on strengthening intergenerational support, developing a community-based care system, acknowledging rural and urban differences, and the implications in the context of rapid social changes.

7.3.1 Policy implications on strengthening intergenerational support

The "Protection of the Rights and Interests of the Elderly People" bill which came into effect in 2013 asks adult children to visit their older parents and greet them frequently. Older parents can apply for mediation or bring a case to court if their children disobey the clause. However, it is not specified in the law that how often the children should visit their parents and what penalties they will receive if they ignore their parents (Connan, 2013). The effect of such regulations remains uncertain as the clauses require further clarification (ibid). According to the statistics, there are few successful cases since the law came into effect (Xinhua Net, 2016).

The findings in this study showed that the out-migration of adult children has resulted in the reduction of social support provided by adult children and intergenerational weekly in-person contact, which had a negative impact on the physical and psychological health among Chinese older people. One solution to the challenge of decreasing social support received by older people may come from the experience of the Singaporean government. Singapore, as a mixed-culture society influenced by Malay, South Asian, East Asian and Eurasian cultures, has inherited the Confucius tradition of highly valuing the familial culture and filial piety. In order to reduce the number of 'empty-nest' families, the Singaporean government has been dedicated to encouraging adult children to co-reside with or live nearby their older parents (Singapore Government, 2018). According to the Ministry of Finance, single residents who for the first time buy a flat in order to co-reside with their older parents can benefit from up to 120,000 Singapore Dollar (about 69,300 Pound sterling), and the Proximity Housing Grant has also increased to up to 30,000 S$ (about

17,330 Pound sterling) for families (ibid). These policies have led to an increasing number of households with a member aged 65 or over from 2000 to 2014 and contributed to a more cohesive and resilient family system in Singapore (Mistry of Social and Family Development, 2015; Singapore Government, 2018).

The Chinese government can learn from the Singaporean experience in order to enhance the caregiving support within families. For example, policymakers in collaboration with real estate developers can plan public housing systems characterised as a community of ordinary housing, senior apartments and daycare centres. Housing grants can be allocated to residents who purchase and reside in such communities with their older parents, which not only encourages younger adults to live closer to their older parents, but also facilitates the provision of social support to older people in the community. In this way, adults in China are also inclined to visit their parents more often due to the geographical proximity. Moreover, there is a definite need for practitioners to understand the demand for social care among Chinese older people. The findings from this study also suggest that a low proportion of older people received informal care from their adult children, and the importance of receiving intergenerational social support to older people's psychological health. So far, 13 provinces and 2 cities (Guangzhou and Huaian) in China have approved regulations about Carers' breaks for one child families and encouraged eligible adult children to take such breaks in order to take care of their parents in need (Sina, 2019). Such regulations should be emphasised by other provinces as well, and policymakers/ entrepreneurs are recommended to support Carers' breaks for a wider population, i.e. not only for one-child families, but also for other households. In addition, stakeholders should aim to establish an environment of 'shared care' between the family and the state, such as providing subsidies for family carers (Walker, 2000).

In addition, new filial regulations in China have explored approaches to motivate adult children to provide economic, social and psychological support to their older parents. The Shanghai government, for example, has established an individual credit rating system linking to the provision of intergenerational support. If adult children refuse the judicial decision and deny providing care to their older parents, they will get a low ranking in the overall credit rating system, which can consequently lead to themselves being categorised as immoral residents and the failure in moral-related activities such as opening a bank account or borrowing books from public libraries. Based on the evaluation of such regulations, the Chinese government can improve the Laws on the Protection of the Rights and Interests of Senior Citizens in order to strengthen the family ties and to encourage intergenerational support within Chinese families. Moreover, as demonstrated in this current study, a considerable proportion of Chinese older people are providing grandchild care, which has a negative association with low life satisfaction among older

people in urban areas. The social policymakers and practitioners should pay close attention to the health and well-being of grandparents, especially those with intensive commitments (Baker and Silverstein, 2012; Di Gessa *et al.*, 2016). For instance, policies and programmes can be designed to support older people providing supplementary grandchild care (Kim *et al.*, 2017).

7.3.2 Policy implications on developing a community-based care system

This study has found that economic support provided from adult children to older parents is still dominant in intergenerational transfers, especially for older people with migrant children (see further in Section 4.1). In addition, the social support provided from adult children to older parents remained low due to the shrinking potential carers (as a result of the one-child family planning policy) and increasing geographical separation (see further in Chapter 5), therefore supplementary support provided by the neighbourhood and community can increase the care received by older people in China. It is therefore important to ensure sufficient and qualified systems, services and support for old-age social care being prioritised in the community, so that the pressure of care support on the family members can be alleviated. The Chinese government has been dedicating efforts on the promotion of community-based care in recent decades, aiming to shift the focus of the main old-age care provider from the family to the community, in order to fulfil the growing demand for social care services among older people in China (Blane *et al.*, 2011; Wong, 2013).

Recent research has pointed out some challenges for developing community-based care in China, and the most important one is to establish a formal system in order to balance the role and participation of multiple stakeholders including the government, profit-seeking organisations and voluntary NGOs (Ding and Yang, 2015). From the perspective of Welfare Pluralism, the government should play the role of a manager and supervisor, minimising the low efficiency and non-moral behaviour which can occur in the process of purchasing services (e.g. Rose and Shiratori, 1986; Johnson, 1987; Evers, 1990; Gilbert, 2000).

Moreover, the practitioners, such as the community care centres, should not only provide care services and cultural events for older people, but also help to broaden their understanding of social care in contemporary China. As shown by findings from this study, intergenerational support exchange and contact have been experiencing transformations in China, and older people can benefit from the new forms of intergenerational ties if they have a better understanding of these. For example, older people are encouraged not to rely on their adult children only, and to make the most of the community-based care system (Ding and Yang, 2015). The service-providing

organisations are also invigorated to deliver qualified services expected by older people and assessed by the government (Wang, 2010). With the collaboration of the stakeholders and the maintenance of community-based support, older people will be able to access high-quality social care. In recognition of the above challenges and the unique Chinese culture, greater efforts and careful deliberations are needed in developing a community-based social care system in China.

7.3.3 Policy implications based on rural and urban differences

Older people in rural areas of China are poorer than their urban counterparts on average. About 65% of older people in rural areas live below the poverty line compared to just over 10% in urban areas (Li and Sicular, 2014; Ward, 2016). As found in this current study, older people in rural areas of China were more dependent on their adult children for economic support compared to their urban counterparts. In addition, urban older residents received slightly larger amounts of economic support compared to their rural counterparts. A key policy priority should therefore be to reduce the dependency and enhance the resilience of older people, especially for those residing in rural areas of China. Resilience has been defined as the 'process of effectively negotiating, adapting to, or managing significant sources of stress or trauma' (Windle, 2011: p152). Many recent studies have critically examined the importance of resilience in older people's life and identified it as a protective ability for older people to overcome difficulties (Janssen *et al.*, 2011; Wiles *et al.*, 2012; Lim *et al.*, 2015; Stephens *et al.*, 2015). As improved resilience is crucially associated with better health and well-being, measures to improve the health of older people, such as healthy diet, exercise, good health service can also improve resilience (Centre for Policy on Ageing, 2014). In addition, having good interpersonal relationships and social interactions is another approach to improving resilience among older people. Therefore, community activities such as Tai Chi, chess class are helpful and potentially beneficial for improving resilience (Blane *et al*., 2011).

Another important practical implication is to understand that older people in rural and urban areas of China have different sociodemographic characteristics including the family structure, average educational attainment and economic activities, and experience different receipt/ provision levels of intergenerational economic, social and psychological support. A broad recommendation is to improve the level of pensions/ public economic transfers toward rural Chinese older people, so that they can be less dependent on the economic support provided by their adult children. For urban older residents who live in better economic conditions, policymakers should put more emphasis on improving their psychological well-being. Furthermore, a unified welfare policy may have different impacts on the net welfare of older people in rural and urban areas, therefore it is important to plan the health and social care for

rural and urban older residents separately (Jiang, 2013; Ning and Wang, 2015). For instance, the community-based care services have been successfully provided in some urban areas of China, while these are unavailable in the majority of rural areas. It is not feasible to bring a large number of older people together and provide them with services by daycare centres or nursing institutions within a rural community, therefore shared care from neighbours and villagers may be more realistic for rural older people in contemporary China (Zhu and Walker, 2017).

