GRANDPARENTING AND HEALTH IN LATER LIFE: EVIDENCE FROM THE UNITED STATES, SOUTH KOREA, AND CHINA

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ABSTRACT

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A significant increase in life expectancy over the past decades has changed intergenerational relationships and the role of older adults in aging families. Increasingly, older adults have been involved in caring for grandchildren (i.e., grandparenting), a role emerging in later life. In light of the role strain/enhancement theories, this dissertation investigates how grandparenting is related to the physical and mental health of older adults, and how this association varies by sociocultural context. I adopt a three-essay format to address this research question. My first study draws from the Health and Retirement Study (1988-2014) to examine the linkage between grandparenting and mortality risk, and its racial/ethnic variation in the U.S. The results from the event history models reveal different racial/ethnic patterns in the effects of grandparenting on mortality risk. The mortality advantage of providing grandparenting is robust for white grandparents, whereas the mortality disadvantage of grandparenting is mainly found among black grandparents. In the second study, I investigate how grandparenting affects depressive symptoms among older women in South Korea, using the Korean Longitudinal Study of Aging (2008-2012). The results from growth curve models indicate that caregiving grandmothers in multigenerational households experience a decline in depressive symptoms over time. The mental health gap between the multigenerational household grandparenting and non-caregiving groups decreases with age and reverses after age reaches the mid-60s. Drawing from the China Health and Retirement Longitudinal Study (2011-2015), the third study uses growth curve models to assess how grandparenting influences depressive symptoms in China. The

analyses show that the level of depressive symptoms increases over time among older adults who reside in rural regions and provide multigenerational household grandparenting. The provision of full-time noncoresident grandparenting has an initially protective effect on the depressive symptoms among rural older adults. However, socioeconomic status partially accounts for the association between grandparenting and depressive symptoms. Taken together, the findings of this dissertation confirm that grandparenting plays a significant role in physical and mental health in later life. The effects of grandparenting on health and the underlying mechanisms which explain these relationships vary by sociocultural context. My dissertation advances our knowledge about intergenerational relationships by examining racial/ethnic and social/cultural differences in the consequence of grandparenting for health and well-being in later life.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The health implications of intergenerational relationships in aging families have attracted attention given the significant increase in life expectancy over the past decades. Living longer and healthier than in the past enables older adults to actively engage in intergenerational relationships, including caring for grandchildren (i.e., grandparenting) (Margolis 2016). A fast-increasing number of older adults have been providing grandparenting either as a custodial or secondary caregiver. This phenomenon is attributed to sociodemographic transitions including the rise in women's labor force participation, single parenthood, drug epidemic, incarceration, or economic recession (Fuller-Thomson, Minkler and Driver 1997; Silverstein and Giarrusso 2010; Casper et al. 2016). The growing trend of grandparenting is not limited to the U.S. Rather, it is widely found in various sociocultural contexts including Asia, where older adults have long supported grandchild care, stemming from traditional family values and strong lineage solidarity (Baker, Silverstein and Putney 2008; Mehta and Thang 2012).

There has been little research investigating the consequences of grandparenting on health in later life, despite the increased prevalence of grandparenting among older adults. Although the body of studies examining the association between grandparenting and later health is growing, the findings are inconclusive. Grandparenting has both positive and negative effects on older adults' physical and mental health, largely depending on the types of grandchild care being provided (Blustein, Chan, and Guanais 2004; Chen et al. 2014; Hughes et al. 2017). However, little research uses nationally representative samples of older adults to comprehensively measure grandparenting utilizing both family structure (i.e., in what circumstance the caregiving is

provided) and care intensity (i.e., hours spent on the caregiving). Even less is known about how sociocultural background influences the grandparenting-health relationship (Choi and Zhang 2018; Cong and Silverstein 2008).

In this dissertation, I present three essays that address three separate, but related, research questions to inform how grandparenting affects physical and mental health in later life and how the health implications of grandparenting vary by sociocultural context. In the first study, I not only examine how grandparenting is associated with mortality risk in the United States, but also assess how the link between grandparenting and mortality differs by race/ethnicity. My second study asks how grandparenting affects depressive symptoms in older adults in South Korea. Specifically, I focus on the experience of grandmothers, who make up the majority of caregiving grandparents, based on the gender gap in caregiving roles in the Korean context. I also investigate the extent to which potential mechanisms explain the association. In the third study, I assess how grandparenting is linked to depressive symptoms in older adults in China. Given the substantial rural-urban gap in various socioeconomic dimensions in the Chinese context, I consider the experience of grandparents in both rural and urban regions to identify the rural-urban differences in the health consequences of grandparenting.

CHAPTER 2

GRANDPARENTING AND MORTALITY: HOW DO RACE AND ETHNICITY MATTER?

Introduction

The active roles of older adults in families and intergenerational relationships have attracted attention as life expectancy has substantially increased in the U.S. Caring for grandchildren (hereafter, grandparenting) has been one of the emerging roles of older adults in aging families in concert with increases in women's labor-force participation and single parent families in the adult children generation (Hofferth 1996). One of the foremost issues in terms of grandparenting is the increasing number of grandparents who raise their grandchildren as custodial caregivers. Approximately 7.3 million older adults lived with grandchildren and over 35% of them were the primary caregivers for their grandchildren in 2015 (U.S. Census Bureau 2017). These grandparents perform the primary caregiving on behalf of their adult children who are incapable as a result of the drug epidemic, the rise in the female incarceration rate, and the economic recession over the past few decades (Fuller-Thomson, Minkler and Driver 1997; Keene and Batson 2010). Adding to this, in terms of the older adults who provide temporary noncoresident grandparenting (i.e., babysitting), it is apparent that a considerable number of older adults have engaged in grandparenting in later life (Harrington Meyer and Kandic 2017). Despite this growing phenomenon, the health implications of grandparenting for older adults have been underexplored. Moreover, surprisingly little literature has addressed the consequences of grandparenting for older adult mortality despite its strong association with health.

It is a notable demographic transition that the older population in the U.S. is becoming more racially/ethnically diverse. Given the growth of the overall minority population and greater longevity, the proportion of minority older adults, which comprised 17.5% of the older population in 2003, is projected to increase to 28.5% in 2030 (Administration on Aging 2014). Racial/ethnic minorities present fairly different grandparenting patterns than white grandparents. Grandparenting is a more prevalent and normative role for minority older adults as one way of supporting their family (Burton and Devries 1992; Yancura 2013). Coresidence with grandchildren and having primary responsibility for the grandchildren are also more prevalent among minority grandparents (Minkler and Thomson 2005). In addition to the lower socioeconomic status (hereafter, SES) on average, grandparenting may have different meanings and implications for health and mortality for those groups. Yet research on racial/ethnic variations in grandparenting and later health has been sparse. To my knowledge, this study is a first attempt to assess racial/ethnic differences in the link between grandparenting and older adult mortality in the U.S. using population-level longitudinal data.

This study aims to investigate how caregiving experience as a grandparent influences older adult mortality using data from nine waves of the Health and Retirement Study (1998-2014). I particularly explore how grandparents' individual characteristics, such as SES and health condition and behaviors, contribute to mortality differences among grandparents. The second objective of this study is to examine racial/ethnic differences in these associations. I compare the effects of grandparenting on mortality for white, black, and Hispanic grandparents and highlight the importance of social/cultural contexts in understanding racial/ethnic variations in intergenerational relationships and later health.

Background

Grandparenting, Health in Later Life, and Mortality

In recent years, researchers have attempted to understand the implications of grandparenting for physical and mental health in later life as an increasing number of older adults have become involved in caregiving for grandchildren. However, little is known about the association between grandparenting and older adult mortality. Given that health condition significantly contributes to mortality, it is plausible that grandparenting also influences older adult mortality.

Only a few studies have examined the relationship between grandparenting and mortality risk, and most of these studies were carried out in Europe. Hilbrand et al. (2017) recently found that grandparents who provide non-custodial care for grandchildren are more likely to survive than non-caregiving grandparents and non-grandparents in Germany. A mortality advantage is also found among those who provide child care to non-family members. Christiansen (2014) has suggested that, in Norway, entering into grandparenthood at an early age has an adverse effect on mortality for men. For women, becoming grandmothers at an early age increases mortality risk, whereas those who become grandmothers after middle age (i.e., age 50) report lower mortality. However, it would be inappropriate to apply the prior findings to the U.S. context because the studies are based on Western Europe only. Moreover, the measure of grandparenting in these studies is either simply non-custodial child care versus no care (Hilbrand et al. 2017) or not directly related to caregiving for grandchildren, but rather being a grandparent per se (Christiansen 2014). More importantly, neither of these studies addressed racial/ethnic variations in the link between grandparenting and older adult mortality, which is crucial for the U.S. context because minority older adults in the U.S. tend to take care of grandchildren more

intensively than whites and live with grandchildren more often due to lower SES (Minkler 2005; U.S. Census Bureau 2014).

Grandparenting, Social role, and Health

A growing body of literature has investigated the health consequences of grandparenting in later life to understand the new or changing role of older adults in families. Two competing theoretical perspectives on social roles serve to account for the effects of grandparenting on health. *The role enhancement theory* supports a positive relationship between grandparenting and older adults' health. The theory suggests that individuals feel more satisfaction and experience greater well-being when they carry out various social roles and get a sense of achievement and social support from those activities (Moen, Robison and Dempster-McClain 1995). In the case of grandparenting, older adults get the opportunity to feel a sense of achievement from caring for their grandchildren as well as increased physical and emotional interactions with family members. While performing an active grandparental role, older adults are more likely to be physically active and have feelings of reward, life satisfaction, and purpose (King, Rejeski and Buchner 1998; Pruchno and McKenney 2002; Rozario, Morrow-Howell and Hinterlong 2004; Szinovacz and Davey 2006).

An alternative perspective posits that grandparenting has harmful effects on older adults' health. *The role strain theory* argues that managing multiple role obligations results in a strain on individuals, and that limited resources (e.g., time, goods, emotional capacity, etc.) exacerbate the difficulty (Goode 1960). A high level of stress stemming from role strain leads to psychological distress (Barnett and Baruch 1985; Pearlin 1989). Over-demanding role obligations related to grandparenting may cause stress and fatigue for grandparents and possibly increase the likelihood of negative health outcomes. Grandparenting may also act as a source of stressful

family discord with the grandparent's adult children, spouse, or other family members because of disagreement over child care or insufficient time and resources to share. Furthermore, it is plausible that a lack of personal time for healthy behaviors (e.g., regular exercise) and social activities due to intensive grandparenting can be detrimental to grandparents' health (Choi and Zhang 2018).

Empirical studies on grandparenting and later health have been few and presented mixed findings: grandparenting has both beneficial and detrimental effects on older adults' physical and psychological health. The measures of grandparenting have been various, but primarily classified into two categories, caregiving arrangement and caregiving intensity. Derived from older adults' family structure, *grandparenting arrangement* has three main types: noncoresident, skipped-generation household, and multigenerational household grandparenting, which correspond respectively to grandparents living alone as a couple, a grandparent-headed family without adult children, and an extended family with three or more generations of household members. Older adults, especially grandmothers, who provide noncoresident grandparenting (i.e., babysitting) experience better self-rated health and a lower level of depressive symptoms (Hughes et al. 2007). The health benefits of noncoresident grandparenting are attributed to healthy behaviors (e.g., exercise), emotional supports, and a feeling of role fulfillment while caring for grandchildren, consistent with the role enhancement theory.

On the other hand, the association between skipped-generation household grandparenting and health is well known to be negative (Silverstein and Giarrusso 2010). Researchers have found that, compared to non-caregiving grandparents, older adults providing grandparenting in a skipped-generation household experience a health deficit, including worse self-rated health (Hughes et al. 2007), a higher level of depressive symptoms (Hughes et al. 2007; Szinovacz,

DeViney and Atkinson 1999), and greater frailty (Chen et al. 2014). Older adults providing skipped-generation household grandparenting are most likely doing so because of the absence of the adult children generation for voluntary or involuntary reasons (e.g., illness, death, incarceration, marital dissolution, or unemployment). Elevated stress and physical burden as a custodial caregiver account for the detrimental effect of skipped-generation household grandparenting on older adults' health. With respect to multigenerational household grandparenting, the scant existing research reports that it is associated with greater frailty for white older adults since the extended family is not a common family structure in the U.S. or Western societies (Chen et al. 2014).

Findings on the influence of grandparenting on older adults' health based on g*randparenting intensity*, measured as total hours of child care, are also mixed. Some amount of caring for grandchildren has a protective effect on cognitive functioning for verbal fluency (Arpino and Bordone 2014) and the frailty index (Chen et al. 2014). In particular, a moderate level of grandparenting is beneficial for health. Grandmothers who provide moderate grandparenting suffer less from functional limitations and depressive symptoms (Grundy et al. 2012; Hughes et al. 2007). Supporting the role strain perspective, however, intensive grandparenting is inversely associated with health. Providing highly intensive grandparenting over time predicts deteriorating physical health and increasing stress levels for grandmothers due to the demanding nature of the responsibility (Musil et al. 2011).

It is important to point out that previous literature has mixed the concepts of grandparenting intensity and grandparenting arrangement. For instance, most studies treat intensive grandparenting and skipped-generation household grandparenting interchangeably. Yet, an intensive level of grandparenting is possible in combination with other arrangements,

including noncoresident grandparenting (Choi and Zhang 2018). Some studies differentiate grandparenting arrangement and intensity, but include both concepts as separate indicators (Chen et al. 2014; Hughes et al. 2007). Guided by the theoretical perspectives, I combine the concepts of grandparenting arrangement and intensity together and propose the following hypotheses:

Hypothesis 1: Grandparents who provide light or moderate noncoresident grandparenting have a lower risk of mortality than non-caregiving grandparents.

Hypothesis 2: Grandparents who provide intensive noncoresident grandparenting have a higher risk of mortality than non-caregiving grandparents.

Hypothesis 3: Grandparents who provide skipped-generation household grandparenting have a higher risk of mortality than non-caregiving grandparents.

Hypothesis 4: Grandparents who provide multigenerational household grandparenting have a higher risk of mortality than non-caregiving grandparents.

Race and Ethnicity, Grandparenting, and Health and Mortality

Systematic discussion on racial/ethnic variations in grandparenting and later health and mortality has been sparse. There have been, however, recent attempts to study grandparents from more diverse racial/ethnic backgrounds (Grundy et al. 2012; Pruchno and McKenney 2002).

The patterns and meanings of grandparenting are different for minority older adults than for whites. Minority grandparents more often live with grandchildren (and/or adult children) in the same household and even take the role of primary caregiver for grandchildren (Minkler and Thomson 2005). This is attributed to the fact that, for minority grandparents, caring for grandchildren is regarded as more normative, given their cultural practices, and as more

important for their family's survival, given their lower SES (Burton and Devries 1992; Yancura 2013). For instance, black families have a long tradition of shared childrearing across generations in the face of external adversity, such as subjugation, racism and discrimination, poverty, and single parenthood (Uhlenberg and Kirby 1998). A notably high percentage of black grandparents, compared to other racial/ethnic groups, provide skipped-generation household grandparenting (Bryson and Casper 1999). Hispanics also tend to exchange more frequent and direct support and transfers among generations based on their strong family values and ties (Kataoka-Yahiro, Ceria and Caulfield 2004). Hispanic older adults are more likely to adopt a multigenerational family arrangement (Keene and Batson 2010), and interactions between Hispanic grandparents and grandchildren reproduce Hispanic family culture (Facio 1996; Raphael 1989).

Most prior research on grandparenting and health has included race/ethnicity as only one of the control covariates to predict later health (Hughes et al. 2007; King and Elder 1998; Luo et al. 2012b). Other literature has examined how grandparenting, especially grandparenting arrangement, as opposed to care intensity, affects health for particular racial/ethnic groups. Studies on black grandparents have heavily concentrated on their practice of skipped-generation household grandparenting. In general, black older adults who provide skipped-generation household grandparenting experience deteriorating health conditions, including depressive symptoms (Burton 1992) and a higher level of frailty (Chen et al. 2014). The adverse consequences of skipped-generation household grandparenting for black older adults' health may be due to a high level of stress from the caregiving burden (Pruchno and McKenney 2002) and lower SES (Chen et al. 2014).

There is a dearth of studies on Hispanic grandparents and their health. Past literature has suggested that grandparenting is generally beneficial for the later health of Hispanic older adults. Hispanic grandmothers report a lower level of depressive symptoms when providing noncoresident grandparenting (Grundy et al. 2012). Compared to white and black grandparents who live with and care for grandchildren, caregiving Hispanic grandparents do not experience a health deficit. Multigenerational household grandparenting has no detrimental impact on Hispanic grandparents' health, even though grandparents in extended-family households directly or indirectly take care of grandchildren on a daily basis (Chen et al. 2014). The positive and normative value of grandparenting and the cultural norm of a multigenerational family setting explain the positive health implications of grandparenting for Hispanic older adults (Grundy et al. 2012; Chen et al. 2014).

