ABSTRACT

Title of Dissertation: SHAPE OF CARE: PATTERNS OF FAMILY CAREGIVING ACTIVITIES AMONG OLDER ADULTS FROM MIDLIFE TO LATER AGES IN CHINA AND THE U.S.

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This dissertation consists of three papers that investigate the long-term family caregiving patterns among Chinese and American older adults. Family caregiving has long been an essential fabric of long-term care services. Due to the prolonged life expectancy and the declined family size, older adults today are more likely to care for multiple family members for longer years than the previous cohorts. However, studies on caregiving predominately focus on singular care experiences over a short period time. As older adults transition into and out of multiple care roles, the overall caregiving patterns are overlooked. Leveraging two rich longitudinal datasets (the China Health and Retirement Study and the Health and Retirement Study), this dissertation aims to fill this current research gap by developing long-term family caregiving typologies. The

first paper develops a care typology for Chinese older adults, and thoroughly assesses how gender, *hukou* status, living arrangement, and significant life transitions are associated with the long-term caregiving patterns. In the second paper, using linear mixed-effects models, I continue exploring the positive and negative health consequences of each caregiving pattern among Chinese older adults. The third paper focuses on developing a long-term family caregiving pattern for American older adults. In addition to prolonged life expectancies and the decline in family size, the U.S. has experienced complex transitions in family structures over the past few decades, leading to more diverse family networks and international relations in later life. After establishing the long-term care typology, the third paper pays closer attention to the variations of family caregiving patterns across the War Babies cohort, Early Baby Boomer, and the Middle/Late Baby Boomer cohort. Moreover, I explore how gender, race, and socioeconomic status are linked with these patterns. In the context of global aging, this dissertation highlights the heterogeneity in the family caregiving experiences and identifies the most vulnerable demographic groups who shoulder the heaviest care burden over time. In the end, the findings from the dissertation provide guidance for the investment and design of long-term care services in rapidly aging contexts.

SHAPE OF CARE:
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by

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Dedication

This dissertation is dedicated to my mother (Chun Wu) and father (Qingbo Duan), as well as my aunt, uncle, and cousins, who helped care for my father till his last days.

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Introduction

Family caregiving has always been considered as one of the most important roles from midlife to the later stage of life. Most developed countries and some developing countries have undergone significant demographic transitions over the past several decades, resulting in a drastic increase in aging population and soaring needs in eldercare. Despite the increase in the institutional eldercare provision, family members are still the backbone of caregiving in both developed and developing regions. In China, approximately thirty-three million adults over age 60 have functional limitations and need assistances for daily activities (China National Committee on Agin 2011), and over half of the care are shouldered by spouses and adult children (Liu and Lou 2019). In the U.S., according to a recent study, about 70% of adults aged 65 needed long-term care services before they die, and many older adults with long-term care needs rely exclusively on family members (Spillman, Allen, and Favreault 2019), creating significant burdens for family caregivers (Schulz et al. 2020).

In addition to eldercare, due to the increased life expectancy and longer years of shared lives across generations (Bengtson 2001), older adults today in both China and the U.S. are much more likely to provide primary care to their grandchildren today for longer years than previous cohorts. In China, grandparenting has been long considered as a norm to maintain collective family interests and solidarity: over 40% of grandparents have taken care of their grandchildren, and older adults in rural China are more likely to provide coresidential and custodial grandparenting due to the rural-to-urban migration among adult children (CHARLS 2015). In the U.S., while over 60% of grandparents provided care to their grandchildren, the experiences of

grandparenting differ significantly by race: black and Hispanic grandparents are more likely to engage in co-residential or custodial grandparenting either due to high poverty rate or due to the common practice of reciprocal family support. Although a bulk of studies suggested that grandparenting can be beneficial for older adults' mental well-being (Di Gessa, Glaser, and Tinker 2016; Xu 2019; Luo et al. 2012), several studies found that grandparenting can be stressful and even take a toll on older adults' physical well-being (Chen and Liu 2012; Grinstead et al. 2003).

Previous studies to date have extensive discussion on the consequences of family caregiving on caregivers' health outcomes. On the one hand, family caregiving is seen as a chronic stressor and can translate into accumulative health disadvantages overtime (Schulz et al. 2020); on the other hand, family caregiving can enhance bonding and intimacy among family members, which enhance the physical and psychological well-being in the long run (Han, Kim, and Burr 2021; Chen et al. 2015). Nonetheless, most studies primarily focused on "a singular care experience to a specific care recipient during a short period of life". A recent study, in fact, shows that due to the increased longevity, some caregivers may find themselves in the position of providing care to multiple family members concurrently or sequentially, whereas others might only have caregiving experience to one family member over a short period of time (AARP 2020). Therefore, the investigation of the discrete snapshots of care activities fails to capture diverse caregiving experiences overtime (Keating et al. 2019). Despite the growing efforts in incorporating the life course perspectives into family caregiving studies (Elder et al. 2003; Moen, Robison, and Dempster-McLain 1995), we still have little knowledge about what are the prevalent patterns of caregiving experiences, with respect to the total number of care recipients, the relationships to each care recipient, the duration and intensity of each care experiences, and

the overlapping years of care experiences. In addition, what even less known is how each pattern of caregiving experiences would contribute to the change of mental and physical well-being overtime (Keating et al. 2019).

This dissertation aims to fill the important gaps by developing a typology that identifies the prominent patterns of caregiving experiences as one transit from midlife to later ages, and further exploring how each caregiving pattern contributed to the later-life physical and mental health outcomes.

The first chapter of this dissertation is centered on developing a typology that captures the caregiving patterns among Chinese older adults, using the recent longitudinal data from Chinese Health and Retirement Longitudinal Studies (CHARLS, 2011, 2013, 2015, and 2018). Drawing upon the life course perspective (Elder, Johnson, and Crosnoe 2003) and the theory of family care trajectory, I develop a caregiving typology based on the total number of care recipients, the duration and intensity for each care role, overlapping caregiving waves, and the total duration of caregiving throughout the years (Keating et al. 2019). Specifically, this chapter views care to grandchildren, older parents/parent-in-laws and spouses as three major care roles. Next, I investigate gender, *hukou* status, and living arrangement at the baseline shape the overall caregiving patterns overtime. Moreover, I continue investigating how significant life transitions, including becoming a grandparent, becoming a widower, and changes in the living arrangement are associated with older adults' caregiving patterns over time. I anticipate that women are more likely to care for multiple family members, of heavier intensity, and of longer duration than men, due to the ingrained gendered divisions of labor in the household. As for *hukou* status, I expect that rural residents are more likely to engage in caregiving experiences of longer years and higher intensity, since rural China has relatively fewer and less established eldercare facilitates,

or community-based care compared to urban China, therefore family members would have to shoulder the lion of care needs (Feng et al. 2013). As for the association between caregiving pattern and living arrangement, previous studies indicated that living in a multigenerational household would lead to heavier care burden to grandchildren and parents, whereas living with adult children would alleviate the spousal caregiving burden. Transitions into grandparenthood would prompt older adults into an intensive grandparenting pattern or even a sandwiched caregiving pattern to multiple family members. Having adult children move out of the household would result in having an intensive spousal caregiving pattern.

There is no shortage of literature on the relationship between caregiving and its health consequences, nonetheless, most of them focused on a singular care experience to one single care recipient during a short period of time, which overlooked the complexities of caregiving experiences overtime. As a result, the heterogenous health changes are overlooked too. Moreover, most studies ground their research upon the stress process model (Pearlin et al. 1990), and view caregiving as chronic stressors and caregivers who are exposed to a higher degree of stressful experiences overtime would result in an accumulated biological burden (Seeman et al. 2001; Juster et al. 2010). Nonetheless, the role enhancement perspective argues that engaging in caregiving roles is associated with enhanced well-being, as it provides a sense of purpose and fulfillment (Moen et al. 1995). The two competing theories suggest that it is plausible to have both negative and positive effects on caregivers' well-being. Meanwhile, other important social determinants including gender, *hukou*, and the living arrangement could also moderate the effects of family caregiving on caregivers' well-being. In Chapter Two, based on the caregiving patterns identified in Chapter One, I further investigate health advantages or disadvantages of each caregiving pattern over time. I hypothesize that 1). Among all caregiving patterns,

Temporary Caregivers who engage in short period of care will have better health outcomes than other caregiving patterns. 2). *Intensive Spousal Caregivers* and who mostly care to spouse for long durations would have worse physical and mental health in general, when compared to other caregiving patterns. Likewise, *Intensive Grandchild Caregivers* would have worsened physical and mental well-being overtime. 3). *Sandwiched Caregivers* who provide concurrent care to grandchildren, the spouse, and parents for a longer duration would also have worsened well-being compared to *Temporary Caregivers*. 4). Lastly, *Serial Caregivers* who provide low intensity care to parents and grandchildren for short duration and low overlapping would yield to less harm on their physical and mental well-being. After examining the main effects of family caregiving on caregivers' well-being, I will further investigate how gender, *hukou* status and the living arrangement further moderate these linkages. In general, I expect that rural caregivers and female caregivers would have much worse mental and physical well-being compared to the urban and male counterparts. Lastly, I anticipate that living in the multigenerational household can increase the care network and help alleviate the burden for primary caregivers. By contrast, living without adult children means losing a significant helper at home, which could potentially exacerbate caregivers' well-being, especially when they were engaging in intensive spousal and parental caregiving activities.

As mentioned earlier, both developed countries and some developing countries have seen a drastic rise in aging population and soaring needs in caregiving. Hence, after identifying prominent patterns of family caregiving and related health consequences among Chinese older adults, the third chapter turns to long-term caregiving experiences among older adults in the U.S. U.S. completed their classic demographic transitions, resulting in longer years of life expectancy and the decline in family size. These demographic transitions have created opportunities for

longer years of intergenerational caregiving. Moreover, over the past several decades, the U.S. has also seen a drastic retreat of marriage from childbearing, rise in divorce rate and live-apart-together (LAT) relationships, and life-long singlehood. These changes in family structures could further complicate the later-life caregiving practices (Agree and Glaser 2009). The Baby Boomer cohort is at the forefront of these demographic transitions, which in turn would further shape their family relationships and later-life caregiving practices. On the one hand, the decline and marriage and rise in divorce would decrease the practice of spousal caregiving in later life. Moreover, being divorced or remarried may weaken the ties with their own children, which further decrease the likelihood of grandparenting. On the other hand, the retreat of marriage from childbearing may enhance intergenerational relationships, as older adults are more likely to step up and provide coresidential grandparenting due to the rise of mass incarceration and drug overdose among their adult children's generation (Cherlin 2010). The practice of custodial grandparenting is especially more common among black and Hispanic families (Facio 1996; (Raphael 1989).