7.3.4 Policy implications in the context of rapid social changes

This study demonstrates that with the out-migration of adult children, older people are less likely to have in-person contact with their adult children, but more likely to have distant contact with them (see results in Chapter 5). Having both in-person and distant contact has a positive influence on the psychological health of older people (see results in Chapter 6). The Chinese government has realised the importance of strengthening intergenerational in-person contact within Chinese families and endeavoured to enhance the traditional filial values in various ways. Practitioners such as doctors need to pay attention to the health status of older people who do not stay in frequent contact with their adult children, which may help with the diagnosis of depression. In addition to encouraging adult children to visit their parents regularly/ frequently and including such recommendations in the law, the Chinese government also raised 'Twenty-four Rules for Being a Filial Person in Contemporary China' (Chinese Government, 2012; The All-China Women's Federation, 2012). The rules include specific items such as 'preparing meals for parents', 'providing economic support to parents in the long term', 'buying parents insurances' and 'teaching parents to use the Internet and go online surfing' (The All-China Women's Federation, 2012). Despite being criticised as being unrealistic and ambitious, the rules have provided an updated understanding of filial piety in China and expressed a solid attitude towards enhancing intergenerational ties by the Chinese government.

The findings from this study show that having frequent distant contact with one's adult children is beneficial for the psychological health among older people in rural and urban areas. As a matter of fact, various forms of intergenerational support are gradually accepted by older people in China, especially taking consideration of the rapid societal development in China. It is notable that the new rules have considered various forms to 'become a filial person', which not only include the traditional ways of supporting older people, but also embrace new-fangled approaches such as contacting parents via phone/ internet, travelling, taking photos, watching films, working out together and taking them to conduct health examinations regularly (The All-China Women's Federation, 2012). Technological development has brought great opportunities for broadening

the understanding of intergenerational support exchanges in modern society. Yet, it is important to understand how such transformations in intergenerational support exchanges may affect older people's health status, thus further recommendations can be provided based on the evidence (see recommendations for future research in this area in Section 7.5).

As is the case for all research, this study is subject to a number of potential limitations, which are discussed in the following section.

7.4 Limitations of this Study

There are some limitations which should be taken into account when interpreting the findings of this research. First, the study used secondary data for the analysis, which was subject to some unavoidable natural limitations in the data source. In this study, such a limitation was reflected in the time points when the data was available for and the variables used. For example, the changes in the flows of intergenerational economic, social and psychological support cannot be examined over a prolonged period, as this study can only obtain the data over a five-year period due to the availability of the CHARLS. As such, it is conceivable that the patterns of support described in this paper are unique to the period under study. This limitation was addressed by critically engaging with earlier research findings from other representative datasets, such as the CFPS, CHNS and CLHLS (Xu *et al*., 2014; Huang *et al.*, 2016; Oliveira, 2016).

Another limitation of using secondary data relies on the restrictive operationalisation of variables according to the survey design, such as using the change in living arrangement to measure migration. As discussed in Section 3.4, the out-migration of an adult child inevitably results in the change in the older parents' living arrangement from co-residing with an adult child to not doing so, however, the change in the living arrangement with an adult child does not represent the child's migration behaviour. This leads to an over-estimation of the number of migrant children in this study, and possibly an underestimation of the influence of children's out-migration on the exchange of intergenerational support exchange. One recommendation is to be cautious when interpreting such results, and rather than using 'the out-migration of adult children', use the phrase 'the change in the living arrangement with adult children' as the independent variable in the analysis.

In addition, information about social support provided by older respondents to adult children was not available in the CHARLS, thus this study was unable to research this kind of support in the study. In addition, the proxies of 'having intergenerational weekly in-person/ distant contact' were used for measuring intergenerational psychological support, which may be open to criticism as 'having weekly contact' does not necessarily represent the behaviour of comforting another

person. However, the use of such proxies has been validated in previous research (e.g. Ho, 2015; Gruijters, 2017). Another issue is that the economic support provided/ received by children and grandchildren was indistinguishable in this current study. Previous evidence has suggested that combining the economic support provided/received by children or grandchildren can produce reliable findings in terms of the impact on older people's health (Ploeg *et al.*, 2004; Li *et al.*, 2014). Meanwhile, the economic support received and provided by the older parents, as well as the grandchild care they provided, included both the respondents and their partner's involvement. As discussed in Section 3.4, it is beneficial to consider the respondents and their spouse at an aggregate level for these variables, due to the indistinguishable nature of the expenditure and grandchild care provided by older parents (Silverstein *et al.*, 2006). However, respondents who did not have a spouse were also asked the same question, and their answers only referred to their own support exchange patterns, which consequently resulted in the low proportion and amount of economic transfers among respondents who were single/ divorced/ separated, compared to their counterparts who were married and living with a partner.

Second, there was one limitation that the researcher was unable to control in this current study, which is the missing information about whether respondents taking care of their grandchildren in Wave 1 data (see further in Section 3.3). More specifically, among respondents who had missing values in intergenerational support provision (n=1,252), there were 60% of Wave 1 respondents with missing values for grandchild provision. As acknowledged in the Harmonised CHARLS release note, it was unclear why these respondents did not answer the question in terms of care provision for grandchildren when the majority reported that they had grandchildren under the age of 16 (Beaumaster *et al.*, 2018). The potential pattern regarding grandchild care among this missing group of respondents may have an influence on the results. The comparison with the statistics in Waves 2 and 4 suggests a possible underestimation of grandchild care provision in Wave 1, which means that a higher proportion of the respondents with missing values provided grandchild care than the average (see further details in Table 4.1). As only respondents who had at least one child and grandchild, and those who had valid answers in all types of intergenerational support at all waves, were included in the regression analyses, this may slightly influence (exaggerate) the result relating to the changes in the provision of grandchild care.

Third, as explained in Section 4.1.1, only respondents who had a difficulty with (I)ADLs were asked of the receipt of help with (I)ADLs from their adult children, however respondents who had at least one adult child and one young grandchild were included as the analytical sample, in order to keep sufficient sample for conducting the hybrid models, especially that the analytical sample is

further distinguished by respondents' Rural and Urban Hukou. Nonetheless, this leads to an underestimation of the proportion of older people receiving help with (I)ADLs from their adult children. Such results need to be interpreted with caution, and future studies focusing on the help with (I)ADLs received by respondents are recommended to deliberate the sample selection according to the research aims.

Finally, this study excluded a few specific issues when considering the main variable and the control variables in order to focus on exploring and addressing the research questions. For example, this study focused on intergenerational support only, and did not include the support provided by other family members, such as the spouse, which is an important source of informal care receipt for older people. Moreover, this study did not evaluate the frequency/ intensity level of grandchild care provided by older people, which may have an influence on the health status of older people (Chen and Liu, 2011). In addition, adult children's characteristics including their gender and whether they had any siblings are also important factors that may affect the exchange of intergenerational transfers (Lee *et al.*, 1994; Xie and Zhu, 2009), which were not investigated in this study. These factors were not included in the research design as they were not directly linked to the research theme of this study. Further research is recommended to address these specific topics, which will be discussed in Section 7.6.

7.5 Contributions of this Thesis

Notwithstanding these limitations, this study makes theoretical, methodological and empirical contributions to the research on intergenerational support exchange in China. The theoretical contribution of this study is that it tests the appropriateness of applying the modernisation and ageing theory, the economics of labour migration theory and the modified extended family model to researching intergenerational support exchange in China, and remains crucial to our wider understanding of the associations between the living arrangements with adult children, intergenerational support exchange and the health status of older people. For example, with the modernisation trend, older people in China were found more likely to have economic support exchange with their adult children in both upward and downward directions, which supports the economics of labour migration theory (Stark and Bloom, 1985). In addition, there has been a transformation from having intergenerational in-person contact to distant contact with one's adult children, which is consistent with the modified extended family model (Litwak, 1960; Greenwell and Bengtson, 1997). Therefore, this current study shows that there have been changes in different types and directions of intergenerational support provision in China, but not necessarily declines in such support provision as argued by the modernisation and ageing theory (Cowgill, 1972). Therefore, the findings reject the modernisation and ageing theory and indicate

that the theory is not transferrable to the Chinese context. By contrast, the findings provide supportive evidence for the economics of labour migration theory and the modified extended family model in China (see further in Section 2.1).