In light of the current growth of the minority older population in the U.S., especially Hispanics, it is necessary to take diverse racial/ethnic backgrounds into account and explore their implications for well-being in later life. The consequences of grandparenting for mortality risk or health presumably vary across racial/ethnic groups because of racial/ethnic differences in family culture and behaviors (Keene and Batson 2010; Minkler and Fuller-Thomson 2005; Mouzon 2013). Taking these factors together, I expect that:

> **Hypothesis 5**: Among black, grandparents providing skipped-generation household grandparenting have a higher risk of mortality than non-caregiving grandparents.
>
> **Hypothesis 6:** Among Hispanic, grandparents providing multigenerational household grandparenting have a lower risk of mortality than non-caregiving grandparents.

Data and Methods

Data

I used the nine waves (1998-2014) of the Health and Retirement Study (HRS) data to examine the relationship between grandparenting and mortality and how the link differs by race. The HRS is a longitudinal study of a nationally representative sample of 21,384 Americans over age 50 in the 1998 wave. The survey has biennially collected detailed data on older adults' changes in physical and mental health factors including mortality, health behaviors, family conditions, labor force participation, and financial situation. Data for these analyses came from raw HRS data, RAND HRS data, and the Tracker file of the HRS. The RAND data are the cleaned and streamlined versions of HRS data developed by the RAND Center for the Study of Aging. The Tracker file is a cleaned version which facilitates the use of HRS data across waves.

The HRS oversampled two racial/ethnic minority groups, blacks and Hispanics. Asians and other races were not included due to insufficient sample size. The analytic sample in this study includes 13,705 non-Hispanic whites (hereafter, whites), non-Hispanic blacks (hereafter, blacks), and Hispanics. I restricted the sample to respondents aged 50–80 who had grandchildren and who completed questions on grandparenting and race/ethnicity in 1998. Although "older adults" generally refers to those age 65 and over, I included respondents starting at age 50 not only to utilize more cases in the data but also to take into account the childcare experience of young grandparents. I set the upper age limit at 80 years because the oldest older adults are less likely to take care of grandchildren because of declining health (Hughes et al. 2007; Ku et al. 2013).

Measures

Mortality. The outcome variable used in this study is older adult mortality, which indicates whether a respondent died from any cause in the follow-up surveys (death = 1). Death information was extracted from the Tracker file. I considered only respondents having valid data for the time of death. Of the 13,705 respondents aged 50–80 in 1998, 3,351—about 25%—were reported to have died by 2014.

Grandparenting. Grandparenting, the key independent variable, assesses older adults' experience of providing child care for grandchildren. This measure incorporates both their family structure and caregiving intensity to take into account the caveat from prior studies using only one of these facets. Using two survey items, respondents' household member information and the total hours of child care provided for grandchildren that respondents reported for the previous two years, I measured grandparenting as a time-varying categorical variable. The categories are no grandparenting (reference), skipped-generation household grandparenting, multigenerational household grandparenting, and noncoresident grandparenting. I classified older adults who reported providing no child care for grandchildren into the no-grandparenting group regardless of family structure. Among older adults who provided care, those living with grandchildren only (without adult children) were categorized as providing skipped-generation household grandparenting. Caregiving grandparents living with adult children as well as grandchildren were categorized as providing multigenerational household grandparenting. Grandparents who cared for grandchildren but lived in a separate household were classified as providing noncoresident grandparenting.

I further categorized noncoresident grandparenting into two sub-groups based on caregiving intensity: light/moderate noncoresident grandparenting (0–499 hours during the

previous two years) and intensive noncoresident grandparenting (over 500 hours). I did not apply this sub-categorization to the skipped-generation household grandparenting and multigenerational household grandparenting groups due to small sample sizes. Only a small number of coresident grandparents reported their time spent on child care, possibly because living together with grandchildren makes it hard to count the exact number of hours of caregiving during the previous two years.

Health condition. Health condition includes three sets of time-varying predictors. Self-rated health is coded 1 for fair or poor health. I utilized a short version of the Center for Epidemiologic Studies-Depression (CES-D) scale, ranging from 0 to 8, to measure depressive symptoms. Chronic disease is included as a dichotomous variable (yes = 1), indicating whether respondents had been diagnosed with one or more chronic conditions (i.e., hypertension, diabetes, stroke, lung disease, heart disease, or cancer) among the leading causes of death in the U.S. (Heron 2013).

SES. SES is measured using education, household income, net household wealth, employment, and health insurance. Education is a continuous variable constructed from the respondent's years of schooling. Household income and net household wealth are time-varying continuous variables, adjusted as logged. I also created dummy variables for employment (working = 1) and having long-term health insurance (yes = 1). All of these variables except for household income and net household wealth were measured at baseline.

Health behaviors. I include three dimensions of health behaviors. I dichotomized smoking (currently smoking = 1) and drinking (currently drinking = 1), and both are time-varying variables. Exercise was coded as 1 for those who did not participate in vigorous physical activity three or more times a week in the previous year (reference) and 0 for those who did.

Exercise was measured at baseline only because the question on exercise was inconsistent over the waves.

Controls. I controlled for sociodemographic characteristics, including gender, race, age, marital status, and nativity. Gender is a dichotomous variable (women = 1). I coded self-reported race into three categories: white (reference), black, and Hispanic. Age is measured as a time-varying continuous variable. Marital status (married = 1) and nativity (foreign born = 1) are dummy variables.

Analytic Strategy

This study employs a complementary log-log model to investigate the relationship between grandparenting and older adult mortality over sixteen years, 1998-2014. The complementary log-log model can specify how the discrete-time hazard depends on time and explanatory variables. In addition, the model is also directly equivalent to the Cox proportional hazards model in continuous time since the complementary log-log function builds in a proportional hazards assumption (Allison 2014). The complementary log-log model is specified as:

$$\log\left[-log\left(1-P(t)\right)\right] = \alpha + \sum \beta_k X_{ik} + \sum \beta_j X_{ij}(t)$$

where $P(t)$ is the conditional probability of death for individuals at wave t (1-9). α represents the complementary log-log transformation of the baseline hazard. $\beta_k X_{ik}$ indicates the effects of time-invariant covariates, and $\beta_j X_{ij}(t)$ is the effects of time-varying covariates.

Using person-year record files for two-year intervals from 1998 to 2014, I estimated a series of nested complementary log-log models to test my hypotheses. I first estimated the main

effect of grandparenting on mortality, net of sociodemographic characteristics. I then introduced health condition to adjust for the selection effect that healthier older adults are more likely to care for grandchildren. Next, I added multiple indicators (SES and health behaviors, respectively) to assess whether and to what extent they explained mortality risk as a function of grandparenting. Finally, I included the interaction term of race and grandparenting, net of all covariates, to evaluate the racial gap in mortality explained by grandparenting. Missing data for the independent variables ranged from none to approximately 17% for grandparenting. In order to retain all cases, I imputed missing values with multiple imputation by chained equations in Stata 14 (Young and Johnson 2015). Results were based on estimates from 10 imputed data sets. I applied weights to adjust for the complex sampling design of the HRS.

Results

Descriptive Statistics

I provide weighted descriptive statistics for the older adults in Table 1. The results are reported by race/ethnicity to show the differences among whites, blacks, and Hispanics. Significant differences among racial groups are indicated with an asterisk. Table 2-1 shows that 24.89% of white grandparents and 24.87% of black grandparents died between 1998 and 2014. The proportion of death is significantly smaller for Hispanic grandparents (18.78%) in comparison with white grandparents.

In terms of grandparenting, the majority of older adults do not take care of any grandchildren. The proportion of non-caregiving grandparents is especially high among whites (80.32%), although not significantly higher than among blacks or Hispanics. However, caregiving grandparents show different grandparenting patterns by race/ethnicity. For whites, the

second largest group are those who provide light/moderate noncoresident grandparenting (10.54%), followed by intensive noncoresident grandparenting (4.87%), multigenerational household grandparenting (2.81%), and skipped-generation household grandparenting (1.47%). By contrast, among blacks, 8.23% of grandparents provide multigenerational household grandparenting—the second most common care type. The light/moderate noncoresident grandparenting group accounts for 7.52%, followed by skipped-generation household grandparenting (4.66%) and intensive noncoresident grandparenting (3.84%). Compared to white grandparents, significantly more black grandparents live with either adult children and grandchildren or with grandchildren only. As for Hispanics, 7.62% provide light/moderate noncoresident grandparenting. The next largest groups are multigenerational household grandparenting (6.85%) and intensive noncoresident grandparenting (4.11%). The skipped-generation household grandparenting group represents 2.80% of Hispanics. Like black grandparents, Hispanic grandparents tend to reside with younger generations including grandchildren more often than whites, and the difference is statistically significant.

The general health conditions (i.e., self-rated health, CES-D, and chronic disease) of blacks and Hispanics are significantly worse than those of whites. SES also differs by race in my sample. Black and Hispanic older adults, as expected, report lower SES than whites in all dimensions, including education, household income, net household wealth, and long-term health insurance. With respect to health behaviors, the racial gaps are mixed: blacks and Hispanics are less likely to exercise vigorously than whites, but currently drink less than whites. Blacks currently smoke more than whites. Last, looking at the control variables, significantly more black grandparents are female. Blacks and Hispanics are more likely to be younger and less likely to be married than whites. More black and Hispanic grandparents are foreign born compared to whites.

Results from Event History Models

As a next step, I estimated a series of complementary log-log models to investigate the association between grandparenting and older adult mortality and whether and how the linkage differs by race/ethnicity. Table 2-2 presents results from the six models. The results from Model 1 of Table 2-2 indicate that older adults who provide any level of noncoresident grandparenting have significantly lower mortality than older adults who provide no caregiving, net of control variables. Specifically, the hazard of death for those who provide light/moderate noncoresident grandparenting is approximately 20% lower than for non-caregiving grandparents. Grandparents who provide intensive noncoresident grandparenting have a 19% lower hazard of death compared to their non-caregiving counterparts.

Model 2 includes health condition. The significant effect of grandparenting on mortality holds even after controlling for various health statuses. The lower mortality risk for those who provide any noncoresident grandparenting remains, and the magnitude of the hazard ratios slightly increases.

I add SES to the association between grandparenting and mortality in Model 3 of Table 2-2. The results show that the hazard of death for older adults who provide light/moderate noncoresident grandparenting slightly increases (from .83 to .89), while the hazard for those who provide intensive noncoresident grandparenting remains similar (changing from .84 to .85), net of health condition, SES, and controls. The decreasing effect of noncoresident grandparenting on mortality mainly derives from its positive association with several SES indicators: education, household income, net household wealth, and currently working, which are negatively related to mortality as predicted.

When health behaviors are introduced in Model 4, the results indicate that the protective effects of noncoresident grandparenting on mortality still exist. The hazard of death for the light/moderate and intensive noncoresident grandparenting groups (.85 and .85, respectively) remains similar to that in Model 2, controlling for health condition and behaviors as well as controls.

I next include all variables in the full model (Model 5). The impacts of noncoresident grandparenting are still significant, net of all covariates. Grandparents providing a light/moderate level of noncoresident grandparenting have a 10% lower hazard of death compared to non-caregiving grandparents. The hazard of death for grandparents providing intensive noncoresident grandparenting is 14% lower than that of non-caregiving grandparents.

The final model (Model 6 of Table 2-2) adds an interaction term to further examine whether and how the association between grandparenting and mortality varies by racial/ethnic groups. The results show that several types of grandparenting interact significantly with being black. The mortality risk is significantly increased among black grandparents who provide skipped-generation household grandparenting (OR=1.51*0.87=1.31), multigenerational household grandparenting (OR=1.50*0.84=1.26), and intensive noncoresident grandparenting (OR=1.31*0.82=1.07). For Hispanics, however, only the mortality difference between intensive noncoresident grandparenting and non-grandparenting is marginally significant.

To better illustrate the joint effects of grandparenting and race on mortality, Figure 2-1 presents the predicted probabilities of mortality, adjusting for all covariates in Model 6 of Table 2-2. The patterns are different among races. Providing any type of grandparenting except for skipped-generation household grandparenting has a protective effect on whites' mortality risk. The probability of mortality for whites is the highest among those without grandparenting

experience but the lowest among those who provide intensive noncoresident grandparenting. In contrast, for blacks, the mortality probability is the highest for the skipped-generation household grandparenting group and the lowest for the light/moderate noncoresident grandparenting group. Blacks' mortality risk is higher than that of whites and Hispanics for those who provide skipped-generation household grandparenting and multigenerational household grandparenting. The mortality of Hispanic grandparents is consistently the lowest in comparison with white and black grandparents, but does not significantly differ by grandparenting type.

Finally, I note that all basic control variables are significant in the expected directions in all six models. Women have a lower hazard of death than men. As age increases, the hazard of death also increases. Those who are married and foreign-born have a lower hazard of death than non-married and U.S.-born individuals, respectively.

Discussion

The present study is among the first to examine the association between grandparenting and older adult mortality using population-level longitudinal data. The first aim of this study is to examine how grandparenting experience influences mortality. The second aim is to further investigate whether and how the linkage between grandparenting and mortality differs by race/ethnicity, to better understand the consequences of contemporary grandparenting for various racial/ethnic groups. Six hypotheses are proposed on the basis of previous literature that argues for both positive and negative health implications of grandparenting depending on caregiving arrangement and intensity as well as grandparents' race/ethnicity.

In terms of the general mortality implications of grandparenting, I first hypothesize that grandparents who provide light/moderate noncoresident grandparenting have a lower mortality

risk than their non-grandparenting counterparts. The results support this hypothesis. This finding is consistent with a recent study that finds a beneficial impact of noncoresident grandparenting on caregivers' mortality risk in Europe (Hilbrand et al. 2017). The result is also broadly in line with previous studies that suggest positive associations between grandparenting and older adults' various physical and mental health outcomes (Chen et al. 2014; Hughes et al. 2007; Ku et al. 2013). The role enhancement theory may explain why grandparenting plays a protective role in mortality and health. Carrying out multiple social roles can contribute to one's well-being by boosting positive feelings, such as self-efficacy, self-esteem, and life satisfaction (Moen, Robison and Dempster-McClain 1995). Accordingly, grandparents may obtain emotional reward from taking on an additional caregiving role, grandparenting, in their later life. Grandparenting may also promote older adults' mental well-being because of their increased interactions with grandchildren and adult children during child care (Pruchno and McKenney 2002; Rozario, Morrow-Howell and Hinterlong 2004; Szinovacz and Davey 2006). A decent level of healthy behavior, such as physical activity and a regular and nutritious diet, while caring for grandchildren also decreases health and mortality risks (King, Rejeski and Buchner 1998).

Hypothesis 2 stated the contrasting expectation that grandparents who provide intensive noncoresident grandparenting have a higher mortality risk than non-caregiving grandparents. I do not find any supporting evidence. The results instead show that the mortality risk for older adults providing intensive noncoresident grandparenting is lower than that of their non-grandparenting counterparts. Although very little is known about the mortality implications of intensive noncoresident grandparenting, the finding here is inconsistent with extant literature that suggests an inverse relationship between highly intensive grandparenting and older adults' health (Musil et al. 2011), which may ultimately predict mortality. The inconsistency is perhaps due to the

buffering effect of the family structure of these grandparents. Compared to older adults who provide skipped-generation household and multigenerational household grandparenting, it is possible for older adults providing noncoresident grandparenting to have a respite from child care and have time for their own needs and leisure (Choi and Zhang 2018). Thus, noncoresident grandparents may experience less physical burden and stress from their caregiving despite its high intensity and still benefit from grandparenting with a lower mortality risk. In addition, grandparenting intensity seems to affect mortality risk little, compared to grandparenting arrangement, given that both light/moderate and intensive noncoresident grandparenting have effects of the same direction and similar magnitude.

The third hypothesis in this study is that older adults providing skipped-generation household grandparenting experience a higher risk of mortality than their non-caregiving counterparts. I do not find any significant evidence to support the hypothesis. The result is surprising in light of many previous studies reporting an inverse relationship between skipped-generation household grandparenting and health in later life. The inconsistency could be because of the prior conditions of caregiving grandparents rather than the grandparenting practice itself. For example, grandparents' earlier health status and socioeconomic resources explain older adults' health more than does grandparenting (Hughes et al. 2007). I also hypothesize that grandparents who offer multigenerational household grandparenting have a higher mortality risk than non-caregiving grandparents (Hypothesis 4), but no significant supporting evidence is found.

Next, I turn to racial/ethnic variations in the linkage between grandparenting and older adult mortality. In light of the previous literature on grandparenting and health, I expect higher mortality for black grandparents who provide skipped-generation household grandparenting than

for non-caregiving grandparents (Hypotheses 5). I also expect lower mortality for Hispanic grandparents providing multigenerational household grandparenting than for their non-caregiving counterparts (Hypotheses 6). The findings are mixed. Supporting Hypothesis 5, black older adults providing skipped-generation household grandparenting have a higher mortality risk than the non-caregiving group. Moreover, multigenerational household grandparenting and intensive noncoresident grandparenting are also associated with a higher risk of mortality for black grandparents. As for Hispanics, however, I did not find any significant mortality differences among grandparenting groups. I also note that the results indicate that white grandparents providing multigenerational household grandparenting and light/moderate or intensive noncoresident grandparenting have a lower mortality risk relative to their non-caregiving counterparts. In sum, the results indeed suggest significant racial/ethnic variations in the association between grandparenting and mortality.