Similar to the plan of Chapter One, I construct a typology of long-term caregiving experiences for American older adults based on information including total number of care recipients, relationships to care recipients in each care role, the care intensity and duration of each care role, the duration of concurrent caregiving experiences to multiple family members, and the total caregiving waves precluded overlapping waves. For this chapter, I use longitudinal data from the Health and Retirement study (HRS, 2000-2018), a nationally representative sample of Americans over 50, and similar to Chapter One, I treat care to a spouse, parents/parent-in-laws, and grandchildren as three major care roles. Next, I examine to what extent are Baby Boomers' caregiving patterns differ from previous cohorts. Further, I continue exploring how

gender, race, and SES shaped the long-term caregiving patterns. I hypothesize that the Baby Boomers are more likely to have longer duration of parental care and grandparenting, more likely to have longer duration of overlapping care experiences, and less likely to provide spousal caregiving than previous cohorts. I also expect that female caregivers are more likely to provide intensive caregiving and have multiple caregiving roles than male caregivers. This pattern is also more common among racial minorities and lower SES groups. Blacks and Hispanics are also more likely to engage in intensive and longer duration of family caregiving than Whites.

In summary, moving beyond the monolithic investigation of family caregiving, this dissertation aims to capture the heterogeneity of the long-term family caregiving experiences among older adults, and to investigate how the evolve of caregiving experiences over time would shape their later-life health outcomes. This dissertation is based on China and the U.S., as they are both facing the rapid increase in aging population and soaring needs in caregiving. For Chinese older adults (Chapter One and Chapter Two), I would use longitudinal data from China Health and Retirement Longitudinal Study (CHARLS 2011-2018), a nationally representative data from older adults aged 45 and older. For American older adults (Chapter Three), I would use longitudinal data from Health and Retirement Study (2000-2018), also a nationally representative data from older adults who are 50 and older. The thorough study of these two countries would help draw a better picture of aging and caregiving issues in developed and developing regions more broadly.

Significance of the Current Study

This dissertation attempts to fill the research gaps in multiple ways. First, despite the interests and efforts in incorporating the life course perspectives into caregiving studies, most studies to date have only focused the snapshots of caregiving experience instead of the overall

long-term experiences. This dissertation is therefore among the first to thoroughly explore the patterns long-term family caregiving among both Chinese and American older adults. Second, built upon the life course perspective and the theory of family care trajectory (Keating et al. 2019), I construct the life courses of caregiving typology for both Chinese and American older adults, using the information on total number of recipients overall, relationships to each care recipient, intensity and duration of each care episode, the overlapping duration of concurrent caregiving to multiple family members, and total durations of family caregiving. Specifically, in the Chinese context, I examine how gender, *hukou* status, and living arrangement at the baseline determine the family caregiving patterns. Moreover, I also investigate how significant life transitions, such as transitions into retirement, widowhood, grandparenthood, and changes in living arrangements shape the long-term caregiving patterns. In the U.S. context, I first investigate to which extent do Baby Boomers' birth cohort differ from previous cohorts, and how do gender, race, and SES determine the caregiving patterns overtime. By constructing a caregiving typology and identifying the population who are the most vulnerable to engage heaviest care burdens and have less economic resources to begin with, this dissertation aims to provide guidance for the government to better support the vulnerable population to ease their burdens of family caregiving. Third, most studies to date have focused on health consequences of caregiving over a relatively short period of lifetime, this dissertation, however, aims to advance the understanding on how the evolution of care experiences shape the cumulative health advantages/disadvantages, based on the constructed long-term caregiving typology. Further, in doing so, I hope to uncover in what contexts does family caregiving leads to health advantages or disadvantages overtime.

Lastly, this dissertation also aims to provide insights on how to reform the current formal/institutional care policies to better facilitate and alleviate the burden of family caregivers. Despite the investment in formal care resources over the past decade, family members remain the bedrocks of the long-term care services. While family caregiving may have positive effects on caregivers' well-being, it may also have considerable disadvantages, especially for caregivers with lower SES and have fewer resources at their disposal. By identifying the most vulnerable population shouldering the heaviest care burdens, the government can distribute more targeted formal care resources to ease their caregiving burdens.

Chapter One

Shape of Care: Patterns of Family Caregiving among Older Adults in China

Abstract

China has been aging rapidly over the past decade. The prolonged life expectancy has increased shared lives with family members, and thus older adults today are more likely to care for multiple family members concurrently or sequentially. Guided by the life course perspective, this study develops a care typology that captures older adults' long-term care experiences as they transition into and out of different care roles. Using four waves of longitudinal data from the China Health and Retirement Study (CHARLS 2011, 2013, 2015, and 2018, N=14,787), this study employs the latent profile analysis and identifies five long-term caregiving patterns: *Temporary Caregivers* (53.0%), *Intensive Grandchild Caregivers* (26.4%), *Intensive Spousal Caregivers* (6.1%), *Sandwiched Caregivers* (5.2%), and *Serial Caregivers* (9.3%). Moreover, the results of multinomial logistic regression suggest that female caregivers are more likely to become *Intensive Grandchild Caregivers* and *Sandwiched Caregivers* than male caregivers. Rural caregivers are more likely to be *Intensive Spousal Caregivers* and less likely to be *Serial Caregivers* than urban caregivers. Living in a multigenerational household is associated with a higher likelihood of being a *Sandwiched Caregiver* and an *Intensive Grandchild Caregiver*. Lastly, significant life events, such as transitions into grandparenthood, widowhood, retirement, and having adult children move away, are also linked with intensive caregiving patterns.

Introduction

The aging population in China has increased at an unprecedented rate over the past few decades: the proportion of the population over 65 has increased from 8.9% in 2010 to 13.5% in 2020 (Chinese Bureau of Statistics 2021), and this growth is one of the highest in the world (United Nations 2019). This prolonged longevity has created substantially longer years of shared lives among family members, especially across generations. As a result, individuals today are likely to engage in longer years of caregiving to multiple family members than previously. Caring for grandchildren, a spouse, and parents or parents-in-law are three major caregiving activities among Chinese older adults (Liu and Lou 2016). Additionally, in recent years, scholars have seen a rising trend of caregiving across multiple generations in China (also called the "sandwiched generation") (Xu 2019; Falkingham et al. 2020).

Due to this increased longevity, some caregivers may care for multiple family members simultaneously, or sequentially for a longer period of time. Nonetheless, most studies primarily focused on "a single care experience to a specific care recipient during a short period of life" (Keating et al. 2019), which significantly neglected the complexity of caregiving experiences one might have from the midlife to a later stage of life. To address current gaps in the caregiving literature, scholars have urged an examination of caregiving under the life course framework, arguing that "caregiving is not a static event or a single behavior, but it is instead a complex, dynamic process that unfolds over time" (Moen et al. 1995; Shewchuk and Elliott 2004). Furthermore, individuals' caregiving patterns are embedded in and shaped by social and historical backgrounds, hence caregivers may follow heterogenous family caregiving patterns depending on their socio-demographic configurations and occurrences of significant life events/transitions.

Family caregiving patterns among Chinese older adults are gendered and show drastic differences between rural and urban regions. Like in many other countries, women in China shoulder the lion's share of childcare and eldercare responsibilities, and it is particularly pronounced in rural regions where community-based care facilities are less accessible. Moreover, the rising prevalence of rural-to-urban migrant workers over the past three decades has left many women, younger children, and older adults behind. This not only perpetuates the gendered division of family caregiving but also increases the prevalence of later-life caregiving among older adults, such as grandparenting and spousal care (Cong and Silverstein 2008).

So far, we have accumulated a great deal of knowledge about the patterns and the consequences for one specific type of care over a short period of time. To my knowledge, no study has examined long-term caregiving patterns, as older adults transit from midlife to later ages in China. The life course perspective provides scholars with a theoretical framework for understanding the ebbs and flows of caregiving patterns. In this study, I take a step forward in building a typology of family caregiving patterns and investigating the determinants that shape these patterns. By doing so, I can identify the most vulnerable group who shoulder the heaviest caregiving load. Accordingly, more targeted policies or community programs can be implemented to alleviate their burdens. Understanding these heterogenous caregiving patterns can also empower scholars to further investigate the link between caregiving and later-life well-being, such as patterns that are linked with enhanced well-being, or are associated with drastic health decline.

Using four waves of data from the China Health and Retirement Longitudinal Study (CHALRS, 2011-2018) and the latent profile analysis, this study first aims to construct a family care typology for Chinese older adults and investigate how socio-demographic characteristics

and transitions in life shape the patterns of family caregiving patterns over time. The answers to these questions will allow scholars to not only gain a better understanding of prominent caregiving patterns among older adults in China, but also help identify the population that is most vulnerable to possessing the heaviest care burdens.

Theoretical Framework and Literature Review

Conceptualizing family caregiving with the life course perspective

For years, scholars have called for incorporating the life course perspective into informal caregiving studies (Moen et al. 1995; Marks et al. 2002; Elder et al. 2003), arguing that "it is important to better understand how life courses of family care evolve and how cumulative care experiences shape late-life outcomes" (Keating et al. 2019). Specifically, the principles of the life course perspective urge scholars to investigate how the timing, intensity, and duration of family caregiving experiences together can construct its trajectories, how each care episode is embedded in the relationships with other family members, and how patterns of family caregiving are shaped by geographic locations and public policies.

First, the duration of family caregiving experiences matters. Caregivers normally adapt and adopt various coping strategies as family caregiving progresses. Studying family caregiving over substantial periods of time allows us to capture the "ebbs and flows" of caregiving experiences (Milne and Larkin 2015), which are linked with patterns of late-life adaptation and the aging process (Lacey et al. 2018; Pristavec and Pruchno 2019).

Second, the life course perspective emphasizes individuals' agency in constructing their life course, through making choices and compromises based on alternatives they perceive (Elder et al. 2003). In the case of grandparenting, for instance, grandparents would step in and provide custodial care to their grandchildren when their adult children in remote regions become migrant

workers for better-paying jobs (Silverstein, Cong, and Li 2006). This decision is usually seen as an adaptive strategy to maximize the collective well-being of the entire family – grandparenting not only increases labor force participation for younger mothers, but also enhances their own well-being by ensuring a remittance from their adult children, which compensates for their efforts in childcare (Chen and Liu 2012; Song and Chen 2020).