The methodological contribution lies in that, on the one hand, this study has been the first PhD thesis using the Harmonised CHARLS data to conduct the analysis. This most updated dataset not only provides trackable information about the respondents between 2011 and 2015, but also echoes the design and measurement of the HRS, SHARE and ELSA. It uses reliable measures and can prompt international comparisons based on the research findings. On the other hand, the lagged hybrid regressions combining fixed and random effects undertaken in this study have enhanced our confidence in interpreting causal relationships by reducing the risk of reverse causality. The findings will be of interest to international researchers relating to this area, practitioners, government/ policy makers and different age groups of the population in China.

Empirically, this study marks the first comprehensive attempt to explore the different dimensions of intergenerational transfers including economic and social support, and weekly contact and two directions of support which is provided to or by older people. The findings suggest several new ways to our understanding of the research topic, such as the influence of adult children's out-migration on the downward economic support depending on the stage of the migration process; the rural and urban differences in the exchanges of different types of intergenerational support, as well as the influence on older people's health and well-being; and the crucial role of having frequent contact, either in-person or distant contact, in improving older people's psychological health. Taking account of the contextual factors such as rapid ageing, massive migration and substantial rural-urban differences in contemporary China, this thesis provides empirical evidence for the important understanding of changing intergenerational support, which is relevant to both practitioners and policy-makers. This study also provides a fruitful area in need of further investigation, which will be discussed in Section 7.6.

7.6 Recommendations for Future Research

The results of this study have provided reliable and valid evidence for researchers, practitioners and policymakers. Nevertheless, this current study has thrown up a few questions in need of further investigation.

First, this study shows that having intergenerational in-person and distant contact is beneficial for older people' (I)ADL functional status over the same period of time, however such associations do

not hold with the inclusion of a lagged variable. A further study could assess the effect of having intergenerational contact upon the physical health status of older people within a longer period of time, perhaps by using another longitudinal dataset in China such as the CLHLS (Xu *et al.*, 2019). As suggested in Section 7.4, further investigations are needed to consider and estimate more specific issues, including the level of intergenerational support exchange, the gender of adult children, and respondents who do not have offspring. It is recommended that researchers use the lagged hybrid method in future studies in order to reduce the reverse causal bias.

Second, as discussed in Section 7.2.2, the impact of an adult child's out-migration on the provision of downward economic support by older people may depend on the stage of the migration process that the adult child is in. It is implied in the study that older people are more likely to provide economic transfers to support their adult children when they first migrate, yet less likely to do so after they settle down in the destination cities several years later (see further in Section 7.2.2). A further study could categorise the migration of adult children into different stages, and assess the effects of the migration stage on the provision of intergenerational economic support bi-directionally (e.g. Levitt *et al.*, 2005; Baykara-Krumme and Fokkema, 2018).

Further research could also usefully explore the changing patterns of intergenerational economic, social and psychological support using secondary data with similar research designs in order to make international comparisons (e.g. Schwarz *et al.*, 2010; Baker and Silverstein, 2012; Kim *et al.*, 2017). With the release of the Harmonised CHARLS version in June 2018, there are currently ten Harmonised versions of HRS-like datasets focusing on different nations available on the Gateway to Global Ageing Data (Gateway to Global Aging Data, 2018). These are the HRS (the US), MHAS (Mexico), ELSA (England), SHARE (20+ European Countries and Israel), CRELES (Costa Rica), KLoSA (Korea), JSTAR (Japan), TILDA (Ireland), CHARLS (China) and LASI (India). These ten surveys are designed to ensure comparability with the HRS in the US, and the availability of the Harmonised CHARLS data has for the first time allowed the possibility of conducting cross-country comparisons including China. As it is not the research questions of this study and due to the late release of the Harmonised CHARLS dataset, this current study is unable to conduct such comparisons. It is recommended that further research such as a comparative study between the CHARLS and other Asian countries (KloSA, LASI), or an even broader context including the SHARE, ELSA and HRS, can be undertaken in the area. Such research will be useful as it encourages learning between countries and can provide policy implications for a broader population.

Another possible area of future research would be to investigate such research topics using a mixed method with both quantitative and qualitative approaches. Qualitative research can generate information about behaviour, perspectives and experiences, as well as explore the

understandings and experiences of research participants (Mason, 2017). The contribution of a qualitative study such as in-depth interviews and focus groups will further demonstrate the trajectory of changing intergenerational support within Chinese families, the mechanisms behind the associations between adult children's out-migration, intergenerational support exchange and older people's health and well-being. This not only overcomes the limitation of unattainable variables (e.g. in this study, the social support provided by older people to adult children and the psychological comfort from adult children to older people) when using a secondary quantitative dataset, but also provides rich information regarding the participants' understanding, feelings and reflections.

Finally, a further study could assess the long-term effects of important policy changes on intergenerational support exchanges. There are laws in China requiring adult children to visit or take care of their parents (The Central People's Government, 2012), regulations about how to be a 'filial person' (Chinese Government, 2012; The All-China Women's Federation, 2012), and policy reforms on public pension schemes for older people in rural and urban areas (Cheng *et al.*, 2016; Cheng *et al.*, 2018). It would be worth conducting a policy evaluation which examines the impact of such policy changes on intergenerational support exchanges within Chinese families. As such policy changes expressing filial piety in laws and regulations are less common in European countries or the US, research on this in China would be uniquely placed to assess whether they have any effect on the changes in intergenerational support, which would provide additional evidence and implications for both practitioners and policymakers.

7.7 Conclusion

In conclusion, the findings from this study represent a further step towards understanding the changes in intergenerational economic, social and psychological support exchange within Chinese families, and the associations between the living arrangements with adult children, intergenerational support exchange and older people's health and well-being, in three ways. Firstly, previous research either focused on one type/ direction of intergenerational support, or examined the influence of multi-dimensional support as a merged variable, and failed to assess the impact of different types/ directions of intergenerational support respectively. This study addresses such research gaps by investigating the flows of intergenerational economic, social and psychological support respectively and bi-directionally. Secondly, in reviewing the literature, very little research was found exploring the association between intergenerational economic support and physical health of older people. This study provides deeper insights into understanding the

effect of intergenerational support exchanges upon both the (I)ADL functional status and psychological health of older people. Finally, the lagged hybrid method used in the study reduces the risk of reverse causality and has effectively assessed the causal relationships between the key variables. The findings of this study help to better support intergenerational ties and improve older people's wellbeing, which is particularly important for practitioners and policymakers at the national, regional and local level in China.