The robust mortality benefits of grandparenting throughout the models—mainly from light/moderate and intensive noncoresident grandparenting—are driven by the white grandparents, the majority group, even net of SES and health condition and behaviors. White grandparents enjoy significantly longer periods of healthy grandparenthood than minority grandparents (Margolis and Wright 2017). Furthermore, direct or indirect support from/to family members, a healthy lifestyle, and the psychological satisfaction derived from consistent intergenerational relationships through grandparenting—without the stressful responsibility of being the primary caregiver—may contribute to the lower mortality risk for white grandparents (Hayslip, Blumenthal and Garner 2014; Pruchno and McKenney 2002). On the other hand, most types of caregiving for grandchildren leads to mortality disadvantages for black older adults. In addition to the physical burden and stress from child care (Pruchno and McKenney 2002), this is

perhaps due to black grandparents' lower SES and worse health condition. Health deficits of caregiving grandparents considerably reflect their SES and prior health, rather than being a consequence of grandparenting itself (Chen et al. 2014; Hughes et al. 2007). Black grandparents tend to be poor and unhealthy compared to whites (Burton and Devries 1992). The lower SES of black older adults and their families is one of the primary reasons why black grandparents are more likely to take care of grandchildren intensively in either a skipped-generation household or multigenerational household setting, or even when not coresiding with their adult children or grandchildren (Bryson and Casper 1999; Burton and Devries 1992; Uhlenberg and Kirby 1998). Thus, black caregiving grandparents on the whole seem to be unable to enjoy the health benefits of grandparenting due to their disadvantaged social/individual status.

I conducted several sensitivity analyses to ensure that the findings are robust (results not shown but available upon request). First, I further categorized the intensity of caregiving for noncoresident grandparenting into three groups (light, moderate, and intensive care) and implemented the same models. The analytic results support the main findings above. Next, I analyzed whether social support (e.g., social activities with family and friends, or in a community) affects the relationship between grandparenting and mortality. Social support has no significant effect, and the effect of grandparenting still holds. Lastly, given the high percentage of foreign-born individuals in the Hispanic sample (approximately 53%), I tested whether nativity moderates the racial/ethnic differences in grandparents' mortality risk. The results did not show any statistically significant three-way interaction effects.

The present study is not without limitations. First, I have small samples of minority older adults for some grandparenting groups. Although the HRS oversamples black and Hispanic populations, particular categories (i.e., the skipped-generation household grandparenting and

intensive noncoresident grandparenting groups) still contain a relatively insufficient number of observations. This data limitation may prevent me from detecting a significant impact of such grandparenting types on mortality for Hispanics. Second, I may be unable to entirely eliminate a selection effect for caregiving grandparents. Healthier grandparents are more likely to take care of grandchildren and survive longer than their non-caregiving counterparts (Hilbrand et al. 2017), and there may be racial/ethnic differences in those patterns of grandparents. Although I control for various health indicators (health condition and health behaviors) at baseline and as time-varying, the results may need to be interpreted with caution.

Despite these limitations, this study is important as one of the first to investigate how grandparenting and older adult mortality are associated and whether and how the linkage differs by race/ethnicity. I contribute to the current discussion on grandparenthood by finding mixed effects of caring for grandchildren on mortality by racial/ethnic groups using a nationally representative longitudinal data set. The mortality advantage from grandparenting is robust for white older adults. A mortality disadvantage from grandparenting is mainly found among black grandparents. Given the increasing diversity of the older population in the U.S., this study emphasizes the importance of understanding how social/cultural contexts for each racial/ethnic group shape their intergenerational relationships and well-being in later life.

CHAPTER 3

CAREGIVING GRANDMOTHERS' DEPRESSIVE SYMPTOMS IN SOUTH KOREA

Introduction

Over the past few decades, researchers have increasingly sought to understand how significantly increased life expectancy affects intergenerational relationships and older adults' roles in aging families. As older adults live longer and stay healthier than they had in the past, their grandparenthood, a period when older adults can interact with their grandchildren, has also been extended (Margolis 2016). An increasing number of grandparents have become engaged in caring for grandchildren (i.e., grandparenting) during later life (Baker, Silverstein and Putney 2008; Silverstein and Giarrusso 2010). Some older adults even provide very intensive care for their grandchildren depending on the family's situation, especially their adult children's needs from changing sociodemographic trends, such as single parenthood, women's employment, and increasing work hours (Casper et al. 2016; Cherlin 2010). These phenomena are found in various sociocultural settings around the world since grandparents, specifically grandmothers, have long played an important role in supporting child care within their families (Baker, Silverstein and Putney 2008).

South Korea (hereafter, Korea) is one of the countries that has achieved a rapid increase in life expectancy over the past several decades. Indeed, the life expectancy at birth for Korean women is 84.6 years old, which ranked eighth in the world in 2012 (World Health Organization 2014). As their healthy later life has been extended, Korean older women have been more actively engaged in their family care as caregivers. As in the U.S. or other western countries, one of the popular caregiving roles of Korean older women is grandparenting. An increasing number

of grandmothers have provided an intensive level of daily child care for their grandchildren, even when their grandchildren and adult children do not reside with them (Korea Institute of Child Care and Education 2015). The unique facet of Korean grandparenting is derived from the situation wherein older women usually take care of grandchildren to support their dual-income adult children. Traditional family culture emphasizing intra-family support and the absence of sufficient quality daycare centers are the primary reasons why Korean older women are more frequently associated with the grandparenting role.

There have been few studies that investigate the consequences of grandparenting for older women's well-being and health in Korea despite the significant growth of the grandparenting trend. Little is known about the health consequences of Korean grandparenting, especially for mental health, though the findings from other cultural contexts have reported both positive and negative impacts of grandparenting on older adults' mental health (Hughes et al. 2007; Ku et al. 2013; Szinovacz, DeViney and Atkinson 1999). In addition, the majority of prior research on Korean grandparenting has focused only on grandparents who provide skipped-generation household grandparenting (i.e., care in grandparent-grandchildren only households) and their excessive caregiving demands (Kim 2009; Lee and Han 2008; Park 2010). It is unknown whether other types of grandparenting have significant effects on health. Finally, most prior studies have utilized either cross-sectional regional data (Bae 2007; Baek 2009; Choi and Cha 2013; Kang 2011) or qualitative data (Kim and Seo 2007).

The aim of the present study is to untangle the association between grandparenting and mental health, particularly depressive symptoms, in the Korean context. First, drawing on the Korean Longitudinal Study of Aging (2008-2012), I examine whether grandparenting influences the trajectory of depressive symptoms over time among older women. Second, I investigate the

extent to which socioeconomic status (hereafter, SES), health behaviors, and social support account for that association.

Background

Theoretical Perspectives

Grandparenting is one of the new social roles for older adults living longer and healthier later lives. In order to understand how grandparenting may influence older adults' mental health, two competing theoretical perspectives are often used: the role enhancement theory and the role strain theory. *The role enhancement theory* suggests that executing multiple social roles simultaneously contributes to individuals' well-being, which also promotes mental health. Those who have different social roles enjoy a greater sense of fulfillment and satisfaction cumulated from carrying out each role (Moen, Robison and Dempster-McClain 1995). In light of this perspective, grandparenting is associated with better mental health. Older adults who provide care for their grandchildren, a new additional role in life, obtain positive health-promoting emotions, including the sense of purpose in life, self-efficacy, and life satisfaction, while interacting with their grandchildren and their parents, the adult children (Pruchno and McKenney 2002; Rozario, Morrow-Howell and Hinterlong 2004; Szinovacz and Davey 2006). Caregiving grandparents are likely to be more physically active in taking care of grandchildren, which in turn has beneficial effects on mental health (King, Rejeski and Buchner 1998).

Grandparenting, on the other hand, can adversely affect older adults' mental health. *The role strain theory* argues that, in contrast to the role enhancement theory, simultaneously holding various social roles is detrimental to individuals' well-being. The more role obligations one has, the more struggling and stress arise because one's resources, such as time, energy, emotions, and

property, have limits (Goode 1960). As such, overburdening tasks lead to stress and more psychological distress (Barnett and Baruch 1985; Pearlin 1989). Based on the role strain theory, grandparenting can be a source of stress and poor mental status for older adults. Given that grandparenting is not a mandatory responsibility of grandparents, older adults who care for grandchildren can experience strain from fulfilling this additional role. Caregiving grandparents may find increasing role strain from managing concurrent social roles, such as spouse, parent, grandparent, friend, and other social positions. These over-demanding role obligations and strains have negative effects on caregiving older adults' mental health. In addition, such role strain deteriorates grandparents' mental health by bringing additional stressors, including conflicts over child rearing with their adult children, less time with their spouse or other family members, and loss of time for leisure and participation in social activities (Blustein, Chan and Guanais 2004). Both of these two theoretical perspectives explain the association between grandparenting and older adults' mental health. That said, the health consequences of grandparenting may depend on whether the strains from grandchild care outweigh the physical and mental benefits of the caregiving experience.

Empirical Evidence on Grandparenting and Mental Health

Research on grandparenting has been limited and the majority of the studies are predominantly based on cases in the U.S. and European countries. Given the scarcity of Korean studies on grandparenthood, I first address the previous findings from other countries in this section then discuss the Korean context. The extant literature on grandparenting has suggested that grandparenting has both positive and negative impacts on mental health in later life. The mixed evidence depends on what types of grandparenting older adults provide for their grandchildren. Researchers have mainly measured grandparenting using either family structure

(i.e., in what family circumstance the caregiving is provided) or care intensity (i.e., how many hours are spent on the caregiving) of older adults. As for the beneficial effects of grandparenting on mental health, prior studies have found that providing noncoresident grandparenting (i.e., maintaining a separate household from grandchildren but still babysitting) is associated with grandmothers' lower levels of depressive symptoms. Caregiving grandmothers are also more likely than non-caregiving grandmothers to report lower rates of depressive symptoms when providing moderately intensive grandparenting (i.e., providing 200 to 500 hours of care over two years, which is approximately 8-19 hours per week) (Hughes et al. 2007). A moderate level of grandparenting, especially on a regular basis, is linked to less depression among grandmothers (Grundy et al. 2012). A moderate level of role obligation and interaction with grandchildren and/or adult children via caregiving would thus contribute to the older adults' better mental health as explained by the role enhancement theory.

Other empirical studies, by contrast, suggest that grandparenting is detrimental to mental health in later life. As the role strain theory argues, grandparenting adversely affects mental health, especially when the intensity of grandchild care is excessive. An increasing number of older adults live with and take care of grandchildren as a custodial caregiver on behalf of their incapable adult children. Adult children in these cases are mostly absent in the household (i.e., skipped-generation households) for various reasons, such as divorce, unemployment, death, and incarceration (Silverstein and Giarrusso 2010). Previous research has found that an intensive level of grandchild care, such as with skipped-generation household grandparenting, is significantly associated with depressive symptoms among grandparents (Blustein, Chan and Guanais 2004; Hughes et al. 2007; Szinovacz, DeViney and Atkinson 1999). Stress and physical

burden from a substantial amount of grandparenting seems to explain the adverse effects of grandparenting on older adults' mental health.

The implications of grandparenting for later mental health may vary by sociocultural context, given the cultural differences in the meaning of grandparenthood and the social expectations for grandparental roles (Hayslip et al. 2012). The provision of grandparenting is more common and normative for older adults in Asia to support their adult children. Strong family values and ties within the Asian culture encourage such direct family support across generations (Kataoka-Yahiro, Ceria and Caulfield 2004; Yancura 2013). A growing number of studies have examined the role of grandparenting in shaping older adults' well-being and health in the Asian context (Mehta and Thang 2012). Those studies have often focused on grandparenting in multigenerational households—an extended family setting, which is a more traditional and common family structure in Asia than in western countries. For instance, Taiwanese older adults experience lower rates of depressive symptoms when providing long-term grandparenting in a multigenerational household, relative to non-caregiving and short-term caregiving grandparents (Ku et al. 2013). In addition, numerous Chinese grandparents in rural areas are taking care of grandchildren as the primary caregiver to support their adult children, who are working in urban areas. Those rural grandparents providing skipped-generation household grandparenting have fewer depressive symptoms when migrant adult children provide financial support as a reward (Cong and Silverstein 2008). The inconsistent evidence suggests that sociocultural differences in the grandparenting experience and its health consequences exist even in the same regional context.

Korean Grandmothers and Mental Health

It is inappropriate to apply the evidence on grandparenting and mental health to the Korean context because most of the previous studies are from the U.S. and Europe, where populations largely come from very different cultural backgrounds. Although there is some research on Asian grandparenting, these studies have often focused on multigenerational household grandparenting, which is a fairly rare family structure in Korea (Korea Institute for Health and Social Affairs 2014). Moreover, the mixed findings from the Asian context indicate that country-specific studies are necessary for a more comprehensive understanding of the effects of grandparenting on mental health.

More and more grandparents in Korea have taken care of their grandchildren over the past decade. Korean grandparenting is unique because a sizable number of older adults offer intensive child care (e.g., full-time) for their grandchildren despite not living in the same household with grandchildren and/or adult children (Korea Institute of Child Care and Education 2015). Despite the growing trend, Korean older adults' grandparenting and its health implications remain underexplored. Especially with regard to mental health, only a few studies have examined the association with grandparenting in the Korean context. Some studies have found that caring for grandchildren has a protective effect on mental health in later life. Grandparents who provide part-time grandparenting (i.e., less than 40 hours of care per week) are more likely to experience life satisfaction than full-time caregiving grandparents (Choi and Cha 2013).

Most prior literature, however, has reported the harmful impacts of grandparenting on older adults' mental health, specifically depressive symptoms. As found in the U.S. and Europe, certain family structures and intensive care are factors that diminish depressive symptoms. For

instance, older adults providing skipped-generation household grandparenting are prone to experience a higher level of depressive symptoms (Bae 2007). Moreover, providing full-time caregiving is connected to more severe depressive symptoms among grandparents compared to those who are part-time caregivers (Bae 2007; Baek 2009).

It is important to point out that previous findings do not fully represent the experience of Korean grandparents. The majority of studies have focused only on excessive caregiving demand, such as skipped-generation household grandparenting and full-time grandparenting (Kim and Kim 2004; Lee and Han 2008). Those types of grandparenting, however, are not common practice among older adults. It is still unclear whether and how other types of grandparenting affect mental health. In addition, researchers do not exclusively utilize the concept of family structure and care intensity to measure grandparenting; most studies consider only one of the two dimensions (Baek 2009; Choi and Cha 2013). Furthermore, it is unknown how other individual characteristics of older adults, such as SES, health behaviors, and social support, influence the linkage between grandparenting and mental health. Finally, most prior research has used either qualitative methods (Kim and Seo 2007) or cross-sectional or regional data (Bae 2007; Baek 2009; Choi and Cha 2013; Kang 2011), which makes the potential causal relationship between grandparenting and mental health much less clear.

Present Study

The current study aims to examine the association between grandparenting and mental health, specifically the trajectory of depressive symptoms of caregiving grandmothers in Korea. Guided by the role strain/enhancement theories and previous literature, I expect that the effect of grandparenting on depressive symptoms may be more profound among grandmothers who provide more intensive types of care, such as skipped-generation household grandparenting and

full-time noncoresident grandparenting. Given the low prevalence of multigenerational households in Korea, I hypothesize that multigenerational household grandparenting may develop grandmother's depressive symptoms. I also expect that the trajectory of depressive symptoms by grandparenting may be partially explained by the underlying mechanisms of SES, health behaviors, and social support.

This study goes beyond previous studies in several ways. First of all, I incorporate both family structure and care intensity for a more thorough measurement of grandparenting among older adults. This approach also captures various types of contemporary Korean grandparenting and compares the effect of each type of grandparenting on mental health. Second, this study is among the first to investigate potential mechanisms underlying the association between grandparenting and mental health. Third, I use a nationally representative longitudinal survey to better understand the causal relationship of grandparenting with mental health and the changes in this link over time.

Data and Methods

Data

This study uses data provided by the Korean Longitudinal Study of Aging (KLoSA) to examine the relationships between grandparenting and depressive symptoms among Korean grandmothers. The KLoSA is a longitudinal study of a nationally representative sample of 10,254 Koreans aged 45 and older in 15 major cities and provinces. The primary purpose of the survey is to collect data on older adults' labor force participation, family life, financial status, retirement, health status, and social welfare. The KLoSA has been biennially conducted since 2006, the first survey year.