Third, the life course perspective prompts scholars to investigate how macro policies shape individuals' life patterns (Elder et al. 2003). Specifically, it suggests that policy and geographic regions might constrain individuals' options, and thus shape later-life care experiences. In the case of family caregiving, care facilities (either childcare or eldercare) in China are more accessible in urban regions; therefore, urban residents with more economic resources are more likely to hire professional caretakers and are less likely to engage in intensive caregiving for a longer duration, relative to rural residents.

Fourth, the life course perspective emphasizes that "the same life event may affect individuals in different ways depending on when they occur in the life stage". For instance, individuals who started engaging in caregiving earlier in their life are more likely to retire earlier and even have a longer period of care experience, which may further truncate their social networks and deteriorate their well-being in a later stage of life (Carr and Kail 2013).

Fifth, the life course perspective addresses that "individuals' lives are constructed interdependently through their social networks with others." This means that individuals' life pathways tend to be embedded in, and shaped by, relationships with other family members like spouses, children, and aging parents. Family caregiving, which occurs expectedly or unexpectedly, is consequentially one of the most important social roles in older adults' lives, and significantly shapes older adults' life experiences and well-being (Schulz et al. 2020).

Built upon the life course perspective, Keating and her colleagues (2019) proposed a theory on the life course trajectories of family care: transitions into care episodes, and out of them, constitute heterogeneous patterns of family care trajectories. Key components of family care trajectories are bookends that mark the start and the end of a life course of care, the duration of each care episode, and to what extent care episodes overlap. Based on the components of family care trajectories, Fast and her colleagues identified five distinctive care trajectories among Canadians: compressed generational trajectory, the most common type, has a single short care episode to close-kin; broad generational trajectory, which consists of a first long episode to close kin in midlife, followed by shorter episode to non-close kin; intensive parent care trajectory, a long episode to parents/parents-in-law and sometimes caring for multiple parents; career care trajectory, a very long episode to close family members with disabilities that span for more than two decades; serial care trajectory, the least common trajectory type, has a lifelong duration of caring for multiple family members with longer overlapping years, and has the longest duration at over three decades (Fast et al. 2021).

So far, Fast and her colleagues (2021) are among the first that categorized caregiving patterns over the life course. Nonetheless, most life-course studies are conducted in the Global North, yet the life-course transitions in other developing regions have long been overlooked. Many developing countries, such as China and South Korea, are aging at an even faster pace today (United Nations 2019). Unlike many OECD countries where formal care facilities are better established, in most developing countries, family members are usually the primary source of caregiving, as institutionalized eldercare facilities are less accessible to the general population.

China has been aging rapidly over the past few decades. Caregiving has long been considered a “family affair” and a manifestation of intergenerational solidarity (Chen and Liu

2012; Liu and Dupre 2016). However, the implementation of the One-Child Policy in the 1970s has drastically reduced the fertility rate, which consequently has shrunk the pool of family caregivers for older adults. Adults today in their midlife are thus facing increasingly heavier caregiving burdens than previous generations (Zhan 2004; Zhang and Goza 2006).

Family caregiving in China

As discussed earlier, family caregiving is one of the most important roles among Chinese older adults, through which they can fulfill the expectations of reciprocity and enhance solidarity across generations (Mjelde-Mossey et al. 2009; Chen and Liu 2012). Caring for grandchildren, parents/parents-in-law, and a spouse are the three most common caregiving activities among Chinese older adults. Grandparenting is a highly valued role among Chinese older adults (Silverstein, Cong, and Li 2006), and over 50% of Chinese grandparents have cared for their grandchildren at some point in their lives (Ko and Hank 2014). Meanwhile, older adults today are more likely to provide custodial childcare to grandchildren in skipped-generation households, especially when their adult children become rural-to-urban migrant workers and leave their young children behind at home (Chen and Liu 2012). Caring for elderly parents/parents-in-law is also highly expected due to the norm of filial piety (Chen and Liu 2009). In addition to grandparenting, older adults today are likely to provide care to their own aging parents because of their prolonged longevity (Xu 2019). Lastly, due to the decline in multiple-generation households and the rise in the prevalence of older adults who live alone, spousal caregiving is on the rise as well. One study found that spouses were most likely to take on a primary caregiving role, even when older couples were co-residing with their adult children (Li and Dai 2019).

So far, we have how the activities of caring for grandchildren, the spouse, and parents separately affect caregivers' well-being, and its prevalence. But we know very little about how

individuals transit into and out of each care role over a substantially longer period of time, how long each care role lasts, and how each caregiving role overlaps with one another. As the life course perspective and the theory of family care trajectories suggest, scholars need to move beyond assessing monolithic care experiences, but instead, identify the diverse patterns of family caregiving trajectories that capture how these care experiences evolve and unfold over time, as cumulative care experiences are important for us to better understand later-life outcomes (in Chapter 2).

Therefore, guided by the life course perspective and theory of family care trajectories, and using four waves of longitudinal data from the China Health and Retirement Study (CHARLS, 2011-2018), this study aims to develop a family caregiving typology that classifies heterogenous care experiences based on information about total care recipients, the duration and the intensity of each care episode, and the duration of overlapping care experiences to multiple family members. As the life course perspective posits, individuals' life pathways are embedded in and shaped by historical, social, or cultural factors, thus, I assume that gender, *hukou* status, and living arrangement all play important roles in determining the family care patterns of caregivers. After developing the typology for family caregiving, this study will further explore how these sociodemographic factors determine the patterns of family caregiving experiences, as one transition from midlife to older ages.

Research Objectives

Moving beyond studying monolithic care experiences, this proposed study aims to expand the current literature on static caregiving experiences by capturing the transitions into and out of care roles for multiple family members. It further investigates how a series of socio-demographic factors determine patterns of family caregiving. Guided by the life course perspective and the

theory on family care trajectory, Fast and her colleagues (2021) identified several care trajectories: compressed generational care trajectory, board generational trajectory, intensive parent care trajectory, career care trajectory, and serial care trajectory. Using four waves of longitudinal data from CHARLS (2011-2018), this study contributes to the current caregiving literature by assessing how prescribed social status and significant life transitions further shape the patterns of family caregiving among older adults in China.

This study is motivated by the following questions:

1) What are the most prominent caregiving patterns among Chinese older adults?
2) To what extent are Chinese older adults shouldering the heaviest load of care for grandchildren, aging parents, and spouses?
3) To which degree are Chinese older adults engaging in multiple care experiences concurrently or sequentially as they transition from midlife to older ages?
4) How do the baseline socio-demographic characteristics, onsets of significant life transitions, such as transitioning into grandparenthood, retirement, and widowhood, and changes in the living arrangement, determine patterns of family caregiving experiences over time?

The answers to the questions above allow us to gain a better understanding of current patterns of family caregiving across different socio-demographic groups, and to identify the major life events that prompted older adults into relatively intensive and longer caregiving trajectories. Hence, more targeted policies and programs can be implemented to ease the burdens among these heavily burdened family caregivers.

Research Hypotheses

As the life course perspective suggests, individuals' life pathways are embedded in relationships with other family members and shaped by macro policies. Thus, I anticipate that major life transitions may play important roles in shaping the patterns of family caregiving. I hypothesize that transitions into grandparenthood, retirement, and having adult children moving away will lead to a heavier caregiving load for grandchildren, aging parents, and spouse (H1). As discussed, family caregiving experiences in China are strongly determined by prescribed social attributes such as gender and hukou status, therefore I hypothesize women on average are more likely to engage in heavier load and longer duration of caregiving (H2), and also tend to engage in multiple care experiences to family members concurrently (e.g., sandwiched caregiver) than men (H3), and this pattern is more pronounced in rural regions (H4). Living in a multigenerational household would increase the likelihood of intensive caregiving to multiple family members simultaneously. Similarly, living in a skipped-generation household would also increase the likelihood of being an intensive grandchild caregiver. By contrast, living in a one-generation household would prompt older adults into intensive spousal caregivers (H5).

Data and Methods

Data and Sample

This study uses four waves of data from the China Health and Retirement Longitudinal Study (CHARLS, 2011, 2013, 2015, and 2018), an ongoing biennial longitudinal survey on a nationally representative sample of Chinese residents and their spouses aged over 45-years-old. CHARLS sampled 17,708 residents from 150 counties from 28 provinces in China in the baseline survey in 2011, with a response rate over 80%. The average age of the respondents in the baseline survey was 59.1; around 78% of them were rural residents and 22% were urban residents. The follow-up waves added new respondents to replenish the original sample, with a total of 25,586

respondents surveyed between 2011 to 2018. This study first restricts the sample to those who were aged 45 and 85 at the baseline (N=23,017) and then dropped 196 respondents who were missing all caregiving information in all four waves (N=22,821). Around 14,787 respondents have cared for grandchildren, spouses, or parents/parents-in-law between 2011 and 2018. Among these 14,787 caregivers, 51.0% were women and 49.0% were men. About 23.8% of them dropped out of the survey, and around 0.3% were deceased in later waves. Around 95.5% of them have more two person-wave observations, and the average person-wave observation for each caregiver was 3.3 waves.

Measurement

1. Family caregiving and its intensity

Table 1.1 displays summary statistics of caregiving measures on grandparenting, eldercare, and spousal care between 2011 and 2018.

--Table 1.1 about here --

1). Grandparenting and eldercare to parents/parent-in-laws

Both grandparenting and eldercare to parent/parents-in-law are measured based on the total weekly caregiving hours. For eldercare to parents/parents-in-law, care activities range from instrumental activities of daily living (IADL) assistance (e.g., laundry, grocery shopping, meal preparation, etc.) to activities of daily living (ADL) assistance (e.g., bathing, toileting, walking, feeding, etc.) because parents' functional limitations. I first calculated the average weekly care hours of grandparenting and parental care throughout the four waves. Based on the distribution of average care hours of grandparents and eldercare per week, the intensity of caregiving is classified into four categories: *no care hours*, *low-level care hours*, *medium-level care hours*, and

high-level care hours. The cutoff points were determined based on the distribution of care hours, and each category accounts for about 20 to 30 percent of the caregivers. For eldercare, caring for parents/parents-in-law for 1 to 5 hours per week is categorized as "1: low level (37.4%)" 6 to 20 hours per week is categorized as "2: medium level (32.0%)", and 20 hours above per week is categorized as "3: high level (30.6%)" For grandparenting, 1 to 10 hours per week is coded as "1: low level (20.4%)", 11 to 40 hours per week is coded as "2: medium level (40.3%)" and 40 hours above is coded as "3: high level (39.3%)".