Appendix A

Variables and questions in the CHARLS

Variable	Wave	Code	Question	Type	Filter applied
Intergenerational Support Exchange					
Upward economic support	1	CE007	In the past year, did you or your spouse receive any economic supports from your non-co-resident children?	Binary	Yes (non-co-resident children only)
		CE009	How much of the following did you receive from this child in the past year? (regular/ non-regular/monetary/ in-kind)[20]	Continuous	Yes (those who received economic support)
	2 & 3	CE009	In the past year, how much economic supports did you or your spouse receive from your non-co-resident children? (total/ regular/ monetary/ in-kind)[21]	Continuous	Yes (non-co-resident children only)
Downward economic support	1	CE027	In the past year, did you or your spouse provide any economics supports to your non-co-resident children?	Binary	Yes (non-co-resident children only)
		CE029	How much of the following did you provide to this child in the past year? (regular/ non-regular/monetary/ in-kind)	Continuous	Yes (those who received economic support)
	2 & 3	CE029	In the past year, how much economic supports did you or your spouse provide to your non-co-resident children? (total/ regular/ monetary/ in-kind)	Continuous	Yes (non-co-resident children only)
Upward social support	1	DB022	Who most often helps you with dressing, bathing, eating, getting out of bed, using the toilet, controlling urination and defecation, doing chores, preparing hot meals, shopping, managing money, making phone calls, taking medications?	Categorical	Yes (if need help with (I)ADLs)
	2	DB022_W2_1	Who most often helps you with [dressing/bathing/eating/getting (in/out of) bed/using the toilet]?	Categorical	
		DB022_W2_5	Who most often helps you with [do household chores/preparing hot meals/shopping/making telephone calls/taking medications]?	Categorical	Yes (if need help with (I)ADLs)
	3	DB022_W3_1	Who most often helps you with (dressing, bathing, eating, getting out of bed, using the toilet, controlling urination and defecation, doing chores, preparing hot meals, shopping, managing money, making phone calls, taking medications)?	Categorical	Yes (if need help with (I)ADLs)
Downward social support	1, 2 & 3	CF001	Did you spend any time taking care of your grandchildren last year?	Binary	Yes (if any grandchildren under 16)
		CF003	Approximately how many weeks and how many hours per week did you spend last year taking care of this child's children?	Continuous	
Weekly contact	1, 2 & 3	CD003	How often do you see CHILDn's NAME?	Categorical	Yes (non-co-resident children only)
		CD004	How often do you have contact with CHILDn's NAME either by phone, text message, mail, or email, when you didn't live with CHILDn's NAME?		
Co-Residence/ Living Nearby with Adult Children					

[20] Regular means supporting at fixed time such as per month/quarter of a year/half of a year/year, etc.

[21] If give no money or in-kind support, fill in "0".

Co-residence and living nearby	1, 2 & 3	CB053	Where does this CHILDn's NAME normally live now?	Categorical	No
Health Status of Respondent					
Self-rated health	1, 2 & 3	DA001, DA002[22]	Would you say your health is excellent, very good, good, fair, or poor?	Categorical	No
	2 & 3	DA002_W2_1	Compared with your health when we talked with you in R's LAST IW MONTH, YEAR, would you say that your health is better now, about the same, or worse?	Categorical	Yes (IF XRType = REIW)
Chronic disease	1, 2 & 3	DA007	Have you been diagnosed with [conditions listed below, read one by one] by a doctor?	Binary	Yes (IF XRType = NEWIW)
	2 & 3	DA007_W2_1	Our records from your last interview in R's LAST IW MONTH, YEAR show that you have had/not had [conditions listed below], is this right?	Binary	Yes (IF XRType = REIW)
I(ADL)	1, 2 & 3	DB010- DB020	Please tell me if you have any difficulties with these because of a physical, mental, emotional or memory problem.	Categorical	Yes (IF (DB001=1&DB003 =1&…&DB009 =1) not true)
	2 & 3	DB035	Because of health and memory problems, do you have any difficulties with making phone calls?	Categorical	No
Life satisfaction	1, 2 & 3	DC028	Please think about your life-as-a-whole. How satisfied are you with it? Are you completely satisfied, very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?	Categorical	No
Depression	1, 2 & 3	DC009- DC018	The 10 items below refer to how you have felt and behaved during the last week. Choose the appropriate response.	Categorical	No
Characteristics of Respondent					
Age		BA002_1	When were you born?	Continuous	No
	1	BA004	What is your age?	Continuous	Yes (If the person does not know the date of birth, ask BA004)
	2	BA001_W2_1	We record your birth time is [Birth Time], is it right?	Binary	Yes (IF XRType = REIW)
		BA002	When were you born?	Continuous	
		BA004	What is your age?	Continuous	Yes (IF XRType = NEWIW)
	3	BA004_W3_1	What's your date of birth on ID card or Household register?	Continuous	
		BA002	What's your actual date of birth?	Continuous	No
Gender	1	CV005	IWER: Record Gender of Main Respondent.	Binary	No
	2 & 3	BA000_W2_3	Interviewer record R's gender.		
Marital status	1, 2 & 3	BE001	What is your marital status?	Categorical	No
	1	BE002	Are you unmarried but Living with a partner?	Binary	
	1	BD001	What is the highest level of education you have attained?	Categorical	No
	2	BD001	What is the highest level of education you have attained?	Categorical	Yes (If XRType = NEWIW)
		BD001_W2_1	We record your highest level of education is [education level] in the last wave, is it right?	Binary	Yes (If XRType = REIW)
		BD001	What is the highest level of education you have attained?	Categorical	Yes (If XRType = NEWIW)

[22] Two scales are used to measure self-reported health status. R will be asked to rate their health status twice, once at the beginning of this section and again at the end of the section. Question order will be assigned randomly.

Education status	3	BD001_W2_4	Have your highest level of education changed from the last wave? If so, what's the highest level of education you have attained now?	Categorical	Yes (If XRType = REIW)
Hukou	1 & 2	BC001	What is your current Hukou status?	Categorical	No
	2	BC001_W2_1	We record your Hukou status is [Hukou status] in the last wave, your Hukou status has changed during this two years, right?		
	3	BC001_W3_1	We record your Hukou status is [Hukou status], right?	Binary	Yes (If XRType = REIW)
	3	BC001_W3_2	What is your Hukou Type in the last interview?	Categorical	Yes (If XRType = REIW)
	3	BC002_W3	Since [ZIWTime], have you Hukou type and Hukou location changed?	Categorical	Yes (If XRType = REIW)
	3	BC002_W3_1	What is your current Hukou status?	Categorical	Yes (If BC002_W3 = 1 or = 3)
Economic activity status	1, 2 & 3	FA001	Did you engage in agricultural work (including farming, forestry, fishing, and husbandry for your own family or others) for more than 10 days in the past year?	Binary	No
		FA002	Did you work for at least one hour last week? [23]		
Income	1, 2 & 3	GA001	Did you receive any wage and bonus income in the past year?	Binary	No
		GA002	How much did you receive last year?	Continuous	No
Number of children	1	A006	No. of hhchildren	Continuous	No
	1 & 2	CB001	Have you ever given birth to any child? If yes, how many are currently living, who are not living with you?	Continuous	No
	1 & 2	CB009	No. of adopted/fostered/step children alive and not living with you	Continuous	No
	2	CM001_W2_1	No. of hhchildren	Continuous	No
	3	CB050_W3	How many living children do you have? Including biological and step and adapted children.	Continuous	No
Number of grandchildren	1	CB065	How many sons does CHILDn's NAME have?	Continuous	No
		CB066	How many adult sons（above age 16）does CHILDn's NAME have?	Continuous	No
		CB067	How many daughters does CHILDn's NAME have?	Continuous	No
		CB068	How many adult daughters（above age 16） does CHILDn's NAME have?	Continuous	No
	2 & 3	CB065	How many children does [CHILDn's NAME] have?	Continuous	No
		CB066	How many children under age 16 does CHILDn's NAME have?	Continuous	No
Characteristics of Adult children					
Gender	1	A002	ChildGender (ChildName)'s gender is ?	Binary	No
	2 & 3	CB006	Sex of CHILDn's NAME	Binary	No
Hukou	1, 2 & 3	CB055	What is the current Hukou status of CHILDn's NAME?	Categorical	No
	2 & 3	CB055_W2_1	What is [child name]'s Hukou status before he/she has the unified residency Hukou?	Categorical	Yes (If child has unified Hukou)

[23] Any of the following activities is considered to be work: earn a wage, run your own business and unpaid family business work, *etc*. Work does not include doing your own housework or doing activities without pay, such as voluntary work.