This study uses Waves 2, 3, and 4 (2008, 2010, and 2012) of the KLoSA. I exclude Wave 1 (2006) because the baseline wave does not contain sufficient information on the respondents' household members, which is important for measuring grandmothers' family structure and the relevant grandparenting type. Of the 8,688 respondents at baseline (2008), 5,682 respondents are grandparents who have at least one grandchild. I limit my sample to 3,457 grandmothers; grandfathers (n = 2,225) are dropped from the sample due to the low number of caregiving grandfathers. I also exclude respondents who are older than 80 (n = 385) since the oldest older adults are less likely to provide child care due to their health decline (Hughes et al. 2007; Ku et al. 2013). The range of missing data in the sample varies from less than 1% for most variables to 6.2% for household asset. I use listwise deletion to handle the missing data. The final analytic sample includes 2,814 grandmothers, contributing to 7,657 observations across three survey waves with an average of 2.7 observations per respondent.

Measures

Depressive Symptoms. Depressive symptoms are measured using the Center for Epidemiologic Studies-Depression (CES-D) scale, which ranges from 1 to 10. The depressive symptoms are constructed as a time-varying variable across the three waves.

Grandparenting. Grandparenting in this study is measured as a time-varying categorical variable using two characteristics of older Korean women: family structure and care intensity. First, I classify grandmothers into caregiving and non-caregiving groups based on the question of whether they provide child care ("Did you take care of any of your grandchildren under the age of 10 last year?"). I then utilize a) household member information (i.e., family structure) and b) the hours of child care for grandchildren per week ("On average how many hours per week did you spend on caring for [grandchild's name] last year?"), which I qualify as

care intensity, to capture caregiving grandmothers' various care types. The categories of this grandparenting variable include no grandparenting (reference), multigenerational household grandparenting, part-time noncoresident grandparenting, and full-time noncoresident grandparenting. Grandmothers who are in an extended-family setting (i.e., living with both adult children and grandchildren) and provide care for the grandchildren are categorized under "multigenerational household grandparenting." Caregiving grandmothers who head their own household (i.e., not living with either adult children or grandchildren) are classified into "noncoresident grandparenting" groups. Among the noncoresident caregiving grandmothers, I categorize those who take care of grandchildren less than 40 hours per week as "part-time" and those who provide grandparenting for 40 and more hours per week as "full-time." This classification reflects the trend of highly intensive grandparenting among Korean grandparents who report approximately eight hours of daily child care for five days or more per week, on average (Korea Institute of Child Care and Education 2015). I exclude the group of custodial grandmothers who live with only grandchildren (i.e., skipped-generation household grandparenting) due to very low sample size (0.4% of the sample). Moreover, I do not subcategorize the multigenerational household grandparenting group based on care intensity because there are insufficient numbers of respondents for each subgroup.

SES. SES comprises four predictors. Education is a categorical variable coded using grandmothers' highest education level at baseline: elementary school or less (reference), middle school, and high school diploma or more. Household income is a time-varying continuous variable to which I apply the natural logarithm transformation in order to reduce the skewness. Household asset, which is standardized and time-varying, is measured using the total amount of

assets owned by all household members. Employment status is measured as time-varying and dichotomous (1 = currently working, 0 = currently non-working).

Health behaviors. I include three sets of time-varying dummy indicators: currently exercising (1 = yes), currently smoking (1 = yes), and currently drinking (1 = yes).

Social support. Social support is assessed with three time-varying dummy variables: social activity, support from adult children, and support to adult children. Social activity is measured as how often respondents actively participate in any organizations, clubs, or societies (1 = more than monthly). In addition, I include financial and non-financial support from adult children (1 = yes) and financial and non-financial support to adult children (1 = yes).

Controls. I include age, marital status, past grandparenting experience, self-rated health, and chronic condition as control variables. Age is a continuous variable and centered at 47. A preliminary analysis shows no evidence that the age effect has a nonlinear pattern. Marital status is coded as time-varying dummy (1 = married). Past grandparenting experience is measured at baseline as dummy (1 = yes). I also control for self-rated health (1 = fair or poor health) and whether respondents were ever diagnosed with any major chronic diseases (e.g., cardiovascular disease, heart disease, diabetes, cancer, high blood pressure) by a physician (1 = yes) as time-varying dummy variables to avoid potential bias from reverse causality. Two measures of attrition, respondents' death and dropout at any point across the three waves (1 = yes), are included in all models.

Analytic Strategy

I first present weighted descriptive statistics of the sample in this study. I then apply growth curve models to examine how grandparenting affects the trajectory of depressive

symptoms. The growth curve models have an advantage that distinguishes two different types of variance (i.e., within-individual level and between-individual level) in estimating population average difference in order to remove possible bias from repeated measures. Taking advantage of three waves of the KLoSA and the growth curve analysis, I evaluate the development of depressive symptoms as a function of age. The growth curve models I use take the following forms:

Level 1 model:

$$Y_{ij} = \alpha_i + \beta_i Age_{ij} + \sum \gamma_k G_{kij} + \sum \tau_m TVC_{mij} + \varepsilon_{ij}$$

Level 2 model:

$$\alpha_i = a_0 + \mathrm{X'}_{0i}\mathrm{B}_0 + \zeta_{0i}$$

$$\beta_i = b_0 + \mathrm{X'}_{0i}\mathrm{B}_1 + \zeta_{1i}$$

In the level-1 model for within-individual change of depressive symptoms over time, individual's growth trajectory of depressive symptoms is a function of time and other time-varying covariates. Y_{ij} denotes the dependent variable, the depressive symptoms of individual *i* at the *j*th wave, and *j* = 1, 2, or 3 indicating KLoSA waves 2 (2008) through 4 (2012); Age_{ij} is the age of individual *i* at the *j*th wave. G_{kij} represents the grandparenting of individual *i* at the *j*th wave; TVC_{mij} denotes all other time-varying covariates; α_i and β_i are the *i*th individual's latent intercept and age slope. γ_j is the coefficient for the effects of grandparenting for individual *i* at the *j*th wave, which do not vary for individuals (fixed effects); ε_{ij} is the level 1 residual.

The level-2 model specifies heterogeneity in change across individuals and incorporates the association between time-invariant covariates and each individual's growth trajectory of

depressive symptoms. X'_{0i} and X'_{1i} represent all other time-invariant covariates. ζ_{0i} and ζ_{1i} are individual-specific residual terms.

The analyses from the growth curve models estimate five models. The base model includes grandparenting and basic controls (i.e., marital status, past grandparenting experience, self-rated health, chronic condition, death and dropout). Next, I assess how potential mechanisms explain the association between grandparenting and depressive symptoms. Indicators of SES, health behaviors, and social support are added in a series of nested models (Model 2-4). Finally, the full model consideres all covariates.

Results

Sample Characteristics

Table 3-1 presents weighted descriptive statistics for Korean grandmothers at baseline (2008) in this study. The average CES-D score for all grandmothers is 4.27 out of 10. The average age of grandmothers is 65.09 years old. Most grandmothers are not taking care of grandchildren. Among caregiving grandmothers, full-time noncoresident grandparenting is the largest group accounting for 3% of all grandmothers. Grandmothers who provide part-time noncoresident grandparenting and multigenerational household grandparenting account for 2.37% and 1.53%, respectively. Figure 3-1 shows the average CES-D scores by grandparenting type. Non-caregiving grandmothers have the highest level of depressive symptoms, followed by grandmothers who provide part-time noncoresident grandparenting and multigenerational household grandparenting. Those who provide full-time noncoresident grandparenting report the lowest level of depressive symptoms.

In terms of SES, the majority of grandmothers report an educational attainment of elementary school or less (69.52%). The average household income and household asset of grandmothers are 1978.44 and 18303.83, respectively. More than 27 percent of grandmothers are currently working. With respect to health behaviors, more than 30 percent of grandmothers report regular exercise. Only 3.35 percent of grandmothers are smokers and approximately 17 percent were drinkers. As for social support, most grandmothers engage in frequent social activities (88.02%) and receive any financial or non-financial support from their adult children (83.30%). Approximately 26 percent of grandmothers provide any type of financial or non-financial support to adult children. Lastly, two-thirds of grandmothers (67.95%) are married and 13.34% of grandmothers have grandparenting experience in the past. 38.70% of grandmothers rate their health as poor and slightly more than 65% of them have been diagnosed with at least one major chronic disease.

Grandparenting and Depressive Symptoms Trajectories

Table 3-2 reports growth curve estimates of depressive symptoms by grandparenting between ages 47 and 80. Results from the base model show that multigenerational household grandparenting is marginally significant and positively associated with the initial depressive symptoms. The marginally significant positive coefficient for multigenerational household grandparenting on the depressive symptoms intercept (1.615) indicates that grandmothers who provide multigenerational household grandparenting have 1.615-point higher CES-D scores than non-caregiving grandmothers at age 47, net of marital status, past grandparenting experience, poor self-rated health, chronic condition, and attrition. However, the significant negative coefficient for multigenerational household grandparenting on the age slope (-.098) indicates that

they have a slower rate of increase of depressive symptoms compared to those who do not provide grandparenting.

Figure 3-2 illustrates the significant association between grandparenting and the trajectories of depressive symptoms (CES-D score) among grandmothers on the basis of Model 1 in Table 3-2. Overall, non-caregiving grandmothers' CES-D scores increase by roughly over 1 point (3.119 to 4.208) between age 47 and 80. On the other hand, grandmothers who provide multigenerational household grandparenting exhibit more severe depressive symptoms at age 47 (4.734) than non-caregiving grandmothers, but experience a decline in depressive symptoms over time. The trajectories of depressive symptoms between the two groups converge by age in the mid-60s, then reverse until age 80. Grandmothers providing multigenerational household grandparenting, relative to non-caregiving counterparts, experience a steeper reduction in depressive symptoms and better mental health after their mid-60s than non-caregiving counterparts.

Next, I add SES, health behaviors, and social support to Model 1 of Table 3-2, respectively, to test whether those mechanisms may explain the grandparenting-depressive symptoms relationship. After adding SES (Model 2), the coefficient for multigenerational household grandparenting on the depressive symptoms intercept and age slope decrease and the age slope remains statistically significant.

Model 3 suggests that the marginally significant association between multigenerational household grandparenting and depressive symptoms at baseline still holds after adding health behaviors to Model 1. The magnitude and shape of the effect also decrease. Yet there is no evidence that any particular health behavior explains the multigenerational household grandparenting-depressive symptoms relationship over time.

In Model 4, I add social support to Model 1. The results indicate that the effects of multigenerational household grandparenting on the intercept and the age slope decrease (1.470 and -.095, respectively) and the age slope remains statistically significant. Social support, however, does not explain the trajectory of depressive symptoms between age 47 and 80 for the multigenerational household grandparenting group.

The full model (Model 5 of Table 3-2) shows that, after controlling for all covariates, multigenerational household grandparenting is still marginally associated with a higher level of depressive symptoms at age 47, relative to non-caregiving counterparts. The effects of multigenerational household grandparenting on the initial depressive symptoms decrease by approximately 12% (= (1.420 – 1.615) / 1.615), compared to the base model. The remaining significant coefficient for the age slope of the multigenerational household grandparenting group suggests that none of the proposed mechanisms affect the group's differences in depressive symptoms over time.

Other covariates are significant in the expected directions. For example, being married, providing grandparenting in the past, being highly educated, currently working, having a higher household income, currently exercising and drinking, actively participating in social activities, and providing financial or non-financial support to adult children are beneficial to mental health by reducing depressive symptoms. In contrast, being in poorer health, having chronic conditions, attrition, currently smoking, and receiving financial or non-financial support from adult children are significantly associated with a higher degree of depressive symptoms.

Discussion

Studies on how grandparenting affects mental health in later life are limited and even the findings in the limited literature are inconsistent. Moreover, the majority of these studies have been conducted in the U.S. and Europe, although the trend of grandparenting is growing in other sociocultural contexts including Asia (Mehta and Thang 2012). Using a nationally representative sample from Korea, this study extends the extant literature by investigating whether grandparenting affects the trajectory of depressive symptoms among older women. I also examine the extent to which potential mechanisms, including SES, health behaviors, and social support, explain the association between grandparenting and depressive symptoms.

Results from this study reveal that a particular type of grandparenting shapes depressive symptoms trajectories in later life. Specifically, multigenerational household grandparenting significantly decreases caregiving grandmothers' depressive symptoms as they age, although it is only marginally significant that grandmothers providing multigenerational household grandparenting have a higher level of depressive symptoms initially, at age 47, than that of non-caregiving counterparts. In contrast, non-caregiving grandmothers' depressive symptoms increase between ages 47 and 80. Thus, the mental health gap between grandmothers with multigenerational household grandparenting and non-caregiving grandmothers decreases over time and even reverses when they reach their mid-60s, suggesting that grandmothers who provide multigenerational household grandparenting enjoy better mental health in later life. The association between multigenerational household grandparenting and depressive symptoms over time is stable across all models.

These results contribute one of the new findings to the literature on Korean grandparenthood because previous studies have overlooked multigenerational household

grandparenting given the low prevalence of this caregiving type (Kim and Kim 2004; Lee and Han 2008). The results are in line with the previous literature that found fewer depressive symptoms among older adults providing multigenerational household grandparenting in China and Taiwan (Cong and Silverstein 2008; Ku et al. 2013). However, the results are inconsistent with the studies in the U.S., which find no relationship between multigenerational household grandparenting and depressive symptoms (Hughes et al. 2007; Musil et al. 2013).

These findings suggest that grandmothers who provide multigenerational household grandparenting may psychologically benefit from stable intergenerational relationships and grandchild care. The coresidence setting with both adult children and grandchildren allows grandmothers to have a sufficient level of interaction with family members to receive physical and psychological support through the experience. Moreover, supported by the role enhancement theory, those grandmothers may have more self-efficacy, sense of achievement, and life satisfaction derived from the additional caregiving role (Chen et al. 2014; Choi and Zhang 2018). Simultaneously, grandmothers who provide multigenerational household grandparenting may experience less stress and sense of responsibility through the role because they are still not a custodial grandparent with primary care obligations. The traditional Confucian values in Korea, which emphasize the concepts of filial piety in an extended family (Yee et al. 2009), may also contribute to the better mental health of grandmothers because they live in the family structure that the older generation conventionally favors.

Based on the role strain theory and prior findings, I expected that there may be more profound association between intensive grandparenting (e.g., skipped-generation household grandparenting and full-time noncoresident grandparenting) and depressive symptoms, with the grandparenting-depressive symptoms relationship being contingent on age. However, I did not

find any significant evidence for depressive symptoms at baseline or a linear age slope in relation to any intensive types of grandparenting. The results differ from the previous literature in that earlier studies find that providing full-time care is adversely associated with depressive symptoms among Korean older adults (Bae 2007; Baek 2009). In addition, although this study anticipated that the trajectory of depressive symptoms by grandparenting can be explained in part by SES, health behaviors, and social support, none of those mechanisms significantly accounts for the mental health change over time in relation to grandparenting.

This study is not without limitations. First, I have only small sample of caregiving grandparents in the data. Due to this constraint, I was unable to include some types of grandparenting (e.g., skipped-generation household grandparenting) and more elaborately categorize caregiving groups by caregiving intensity (e.g., low, medium, and high intensity). As such, the small sample size may prevent me from detecting significant effects of particular types of grandparenting on depressive symptoms. Second, it is plausible that I was unable to completely eliminate the possibility that healthier grandparents are more likely to take care of grandchildren, although I control for health condition and health behaviors at baseline and as time-varying. Third, future research needs to explore the gendered implications of grandparenting for mental health. Although this study excludes grandfathers from analyses due to very small sample sizes, an increasing number of grandfathers are engaged in grandchild care. Given a traditional gender norm which regards child care more as a women's role (De Vos and Lee 1993; Kamo 1998), the meaning of grandparenting and its impacts on health may be different for grandfathers.

Despite these limitations, the current study contributes to the literature on grandparenting and mental health in later life. Using longitudinal data on a nationally representative sample in

Korea, this study examines how grandparenting is associated with the trajectory of older women's mental health and how this link varies in a different sociocultural context. I find that grandmothers' depressive symptoms decline with age when providing multigenerational household grandparenting. The gap in depressive symptoms between grandmothers who provide multigenerational household grandparenting and non-caregiving grandmothers decreases over time and reverses in later life. The findings in this study extend previous research on grandparenting and older adults' mental health. This study also calls for future studies that explore the social/cultural differences in grandparenthood and well-being.

CHAPTER 4

GRANDPARENTING AND OLDER ADULTS' TRAJECTORIES OF DEPRESSIVE SYMPTOMS IN CHINA

Introduction

As people are now living longer and healthier lives, older adults have been increasingly involved in caring for grandchildren (i.e., grandparenting) as either secondary or primary caregivers (Silverstein and Giarrusso 2010; Margolis 2016). This phenomenon is particularly prevalent in China. A recent study using the nationally representative samples reports that approximately 34 percent of older adults care for grandchildren (Sun 2017). Chinese older adults regard active grandparenting as their normative role in the family based on the traditional values of strong family ties and lineage solidarity (Yancura 2013; Mehta and Thang 2012). Another notable aspect about Chinese grandparenting is urban-rural differences. Increased number of grandparents in rural regions intensively care for grandchildren as a custodial caregiver to help support their adult children, the parents of those grandchildren, who migrate to urban regions for employment (Lou et al. 2013).