2). Spousal care

Different from grandparenting and eldercare to parents/parents-in-law, the information on spousal care was not directly asked in the questionnaire. Instead, the survey asked each respondent if they have any care need (either ADL or IADL needs) and received primary caregiving from the spouse. If yes, I coded their spouse as the spousal caregiver. Providing only IADL assistance but no ADL assistance to a spouse is coded as "1: low level", providing 1 to 2 ADL assistance to a spouse is coded as "2: medium level" and providing more than two ADL assistances is coded as "3: high level" This strategy of using the number of IADL and ADL assistance to distinguish the intensity of spousal care has been adopted by several studies (Liu and Lou 2019; Freedman et al. 2014; Burton et al. 2003).

2. Measurements for family caregiving patterns

I use seven indicators to inform the complexities of family caregiving patterns. The indicators include the total number of older adults as care recipients, the total number of grandchildren as care recipients, the cumulative caregiving load of each care role for grandparenting, parental care, and spousal care, the total number of waves spent in family caregiving across four survey waves, and the number of overlapping waves caring for multiple family members during four

waves. The cumulative caregiving load for each care episode is calculated by taking the average level of care intensity throughout four survey waves × care durations (measured by waves). As mentioned earlier, the average care intensity has a scale from 0 to 3, indicating an average care burden from zero, low-level, medium-level, and high-level burden. The care duration of a particular care activity is measured by the number of waves spent caring for a particular family member (e.g., spouse, grandchildren, or grandparents). I then separately calculated the caregiving load for grandparenting, eldercare to parents/parents-in-law, and spousal care. This approach that uses the product of average stress level throughout the years and total years of stress exposure to measure the cumulative stress exposure has been adopted by multiple studies from public health studies (Lee et al. 2011; Price et al. 1999). Since the information on grandparenting and spousal care is available in all four survey waves, the range of cumulative load for grandparenting and spousal care is from 0 to 12. However, parental care information is only available in three waves (2011, 2013, and 2015), so the range of the cumulative load for parental care is from 0 to 9. The descriptive statistics of these indicators are also shown in Table 1.1.

I include a variety of socio-demographic variables at the baseline to examine their relationship with family caregiving patterns. Particularly, I am planning to investigate how gender, *hukou* status, and the living arrangement in the baseline would determine the class membership of caregiving patterns. The living arrangement includes four-generation and three-generation households, skipped-generation households, two-generation households including self with parents or self with adult children, and one-generation households. Moreover, I investigate how the onset of significant life events, such as transitions to retirement, grandparenthood, and changes in living arrangement, shape individuals' family caregiving patterns.

Method

The statistical analyses are conducted in two steps. First, the latent profile analysis (LPA) is used to identify whether heterogeneous subgroups exist among the analytical sample, based on similar response patterns on the seven family caregiving indicators mentioned above. The LPA is a person-centered and probability-based approach that focuses on identifying latent subgroups within a population based on a certain set of variables (Collins and Lanza 2009), and it takes measurement error into account and provides a test for the number of profiles (Lubke and Muthén 2005). Moreover, LPA offers a parsimonious representation of structures in forms of grouping (Macrae and Bodenhausen 2000). Compared to other traditional clustering methods (i.e. K-means clustering and hierarchical clustering), LPA is superior because individuals are classified based on the membership probabilities estimated directly from the model, and it allows the predictor to be a continuous, categorical, and count variable (Magidson and Vermunt 2002; Spurk et al. 2020).

The Akaike Information Criteria (AIC) and the Bayesian Information Criteria (BIC) are used to determine the appropriate number of latent profiles. Each profile is expected to account for at least 5% of the analytical sample. The overall goal is to achieve an adequate model fit with the lowest number of profiles, as it provides the most parsimonious solution (Lubke and Muthén 2005). I use the command "gsem" from Stata16 to conduct the latent profile analysis.

After determining the most suitable number of profiles, I further employ multinomial logistic regression models to assess how baseline socio-demographic characteristics, including gender, *hukou* status, significant life transitions, and the living arrangement would determine the membership of the profiles.

Results

1. Results of latent profile analysis

Table 1.2 presents the fit statistics of four solutions to the latent profile analysis: the two- through five-profile models. It is worth noting that the identified caregiving patterns are based on pooled samples for four survey waves altogether (a time-invariant variable) rather than the care patterns by each survey wave. As the table shows, having five classes has the smallest AIC and BIC, and each profile accounts for at least 5% of the analytical sample. A six-class model only has marginally smaller fit statistics, yet the classification does not further inform group heterogeneity in a qualitative way. Therefore, I determine that a five-class model is the most suitable solution.

-- Table 1.2 about here --

1). Characteristics of each caregiving pattern

Table 1.3 displays the characteristics of each family caregiving profile. The largest group (class 1, 53.01% of the sample) is labeled as *Temporary Caregiver*, as they have slightly over one wave of caregiving duration to mostly grandchildren with a cumulative care load (a product of caregiving waves and averaged care intensity of a particular care episode) of 1.37, and they also have very few overlapping waves for caring multiple family members concurrently. The second largest group (class 3: 25.9%) is labeled as *Intensive Grandchild Caregivers*, who primarily provide intensive grandchildren care for nearly three waves with a relatively heavier cumulative care load of 7.6. Like *Temporary Caregivers*, *Intensive Grandchild Caregivers* also have few overlapping care waves. The third-largest group (class 5: 9.9%) is labeled as *Serial Caregivers*, who have a distinctive feature of caring for both elderly parents and grandchildren, but with very few overlapping waves (0.3 waves). Among *Serial Caregivers*, the cumulative loads for parental care and grandparenting are 3.39 and 1.23, respectively. The second-smallest group is labeled as

Intensive Spousal Caregivers (class 2: 6.2%), who primarily cared for their spouse for nearly three waves with very few overlapping care waves. The cumulative spousal care load is 7.2, which is substantially higher than the rest of caregivers, and provides primarily intensive spousal care for almost three waves. The smallest group (class 4: 5.12%) is labeled as *Sandwiched Caregivers*, who distinguished themselves from other caregivers with a total caregiving wave of 3.4 waves—the longest caregiving duration among all caregivers—and more than two overlapping care waves, which are the highest among all caregivers. The cumulative care load of sandwiched caregivers for spousal care, grandparenting, and parental care are 3.4, 8.1, and 1.9, respectively.

--Table 1.3 about here—

Table 1.6 displays the demographic characteristics of each caregiving group. *Temporary Caregivers* and *Intensive Spousal Caregivers* have a higher proportion of men, whereas *Intensive Grandchild Caregivers*, *Sandwiched Caregivers*, and *Serial Caregivers* all have a higher proportion of women. Over 46% of *Intensive Grandchild Caregivers* and *Sandwiched Caregivers* live in a four-or-three-generation household, which is much higher than other caregiving patterns. By contrast, over 55% of *Intensive Spousal Caregivers* are living in a one-gen household, much higher than other caregiving patterns. Over 40% of *Intensive Grandchild Caregivers* and over 43% of *Sandwiched Caregivers* experienced transitions into grandparenthood between 2011 to 2018, which is the highest level among all caregiving patterns. Lastly, over 50% of *Sandwiched Caregivers* experienced having an adult moving outside the household.

--Table 1.6 about here –

2. Results of the multinomial logistic regression

1). Main effects

After identifying the prominent long-term caregiving patterns, multinomial logistic regressions are employed to investigate how gender, *hukou*, the living arrangement, and other significant life events are associated with each caregiving pattern. The results are shown in Table 1.4

--Table 1.4 about here--

Gender variations: As Table 1.4 suggests, compared to male caregivers, female caregivers have a significantly higher relative risk ratio in becoming an *Intensive Grandchild Caregiver* ($RRR_{intensive\ grandchild\ caregiver} = 1.51, p < 0.001$) and a *Sandwiched Caregiver* ($RRR_{sandwiched\ caregiver} = 1.28, p < 0.01$) than being a *Temporary Caregiver*. There are no significant gender differences in being a *Serial Caregiver* or *an Intensive Spousal Caregiver* relative to being a *Temporary Caregiver*.

Rural vs. Urban variations: Compared to urban residents, rural residents have a significantly lower relative risk ratio of being a *Serial Caregiver* compared to being a *Temporary Caregiver* ($RRR_{serial\ caregiver} = 0.46, p < 0.01$). However, rural residents have a significantly higher relative risk ratio of being an *Intensive Spousal Caregiver* relative to a *Temporary Caregiver* than urban residents ($RRR_{intensive\ spousal\ caregiver} = 1.51, p < 0.01$). There is no significant rural-urban difference of being an *Intensive Grandchild Caregiver* or a *Sandwiched Caregiver*, relative to being a *Temporary Caregiver*.

Living arrangement variations: Living in a 4-or-3-gen household is associated with a significantly lower relative risk ratio of being a *Serial Caregiver* ($RRR_{serial\ caregiver} = 0.6, p < 0.01$), but a significantly higher relative risk ratio of being an *Intensive Grandchild Caregiver*

$\left(RRR_{intensive\ grandchild\ caregiver} = 5.12, p < 0.001\right)$ and a *Sandwiched Caregiver* $\left(RRR_{sandwiched\ caregiver} = 4.68, p < 0.001\right)$ than living in a one-gen household. Similarly, living a skipped-generational household is also associated with a significantly higher relative risk ratio being an *Intensive Grandchild Caregiver* ($RRR_{intensive\ grandchild\ caregiver} = 7.99, p < 0.001$) and being a *Sandwiched Caregiver* ($RRR_{sandwiched\ caregiver} = 6.97, p < 0.001$) than living in a one-gen household. Living in a household with only older parents is associated with a significantly higher relative risk ratio of being a *Serial Caregiver* ($RRR_{serial\ caregiver} = 1.93, p < 0.001$) compared to being a *Temporary Caregiver*. By contrast, compared to living in a one-gen household, living in a household with only adult children is associated with a significantly lower relative risk ratio of being a *Serial Caregiver* ($RRR_{serial\ caregiver} = 0.76, p < 0.001$), an *Intensive Spousal Caregiver* ($RRR_{intensive\ spousal\ caregiver} = 0.72, p < 0.001$), an *Intensive Grandchild Caregiver* ($RRR_{intensive\ grandchild\ caregiver} = 0.81, p < 0.01$), and a *Sandwiched Caregiver* ($RRR_{sandwiched\ caregiver} = 0.63, p < 0.01$) relative to being a *Temporary Caregiver*.

Significant life events: To investigate how significant life transitions are associated with older adults' caregiving patterns, I created binary variables to indicate whether older adults ever transitioned into grandparenthood, retirement, widowhood, and having adult children move out of the household during the four-wave survey window. These binary indicators are all time-invariant variables.