Appendix A

Type of location	1, 2 & 3	CB054	In what type of location does CHILDn's NAME live?	Categorical	No
Education level	1 & 2	CB060	What is the highest level of education CHILDn's NAME completed?	Categorical	No
	3	CB052_W3		Categorical	No
Marital status	1, 2 & 3	CB063	What is CHILDn's NAME marital status?	Categorical	No
Income level	1, 2 & 3	CB069	Which category did the total income of CHILDn's NAME (and his/her spouse) in the past year belong to?	Categorical	No
Job type	1, 2 & 3	CB071	What is [CHILDn’s NAME]’s main occupation?	Categorical	No

Appendix B

Table A Descriptive analysis of the full sample and repeated cross-sectional analytical sample (2011, 2013 & 2015)

Variables	Repeated cross-sectional analytical sample						Full sample					
	Wave 1 (n=9,532)		Wave 2 (n=8,701)		Wave 4 (n=8,417)		Wave 1 (n=1,7224)		Wave 2 (n=18,175)		Wave 4 (n=20,537)	
	n/M	%/SD	n/M	%/SD	n/M	%/SD	n/M	%/SD	n/M	%/SD	n/M	%/SD
Age	63.4	10.5	65.0	10.3	66.4	10.0	59.1	9.9	60.0	10.0	60.0	10.1
45-59	3,836	41.2	2,886	33.6	2,343	28.2	9,771	56.8	9,517	52.6	9,703	50.3
60-74	4,132	40.2	4,153	44.7	4,267	48.4	5,968	32.8	6,881	35.9	7,272	38.9
75 or over	1,564	18.6	1,662	21.7	1,807	23.4	1,485	10.4	1,777	11.5	1,799	10.5
missing	0	<0.1	0	<0.1	0	<0.1	0	<0.1	0	<0.1	0	<0.1
Gender												
Male	4,596	47.7	4,203	47.9	4,268	50.0	8,397	48.4	8,805	48.6	9,107	48.3
Female	4,931	52.3	4,498	52.1	4,149	50.0	8,827	51.6	9,370	51.4	9,667	51.7
missing	5	<0.1	0	<0.1	0	<0.1	0	<0.1	0	<0.1	0	<0.1
Hukou of Respondent												
Agricultural Hukou	7,323	70.1	6,770	72.3	6,043	66.2	13,320	70.5	13,839	69.2	12,786	68.5
Non-Agricultural Hukou	2,152	29.2	1,817	26.0	1,734	25.7	3,781	28.7	4,076	29.0	3,054	24.1
Others	54	0.6	92	1.1	69	1.0	104	0.7	203	1.2	382	2.6
missing	3	<0.1	22	0.6	571	7.1	19	0.1	57	0.6	2,552	4.8
Education Level												
Illiterate	2,521	24.9	2,357	26.5	2,189	25.4	4,758	25.9	4,821	26.6	4,929	26.3
Less than lower secondary	5,785	59.8	5,265	59.3	5,227	60.7	10,260	58.7	10,977	59.8	11,834	63.0
Upper secondary & vocational training	9,79	11.6	1,012	13.1	839	11.2	1,830	12.2	1,985	11.4	1,708	9.1
Tertiary	241	3.6	66	1.1	158	2.6	366	3.1	389	2.2	294	1.6
missing	6	0.1	1	<0.1	4	<0.1	10	0.1	3	<0.1	9	<0.1
Marital Status												
Married/partnered	7,506	76.4	6,670	73.8	6,260	72.8	14,970	85.1	15,783	86.8	14,737	84.7
Divorced/separated	207	2.7	137	2.0	127	1.5	223	1.7	187	1.0	168	1.0
Widowed	1,800	20.6	1,762	22.5	1,911	24.0	1,866	12.1	2,048	11.3	2,122	13.4
Never married	19	0.3	131	1.7	113	1.6	159	1.1	155	0.8	138	0.9
missing	0	<0.1	1	<0.1	6	<0.1	6	<0.1	2	<0.1	1,609	<0.1
Work Status												
Did not work last year	3,482	42.0	3,277	42.2	3,204	42.3	5,756	34.0	6,322	38.6	7,380	38.8
Worked last year	1,149	15.6	1,045	14.6	911	12.3	2,465	15.1	2,860	15.8	3,997	16.6
missing	4,901	42.4	4,379	43.2	4,302	45.4	9,003	50.9	8,993	45.6	9,160	44.6

Note: only respondents who had a valid answer to intergenerational support in at least one wave were included in the repeated cross-sectional analytical sample. The full sample excluded 458, 419 and 1,763 cases where respondents' age were below 45 at Waves 1, 2 4 respectively.

Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

Appendix C

Table B: Activities of Daily Living of respondents by age (2011, 2013 & 2015) (%)

Variables	Wave 1			Wave 2			Wave 4		
	45-59	60-74	75 or over	45-59	60-74	75 or over	45-59	60-74	75 or over
ADL									
Have Any Difficulty With Dressing									
No	97.4	94.3	84.3	97.6	93.5	85.8	95.2	90.7	84.7
Yes	2.6	5.7	15.7	2.4	6.5	14.2	4.8	9.3	15.3
Total	100	100	100	100	100	100	100	100	100
	(8,240)	(5,185)	(1,120)	(7,072)	(6,020)	(1,523)	(5,379)	(5,761)	(1,738)
Have Any Difficulty With Bathing									
No	96.8	82.3	79.2	97.0	92.0	77.1	94.7	88.4	76.6
Yes	3.2	7.7	20.8	3.0	8.0	22.9	5.3	11.6	23.4
Total	100	100	100	100	100	100	100	100	100
	(8,241)	(5,179)	(1,116)	(7,065)	(6,012)	(1,518)	(5,377)	(5,751)	(1,727)
Have Any Difficulty With Feeding									
No	98.7	96.6	89.0	99.1	96.9	92.1	98.2	96.3	91.6
Yes	1.3	3.4	11.0	0.9	3.1	7.9	1.8	3.7	8.4
Total	100	100	100	100	100	100	100	100	100
	(8,242)	(5,185)	(1,302)	(7,285)	(5,604)	(1,726)	(5,378)	(5,763)	(1,736)
Have Any Difficulty With Transferring									
No	97.5	93.9	82.3	97.1	93.3	85.0	94.6	89.4	82.9
Yes	2.5	4.1	17.7	2.9	6.7	15.0	5.4	10.6	17.1
Total	100	100	100	100	100	100	100	100	100
	(8,242)	(5,184)	(1,119)	(7,071)	(6,019)	(1,524)	(5,377)	(5,762)	(1,735)
Have Any Difficulty With Toileting									
No	94.2	86.7	72.6	93.3	85.7	73.4	88.1	80.0	70.2
Yes	5.8	13.3	27.4	6.7	14.3	26.6	11.9	20.0	29.8
Total	100	100	100	100	100	100	100	100	100
	(8,240)	(5,185)	(1,120)	(7,071)	(6,018)	(1,525)	(5,375)	(5,761)	(1,737)
Have Any Difficulty With Continence									
No	97.9	95.5	88.6	98.3	94.8	89.0	96.5	93.1	87.2
Yes	2.1	4.5	11.4	1.7	5.2	11.0	3.5	6.9	12.8
Total	100	100	100	100	100	100	100	100	100
	(8,238)	(5,185)	(1,119)	(7,066)	(6,017)	(1,514)	(5,376)	(5,755)	(1,728)
IADL									
Have Any Difficulty Housekeeping									
No	95.4	88.8	69.8	94.6	87.1	67.5	93.9	85.4	67.2
Yes	4.6	11.2	30.2	5.4	12.9	32.5	6.1	14.6	32.8
Total	100	100	100	100	100	100	100	100	100
	(8,348)	(5,224)	(1,124)	(7,117)	(6,008)	(1,510)	(9,589)	(7,791)	(1,912)
Have Any Difficulty With Food Preparation									
No	95.7	89.8	70.5	96.2	89.3	68.2	96.3	89.9	71.4
Yes	4.3	10.2	29.5	3.8	10.7	31.8	3.7	10.1	28.6
Total	100	100	100	100	100	100	100	100	100
	(8,346)	(5,226)	(1,124)	(7,107)	(5,994)	(1,503)	(9,570)	(7,774)	(1,908)
Have Any Difficulty With Shopping									
No	95.6	89.7	71.5	96.1	90.6	70.4	96.5	91.1	72.4
Yes	4.4	10.3	28.5	3.9	9.4	29.6	3.5	8.9	27.6
Total	100	100	100	100	100	100	100	100	100
	(8,343)	(5,220)	(1,120)	(7,112)	(5,989)	(1,507)	(9,585)	(7,766)	(1,897)
Have Any Difficulty With Managing Assets									
No	92.7	87.0	69.0	33.8	88.8	74.4	93.9	89.0	77.5
Yes	7.3	13.0	31.0	6.2	11.2	25.6	6.1	11.0	22.5
Total	100	100	100	100	100	100	100	100	100
	(8,344)	(5,214)	(1,119)	(7,084)	(5,968)	(1,501)	(9,554)	(7,748)	(1,893)

Variables	Wave 1			Wave 2			Wave 4		
	45-59	60-74	75 or over	45-59	60-74	75 or over	45-59	60-74	75 or over
Have Any Difficulty With Taking Medications									
No	96.1	93.4	81.8	97.3	94.7	84.9	97.4	94.9	86.9
Yes	3.9	6.6	18.2	2.7	5.3	15.1	2.6	5.1	13.1
Total	100	100	100	100	100	100	100	100	100
	(8,341)	(5,224)	(1,124)	(7,113)	(6,002)	(1,518)	(9,580)	(7,789)	(1,900)

Note: unweighted percentage, unweighted sample count
Source: Author's analysis of the CHARLS data.