Despite rapid growth of the grandparenting trend in China, few studies have examined the consequences of grandchild care on later health. The mental health implications of grandparenting remain especially underexplored. Some research has found that grandparenting is associated with a lower level of depressive symptoms and greater life satisfaction (Cong and Silverstein 2008; Ku et al. 2013; Xu et al. 2012; Silverstein, Cong, and Li 2006). Most of the findings, however, capture the grandparenting experience of older adults who reside in rural regions only (Cong and Silverstein 2008; Xu et al. 2012; Silverstein, Cong, and Li 2006). In

addition, the literature only utilizes information on either family structure or care intensity to measure grandparenting (Xu 2018; Ku et al. 2013). Furthermore, little is known about the potential mechanisms that buffer or exacerbate the effects of grandparenting on later mental health.

The aim of the current study is thus to examine how grandparenting is associated with older adults' mental health, specifically depressive symptoms, in China. This study extends previous research on grandparenting and mental health by addressing two research questions. First, I assess whether and how grandparenting affects a trajectory of depressive symptoms among older adults in both rural and urban regions using a nationally representative survey. Second, I examine the extent to which individual and household characteristics (i.e., socioeconomic status (SES), health behaviors, and social support) account for the link between grandparenting and depressive symptoms.

Background

Grandparenting and Mental Health

Research on grandparenting and mental health in later life has been underexplored. Most literature has focused on the experience of U.S. and European grandparents while few studies have been done regarding Chinese grandparenting. Thus, I first address previous findings based on those western countries before then discussing the Chinese context.

Previous literature has measured grandparenting using either family structure (i.e., family composition and living arrangement) or care intensity (i.e., hours spent on grandchild care) of the grandparents. In general, grandparenting is both positively and negatively associated with mental health among older adults (Silverstein and Giarrusso 2010). The mixed findings are driven by the

different types of care older adults provide for their grandchildren. With respect to the protective effects of grandparenting on mental health, a moderate level of noncoresident grandparenting (i.e., 200-500 hours of babysitting over two years, that is about 8-19 hours per week) is linked to milder depressive symptoms in later life in the U.S (Hughes et al. 2007). The regular provision of moderate grandparenting also has a positive relationship with depression in Chile (Grundy et al. 2012). Multigenerational household grandparenting is beneficial for subjective psychological well-being (Goodman and Silverstein 2002). Yet, the causal relationship of grandparenting with mental health has been unclear due to the cross-sectional nature of some prior studies.

The *role enhancement theory* is often used to account for the positive impacts of grandparenting on mental health in later life. It argues that those who hold various social roles are likely to have better mental health. Carrying out different social roles and the compounded sense of fulfillment and life satisfaction obtained from the experience increase individuals' well-being (Moen, Robison, and Dempster-McClain 1995). In this sense, grandparenting, an emerging additional role in one's later life, can be beneficial to older adults' mental health. Grandparents achieve greater life satisfaction, self-efficacy, and feelings of reward through the caregiving role (Pruchno and McKenney 2002; Rozario, Morrow-Howell, and Hinterlong 2004; Szinovacz and Davey 2006). In addition to the emotional benefits, grandparenting helps older adults stay physically active (King, Rejeski, and Buchner 1998) and maintain closer family ties and intergenerational support (Mahne and Huxhold 2014) while interacting with their grandchildren and adult children.

On the other hand, some literature suggests that grandparenting negatively affects mental health in later life. For example, intensive types of grandparenting have an adverse association with the mental health of older adults. Specifically, custodial grandparenting in skipped-

generation households—an increasing vulnerable family type which consists of grandparent generation and grandchildren only—is linked to elevated depressive symptoms in several western countries (Blustein, Chan, and Guanais 2004; Minkler et al. 1997; Szinovacz, DeViney, and Atkinson 1999).

The *role strain theory* provides an explanation for the negative consequences of grandparenting on mental health. The theoretical perspective suggests that carrying out multiple social roles can be detrimental to individuals' mental health and well-being. Given the limited nature of resources including time, energy, and goods, individuals experience difficulties executing different roles concurrently (Goode 1960). The increased obligations of meeting these additional expectations serve as stressors, which exacerbate one's mental health (Barnett and Baruch 1985; Pearlin 1989). From this perspective, grandparenting can lead to further role strain and stress. Considering the various social roles that older adults must already fill (e.g., spouse, parent, child, or any other position), the additional role as a grandchild care provider can be a greater source of health risks for older adults. The burden of grandparenting deteriorates older adults' psychological health, especially when the care work is considerably intensive.

Other grandparenting-related stressors, such as intergenerational conflicts over child rearing, a shortage of private time for self-care, leisure and social engagement, and financial burden, are adversely related to later mental health (Minkler 1999; Baker, Silverstein, and Putney 2008; Blustein, Chan, and Guanais 2004; Jendrek 1993). Pre-existing disadvantages in SES and health condition also undermine the mental health status of older adults, given that grandparents with elevated levels of deprivation tend to provide more intensive grandparenting (Burnette, Sun, and Sun 2013; Silverstein and Giarrusso 2010). When all the strain and burdens from

grandparenting outweigh the benefits of caregiving, the health consequences of grandparenting are more likely to be negative.

Mental Health Implications of Grandparenting in China

The perception and expectations for grandparental roles vary by social/cultural contexts (Hayslip et al. 2012). In Asia, active grandparental roles are normative and prevailing as one form of family support based on strong family values and intergenerational ties (Kataoka-Yahiro, Ceria, and Caulfield 2004; Yancura 2013; Mehta and Thang 2012). As such, in China, a large number of older adults have provided various types of grandparenting as support for their adult children, in addition to the grandchildren themselves. Accordingly, increased attention has been recently paid to the health implications of grandparenting in later life. Previous studies have mainly found that grandparenting is positively associated with physical and mental health, although some negative or null effects of grandparenting have also been reported (Xu 2018).

In terms of Chinese grandparenting, a primary issue found in the literature is rural-urban differences. Chinese populations are identified as rural and urban residents by the *hukou*, the official household registration system (Chan 2009). There are significant socioeconomic disparities between the rural and urban regions in China. In comparison with urban residents, rural residents have limited access to quality public resources, facilities, and services (e.g., schools, pension benefits, health care access, etc.), which result in their greater risk of poverty in later life. Thus, older adults living in rural regions are more likely to develop depressive symptoms (Li et al. 2016).

The majority of research on Chinese older adults' grandparenting and psychological well-being have explored caregiving grandparents in skipped-generation households who reside in

rural regions. Numerous grandparents left behind in rural regions take care of grandchildren as custodial caregivers to support their migrant adult children who work in urban centers (Lou et al. 2013). Previous findings have suggested that, despite the intensive care burden, skipped-generation household grandparenting can have mental health benefits, depending on the rewards from adult children, such as financial support (Cong and Silverstein 2008; Silverstein, Cong, and Li 2006), and care intensity (Xu et al. 2012).

Prior studies have also focused on multigenerational household grandparenting, which refers to older adults' grandchild care in an extended family setting. This type of family structure has been common and preferred in China and other Asian countries based upon strong family solidarity, filial piety, and collective interest (Mehta and Thang 2012). Research from China, Taiwan, and Hong Kong has found that grandparents who provide multigenerational household grandparenting report fewer depressive symptoms and greater life satisfaction, relative to non-caregiving grandparents (Ku et al. 2013; Guo, Pickard, and Huang 2008; Silverstein, Cong, and Li 2006).

Findings on the link between grandparenting and mental health in China are still sparse and inconclusive. The mixed evidence suggests that the health implications of grandparenting are likely to vary by not only caregiving experience itself but also regional context and underlying individual characteristics (Xu 2018). Moreover, some significant limitations exist in the extant literature. Prior studies have focused on the grandparenting experience of older adults who reside in rural regions only (Cong and Silverstein 2008; Silverstein, Cong, and Li 2006; Xu et al. 2012). Furthermore, previous research has not successfully taken both family structure and care intensity into consideration to capture the various types of older adults' grandparenting and their respective health consequences (Cong and Silverstein 2008; Guo, Pickard, and Huang 2008).

Taken together, the current study aims to examine how grandparenting influences Chinese older adults' mental health, specifically the trajectory of depressive symptoms. To extend the literature, this study also detects various potential mechanisms underlying the relationship of grandparenting with depressive symptoms. I include grandparents in both rural and urban regions using data from a nationally representative longitudinal study to assess the rural-urban differences. Grandparenting is more thoroughly measured by combining both family structure and care intensity.

In light of the role enhancement/strain theories and prior findings, I expect that highly intensive types of grandparenting—skipped-generation household grandparenting and full-time noncoresident grandparenting—have more pronounced effects on older adults' development of depressive symptoms with age. In terms of the rural-urban disparities in China, I hypothesize that rural grandparents who provide skipped-generation household grandparenting and multigenerational household grandparenting report fewer depressive symptoms relative to non-caregiving counterparts. I also expect that some underlying mechanisms, such as SES, health behaviors, and social support, partially explain the depressive symptoms trajectory of caregiving grandparents.

Data and Methods

Data

The current study utilizes the China Health and Retirement Longitudinal Study (CHARLS) to investigate the association between grandparenting and depressive symptoms. The CHARLS has tracked a nationally representative sample of Chinese adults aged 45 years and older to collect data on older adults' health and lifestyles. The baseline sample includes

approximately 10,000 households and 17,500 individuals in 150 counties/districts and 450 villages/resident committees in 2011. The respondents have been followed up every two years.

I use three waves of the CHARLS data (2011-2015). The analytic sample of this study includes 5,691 older adults who have grandchildren and complete the questions on grandparenting, depressive symptoms, and region. I exclude grandparents who are over 80 years old given that few of the oldest older adults are engaged in grandparenting due to worsening health (Hughes et al. 2007; Ku et al. 2013).

Measures

Depressive Symptoms. The dependent variable of this study is depressive symptoms. I measure depressive symptoms using the Center for Epidemiologic Studies-Depression (CES-D) scale. Ten items in the CHARLS ask how respondents felt and behaved in the past week on a 4-point scale: "rarely or none of the time (less than one day)" to "most or all of the time (five to seven days)." Depressive symptoms in this study are a time-varying continuous variable ranging from 1 to 30, where 30 indicates the worst level of depressive symptoms.

Grandparenting. Grandparenting is a key independent variable in this study. Grandparenting is a time-varying categorical variable: no grandparenting (reference), skipped-generation household grandparenting, multigenerational household grandparenting, part-time noncoresident grandparenting, and full-time noncoresident grandparenting. I first use the question, "Did you spend any time taking care of your grandchildren (under age 16) last year?" to identify caregiving and non-caregiving grandparents. To categorize the caregiving grandparents, I then utilize two items, household member information and a grandparenting-

related question ("Approximately how many weeks and hours per week did you spend last year taking care of this child's children?"), to identify grandparents' family structure and care intensity, respectively. Using the family structure, I classify caregiving grandparents who live with grandchildren, but not adult children, into "skipped-generation household grandparenting." Caregiving grandparents who live in an extended family with both grandchildren and adult children are classified into "multigenerational household grandparenting." Caregiving grandparents who live without both grandchildren and adult children are categorized as "noncoresident grandparenting." In addition, I subcategorize the noncoresident grandparenting group into "part-time" and "full-time" depending on care intensity (i.e., hours of grandchild care per week). The part-time group includes grandparents who spend less than 40 hours per week on noncoresident grandparenting. Grandparents spending 40 or more hours per week on noncoresident grandparenting are labelled as the full-time group.

This study includes three potential mechanisms to explain the association between grandparenting and depressive symptoms: SES, health behaviors, and social support.

SES. Four indicators represent older adults' SES. Education is a categorical variable from baseline, including illiterate (reference), less than elementary school, elementary school, and middle school or higher. In order to measure household-level economic status, I use an asset index, rather than household income, because the asset index could be a better proxy of wealth or standard of living in the context of developing countries, which is less subject to measurement errors (Bollen, Glanville, and Stecklov 2002, Filmer and Pritchett 2001). I measure the asset index as a time-varying continuous variable using the household ownership of 17 luxury items (e.g., automobile, electric bicycle, motorcycle, refrigerator, washing machine, TV, computer, etc.), ranging from 0-17. Current employment status is coded as time-varying dichotomous

(working = 1). Pension receipt is a time-varying dichotomous variable indicating whether respondent received any pension income (yes = 1).

Health behaviors. I include three time-varying categorical predictors. Exercise is measured based on the question whether respondents do any vigorous physical activity for at least 10 minutes every week: no (reference), yes, and missing report. With respect to current smoking and drinking status, respondents are also categorized into three groups: no (reference), yes, and missing report.

Social support. I assess social support using three time-varying dummy variables. Social activity is constructed using the item on whether respondents participate in any social activities, including spending time with friends; playing ma-jong, chess, or cards with others or going to a community club; sport, social, or other types of club activities; activities of community-related organizations; volunteer or charity work; and educational or training courses. Respondents who have engaged in any such activities are coded as 1 (= yes). I also include whether older adults have received any financial support from adult children (yes = 1), and whether older adults give any financial support to adult children (yes = 1).

Controls. This study controls for basic demographic characteristics and health status of older adults. Gender is a dummy variable (female = 1). Age is treated as continuous and centered at 55, a common retirement age in China. A preliminary analysis reveals that there is no significant nonlinear pattern of age effects. Marital status is a time-varying dummy variable (married = 1). I also include whether older adults live in rural regions (rural = 1, urban = 0). The rural residence is measured based on respondents' current *hukou* status, which is the official household registration system indicating legal rural and urban populations in China (Chan 2009). In terms of health status, I control for self-rated health (poor health = 1) and whether respondents

have been diagnosed with any chronic conditions among hypertension, diabetes, heart disease, and stroke (yes = 1). Respondents' death and dropout at any point across the three waves (yes = 1) are included to take into account attrition in the data.

Analytic Strategy

I first present weighted descriptive statistics from the baseline sample of this study. Next, I estimate growth curve models to investigate the effects of grandparenting on depressive symptoms initially and over time. The growth curve analysis takes advantage of the longitudinal nature of the CHARLS and the development of depressive symptoms is evaluated as a function of age in this study. The two-level growth curve model is specified as:

Level 1 model:

$$Y_{ij} = \alpha_i + \beta_i Age_{ij} + \sum \gamma_k G_{kij} + \sum \tau_m TVC_{mij} + \varepsilon_{ij}$$

Level 2 model:

$$\alpha_i = a_0 + \mathrm{X'}_{0i}\mathrm{B}_0 + \zeta_{0i}$$

$$\beta_i = b_0 + \mathrm{X'}_{1i}\mathrm{B}_1 + \zeta_{1i}$$

The Level 1 model characterizes within-individual change in depressive symptoms over time. In this model, an individual's growth trajectory in depressive symptoms is a function of age and other time-varying covariates. Y_{ij} is the depressive symptoms of individual *i* at the *j*th wave, where *j* = 1, 2, or 3, indicating the waves 1-3 of the CHALRS; Age_{ij} represents the age of individual *i* at the *j*th wave; G_{kij} denotes the grandparenting of individual *i* at the *j*th wave; TVC_{mij} indicates other time-varying covariates included in the model; α_i and β_i are the *i*th individual's intercept and the rate of change in depressive symptoms with age; γ_k denotes the coefficient for

the impacts of grandparenting for individual *i* at the *j*th wave, which is fixed over individuals; the error term ε_{ij} is the level 1 residual.

The Level 2 model specifies heterogeneity in change across individuals and determines the relationship between time-invariant covariates and the shape of each individual's growth trajectory of depressive symptoms. X'_{0i} and X'_{1i} represent all other time-invariant predictors in the models. ζ_{0i} and ζ_{1i} are individual-specific residual terms.

The analyses of this study estimate five models. Model 1 includes grandparenting, the key independent variable, to assess how grandparenting is associated with depressive symptoms over time. Models 2-4 each add predictors of SES, health behaviors, and social support, respectively, to Model 1 in order to examine whether and how those mechanisms account for the relationship between grandparenting and depressive symptoms. Model 5 is the full model including all covariates. Given the importance of rural-urban differences in the Chinese context found in the literature, I estimate those series of models separately for grandparents living in rural versus urban regions to find regional differences in the mental health implications of grandparenting.

Results

Descriptive Statistics

Table 4-1 presents weighted descriptive statistics from baseline (2011) for all analyzed variables. I display the results by region to show the differences between rural and urban grandparents. The results show that rural grandparents report a significantly higher level of depressive symptoms (9.04) compared to urban grandparents (6.69). The average age of rural grandparents is 58.83, which is younger than that of urban grandparents (61.45).