Transition into grandparenthood during the four waves is associated with a significantly higher relative risk ratio of being an *Intensive Grandchild Caregiver* ($RRR_{intensive\ grandchild\ caregiver} = 2.16, p < 0.001$) and a *Sandwiched Caregiver*

($RRR_{sandwiched\ caregiver} = 2.42, p < 0.001$) as opposed to being a *Temporary Caregiver*. Meanwhile, transition into retirement is also associated with a significantly higher relative risk ratio of being an *Intensive Spousal Caregiver*, an *Intensive Grandchild Caregiver*, and a *Sandwiched Caregiver* than being *a Temporary Caregiver*. However, it is hard to eliminate the reverse causality here, as it is entirely possible that being in such intensive caregiving patterns pushes older caregivers into retirement. Having an adult child move out of the household is associated with a significantly higher relative risk ratio of being a *Serial Caregiver*, an *Intensive Grandchild Caregiver*, and a *Sandwiched Caregiver* as opposed to being a *Temporary Caregiver*. Lastly, transition into widowhood is associated with a significantly lower relative risk ratio of being a *Serial Caregiver* ($RRR_{serial\ caregiver} = 0.70, p < 0.05$) and an *Intensive Grandchild Caregiver* ($OR_{intensive\ grandchild\ caregiver} = 0.70, p < 0.05$) relative to being a *Temporary Caregiver*.

2). Interaction effects between gender and *hukou* status

To examine whether rural women face much heavier long-term caregiving patterns and how much they are differing from urban women and rural men, I added the interaction between gender and hukou (Gender × *hukou*) to test the differential effects. The results of the multinomial logistic regression with interactions are shown in Table 1.5.

--Table 1.5 about here—

As Table 1.5 suggests, the interaction of Gender × *hukou* is for *Intensive Spousal Caregivers* and *Intensive Grandchild Caregivers*. I plotted the predicted probability of each caregiving pattern in Figure 1.1. Since the interactions are only significant *for Intensive Spousal Caregivers* and *Intensive Grandchild Caregivers*, whereas *Temporary Caregivers* are treated as a

reference group in the multinomial logistic regression, therefore, I discuss the predicted probability for these three care patterns by gender and *hukou* status next.

--Figure 1.1 about here--

A. Temporary caregiver: Rural men have the highest probability of being a *Temporary Caregiver* (55.8%), followed by urban men (51.8%), rural women (50.2%), and urban women (47.8%). For both rural and urban caregivers, female caregivers have significantly lower probability of being a *Temporary Caregiver* than their male counterparts. While the probability of being a *Temporary Caregiver* is significantly higher for rural men than urban men, there is no significant difference in the probability of being a *Temporary Caregiver* between rural women and urban women.

B. Intensive spousal caregiver: Rural men have the highest probability of being an *Intensive Spousal Caregiver* (7.5%) across all subgroups, followed by rural women (6.1%), urban women (5.4%), and urban men (4.3%). Rural men have a significantly higher probability of being an *Intensive Spousal Caregiver* than rural women by (7.5% -6.1%)/6.1%=22.9%, however, there is no significant difference between urban men and urban women.

C. Intensive grandchild caregiver: Rural women have the highest predicted probability of being an *Intensive Grandchild Caregiver* across all subgroups (30.4%), followed by urban women (27.8%), urban men (24.9%), and rural men (23.5%). Meanwhile, while rural women a have significantly higher probability of being an *Intensive Grandchild Caregiver* than rural men by (30.4%-23.5%)/23.5%=29.4%, there is no significant difference in being an *Intensive Grandchild Caregiver* between urban men and urban women. Further, rural women also have a significantly higher probability than urban women by (30.4%-27.8%)/27.8%=9.4%, yet there is

no significant difference between rural men and urban men in being an *Intensive Grandchild Caregiver*. This further suggests that rural women face a significantly higher risk of providing intensive grandparenting than rural men and urban women.

Sensitivity Analysis

Temporary Caregivers are treated as the reference group in the multinomial logistic regression. To address the selection issues of caregivers, I compared the demographic characteristics between non-caregivers and the other five types of caregivers, as shown in Table 1.7. Compared to caregivers in the analytical sample, non-caregivers have a higher proportion of women (53.4% v.s. 51.6%) and widowers (11.4% v.s. 16.5%), and they also have a much higher attrition rate (28.9% vs. 24.2%). As a part of the sensitivity check, I included non-caregivers in the multinomial logistic regression and treated them as the reference group. The coefficients did not shift much except for the *Intensive Spousal Caregivers*: older men have a significantly higher relative risk ratio of being an *Intensive Spousal Caregiver* as opposed to being a *non-caregiver* than older women. This is due to the gender differences in being married in later lives –older women are much more likely to be widowed and thus less likely to provide care to their spouses. Lastly, to address attrition issues, I added a binary variable indicating the attrition status among caregivers but did not drastically shift the results.

--Table 1.6 about here--

Discussion and Conclusion

Family caregiving is one of the most important roles for older adults in China. The patterns of each specific caregiving role, such as grandparenting, eldercare to parents, and spousal care are well documented (Liu and Chen 2021; Liu and Dupre 2016; Liu and Lou 2017; Duan and Chen

2022). In addition, due to the increased longevity, some caregivers are likely to take care of multiple family members simultaneously or at different time. Nonetheless, very few studies provide a thorough investigation of overall caregiving experiences, especially for older adults involved with multiple care roles over a longer period of time. Using four waves of longitudinal data from CHARLS (2011-2018) and guided by the life course perspective, this study is among the first that investigates and identifies the most prominent long-term patterns among Chinese adults as they transition from midlife to later ages.

Based on the number of family members one ever cared for, cumulative care loads for grandparenting, spousal care, and eldercare to parents, overlapping waves, and total care waves (excluding overlapping waves), this study identified five main long-term caregiving patterns, which are, *Temporary Caregivers* (53.01%), *Intensive Spousal Caregivers* (6.1%), *Intensive Grandchild Caregivers* (26.4%), *Sandwiched Caregivers* (5.2%), and *Serial Caregivers* (9.3%). Among these five patterns, *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers* are more intensive long-term caregiving patterns. Because their cumulative care loads are much heavier, their total care waves are much longer than other patterns. It is also worth noting that *Sandwiched Caregivers*, who account for 5.2% of all caregivers and are engaged in all three types of care roles for over three waves, are the most overloaded caregivers among these five patterns.

The age differences across five caregiving patterns deserve noting. The *Serial Caregivers* have the youngest baseline age (49.9), followed by *Sandwiched Caregivers* (55.7*)*, *Intensive Grandchild Caregivers (*55.2), then *Temporary Caregivers* (57.0), and finally *Intensive Spousal Caregivers* (62.3). Although the latent profile analysis cannot capture sequences of care role transitions, the age differences across five categories indicate a care role sequence among

Chinese older adults— first caring for elderly parents, then grandchildren, and finally for their spouse—despite that some older adults might experience multiple care roles concurrently in their 50s.

The results of multinomial logistic regressions suggest that some life transitions during four waves are significantly associated with older adults' caregiving patterns. Specifically, transition into grandparenthood is associated with a significantly higher relative risk ratio of being an *Intensive Grandchild Caregiver* and a *Sandwiched Caregiver* than being a *Temporary Caregiver*. Having an adult child move away during the four waves' observation window was also associated with significantly higher odds of being a *Serial Caregiver*, an *Intensive Grandchild Caregiver*, or a *Sandwiched Caregiver* relative to being a *Temporary* Caregiver. This echoes previous studies' findings on the benefits of living with adult children and provides evidence to *H1*. Adult children at home might help share the caregiving burden (Mao and Chi 2011; Zimmer 2005; Zhang, Gu, and Luo 2014), and when they move away, it is associated with an elevated caregiving load. I find that the transition into retirement is linked with a higher relative risk ratio of being an *Intensive Spousal Caregiver*, an *Intensive Grandchild Caregiver*, and a *Sandwiched Caregiver*, compared to being a *Temporary Caregiver*. However, it is unknown whether the heavier burden prompts older adults into retirement or *vice versa*. Reverse causality is hard to eliminate in this cross-sectional multinomial logistic regression. The transition into widowhood is associated with a lower relative risk ratio of being a *Serial Caregiver* or an *Intensive Grandchild Caregiver*. Previous studies suggest that widowhood is linked with worsened physical and psychological well-being (Li and Lin 2020; Perkins et al. 2016), which prevents older adults from caring for other family members.

Results also demonstrate that long-term caregiving patterns are shaped by gender and *hukou* status. Female caregivers have a higher relative risk ratio of being an *Intensive Grandchild Caregiver* and a *Sandwiched Caregiver* than being a *Temporary Caregiver* than male caregivers. However, this is no significant gender difference in the relative risk ratio of being either a *Serial Caregiver* or an *Intensive Spousal Caregiver* as opposed to being a *Temporary Caregiver*. This supports *H2* and *H3*, that women are more likely to engage in heavier caregiving pattern and more likely to provide care for multiple family members than men. Interestingly, female caregivers did not show higher risk ratio of being a *Serial Caregiver* relative to a *Temporary Caregiver* than male caregivers. I further conducted a sensitivity test by including non-caregivers as the reference group, but it did not shift the coefficient of gender either. Among *Serial Caregivers*, they involve in a grandparenting load of 1.2 and a parental care load of 3.4. It is consistent with previous literature that suggests that both older men and women care for their parents or their parents-in-law because of the strong social norm of filial piety (Hwang 1999), and that there are no significant gender differences in the level of parental care in rural China (Giles et al. 2018). As for grandparenting, previous studies that used the same data found that grandfathers also engage in certain levels of grandparenting as grandmothers (Xu 2019). In this sense, no significant gender difference in *Serial Caregiving* would be plausible.