Appendix D

Table C: Depression status of respondents by age (2011, 2013 & 2015) (%)

Variables	Wave 1			Wave 2			Wave 4		
	45-59	60-74	75 and over	45-59	60-74	75 and over	45-59	60-74	75 and over
Bothered by things		***			***			***	
Rarely	45.8	45.0	54.4	55.8	59.7	69.3	55.3	56.3	66.8
A little	23.0	22.1	17.1	22.6	17.3	16.5	16.4	14.7	9.6
Occasionally	17.5	18.5	16.5	12.4	12.5	9.3	15.4	15.1	13.3
Most or all of the time	13.7	14.4	12.0	9.2	10.5	4.9	12.8	13.9	10.3
Total	100	100	100	100	100	100	100	100	100
	(7,648)	(4,916)	(987)	(6,505)	(5,518)	(1,133)	(9,092)	(7,398)	(1,513)
Had trouble keeping mind on what I was doing		***			***			***	
Rarely	54.5	49.0	48.2	60.4	60.6	66.5	59.9	59.0	58.1
A little	19.6	21.4	20.4	19.4	15.7	13.1	15.4	13.0	13.8
Occasionally	14.9	16.9	16.2	12.4	12.4	11.7	14.9	14.0	13.5
Most or all of the time	11.0	12.7	15.2	7.8	11.3	8.7	9.8	14.0	14.6
Total	100	100	100	100	100	100	100	100	100
	(7,632)	(4,877)	(965)	(6,470)	(5,647)	(1,099)	(9,035)	(7,291)	(1,470)
Felt depressed									
Rarely	46.8	43.6	46.9	56.7	57.5	64.3	58.0	55.8	62.6
A little	23.7	23.0	19.7	20.9	17.8	16.0	17.3	15.3	13.5
Occasionally	17.9	20.3	18.3	13.6	14.6	11.8	15.3	15.9	12.0
Most or all of the time	11.6	13.1	15.1	8.8	10.1	7.9	9.4	13.0	11.9
Total	100	100	100	100	100	100	100	100	100
	(7,633)	(4,884)	(984)	(6,515)	(5,518)	(1,125)	(9,071)	(7,380)	(1,518)
Everything I did was an effort		***			***			***	
Rarely	55.7	46.8	41.9	62.7	58.5	63.6	64.4	59.6	61.0
A little	17.6	19.3	17.4	15.7	14.1	12.6	12.8	12.2	10.2
Occasionally	14.8	17.1	15.8	11.6	12.1	10.3	12.2	11.8	11.1
Most or all of the time	11.9	16.8	24.9	1.0	15.3	13.5	10.6	16.4	17.7
Total	100	100	100	100	100	100	100	100	100
	(7,640)	(4,906)	(983)	(6,528)	(5,531)	(1,127)	(9,085)	(7,385)	(1,513)
Hopeful about the future		***			***			***	
Rarely	19.1	24.4	24.3	31.9	42.5	43.6	26.9	38.1	43.6
A little	12.7	17.2	20.3	13.8	13.7	14.2	10.7	11.3	9.5
Occasionally	20.8	20.3	24.1	18.1	14.1	17.1	17.4	13.5	15.6
Most or all of the time	47.4	38.1	31.3	36.2	29.7	25.1	45.0	37.1	31.3
Total	100	100	100	100	100	100	100	100	100
	(7,526)	(4,816)	(951)	(6,416)	(5,430)	(1,084)	(8,895)	(7,151)	(1,409)
I felt fearful		***			***			***	
Rarely	81.5	80.4	77.9	85.6	85.5	88.3	85.1	84.9	87.5
A little	9.5	10.2	11.1	6.7	6.1	4.4	5.5	5.5	4.0
Occasionally	5.4	5.9	6.8	4.6	4.9	4.0	5.7	5.0	4.3
Most or all of the time	3.6	3.5	4.2	3.1	3.5	3.3	3.7	4.6	4.1
Total	100	100	100	100	100	100	100	100	100
	(7,666)	(4,931)	(996)	(6,544)	(5,578)	(1,162)	(9,118)	(7,460)	(1,552)
My sleep was restless		***			***			***	
Rarely	50.6	46.8	43.1	51.2	50.9	49.9	54.2	52.7	51.4
A little	16.3	18.1	14.5	16.8	14.9	14.9	13.8	13.6	11.1
Occasionally	14.3	14.7	15.6	14.5	14.1	13.6	14.8	12.9	11.7
Most or all of the time	18.8	20.4	26.8	17.5	20.1	21.6	17.2	20.8	25.8
Total	100	100	100	100	100	100	100	100	100
	(7,674)	(4,936)	(999)	(6,557)	(5,579)	(1,164)	(9,110)	(7,467)	(1,556)
I was happy		***			***			***	
Rarely	13.6	16.5	16.3	26.5	30.8	28.8	18.9	23.6	21.6
A little	13.0	15.7	15.8	15.5	14.1	13.4	10.8	10.8	11.5
Occasionally	27.5	25.7	26.0	23.6	20.5	22.0	20.6	18.8	19.1
Most or all of the time	45.9	42.1	41.9	34.4	34.6	35.8	49.7	46.8	47.8
Total	100	100	100	100	100	100	100	100	100
	(7,660)	(4,917)	(994)	(6530)	(5,567)	(1,151)	(9,071)	(7,403)	(1,534)
I felt lonely		***			***			***	

Variables	Wave 1			Wave 2			Wave 4		
	45-59	60-74	75 and over	45-59	60-74	75 and over	45-59	60-74	75 and over
Rarely	74.9	68.9	61.1	79.5	76.8	76.2	77.3	72.5	70.1
A little	11.6	14.6	15.5	10.0	9.1	9.2	8.5	8.5	8.3
Occasionally	7.7	9.3	12.0	4.2	7.2	6.5	7.4	8.3	9.2
Most or all of the time	5.8	7.2	11.4	4.3	6.9	8.1	6.8	10.7	12.4
Total	100	100	100	100	100	100	100	100	100
	(7,656)	(4,905)	(990)	(6,539)	(5,554)	(1,136)	(9,100)	(7,424)	(1,521)
I could not get 'going'		***			***			***	
Rarely	82.1	77.9	73.2	87.1	84.7	85.7	86.6	82.8	84.2
A little	9.4	11.2	14.4	6.6	6.1	6.5	5.1	5.9	5.2
Occasionally	5.1	6.3	8.0	3.4	4.8	3.9	4.7	5.4	5.2
Most or all of the time	3.4	4.6	4.4	2.9	4.4	3.9	3.6	5.9	5.3
Total	100	100	100	100	100	100	100	100	100
	(7,640)	(4,894)	(981)	(6,528)	(5,535)	(1,141)	(9,072)	(7,387)	(1,503)

Note: unweighted percentage, unweighted sample count
Source: Author's analysis of the CHARLS data.

Appendix E

Approval email of the Ethics submission (Ethics ID: 25698)

From: ERGO
To: yang y. (yy13g14)
Subject: Your Ethics Submission (Ethics ID:25698) has been reviewed and approved
Date: 21 March 2017 19:49:16

Submission Number: 25698
Submission Name: Intergenerational Relations: The Changing Pattern of Economic, Social and Psychological Transfers in Chinese Families (SDA)
This is email is to let you know your submission was approved by the Ethics Committee.

Comments
1.This interesting research involves the use of secondary data. I do not see any ethical concern.