In terms of grandparenting, approximately half of all grandparents take care of grandchildren last year. The patterns of grandparenting differ by region among caregiving grandparents: rural grandparents report higher proportions of grandchild care in coresident family structures compared to urban grandparents. Among caregiving rural grandparents, the largest group is those who provide multigenerational household grandparenting (28.82%), followed by skipped-generation household grandparenting (7.11%), part-time noncoresident grandparenting (7.46%), and full-time noncoresident grandparenting (4.60%). Note, the proportion of skipped-generation household grandparenting is significantly higher among rural grandparents than urban grandparents as previously reported in the literature. Whereas urban grandparents tend to provide grandparenting in noncoresident settings. For urban grandparents, although multigenerational household grandparenting still makes up the largest group (25.75%), part-time noncoresident grandparenting (11.55%) and full-time noncoresdient grandparenting (7.33%) are the next larger groups. Skipped-generation household grandparenting represents 4.91%. Figure 4-1 presents depressive symptoms by grandparenting type for rural and urban grandparents. Overall, rural grandparents show worse depressive symptoms relative to urban grandparents. Among rural grandparents, the level of depressive symptoms is the highest, especially for the skipped-generation household grandparenting and no-grandparenting groups. Urban grandparents report the worst depressive symptoms with the provision of no-grandparenting and multigenerational household grandparenting.

In comparison to urban grandparents, rural grandparents have, on average, lower SES, including lower education levels, less household assets, higher current employment, and less pension receipt. Rural grandparents are more likely to exercise, smoke and drink, and have less social activity and more financial support from adult children, compared to urban grandparents.

Rural grandparents have a lower proportion of being married but better self-rated health and fewer chronic conditions than urban grandparents.

Grandparenting and Trajectory of Depressive Symptoms

Table 4-2 shows the estimated coefficients of depressive symptoms (CES-D) from growth curve models for rural grandparents. The results of Model 1 in Table 4-2 suggest that multigenerational household grandparenting and full-time noncoresident grandparenting have lower level of initial depressive symptoms compared to non-caregiving rural grandparents. The negative coefficient (-0.493) on the depressive symptoms intercept indicates that rural grandparents who provide multigenerational household grandparenting report 0.493-point lower CES-D scores at initial time (age 55) compared to non-caregiving rural grandparents, controlling for gender, marital status, self-rated health, chronic conditions, and attrition. In addition, rural grandparents providing full-time noncoresident grandparenting have 0.508-point lower scores on CES-D initially than their non-caregiving counterparts. As for age slope, the significant positive coefficient for multigenerational household grandparenting (0.057) suggests that, in comparison to their non-caregiving counterparts, rural grandparents who provide multigenerational household grandparenting have a faster increase in depressive symptoms with age.

Figure 4-2 displays the significant association between grandparenting and the trajectories of depressive symptoms based on Model 1 in Table 4-2. The figure shows that depressive symptoms marginally increase between age 45 and 80 for non-caregiving rural grandparents. In contrast, the depressive symptoms of rural grandparents who provide multigenerational household grandparenting increase with age. Due to the faster rate of increase, the depressive symptoms of rural grandparents providing multigenerational household grandparenting surpasses that of non-caregiving counterparts after the early-60s, although their

level of depressive symptoms is lower initially. Meanwhile, rural grandparents providing full-time noncoresident grandparenting consistently have fewer depressive symptoms than their non-caregiving counterparts, both initially and over time. Full-time noncoresident grandparenting is also more beneficial for depressive symptoms than multigenerational household grandparenting after the mid-50s.

Models 2-4 of Table 4-2 add SES, health behaviors, and social support, respectively, to the base model to assess how those potential mechanisms may account for the association between grandparenting and depressive symptoms. In Model 2, the initial differences between multigenerational household grandparenting and full-time noncoresident grandparenting are no longer statistically significant after including SES. However, the significant age slope for multigenerational household grandparenting remains significant.

Model 3 shows that the coefficients of the intercept and age slope for multigenerational household grandparenting and full-time noncoresident grandparenting remain similar and significant when adding health behaviors. Model 4 suggests that including social support makes no change in the significant relationship between multigenerational household grandparenting and the trajectory of depressive symptoms. Yet full-time noncoresident grandparenting loses its significant effect on the intercept of depressive symptoms.

Model 5, the full model, indicates that none of the grandparenting types are significantly associated with rural grandparents' depressive symptoms at initial time (age 55), net of all covariates. However, the effect of multigenerational household grandparenting on the age slope still holds. The results suggest that the proposed mechanisms (i.e., SES, health behaviors, and social support) affect the initial status of depressive symptoms, but not the rate of change in depressive symptoms with age.

The effects of other covariates are significant in the expected directions. Rural grandparents who are women, report poor health, chronic conditions or death, are more likely to experience worse depressive symptoms. On the other hand, higher education levels, being currently working, pension receipt, engaging in social activities, and providing financial support to adult children lower the level of depressive symptoms for rural grandparents.

Lastly, I find no significant evidence for the association between grandparenting and depressive symptoms among urban grandparents (Table 4-3). In addition to the rural-urban difference, I test whether the consequences of grandparenting for mental health differ by gender as a sensitivity analysis (results not shown). The results indicate no significant gendered implications in the relationship.

Discussion

Research on grandparenting and mental health is limited. It is unclear how grandparenting affects older adults' mental health, especially in Asian contexts including China. There is a dearth of studies that examine whether and how grandparenting is related to Chinese older adults' mental health despite the ever-increasing trend of grandparenting (Mehta and Thang 2012). In order to extend the existing literature, this study aims to examine the association between grandparenting and depressive symptoms over time in China. Using nationally representative data, I further advance the literature by assessing the extent to which three potential mechanisms—SES, health behaviors, and social support—explain the relationship between grandparenting and depressive symptoms. I also test the rural-urban differences in grandparenting patterns and their mental health implications, which are important given the fast-growing number of grandchildren left behind with their grandparents in rural regions.

This study has several major findings. Overall, the results suggest that for Chinese older adults, grandparenting has a significant impact on depressive symptoms over time and that association varies by urban-rural context. In particular, grandparenting significantly shapes the trajectory of depressive symptoms among rural grandparents.

First, with regard to grandparenting types, rural grandparents who provide multigenerational household grandparenting have a lower level of depressive symptoms at initial time (age 55) compared to non-caregiving rural grandparents. Multigenerational household grandparenting, however, significantly increases rural grandparents' depressive symptoms over time. In contrast to a minute increase in depressive symptoms among non-caregiving rural grandparents, rural grandparents providing multigenerational household grandparenting experience an accelerated rate of increase in depressive symptoms with age. Consequently, rural grandparents engaging in multigenerational household grandparenting have worse depressive symptoms after reaching their early-60s than non-caregiving counterparts, despite their lower initial level of depressive symptoms. In the long-term, multigenerational household grandparenting is detrimental to rural grandparents' mental health. The mental health gap between multigenerational household grandparenting and non-caregiving groups converges, then widens over time with a negative implication.

The adverse effect of multigenerational household grandparenting on depressive symptoms in this study is inconsistent with two previous studies using cross-sectional data with regional samples, which report fewer depressive symptoms in older adults providing multigenerational household grandparenting in China (Guo, Pickard, and Huang 2008; Silverstein, Cong, and Li 2006). The increase in depressive symptoms over time in relation to providing multigenerational household grandparenting adds a new finding to the literature on

Chinese grandparenting. Moreover, the results are in line with prior research which suggests a rapid decline in self-rated health among caregiving Chinese grandparents in multigenerational households (Chen and Liu 2012).

The role strain theory supports the finding on the negative mental health implications of multigenerational household grandparenting. Older adults who provide multigenerational household grandparenting may suffer physical and/or psychological burdens as a result (Pruchno and McKenney 2002), as this is a new role that they are asked to additionally carry out in later life. Executing multiple roles with the inclusion of grandparenting increases older adults' stress level given their limited time and resources (Goode 1960; Barnett and Baruch 1985; Pearlin 1989). Older adults who provide multigenerational household grandparenting may have less time and resources to invest in their own health and well-being since the coresident setting precludes any full respite from the caregiving (Choi and Zhang 2018).

Family relationships can be another possible stressor for caregiving grandparents in multigenerational households. Negative interactions and relationships among family members result in worse psychological well-being, including elevated depressive symptoms (Lai 1995; Rook 1984). More family members from different generations living together means that more conflicts and tensions over family life or child-rearing philosophy and practices are possible. Specifically in China, older adults mostly live with their sons and daughter-in-law, and it is culturally allowed that paternal grandmothers actively intervene in child rearing (Cong and Silverstein 2008). Considering that those norms remain stronger in rural area (Xu 2018), it is plausible that caregiving rural grandparents have greater risk of stress and depressive symptoms due to conflicts with their adult children, especially daughter in-law. Although older adults providing multigenerational household grandparenting live in a culturally preferred family type

in China (Logan, Bian, and Bian 1998; Mehta and Thang 2012), the cumulative health risks from the care responsibility and coresident family structure offset the advantages of grandparenting and may lead to a faster decline in mental health.

Second, this study finds that rural grandparents who provide full-time noncoresident grandparenting have a lower level of depressive symptoms at initial time (age 55), relative to non-caregiving counterparts. However, rural grandparents' depressive symptoms do not significantly increase over time with the provision of full-time noncoresident grandparenting; the mental health gap between the two groups is consistent. The mental health benefit of full-time noncoresident grandparenting is a new contribution to the literature, which has mostly focused on skipped-generation household grandparenting or multigenerational household grandparenting. Moreover, the result is consistent with earlier studies showing the positive effects of grandparenting on psychological well-being (Xu 2018; Cong and Silverstein 2008; Silverstein, Cong, and Li 2006).

Despite the intensive level of caregiving, full-time noncoresident grandparenting has less harmful influences on depressive symptoms unlike multigenerational household grandparenting. The psychological burden of older adults who provide full-time noncoresdient grandparenting is perhaps less than that of older adults with other intensive care arrangements because they are still not custodial caregivers with the sole or primary responsibility for the grandchildren. It is also plausible that the availability of entirely private leisure time, which is possible due to noncoresidence with grandchildren and/or adult children, outweighs the adverse effect of intensive full-time grandparenting on mental health (Choi and Zhang 2018). Less psychological and physical commitment may help older adults enjoy the various rewards of grandparenting, such as a sense of achievement, self-efficacy, an active life style, and a healthy diet (Chen et al.

2014; Silverstein, Cong, and Li 2006; Pruchno and McKenney 2002). Furthermore, given the Chinese context emphasizing strong family bonds and intergenerational support for collective well-being (Mehta and Thang 2012; Burnette, Sun, and Sun 2013), older adults who live apart from grandchildren and adult children but still provide grandparenting are likely to gain more self-worth and family involvement. Additionally, they are less likely to feel the shortcomings of living apart (e.g., loneliness and physical hardship) through the provision of stable noncoresident grandparenting. Ultimately, the emotional support and health benefits from regular caregiving improve older adults' mental health.

Lastly, I find that SES is the key underlying mechanism that partially explains the association between grandparenting and depressive symptoms. Unlike other mechanisms including health behaviors and social support, SES accounts for a substantial portion of grandparents' depressive symptoms in relation to multigenerational household grandparenting and full-time noncoresident grandparenting. Adding SES nullifies the significant effects of those grandparenting types on depressive symptoms, although the impact of multigenerational household grandparenting on the change in depressive symptoms over time is robust regardless.

The results echo previous literature, which shows a considerable role of individual factors (e.g., prior health, sociodemographic characteristics, and SES) over grandparenting itself in shaping older adults' physical and mental health (Hughes et al. 2007). In China, economic resources especially play an indispensable role in explaining the health consequences of grandparenting (Chen and Liu 2012; Silverstein, Cong, and Li 2006; Cong and Silverstein 2008). Note, it is important that this study finds SES to be a significant underlying mechanism that serves only rural grandparents. Chinese older adults in rural regions are more vulnerable than older adults in urban regions in terms of SES. Rural older adults tend to rely heavily on their

adult children for financial support and health care due to the lack of quality health service and social security available in those regions (Lee and Xiao 1998). As a return, rural older adults provide grandchild care based on the "time-for-money exchange" model (Cong and Silverstein 2008, 2011), even if the caregiving is heavily intensive, such as with skipped-generation household grandparenting and full-time grandparenting. Given the unique rural context, the mental health of rural grandparents is largely contingent on SES, rather than a sole consequence of grandparenting.

Previous literature has suggested that there are gendered implications of grandparenting. Grandmothers and grandfathers show different patterns of grandparenting and, as such, their health consequences also vary (Hughes et al. 2007). Although it is beyond the scope of this study, the results from a sensitivity analysis indicate that the association between grandparenting and depressive symptoms does not differ by gender among both rural and urban Chinese grandparents (results not shown). In light of the more gendered division of care work and nurturing roles in Asian contexts (Mehta and Thang 2012), however, it is still plausible that some health implications of grandparenting are also gendered in China (Xu 2018). Future research is necessary to further examine how gender plays a role in shaping caregiving older adults' health.

This study has several limitations. First, I had to exclude some categories of grandparenting types because of data limitations. The groups of skipped-generation household grandparenting and multigenerational household grandparenting were not further classified utilizing care intensity information as the noncoresident grandparenting groups were because the sample size was insufficient. It is also possible that I was unable to detect significant relationships between grandparenting and depressive symptoms among urban grandparents due to the small sample size of caregiving older adults in urban regions. Next, I call for future

research which takes into account the quality of grandparenting, rather than being based solely on the amount of grandparenting. Even if older adults provide the same amount of time for grandchild care, the impacts of grandparenting on health can differ according to various details of the care (e.g., the age or special needs of grandchildren). Future studies should explore further qualitative or quantitative information on older adults' grandparenting experience to better understand contemporary grandparenting and its health implications. Finally, this study cannot entirely rule out the possibility that the identified grandparenting differences in depressive symptoms are in part driven by selection. For example, it is more likely that healthier older adults engage in grandparenting compared with older adults who are frailer. Although I control for some health conditions and behaviors as time-varying, the results of this study are conservative.

Despite these limitations, the current study makes important contributions to the research on grandparenting and mental health. Using nationally representative longitudinal data in China, this study adds to the literature the finding that the level of depressive symptoms in rural grandparents who provide multigenerational household grandparenting increases over time. The provision of full-time noncoresident grandparenting is associated with fewer depressive symptoms among rural grandparents relative to their non-caregiving counterparts. However, SES partially accounts for the relationship between grandparenting and depressive symptoms. All in all, the findings in this study advance our understanding of the sociocultural differences in the motive, process, and health consequences of grandparenting in later life. This study also suggests that effective intervention in assisting rural grandparents with lower SES needs to be implemented to help reduce the mental health disparities brought on by grandparenting in China.

CHAPTER 5

CONCLUSION

The health implications of intergenerational relationships, specifically grandparenting, in aging families have long been underexplored. This dissertation contributes to the body of knowledge on intergenerational relationships by examining how grandparenting influences health in later life as well as how that association varies by sociocultural context.

Drawing from three longitudinal surveys of nationally representative samples of older adults in the U.S., South Korea, and China, my findings confirm that sociocultural differences exist in the consequences of grandparenting on physical and mental health. The first study suggests that there are racial/ethnic variations in the linkage between grandparenting and mortality in the U.S. White grandparents gain a mortality advantage from grandchild care, whereas black grandparents have a mortality disadvantage from the caregiving experience. The second study examines how grandparenting is associated with grandmothers' mental health in South Korea. The findings show that grandmothers who provide multigenerational household grandparenting enjoy its long-term protective effect on depressive symptoms. The third study assesses the relationship between grandparenting and mental health in China. This project reveals that multigenerational household grandparenting has an adverse effect on Chinese grandparents' depressive symptoms over time, although socioeconomic status partially accounts for this association.

This dissertation sheds light on the importance of grandparenting to health and well-being in later life. The findings also add a deeper understanding to the current scholarship that the significant role of grandparenting in explaining later health differs among societies based on

their unique socioeconomic and cultural contexts. This dissertation calls for greater attention to the sociocultural differences in the concept, motivation, and practice of grandparenting to better understand the health implications of its provision.