As for the association between *hukou* status and caregiving patterns, compared to urban caregivers, rural caregivers have a significantly lower relative risk ratio of being a *Serial Caregiver* but a higher relative risk ratio of being an *Intensive Spousal Caregiver* as opposed to being a *Temporary Caregiver*. The following tests for interactions between *hukou* and gender suggest that rural male caregivers have a higher probability of being an *Intensive Spousal Caregiver* than rural female caregivers. Yet there is no significant difference in being an

Intensive Spousal Caregiver between urban women and urban men. On the one hand, this finding provides evidence that rural caregivers are more likely to shoulder a heavier burden than urban caregivers. However, on the other hand, it is the opposite of what I hypothesized for gender. There are three plausible explanations for this finding. First, rural women are more likely to be widowed than rural men at baseline (13.6% vs. 9.2%), however, all *Intensive Spousal Caregivers* were married at baseline. Since rural female caregivers are less likely to have a spouse than rural male caregivers, the likelihood of being an *Intensive Spousal Caregiver* would be much lower than rural males. Based on data from U.S. and European contexts, previous studies also found that the gender gap in spousal caregiving narrows or even vanishes in later life, as older women are less likely to be married than older men (Glauber 2017; Vlachantoni and Palmer 2019). Second, in addition to caring for a spouse, female caregivers are more likely to provide care for multiple family members, and thus are more likely to be classified as a *Sandwiched Caregiver* instead of *an Intensive Spousal Caregiver* than rural men. Third, the spousal care information was reported by care recipients, and men tend to underreport their wives' care behavior and intensity for themselves (Sharma, Chakrabarti, and Grover 2016). Therefore, it is possible that women's spousal caregiving status is underestimated.

Lastly, the predicted probability for *Intensive Grandchild Caregivers* indicates that rural female caregivers have the highest likelihood of being an *Intensive Grandchild Caregivers* among all groups. This further supports *H4* that rural women are more likely to engage in intensive caregiving patterns than other groups.

In addition to gender and *hukou* differential patterns, this study also found that living arrangements at baseline helped shape the long-term caregiving pattern. Results from multinomial logistic regressions indicate that caregivers living in a 4-or-3 generation, or a

skipped-generation household, have a significantly higher relative risk ratio of being a *Sandwiched Caregiver* or an *Intensive Grandchild Caregiver*. Meanwhile, living with only older parents is also associated with a significantly higher likelihood of being a *Serial Caregiver*. These findings are consistent with previous studies finding that co-residence with grandchildren or older parents is linked with more intensive family caregiving (Chen, Liu, and Mair 2011; Zhang et al. 2014). By contrast, living only with adult children is linked with a lower likelihood of heavier caregiving patterns. This also suggests that adult children can be important helpers at home to ease the caregiving burdens among older adults. However, it is also likely that older adults *chose* to live with their adult children due to their health declines and be care recipients instead of caregivers. While I controlled for health conditions (e.g., the number of ADL needs and multimorbidity) at baseline, the reverse causality cannot be easily addressed in the cross-sectional setting.

This study is limited in several aspects. First, this study only includes caregivers in the analytical sample for the multinomial logistic regressions. Compared to caregivers, non-caregivers have a higher proportion of attrition, widowers, women, and of older adults living in one-gen household (Table 1.7). This suggests that non-caregivers are more likely to be socially isolated that caregivers. To address this selection issue among family caregivers, I conducted a sensitivity test by adding non-caregivers in multinomial logistic regression and set them as the reference group, but the results did not shift drastically except for *Intensive Spousal Caregivers*, which I discussed briefly in the sensitivity test section. Second, parental care information was not available in 2015, which could lead to underestimation of the cumulative eldercare load in the latent profiles. Future research could consider imputing eldercare information for the wave of 2015. Moreover, respondents' spousal caregiving and its intensity was reported by their spouses

instead of respondents themselves. As mentioned earlier, research suggested men have the tendency to underreport their wives' spousal care activity and intensity. As a result, the proportion of intensive spousal caregivers among older women could be undercounted. Third, this study only uses cumulative caregiving measures to identify the latent caregiving profiles. Therefore, the care roles transitions and the sequence of the care roles are overlooked. Future research should consider using time-varying care measures to inform more nuanced care patterns regarding care role transitions and sequences (Sharma et al. 2016).

Despite these limitations, this study is among the first that moves beyond studying each static care experience and pays close attention to the overall care pattern among older adults in China. It provides an advanced understanding of the multiple care role experience as family members have longer years of shared lives than before (Xu 2019; Xu et al. 2022). Despite China's dramatic societal and demographic transitions over the past few decades, intergenerational bonds are still highly valued, family caregiving, especially eldercare to parents and grandparenting, is still a strong social norm regardless of the *hukou* status (Raymo et al. 2015). Meanwhile, older adults' caregiving experiences are also strongly shaped by the life transitions of other family members. For example, transition into grandparenthood is strongly linked with heavier grandparenting, and having adult children moving away is also linked with heavier care patterns. This again provides evidence for the life course perspective, and that individuals' life experiences are interdependent with others. Most importantly, this study found that a large proportion of caregivers are needed across generations and facing severely heavy caregiving burdens. These caregivers more likely to be women and living in a multi-generational or skipped-generational household. Therefore, policymakers need to pay closer attention to these

heavily burdened caregivers and invest more in community-based or home-based care resources, such as day care centers, to alleviate their heavy care burdens.

Appendix

Table 1.1: Characteristics of Caregiving Measurements from 2011 to 2018

	Total N=14,787		Male N=7,250		Female N=7,537	
	Mean/%(SD)	Range	Mean/%(SD)	Range	Mean/%(SD)	Ra
Number of care recipients						
Total number of grandchildren	0.92 (0.78)	0-9	0.91 (0.8)	0-7	0.93 (0.77)	0
Total number of adults	0.86 (0.86)	0-5	0.86 (0.84)	0-5	0.84 (0.89)	0
Averaged spousal care variables from 2011-2018						
Total spousal care waves	0.60 (0.91)	0-4	0.69 (0.94)	0-4	0.52 (0.86)	0
Averaged intensity of spousal care	0.65 (1.01)	0-3	0.99 (0.97)	0-3	0.76 (0.98)	0
0: no care	60.44%		56.16%		64.83%	
1: low intensity (only IADL assistance)	22.22%		25.98%		18.35%	
2: medium intensity (1 ADL assistance)	11.16%		12.29%		10.01%	
3: high intensity (2+ ADL assistance)	6.18%		5.57%		6.82%	
Averaged grandchildren care from 2011-2018						
Total grandparenting waves	1.37 (1.22)	0-4	1.22 (1.17)	0-4	1.50 (1.26)	0
Averaged intensity for grandparenting	1.54 (1.19)	0-3	1.40 (1.18)	0-3	1.67 (1.19)	0
0: no care	31.0%		34.9%		27.2%	
1: low intensity (1-10 hr per week)	13.3%		14.8%		11.9%	
2: medium intensity (11-40hr per week)	27.7%		27.0%		28.3%	
3: high intensity (40hr+ per week)	28.0%		23.2%		32.6%	
Averaged parental care variables from 2011-2018						
Total parental care waves	0.37 (0.61)	0-3	0.34 (0.59)	0-3	0.39 (0.63)	0
Averaged intensity for parental care	0.58 (0.99)	0-3	0.54 (0.97)	0-3	0.62 (1.01)	0
0: no care	69.93%		71.84%		68.10%	
1: low intensity (1-5hr per week)	11.28%		10.62%		11.91%	
2: medium intensity (6-20 hr per week)	9.54%		8.85%		10.21%	
3: high intensity (20hr + per week)	9.25%		8.69%		9.78%	
Cumulative care load = Averaged care intensity ×care waves						
Cumulative parental care load	0.73 (1.44)	0-9	0.68 (1.39)	0-9	0.78 (1.48)	0
Cumulative spousal care load	1.11 (2.04)	0-12	1.23 (2.04)	0-12	0.99 (2.01)	0
Cumulative grandparenting load	3.30 (3.49)	0-12	2.85 (3.23)	0-12	3.73 (3.67)	0
Total caregiving waves	2.01 (1.03)	0-4	1.93 (1.02)	0-4	2.08 (1.04)	0
Total overlapping waves	0.32 (0.60)	0-4	0.32 (0.60)	0-4	0.31 (0.61)	0

Table 1.2: Fit Statistics of the Latent Profile Analysis

	Log-likelihood	DF	AIC	BIC	N	Entropy
Class 2	-157644.9	22	315333.8	315501.3	14,894	0.866
Class 3	-153172.9	30	306405.9	306634.2	14,894	0.887
Class 4	-150527.9	38	301131.8	301421	14,894	0.878
Class 5	-144008.1	46	288108.3	288458.3	14,894	0.915
Class 6	-143310.9	54	286729.8	287140.7	14,894	0.930

Table 1.3: The Characteristics of Five Family Caregiving Patterns (N=14,787)

	Class 1	Class 2	Class 3	Class 4	Class 5
Label	Temporary caregivers	Intensive spousal caregivers	Intensive grandchild caregivers	Sandwiched caregivers	Serial caregivers
# grandchildren ever cared for	0.79	0.56	1.55	1.52	0.57
# adults ever cared for	0.65	1.08	0.47	1.71	2.43
Spousal care load	0.67	7.25	0.37	3.44	0.36
Grandparenting load	1.33	1.02	7.50	8.07	1.21
Parental care load	0.39	0.14	0.31	1.93	3.43
Total waves of caregiving	1.30	2.95	2.93	3.36	1.95
Overlapping waves	0.12	0.42	0.31	2.06	0.37
%	53.01%	6.12%	26.38%	5.20%	9.30%

Table 1.4: Multinomial Logistic Regression on Older Adults' Family Caregiving Patterns (reference = temporary caregivers), N=14,519.