Click here to view your submission
Coordinator: Yazhen Yang

ERGO : Ethics and Research Governance Online
http://www.ergo.soton.ac.uk

DO NOT REPLY TO THIS EMAIL

Appendix F

Ethics Application Form for SECONDARY DATA ANALYSIS

Please consult the guidance at the end of this form before completing and submitting your application.

1. Name(s): Yazhen Yang

2. Current Position: Student/Postgraduate (PhD Gerontology)

3. Contact Details:

Division: Centre for Research on Ageing

Email: yy13g14@soton.ac.uk

Phone: +44 7467318723

4. Is your research being conducted as part of an education qualification?

Yes ☑ **No** ☐

5. If Yes, please give the name of your supervisor:

Maria Evandrou, Athina Vlachantoni

6. Title of your research project / study:

Intergenerational Relations: The Changing Pattern of Economic, Social and Psychological Transfers in Chinese Families

7. Briefly describe the rationale, aims, design and research questions of your research

Please indicate clearly whether you are applying for ethics approval for a specific piece of research, or for overarching ethics approval to use certain datasets for a range of research activities. Approval for the latter will only cover the datasets specified here, for a maximum of 3 years and then subject to renewal.

This research will examine changing intergenerational economic, social and psychological support in China, and investigate causes for this change and impact this may have. First, this project will study the overall pattern of intergenerational support in China with the latest available data. Next, the research will assess the impact of changes in the residential status of children on the provision of intergenerational support based on the econometric analysis. Finally

yet importantly, this study will aim to investigate the impact of the change of intergenerational relations on the health status of respondents.

This research aims to address the following research questions by conducting statistical or econometric analysis of the secondary data China Health and Retirement Longitudinal Study (CHARLS).

A. What is the extent of the intergenerational support (economic, social, psychological and the direction of flows) in China today?

B. To what extent has the flow of intergenerational support in China changed over time?

C. How does change in the residential status of children impact upon the change in intergenerational support?

D. How does change in intergenerational support in Chinese families impact upon the physical and psychological well-being of older people in China?

8. Describe the data you wish to analyse

Please give details of the title of the dataset, nature of data subjects (e.g. individuals or organisations), thematic focus and country/countries covered. Indicate whether the data are qualitative or quantitative, survey data, administrative data or other types of data. Identify the source from where you will be obtaining the data (including a web address where appropriate).

The China Health and Retirement Longitudinal Study (CHARLS) is a quantitative longitudinal dataset led by Peking University and the National Institute on Ageing. The CHARLS aims to collect a high quality nationally representative sample of Chinese residents ages 45 and older to serve the needs of scientific research on the older population. The baseline national wave of CHARLS was fielded in 2011 and the individuals were followed up in 2013. Each wave of the survey includes about 10,000 households and 17,500 individuals in 150 counties/districts and 450 villages/resident committees.

The data can be obtained from the website address: http://charls.pku.edu.cn/en.

9. What are the terms and conditions around the use of the data? Did data subjects give consent for their data to be re-used? If not, on what basis is re-use of the data justified?

Please state what (if any) conditions the data archive imposes (e.g. registration, signing of a confidentiality agreement, specific training etc.). In many cases the data controller will have given explicit permission for data re-use. Please explain how you justify the use of data if approval and consents for the original data collection and re-use are not in place. This may be the case where, for example, the original data collection predated requirements for ethics review or occurred in a jurisdiction where explicit consent and approval are not required.

It is stated in the CHARLS questionnaire that the data will be used for research purposes only and the answers to the questions will be kept strictly confidential. The data is made public for re-use by the data controller and the data subjects give consent for this.

10. Do you intend to use personal data (https://ico.org.uk/media/1549/determining_what_is_personal_data_quick_reference_guide.pdf) or sensitive personal data (http://www.legislation.gov.uk/ukpga/1998/29/section/2) as defined by the Data Protection Act (even if the data are publicly available)?

Yes ☐ **No** ☑

If YES, please specify what personal data will be included and why.

There are none.

11. Do you intend to link two or more datasets?

Data linkage refers to merging of information from two or more sources of data to consolidate facts concerning an individual or an event that are not available in any separate record. Please note that for the purposes of research ethics we are not interested in the merging of different waves of a particular survey, or the merging of data from different countries for the same survey.

Yes ☐ **No** ☑

If YES, please give details of which datasets will be linked and for what purposes.

There are none.

12. How will you store and manage the data before and during the analysis? What will happen with the data at the end of the project?

Please consult the University of Southampton's Research Data Management Policy (http://library.soton.ac.uk/researchdata/storage and http://www.calendar.soton.ac.uk/sectionIV/research-data-management.html), and indicate how you will abide by it.

Any data used will be stored safely.

13. How will you minimise the risk that data subjects (individuals or organisations) could be identified in your presentation of results?

Please consider whether disclosive ID codes have been used (e.g. date of birth) and whether it is theoretically possible to identify individuals by combining characteristics (e.g. widow in Hampshire with 14 children) or by combining datasets. How will you protect individuals' anonymity in your analysis and dissemination?

This will not be an issue for this study, as it is theoretically impossible to identify individuals from the CHARLS data. To minimise the risk of identifying respondent who ages 100 years old and over, age is dealt with as a category variable and this group of the population falls into an age category for the oldest old.

14. What other ethical risks are raised by your research, and how do you intend to manage these?

Issues may arise due to the nature of the research you intend to undertake and/or the subject matter of the data. Examples include: data or analysis that are culturally or socially sensitive; data relating to criminal activity, including terrorism, and security sensitive issues.

There are none.

15. Please outline any other information that you feel may be relevant to this submission.

For example, will you be using the services or facilities of ONS, ADRN, or HSCIC and/or are you obtaining ethical review from NRES (through IRAS) or other? Please confirm whether the data being used are already in the public domain.

There are none.

16. Please indicate if you, your supervisor or a member of the study team/research group are a data controller and/or data processor in relation to the data you intend to use as defined by the Data Protection Act, and confirm that you/they understand your/their respective responsibilities https://ico.org.uk/for-organisations/guide-to-data-protection/key-definitions/).

There are none.

Note: This Ethics Application Form is currently being piloted. If you have comments on any of the questions, it would be helpful if you could email them to rgoinfo@soton.ac.uk with "Secondary Data Analysis Form" in the subject line.

Guidance on applying for ethics approval for secondary data analysis

If your research PURELY involves the following, you do not need to apply for ethics approval:

- analysis of aggregated data on individuals or organisations (e.g. GDP, labour force participation rates, fertility rates);
- meta-analyses (i.e. the analysis of studies);
- literature reviews or reviews/analyses of reports, policies, documents, meeting minutes, newspaper articles, films.

Filling in the online IRGA Form for Secondary Data Analysis Applications:

- Please give your application a title that includes 'SDA' (Secondary Data Analysis) so that it can be appropriately allocated to a reviewer.
- Please answer the questions about dates of 'data collection' to refer to the dates of your proposed study.

Important:

- Please answer **YES** to the question 'Will your study involve humans?'.
- Very approximate figures for sample sizes suffice, please enter these under 'healthy volunteers' and 'adults'!
- Answer **YES** to the question 'Will the Study be only conducted with one or more of the following approaches, and no other methods?'

- Answer **NO** to questions about ingesting food etc., and about NRES.
- Answer **NO** to "Does this research involve any of the following individuals?"
- Answer **NO** to "Does this study involve any of the following?"

Additional Forms:

If your study PURELY involves secondary analysis of data, you only need to fill in the 'Ethics Application Form for Secondary Data Analysis'. You do not need a Risk Assessment Form.

If your study is a mixed-method study involving secondary data analysis AND some component of data collection (e.g. interviews, online survey), or the analysis of non-anonymised data (e.g. social media data), then you need to fill in additional forms:

- Ethics Application Form (for studies other than secondary data analysis)
- Risk Assessment Form
- Participant Information Sheet
- Consent Form
- Draft research instrument

Please note:

- You must not begin data analysis until ethical approval has been obtained.
- It is your responsibility to follow the University of Southampton's Ethics Policy and any relevant academic or professional guidelines in the conduct of your research. This includes ensuring confidentiality in the storage and use of data.
- It is your responsibility to provide full and accurate information in completing this form.