APPENDICES

APPENDIX A: Chapter 2 Tables

Table 2-1. Weighted Descriptive Statistics for Grandparents by Race, Health and Retirement Study, 1998-2014 (*N* = 13,705)

Variable	White (*n* = 10,616)	Black (*n* = 1,978)	Hispanic (*n* = 1,111)
Deceased 1998-2014 (%)	24.89	24.87	18.78*
Grandparenting (%)			
No grandparenting (ref)	80.32	75.75	78.62
Skipped-generation household grandparenting	1.47	4.66*	2.80*
Multigenerational household grandparenting	2.81	8.23*	6.85*
Light/moderate noncoresident grandparenting	10.54	7.52*	7.62*
Intensive noncoresident grandparenting	4.87	3.84*	4.11
Health Condition			
Fair/poor self-rated health (%)	28.07	41.37*	50.08*
CES-D (0-8)	1.43 (.04)	1.93 (.07)*	2.31 (.08)*
Chronic disease (%)	86.63	88.02	80.60*
Socioeconomic Status			
Years of schooling	12.60 (.06)	11.15 (.12)*	8.47 (.39)*
Household income (Ln)	10.50 (.02)	9.94 (.03)*	9.83 (.06)*
Net household wealth (Ln)	11.93 (.05)	10.22 (.09)*	10.38 (.13)*
Working (%)	47.20	48.13	46.52
Long-term health insurance (%)	10.44	7.65*	2.71*
Health Behaviors (%)			
No vigorous exercise	49.86	59.55*	56.66*
Drinking	32.72	18.91*	24.94*
Smoking	14.11	18.25*	15.72
Controls			
Women (%)	58.16	63.46*	58.05
Age	70.61 (.18)	68.38 (.24)*	68.57 (.27)*
Married (%)	73.68	46.68*	63.96*
Foreign born (%)	3.74	5.14*	52.88*

Note: Standard deviations are in parentheses.
*Statistically significant difference between white and black or white and Hispanic at the .05 level.

Table 2-2. Hazard Ratios for Death by Grandparenting and Race (N = 13,705)

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Variable	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Grandparenting (ref = no grandparenting)												
Skipped-generation household grandparenting (SG)	1.02	(0.86-1.22)	0.99	(0.83-1.17)	0.97	(0.82-1.15)	0.97	(0.82-1.15)	0.96	(0.81-1.14)	0.87	(0.69-1.09)
Multigenerational household grandparenting (MG)	1.00	(0.89-1.11)	0.96	(0.86-1.07)	0.95	(0.84-1.06)	0.93	(0.83-1.04)	0.93	(0.83-1.04)	0.84*	(0.73-0.97)
Light noncoresident grandparenting (LNG)	0.80***	(0.73-0.87)	0.83***	(0.76-0.91)	0.89**	(0.82-0.97)	0.85***	(0.78-0.93)	0.90*	(0.83-0.98)	0.90*	(0.82-0.98)
Intensive noncoresident grandparenting (ING)	0.81***	(0.72-0.91)	0.84**	(0.75-0.94)	0.85**	(0.76-0.96)	0.85**	(0.75-0.95)	0.86*	(0.76-0.97)	0.82**	(0.72-0.93)
Race (ref = whites)												
Black	0.98	(0.88-1.10)	0.90+	(0.81-1.01)	0.79***	(0.70-0.88)	0.87*	(0.78-0.97)	0.78***	(0.70-0.88)	0.74***	(0.66-0.84)
Hispanic	0.83*	(0.71-0.98)	0.73***	(0.62-0.86)	0.63***	(0.53-0.74)	0.72***	(0.61-0.85)	0.64***	(0.54-0.76)	0.63***	(0.52-0.76)
Health Condition												
Poor self-rated health			1.74***	(1.59-1.90)	1.52***	(1.40-1.66)	1.62***	(1.48-1.77)	1.46***	(1.34-1.59)	1.46***	(1.34-1.59)
CES-D			1.05***	(1.03-1.08)	1.03*	(1.00-1.05)	1.04***	(1.02-1.07)	1.02+	(1.00-1.05)	1.02+	(1.00-1.05)
Chronic disease			1.41***	(1.24-1.61)	1.37***	(1.20-1.57)	1.42***	(1.24-1.64)	1.39***	(1.20-1.60)	1.39***	(1.20-1.60)
Socioeconomic Status												
Years of schooling					0.98*	(0.97-1.00)			0.99+	(0.97-1.00)	0.99+	(0.97-1.00)
Household income (Ln)					0.89***	(0.85-0.93)			0.90***	(0.86-0.94)	0.90***	(0.86-0.94)
Net Household wealth (Ln)					0.96***	(0.95-0.98)			0.97**	(0.96-0.99)	0.97**	(0.96-0.99)
Working					0.46***	(0.42-0.51)			0.47***	(0.43-0.52)	0.47***	(0.43-0.52)
Long-term health insurance					1.05	(0.91-1.21)			1.06	(0.93-1.22)	1.06	(0.93-1.22)
Health Behaviors												
No virogous exercise							1.35***	(1.27-1.44)	1.25***	(1.17-1.33)	1.25***	(1.17-1.33)
Drinking							0.78***	(0.69-0.88)	0.84**	(0.75-0.94)	0.84**	(0.74-0.94)
Smoking							1.42***	(1.25-1.62)	1.36***	(1.19-1.55)	1.36***	(1.19-1.55)
Interactions												
SG X Black											1.51*	(1.03-2.23)
SG X Hispanic											1.02	(0.64-1.64)
MG X Black											1.50**	(1.12-2.01)
MG X Hispanic											1.15	(0.73-1.80)
LNG X Black											1.02	(0.80-1.30)
LNG X Hispanic											1.05	(0.74-1.49)
ING X Black											1.31*	(1.02-1.70)
ING X Hispanic											1.50+	(0.95-2.36)
Controls												
Women	0.67***	(0.62-0.71)	0.66***	(0.61-0.71)	0.58***	(0.54-0.63)	0.62***	(0.58-0.67)	0.57***	(0.52-0.61)	0.56***	(0.52-0.61)
Age	1.04***	(1.03-1.04)	1.03***	(1.03-1.04)	1.02***	(1.01-1.02)	1.04***	(1.03-1.04)	1.02***	(1.02-1.03)	1.02***	(1.02-1.03)
Married	0.67***	(0.62-0.72)	0.71***	(0.66-0.76)	0.79***	(0.73-0.86)	0.73***	(0.68-0.79)	0.80***	(0.73-0.86)	0.79***	(0.73-0.86)
Foreign Born	0.79**	(0.68-0.92)	0.76**	(0.64-0.89)	0.71***	(0.59-0.85)	0.76**	(0.64-0.90)	0.72***	(0.60-0.86)	0.72***	(0.60-0.86)

Note . HR = hazard ratio; CI = confidence interval.

+p < .10, *p < .05, **p < .01, ***p < .001.

APPENDIX B: Chapter 3 Tables

Table 3-1. Weighted Descriptive Statistics for Grandmothers Aged 47-80, KLoSA, 2008 (*N* = 2,184)

Variable	Mean or %	SD
CES-D (1-10)	4.27	2.96
Age	65.09	8.05
Grandparenting		
No grandparenting (ref)	93.10	
Multigenerational household Grandparenting	1.53	
Part-time noncoresident grandparenting	2.37	
Full-time noncoresident grandparenting	3.00	
Socioeconmic Status		
Elementary school or less (ref)	69.52	
Middle school	15.77	
High school diploma or more	14.71	
Household income (10,000 Won)	1978.44	2698.28
Household asset (10,000 Won)	18303.83	30669.63
Working	27.67	
Health Behaviors		
Exercise	32.28	
Smoking	3.35	
Drinking	17.47	
Social Support		
Social activity (more than monthly=1)	88.02	
Support from adult children	83.30	
Support to adult children	26.31	
Controls		
Married	67.95	
Past grandparenting experience	13.34	
Poor self-rated health	38.70	
Chronic condition	65.41	
Death	4.01	
Dropout	10.42	

Table 3-2. Growth Curve Estimates of Grandparenting on Trajectories of Depressive Symptoms among Grandmothers, KLoSA, 2008-2012 (N = 2,814)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Fixed Effects					
Intercept	3.119***	4.641***	3.421***	3.986***	5.716***
Grandparenting (ref = No grandparenting)					
Multigenerational household grandparenting	1.615+	1.599+	1.557+	1.470+	1.420+
Part-time noncoresident grandparenting	-0.726	-0.793	-0.676	-0.584	-0.611
Full-time noncoresident grandparenting	0.056	-0.004	0.015	-0.040	-0.127
Linear slope (age)	0.033***	0.017**	0.026***	0.026***	0.008
Multigenerational household grandparenting	-0.098*	-0.095*	-0.096*	-0.095*	-0.090*
Part-time noncoresident grandparenting	0.035	0.039	0.032	0.027	0.029
Full-time noncoresident grandparenting	-0.024	-0.025	-0.023	-0.016	-0.017
Socioeconomic status					
Middle school (ref = Elementary school or less)		-0.382**			-0.298*
High school diploma or more		-0.574***			-0.432***
Working		-0.374***			-0.329***
Household income		-0.139***			-0.148***
Household asset		-0.034			-0.039
Health behaviors					
Exercise			-0.446***		-0.399***
Smoking			0.763**		0.649**
Drinking			-0.386***		-0.291**
Social support					
Social activity (more than monthly=1)				-1.012***	-0.999***
Support from adult children				0.314***	0.286**
Support to adult children				-0.357***	-0.281***
Controls					
Married	-0.421***	-0.336***	-0.424***	-0.403***	-0.326***
Past grandparenting experience	-0.326*	-0.332*	-0.285*	-0.398**	-0.361**
Poor self-rated health	1.433***	1.356***	1.390***	1.392***	1.281***
Chronic condition	0.257**	0.231**	0.285**	0.254**	0.257**
Death	0.984***	0.892***	0.892***	0.907***	0.753**
Dropout	0.438**	0.437**	0.441**	0.398*	0.408**
Random Effects					
Level 1 residual	4.554***	4.539***	4.540***	4.558***	4.530***
Level 2 intercept	2.861***	2.704***	2.806***	2.615***	2.465***
Level 2 slope	0.001***	0.001***	0.001***	0.001***	0.001***
-2 Log likelihood	18166	18131	18136	18095	18039

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

APPENDIX C: Chapter 4 Tables

Table 4-1. Weighted Descriptive Statistics, CHARLS, 2011 (*N* = 5,691)

Variable	Mean or % Rural Grandparents (n = 4,638)	 Urban Grandparents (n = 1,053)
CES-D (1-30)	9.04* (6.39)	6.69 (5.64)
Age	58.83* (8.03)	61.45 (7.52)
Grandparenting		
No grandparenting (ref)	52.01	50.46
Skipped-generation household grandparenting	7.11*	4.91
Multigenerational household grandparenting	28.82	25.75
Part-time noncoresident grandparenting	7.46*	11.55
Full-time noncoresident grandparenting	4.60*	7.33
Socioeconomic Status		
Illiterate (ref)	30.07*	10.10
Less than elementary school	21.63*	12.91
Elementary school	25.27*	21.79
Middle school or higher	23.03*	55.29
Household asset (1-17)	3.92* (2.22)	4.83 (2.43)
Working (ref = no)		
Yes	74.16*	31.52
Missing	0.45*	0.20
Pension (ref = no)		
Yes	16.39*	64.66
Missing	0.21*	0.34
Health Behaviors		
Exercise (ref = no)		
Yes	17.66*	6.43
Missing	55.52	56.41
Smoking (ref = no)		
Yes	32.19*	26.12
Missing	0.01	0.00
Drinking (ref = no)		
Yes	19.53*	16.52
Missing	4.92	6.72

Note. Standard deviations are in parentheses.
*Statistically significant difference at the .05 level.

Table 4-1 (cont'd)

Variable	Mean or %	
	Rural Grandparents (n = 4,638)	Urban Grandparents (n = 1,053)
Social Support		
Social activity (ref = no)		
Yes	44.96	58.04
Missing	0.06*	0.00
Support from adult children (ref = no)		
Yes	42.94*	27.72
Missing	0.14*	0.06
Support to adult children (ref = no)		
Yes	18.02*	26.45
Missing	0.17*	0.14
Controls		
Women	51.23	48.86
Married	73.47*	79.21
Poor self-rated health (ref = no)		
Yes	52.61	57.25
Missing	28.10*	23.96
Chronic condition		
Yes	34.88*	50.46
Missing	1.41*	0.42
Death	5.12*	4.03
Dropout	13.02*	28.00

Note. Standard deviations are in parentheses.

*Statistically significant difference at the .05 level.

Table 4-2. Growth Curve Estimates of Grandparenting on Trajectories of Depressive Symptoms among Rural Grandparents, CHARLS, 2011-2015 (*N* = 4,638)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Fixed Effects					
Intercept	6.257***	8.918***	6.083***	6.791***	9.044***
Grandparenting (ref = No grandparenting)					
Skipped-generation household grandparenting	0.027	0.173	0.048	0.132	0.218
Multigenerational household grandparenting	-0.493**	-0.113	-0.496**	-0.483**	-0.123
Part-time noncoresident grandparenting	-0.151	-0.033	-0.143	-0.027	0.037
Full-time noncoresident grandparenting	-0.508*	-0.320	-0.504*	-0.406+	-0.283
Linear slope (age)	0.001	-0.028*	0.004	0.001	-0.029*
Skipped-generation household grandparenting	0.036	0.031	0.034	0.035	0.029
Multigenerational household grandparenting	0.057**	0.057**	0.056**	0.059**	0.058**
Part-time noncoresident grandparenting	-0.020	-0.015	-0.021	-0.023	-0.018
Full-time noncoresident grandparenting	0.033	0.043	0.031	0.030	0.039
Socioeconomic Status					
Less than elementary school (ref = Illierate)		-0.182			-0.163
Elementary school		-0.944***			-0.930***
Middle school or higher		-1.313***			-1.263***
Household asset (1-17)		-0.368***			-0.348***
Working (ref = no)					
Yes		-0.281+			-0.296*
Missing		0.909			0.917
Pension (ref = no)					
Yes		-0.426**			-0.358*
Missing		-0.938**			-0.926**
Health Behaviors					
Exercise (ref = no)					
Yes			0.295		0.296
Missing			0.155		0.105

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table 4-2 (cont'd)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Smoking (ref = no)					
Yes			0.184		0.046
Missing			-0.300		-0.134
Drinking (ref = no)					
Yes			-0.165		-0.096
Missing			0.447		0.181
Social Support					
Social activity (ref = no)					
Yes				-0.699***	-0.564***
Missing				1.361	1.149
Support from adult children (ref = no)					
Yes				-0.089	0.072
Missing				-1.051	-0.913
Support to adult children (ref = no)					
Yes				-0.477***	-0.299*
Missing				0.321	0.600
Controls					
Women	2.041***	1.650***	2.067***	2.070***	1.670***
Married	-0.922***	-0.744***	-0.923***	-0.963***	-0.784***
Poor self-rated health (ref = no)					
Yes	2.742***	2.665***	2.747***	2.724***	2.656***
Missing	2.185***	1.722***	2.154***	2.044***	1.667***
Chronic condition					
Yes	0.938***	1.058***	0.955***	0.963***	1.071***
Missing	0.455	0.494	0.466	0.493	0.512
Death	1.643***	1.262**	1.625***	1.576***	1.248**
Dropout	0.260	0.196	0.254	0.252	0.196
Random Effects					
Level 1 residual	21.177***	21.174***	21.169***	21.193***	21.182***
Level 2 intercept	15.716***	14.414***	15.668***	15.365***	14.206***
Level 2 slope	0.000***	0.000***	0.000***	0.000***	0.000***
-2 Log likelihood	30,548	30,432	30,543	30,520	30,414

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table 4-3. Growth Curve Estimates of Grandparenting on Trajectories of Depressive Symptoms among Urban Grandparents, CHARLS, 2011-2015 (*N* = 1,053)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Fixed Effects					
Intercept	5.391***	8.866***	5.666***	6.135***	9.452***
Grandparenting (ref = No grandparenting)					
Skipped-generation household grandparenting	-0.312	-0.074	-0.408	-0.213	-0.129
Multigenerational household grandparenting	0.063	0.365	0.058	0.108	0.344
Part-time noncoresident grandparenting	-0.702	-0.635	-0.722	-0.671	-0.662
Full-time noncoresident grandparenting	-0.495	-0.293	-0.528	-0.415	-0.281
Linear slope (age)	0.016	0.001	0.015	0.015	-0.002
Skipped-generation household grandparenting	-0.055	-0.060	-0.044	-0.052	-0.051
Multigenerational household grandparenting	-0.053	-0.047	-0.048	-0.050	-0.043
Part-time noncoresident grandparenting	0.055	0.068	0.058	0.061	0.075
Full-time noncoresident grandparenting	0.027	0.021	0.029	0.028	0.022
Socioeconomic Status					
Less than elementary school (ref = Illierate)		-0.687			-0.626
Elementary school		-1.785***			-1.683**
Middle school or higher		-2.798***			-2.684***
Household asset (1-17)		-0.253***			-0.216***
Working (ref = no)					
Yes		-0.029			-0.106
Missing		-0.363			-0.093
Pension (ref = no)					
Yes		-0.474+			-0.378
Missing		-0.231			-0.317
Health Behaviors					
Exercise (ref = no)					
Yes			0.562		0.491
Missing			-0.132		-0.135