VARIABLES	Serial caregivers M1	Intensive spousal caregivers M2	Intensive grandchild caregivers M3	Sandwiched caregivers M4
Women	1.09	0.96	1.48***	1.26**
	(0.07)	(0.07)	(0.07)	(0.10)
Rural	0.48***	1.49***	0.97	1.17
	(0.03)	(0.15)	(0.06)	(0.13)
Living arrangement (ref= 1-gen HH)				
4-or-3 gen HH	0.61***	0.96	5.32***	4.99***
	(0.07)	(0.10)	(0.32)	(0.54)
Skipped-gen HH	0.74	0.86	8.06***	7.17***
	(0.17)	(0.15)	(0.69)	(1.01)
Self & Parent HH	1.88***	0.69	0.87	1.53
	(0.35)	(0.23)	(0.18)	(0.48)
Self & Adult child HH	0.77***	0.76**	0.82**	0.65***
	(0.06)	(0.08)	(0.05)	(0.08)
Transition into grandparenthood	1.06	0.77***	1.96***	2.07***
	(0.08)	(0.07)	(0.10)	(0.17)
Transition into retirement	1.08	1.28***	1.33***	1.18*
	(0.08)	(0.10)	(0.07)	(0.11)
Adult children out	1.42***	0.99	1.11*	1.23**
	(0.10)	(0.10)	(0.05)	(0.11)
Transition into widowhood	0.68*	1.01	0.69***	0.73
	(0.12)	(0.12)	(0.06)	(0.12)
Age (baseline)	0.90***	1.06***	0.97***	0.97***
	(0.00)	(0.00)	(0.00)	(0.01)
Working (baseline)	1.29**	0.92	0.82***	1.05
	(0.12)	(0.09)	(0.05)	(0.11)
# ADL conditions (baseline)	0.96	1.05	0.77**	1.04
	(0.06)	(0.04)	(0.04)	(0.06)
Multi-morbidity (baseline)	0.87	1.20*	0.97	1.23*
	(0.08)	(0.10)	(0.05)	(0.12)
Not married (baseline)	0.91***	0.02***	0.71***	0.12***
	(0.02)	(0.01)	(0.06)	(0.04)
Net transfer >3,000 yuan	0.86	0.95	1.12	1.14
	(0.09)	(0.09)	(0.07)	(0.13)
Attrition in later wave	1.15	0.45***	0.49***	0.27***
	(0.09)	(0.05)	(0.03)	(0.04)
Constant	87.87***	0.00***	1.29	0.36***
	(27.70)	(0.00)	(0.25)	(0.14)
Observations	14,519	14,519	14,519	14,519

Note: Coefficients are in relative risk ratio

*** p<0.001, ** p<0.01, * p<0.05

Table 1.5: Multinomial Logistic Regression on Older Adults' Family Caregiving Patterns with Interactions (reference = Temporary Caregivers)

VARIABLES	Serial caregiver M1	Intensive spousal caregiver M2	Intensive grandchild caregiver M3	Sandwiched caregiver M4
Women	1.13	1.38	1.23*	0.96
	(0.13)	(0.23)	(0.12)	(0.20)
Rural	0.49***	1.78***	0.87	1.03
	(0.05)	(0.23)	(0.07)	(0.15)
Women # rural	0.94	0.65*	1.26*	1.39
	(0.13)	(0.12)	(0.14)	(0.30)
Living arrangement (ref =one-gen HH)				
3-or-4-gen HH	0.60***	0.96	5.32***	4.99***
	(0.07)	(0.10)	(0.31)	(0.54)
Skipped-gen HH	0.74	0.86	8.08***	7.19***
	(0.17)	(0.15)	(0.69)	(1.05)
Self & Parent HH	1.89***	0.69	0.87	1.54
	(0.34)	(0.23)	(0.18)	(0.49)
Self & Adult child HH	0.76***	0.76**	0.83**	0.65***
	(0.06)	(0.08)	(0.05)	(0.09)
Transition into grandparenthood	1.06	0.78***	1.96***	2.07***
	(0.07)	(0.07)	(0.09)	(0.17)
Transition into retirement	1.09	1.28***	1.33***	1.17*
	(0.08)	(0.11)	(0.07)	(0.11)
Adult child moving out	1.42***	0.99	1.09*	1.23**
	(0.10)	(0.10)	(0.05)	(0.11)
Transition into widowhood	0.68*	1.01	0.69***	0.73
	(0.12)	(0.13)	(0.06)	(0.12)
Age (baseline)	0.90***	1.06***	0.97***	0.97***
	(0.00)	(0.00)	(0.00)	(0.01)
Working (baseline)	1.31**	0.93	0.77***	0.95
	(0.12)	(0.10)	(0.04)	(0.11)
# ADL conditions (baseline)	0.97	1.05	0.90***	1.04
	(0.06)	(0.04)	(0.03)	(0.06)
Multi-morbidity (baseline)	0.87	1.20*	0.97	1.23*
	(0.08)	(0.10)	(0.05)	(0.12)
Unmarried (baseline)	0.57***	0.02***	0.71***	0.12***
	(0.09)	(0.01)	(0.06)	(0.04)
Net transfer >3,000 (baseline)	0.87	0.92	1.10	1.16
	(0.09)	(0.09)	(0.07)	(0.13)
Attrition	1.15	0.44***	0.49***	0.27***
	(0.09)	(0.05)	(0.03)	(0.04)

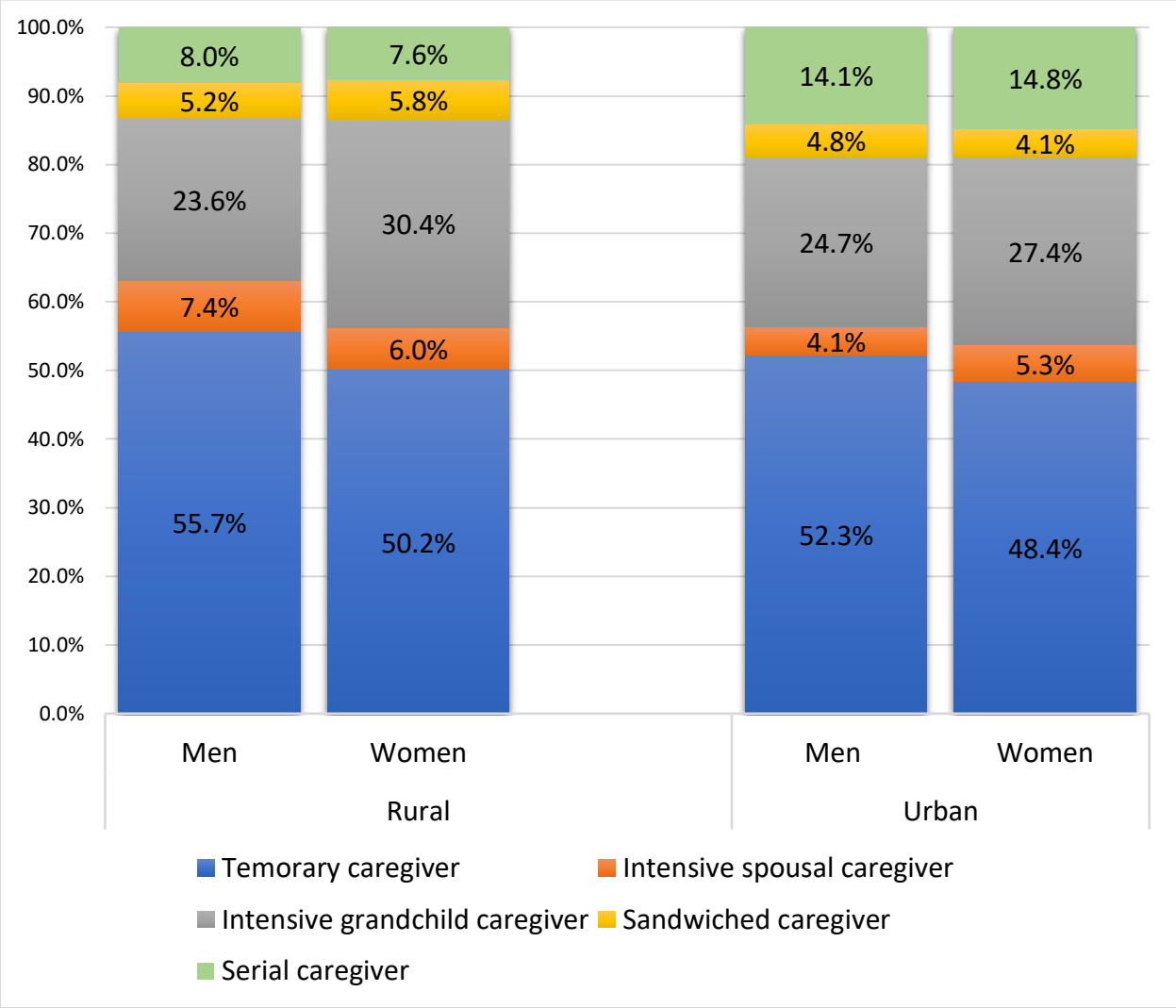
Constant	85.16*** (27.41)	0.00*** (0.00)	1.44 (0.29)	0.20*** (0.08)
Observations	14,519	14,519	14,519	14,519

Note: Coefficients are in relative risk ratio
*** p<0.001, ** p<0.01, * p<0.05

Table 1.6: Demographic Characteristics of Each Caregiving Pattern and Non-caregivers at the Baseline (N=22,821)

	Non-caregivers	Temporary caregivers	Intensive spousal caregivers	Intensive grandchildren caregivers	Sandwiched caregivers	Serial caregiver
Women	53.3%	47.7%	43.5%	58.4%	52.7%	52.5%
Men	46.6%	52.3%	56.5%	41.6%	47.3%	47.5%
Rural	74.3%	76.5%	81.6%	81.5%	85.4%	65.7%
Urban	25.7%	23.5%	18.4%	18.5%	14.6%	33.3%
Living arrangement						
4/3—gen HH	12.5%	19.3%	19.9%	46.7%	46.4%	9.7%
Skipped-gen HH	2.5%	4.1%	4.3%	13.1%	12.3%	1.7%
Self & Parent HH	1.2%	1.8%	1.1%	0.8 %	1.6%	3.9%
Self & Child HH	34.8%	30.7%	19.7%	17.0%	15.9%	41.8%
1-gen HH	48.9%	44.2%	55.0%	22.3%	23.9%	43.0%
Age	56.9	56.9	62.2	55.7	58.3	49.9
Financial Status						
<3,000 yuan	86.8%	85.7%	84.0%	85.6%	71.7%	90.0%
>3,000 yuan	13.2%	14.3%	16.0%	14.4%	28.3%	10.0%
Unmarried	15.7%	9.3%	0.3%	8.6%	1.4%	3.5%
Working	67.8%	72.3%	67.3%	73.4%	76.0%	84.2%
Educational Attainment						
Elementary school	72.8%	68.4%	77.9%	68.7%	64.5%	44.0%
Middle school	16.6%	19.5%	15.5%	20.8%	24.0%	27.2%
HS +	10.6%	12.1%	6.7%	10.5%	11.5%	28.8%
Became widowed	4.6%	7.2%	12.2%	5.8%	6.1%	2.8%
Transition into retirement	21.0%	24.3%	32.9%	32.9%	29.2%	22.5%
Adult children moved out	32.2%	38.5%	34.1%	49.0%	51.6%	46.1%
Attrition	28.6%	26.1%	15.2%	13.7%	7.2%	26.2%
N (respondents)	8,034	7,814	908	3,917	771	1,383
(%)	35.2%	34.2%	4.0%	17.2%	3.4%	6.0%

Figure 1.1: Predicted Probability of Each Long-Term Caregiving Pattern by *Hukou* and Gender



Chapter Two

Long-Term Family Caregiving Patterns, Emotional and Physical Health Consequences among Older Adults in China

Abstract

Although the health implications of family caregiving are well-documented, empirical studies have fewer investigations on how transitions into and out of multiple care roles would affect caregivers' mental and physical well-being. Using four waves' data from the China Health and Retirement Study (CHARLS 2011, 2013, 2015, and 2018), I identified five heterogenous long-term family caregiving patterns in Chapter One. In this chapter, I take a step further by examining the longitudinal association between care patterns and older adults' mental and physical well-being. Moreover, I investigate how these associations depend on caregivers' gender, *hukou* status, and the living arrangement. Analyses from the linear mixed-effects model indicate that, compared to non-caregivers, all five caregiving patterns are associated with higher depressive symptoms, and *Intensive Spousal Caregiver*s and *Sandwiched Caregivers* have the highest level among the five patterns. Only *Intensive Grandchild Caregivers*, *Intensive Spousal Caregivers*, and *Sandwiched Caregivers* are associated with worse physical well-being than non-caregivers. Interestingly, female *Intensive Grandchild Caregivers* are associated with higher life satisfaction than female non-caregivers. Urban *Serial Caregivers* are associated with better self-rated health than urban non-caregivers. Female and rural caregivers consistently have worse mental and physical well-being than their male and urban counterparts. These findings highlight the heterogenous health implications of different long-term caregiving patterns, and more formal care facilities should be invested to alleviate the care burdens among older adults.