Appendix G

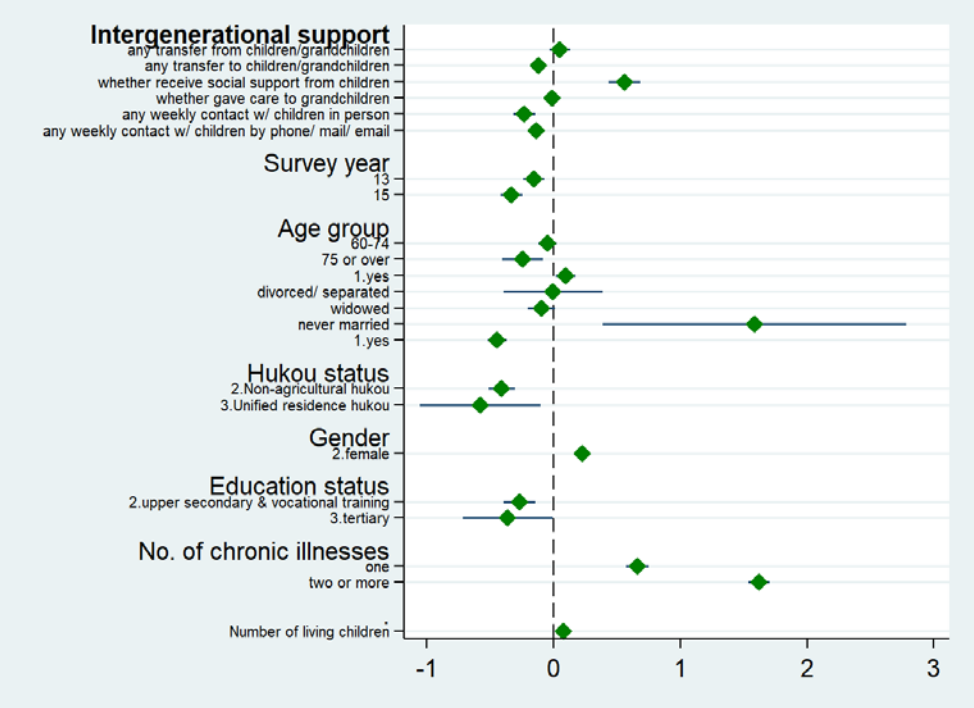
Table D Percentages of respondents receiving social support from their adult children (2011, 2013 & 2015) %

	Wave 1 (n=1,027)	Wave 2 (n=893)	Wave 4 (n=1,281)
Social Support			
Yes	44.9	47.4	50.0
No	55.1	52.6	50.0
missing	0	0	0

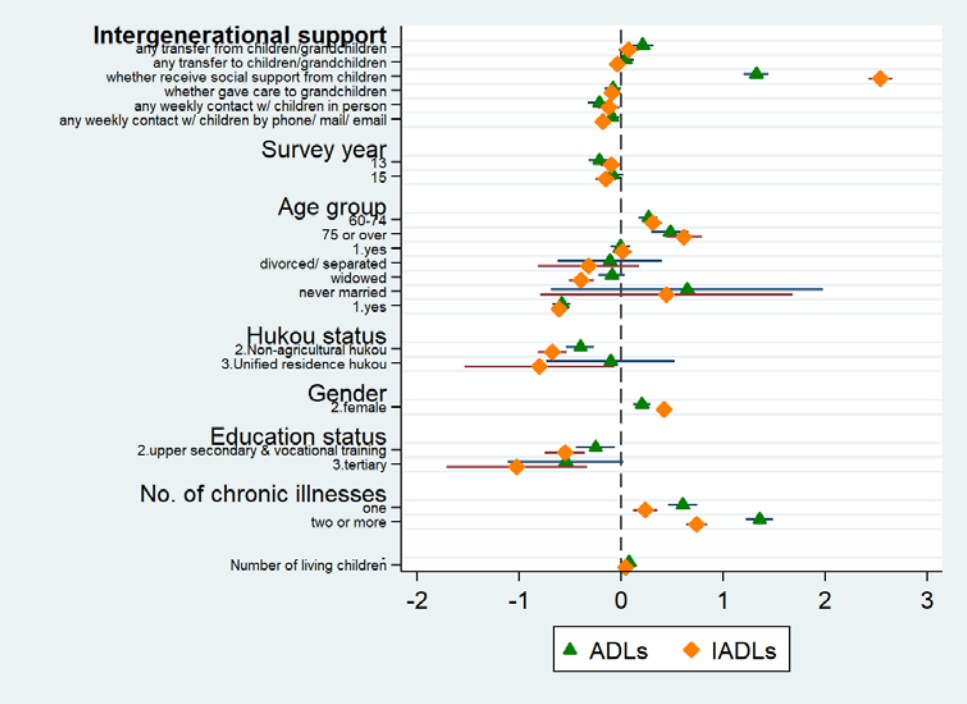
Note: only respondents who had a valid answer in any support in at least one wave, and who needed a need for help with (I)ADLs were included.

Source: Author's analysis of the Harmonised CHARLS data, weighted percentage, unweighted sample count.

Appendix H

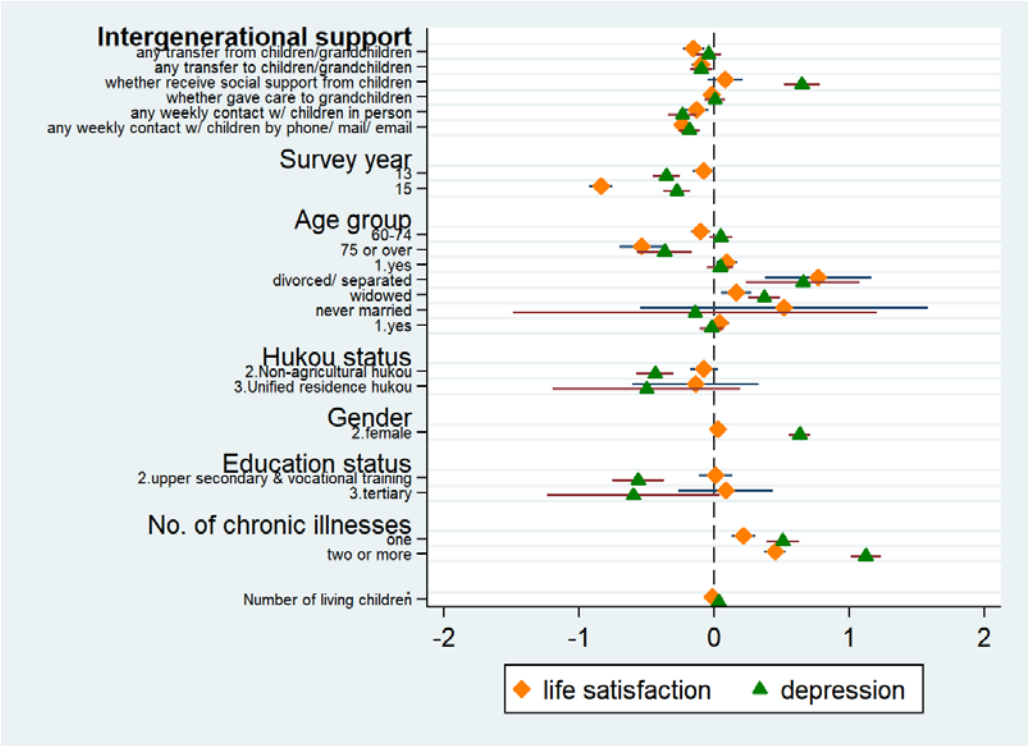


Source: Author's analysis of the longitudinal CHARLS data 2011, 2013 and 2015.
Figure A: Factors influencing the self-reported health of respondents (CHARLS 2011-15)



Author's analysis of the longitudinal CHARLS data 2011, 2013 and 2015.
Figure B: Factors influencing the physical health of respondents (CHARLS 2011-15)

Appendix H



Author's analysis of the longitudinal CHARLS data 2011, 2013 and 2015.

Figure C: Factors influencing the psychological health of respondents (CHARLS 2011-15)

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