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

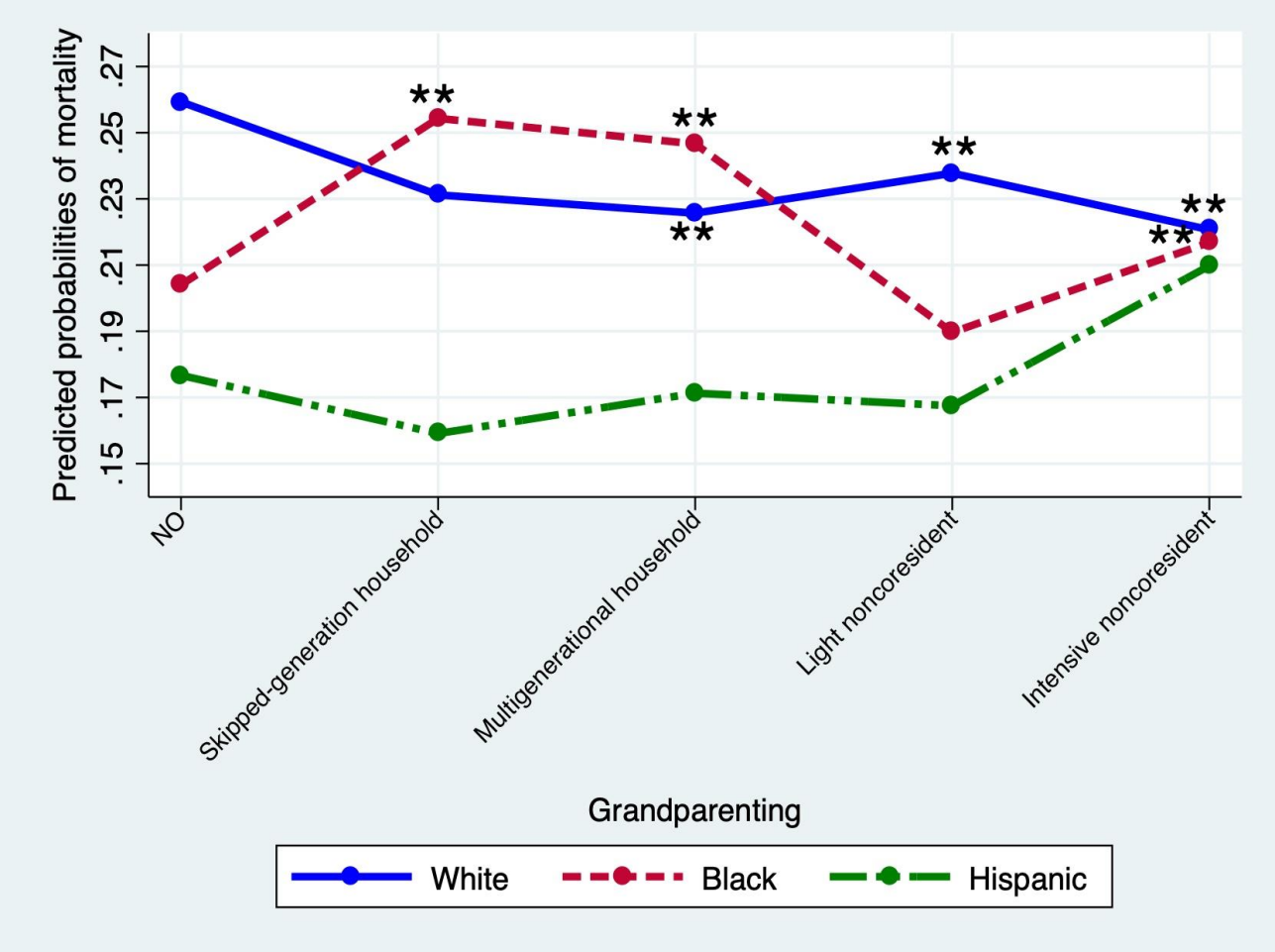
Table 4-3 (cont'd)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Smoking (ref = no)					
Yes			-0.209		-0.329
Missing			-0.569		-0.422
Drinking (ref = no)					
Yes			-0.134		-0.075
Missing			-0.432		-0.356
Social Support					
Social activity (ref = no)					
Yes				-1.123***	-0.854***
Missing				-	-
Support from adult children (ref = no)					
Yes				0.075	0.007
Missing				-1.974	-2.158
Support to adult children (ref = no)					
Yes				-0.463*	-0.247
Missing				0.972	1.461
Controls					
Women	1.284***	0.974**	1.112**	1.290***	0.803*
Married	-0.947**	-0.589+	-0.972**	-0.905**	-0.611*
Poor self-rated health (ref = no)					
Yes	2.251***	2.233***	2.257***	2.253***	2.240***
Missing	1.615***	1.330***	1.577***	1.473***	1.234**
Chronic condition					
Yes	0.561*	0.609*	0.539+	0.583*	0.596*
Missing	-0.797	-0.959	-0.764	-1.008	-1.081
Death	-0.270	-0.769	-0.223	-0.389	-0.769
Dropout	-0.524	-0.312	-0.503	-0.530	-0.317
Random Effects					
Level 1 residual	15.742***	15.867***	15.769***	15.850***	15.930***
Level 2 intercept	14.473***	12.618***	14.304***	13.618***	12.049***
Level 2 slope	0.001***	0.000***	0.001***	0.001***	0.001***
-2 Log likelihood	6,705	6,661	6,702	6,689	6,651

*** p<0.001, ** p<0.01, * p<0.05, + p<0.1

APPENDIX D: Chapter 2 Figure

Figure 2-1. Predicted Probabilities of Mortality by Grandparenting and Race



Note. ** indicates significant mortality differences as reported in Model 6 controlling for all covariates.

APPENDIX E: Chapter 3 Figures

Figure 3-1. Depressive Symptoms by Grandparenting, KLoSA, 2008

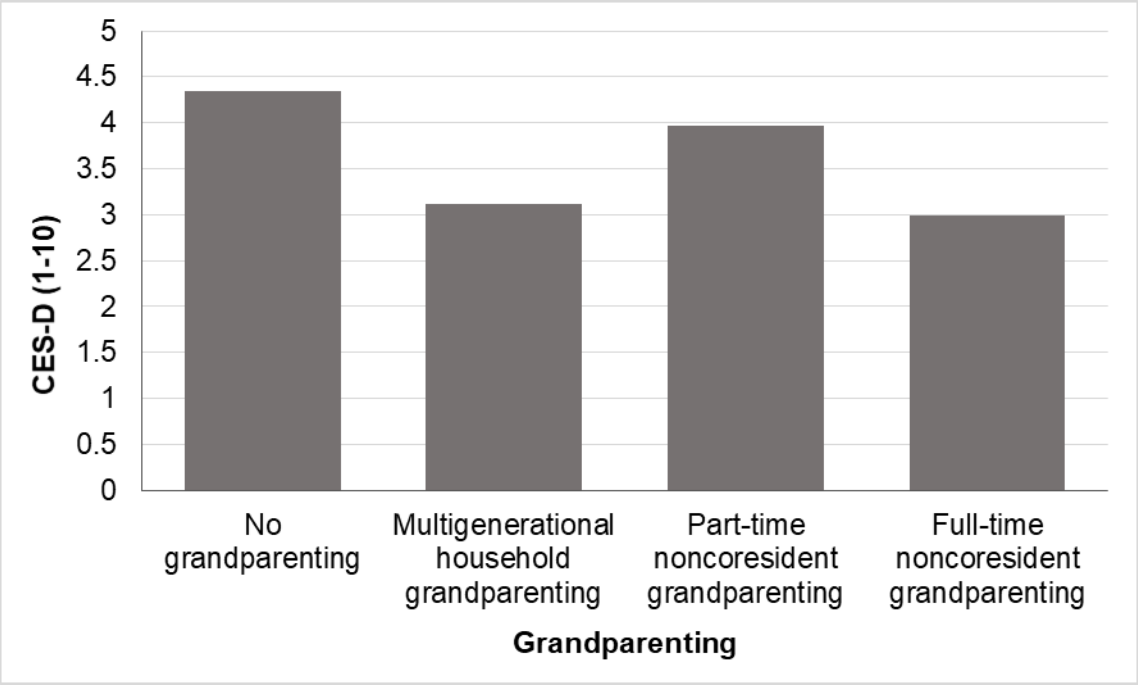
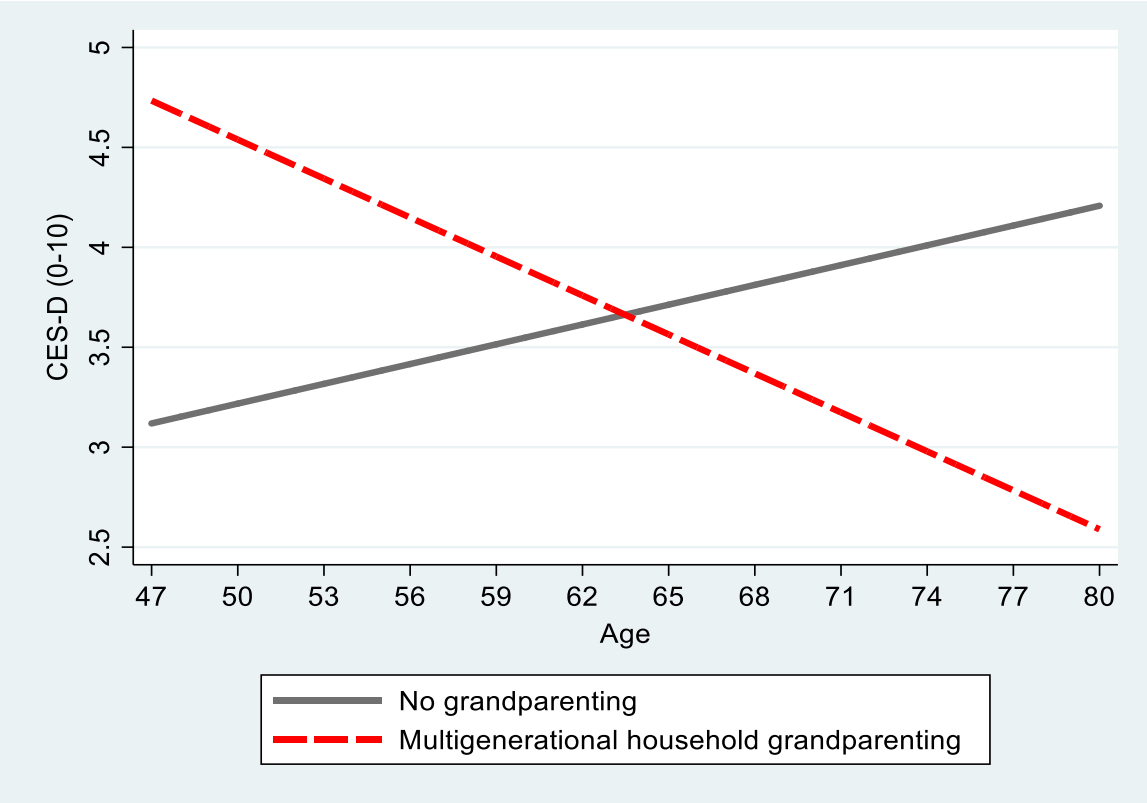


Figure 3-2. Trajectories of Depressive Symptoms by Grandparenting: Growth Curve Model Estimates



Note. Figure 3-2 is based on Model 1 in Table 2 controlling for basic demographic characteristics and health status.

APPENDIX F: Chapter 4 Figures

Figure 4-1. Depressive Symptoms by Grandparenting and Region, CHARLS, 2011

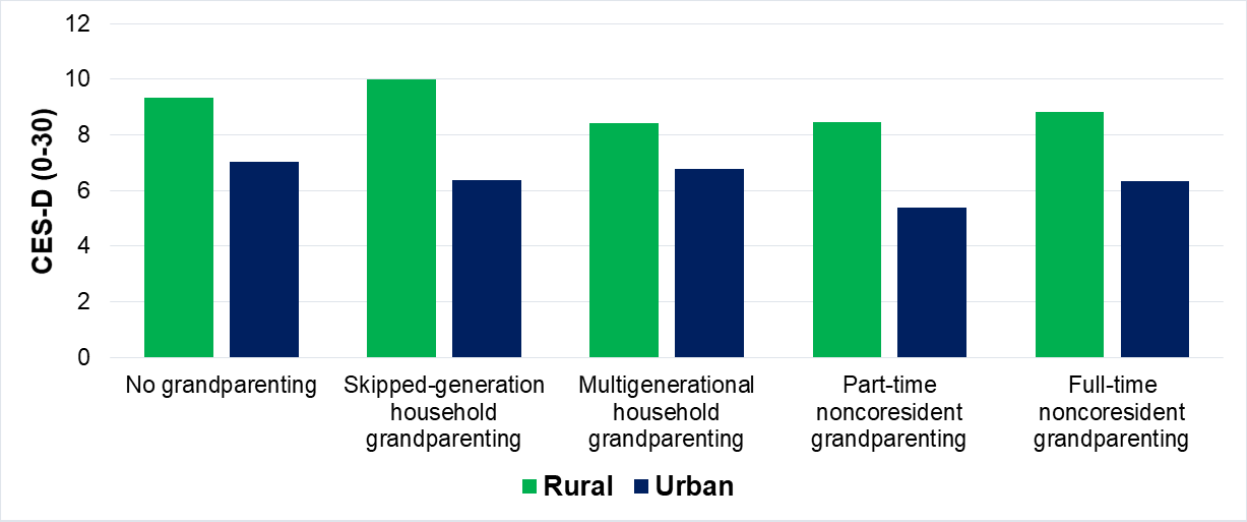
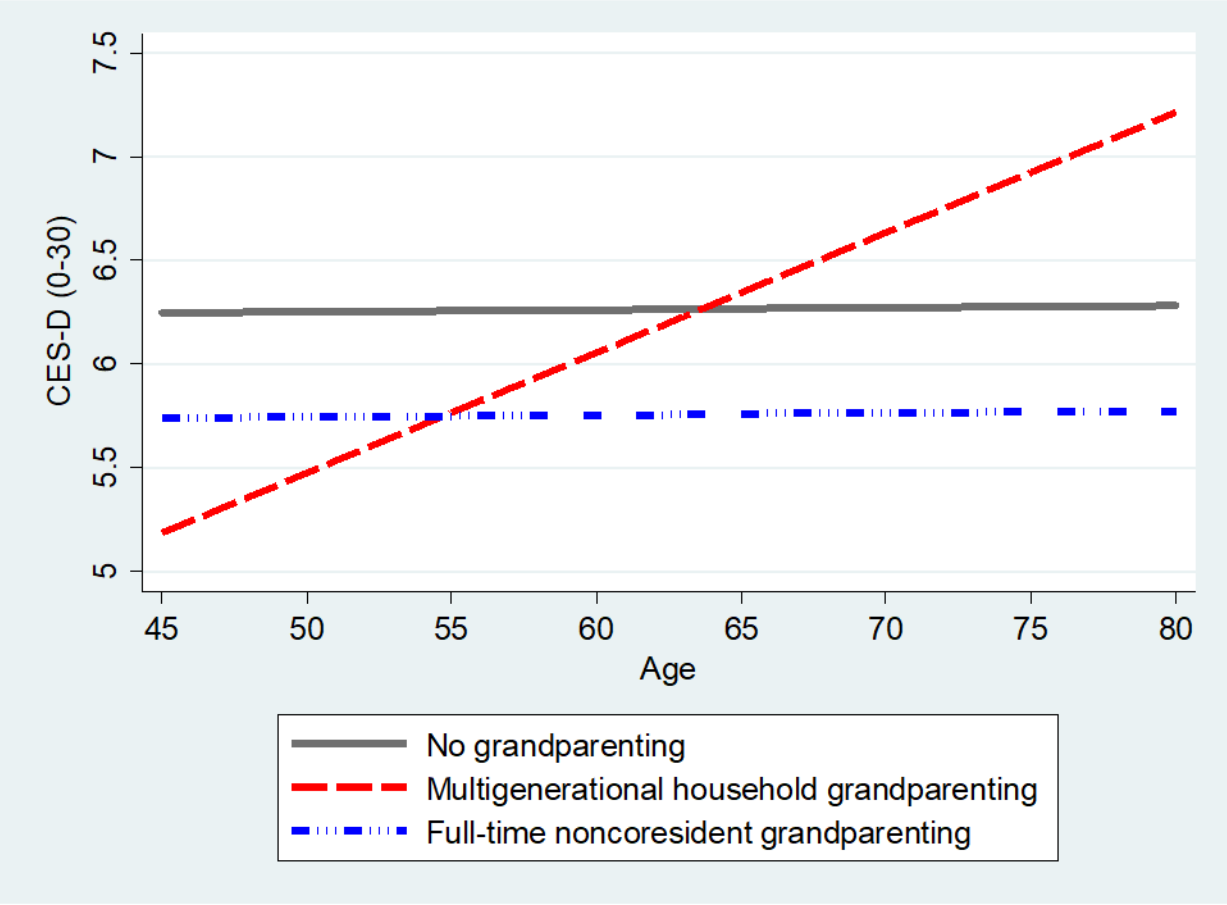


Figure 4-2. Trajectories of Depressive Symptoms by Grandparenting among Rural Grandparents: Growth Curve Model Estimates



Note. Figure 4-2 is based on Model 1 in Table 2 controlling for basic demographic characteristics and health status.

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