Introduction

Family caregiving is one of the most important social roles among older adults in China today. Caring for grandchildren, elderly parents/parents-in-law, and a spouse are three major caregiving activities among older Chinese adults. The practice of grandparenting has long been very common for many families, reflecting the strong intergenerational ties in urban and rural areas in China (Chen and Liu 2011). Studies suggest the health implications of grandparenting are highly contingent upon the intensity level and context of care being delivered (Chen and Liu 2011; Song and Chen 2020). Meanwhile, with the drastic increase in the aging population and a corresponding increase in age-related health issues, adults today in China face soaring elderly caregiving responsibilities as well. The emotional and physical burdens associated with elderly caregiving have been well documented (Hunt 2003; Liu and Dupre 2015; Liu and Lou 2019; Marks et al. 2008). Despite efforts to increase the supply of institutional care facilities, family members remain the caregiving network's backbone. Studies show that family caregivers in later life are more likely to reduce work hours or retire early, creating substantially higher financial loss (Pinquart and Sörensen 2003; Wang et al. 2019; Maurer-fazio and Connelly 2000).

A substantial number of studies have documented both positive and negative health consequences of family caregiving. On the one hand, caring for family members can provide a sense of purpose and reward, leading to enhanced well-being (Chen and Silverstein 2000; Marks, Lambert, and Choi 2002). On the other hand, studies also found family caregiving can become life stressors and can take a toll on caregivers' mental and physical well-being, especially when caring for the frail elderly spouse and parents (Schulz et al. 2020; Liu and Lou 2019; Liu and Dupre 2015). Nonetheless, most studies focus on the health consequences of a singular care role for a relatively short period of time, which neglects the diversity and complexity of caregiving experiences. Many caregivers in China have cared for multiple family members concurrently

(Xu 2019; Falkingham et al. 2020). Hence, despite the efforts of scholars, we still know very little about the "ebbs and flows" of family caregiving experiences over time among Chinese older adults, and how divergent family caregiving patterns translate into cumulative health advantages or disadvantages.

In the first chapter, using four waves of longitudinal data from the China Health and Retirement Study (CHARLS 2011, 2013, 2015, and 2018), I developed a family care typology that captures five long-term family caregiving patterns of Chinese older adults as they transit from midlife to older age. In this study, I continue investigating the psychological and physical health burdens of each caregiving pattern. I expect that caregivers with a heavier cumulative caregiving load, meaning longer duration and heavier intensity of care, are prone to have worse physical and psychological well-being than caregivers with a lighter cumulative care load. In addition, family caregivers who provide intensive care to elderly parents and spouses are more likely to have deteriorated mental and physical health outcomes than those who primarily care for their grandchildren. Finally, family caregivers with longer overlapping years of caring for multiple family members are also likely to have deleterious emotional and physical well-being.

Additionally, I anticipate that the consequences of family caregiving vary drastically by gender, *hukou* status, and the living arrangement. Women are more likely to perform hands-on and intensive assistance, more likely to accept caregiving as their responsibility, and less likely to receive support. In contrast, men are more likely to use problem-focused coping behaviors and instrumental assistances (Pinquart and Sörensen 2006). Therefore, I expect that female caregivers are more likely to experience negative health consequences than male caregivers. Rural residents have less access to community-based care facilities and less likely to outsource their care responsibilities. Hence, I anticipate that rural caregivers would have worse physical

and mental health outcomes than urban caregivers. Further, living in a multigenerational household would enhance caregivers' support network and alleviate caregivers' psychological distress and physical burdens, compared to living in a one-generation or skipped-generation household (Ku et al. 2013; Kitayama 2002).

Theoretical Framework

Role theories on family caregiving

Most studies on caregiving and its health consequences built their frameworks upon role theories. On the one hand, the role conflict perspective indicates that taking on multiple social roles leads to role tensions, as individuals' time and energies are constrained (Marks 1977). Family caregiving usually onsets in the midlife, when caregivers are also likely to encounter multiple family caregiving roles, including grandparenting, eldercare to aging parents, and spousal care. Thus, engaging in multiple social roles simultaneously would induce emotional strains and thus ultimately lead to deteriorated health outcomes (Schulz et al. 2020; Liu et al. 2019). On the other hand, the role enhancement perspective argues that taking multiple roles may facilitate experiences for engaging with others through the exchange of social resources and networks (Goode 1960). One recent study found that caring for grandchildren and elderly parents simultaneously is no longer rare among Chinese older adults. These caregivers, especially urban grandfathers, are also likely to reap enhanced mental and physical well-being (Xu 2019). These two contrasting perspectives provide scholars guidance in understanding the potentially heterogeneous health consequences of family caregiving, especially when caregivers are engaged in multiple caregiving roles. Despite these current efforts, the consequences of other combinations of multiple care roles, such as spousal care and parental care, or grandparenting and spousal care, remain underexplored. Further, current studies are ambiguous about what

circumstances caregiving induces positive experiences versus negative experiences and how the duration, intensity of care, relationship to care recipients, and overlapping caregiving waves inform us about heterogeneous health outcomes over time.

The life course perspective on the health consequences of long-term family caregiving

Many studies on caregiving and caregivers' well-being rely on cross-sectional or longitudinal data over a short period of time. However, the life course perspective suggests that scholars should move beyond studying the "snapshots" of caregiving and instead investigate the dynamics of engaging in one or more care roles over a long period of time (Fast et al. 2021; Marks et al. 2008).

One key element of the life course perspective suggests that earlier life stressors play a significant role in shaping later-life outcomes (Elder 1998); and sometimes even widened health disparities (Dannefer 2003). Hence, caregivers who take on long and intensive caregiving roles in midlife are more likely to have worse and faster declines in physical and mental health outcomes in later life. Second, duration, meaning that the time being exposed to stressors, also matters. Caregivers who are continuously exposed to repeated stressors are likely to have a cumulative effect on the *allostatic load* and are more likely to develop various health problems over time (Seeman et al. 2001; Pearlin et al. 2005). For example, Liu and Dupre (2015) used six waves of longitudinal data from China and found that women who consistently cared for elderly parents experienced worse self-reported health than non-caregivers. Nonetheless, research also indicates that the implication of caregiving on health outcomes depends on the level of intensity and location of care being delivered. One study found that elderly caregivers in Europe who provide residential care reported worsened health outcomes, whereas caregivers from the outside

household reported better health outcomes than non-caregivers (Kaschowitz and Brandt 2016). As for grandparenting, Chen and Liu (2011) found that coresidential grandparents would experience health declines only when they provide intensive care for younger grandchildren. In contrast, lower levels of grandparenting had a protective effect on grandparents' well-being.

Most studies on caregiving revealed that the health consequences differ significantly by the relationship to the care recipient (Penning, Margaret, and Wu 2009; Litwin, Stoeckel, and Roll 2014). These studies overwhelmingly focused on the consequence of engaging in one type of care role. However, older adults today are more likely to take multiple care roles concurrently or sequentially. Despite the efforts in studying the health consequences of "sandwiched caregiving" (Xu 2019; Tan 2018; Margolis and Wright 2017), we still know very little about the health consequences of concurrent caregiving in other role combinations. Furthermore, most caregiving literature focuses on Western contexts but not on developing regions, where the population is aging rapidly and significant eldercare demands need to be addressed (Feng et al. 2020). Studying family caregiving in China, in return, would help scholars understand the heterogeneous consequences of multiple caregiving experiences in other developing regions, where family caregiving is the most important role among older adults and the essential fabric of the long-term care system.

Caregiving and health in the Chinese Context

The implications of family caregiving vary drastically by living arrangement between caregivers and care recipients. Previous studies show that providing co-residential care to elderly parents is usually linked with worsened health outcomes. In contrast, elderly care provided outside the household is associated with better or no difference in health outcomes from non-caregivers

(Kaschowitz and Brandt 2017). As for grandparenting, studies found that grandparents who live in skipped-generation households do not experience health decline. Instead, they might embrace better physical health outcomes. Conversely, grandparenting while living in a traditional multigenerational household has limited health benefits for grandparents (Chen and Liu 2011; Song and Chen 2020). Compared to grandparenting and parental care, spousal caregiving usually onsets unexpectedly (Uccheddu et al. 2019) and normally occurs inside the household, leaving spousal caregivers less room to respite from the high-intensity care situations (Litwin et al. 2014). Consequently, spousal care is usually associated with more negative experiences (Kaufman et al. 2019; Liu and Lou 2019; Pinquart and Sörensen 2007; Sugiura et al. 2009).

So far, I have briefly discussed that providing coresidential family caregiving can lead to worsened health outcomes for caregivers. Nonetheless, what is less discussed is how the living arrangement with other family members would moderate the health effects of caregiving. For example, it is possible that living in a multigenerational household would enable family caregivers to gain more emotional support and assistance from other family members, which may alleviate their care burdens (Burholt and Dobbs 2014; Pyke and Bengtson 1996).

Apart from the living arrangement, the *hukou* status of caregivers could also moderate the linkage between caregiving and health. First, *hukou* status is the most strictly enforced social stratifier in Chinese society. As a result, urban residents have higher income, better retirement support, and better access to health care and community-based care systems than rural residents. Therefore, urban residents are much likely to hire paid care workers to alleviate their family caregiving burdens (Feng et al. 2020). By contrast, for rural residents, due to mass migrations of workers from rural China to urban China over the past few decades, a large proportion of older adults in rural regions are left behind. Therefore, the potential family network might shrink, and

rural older adults are shouldering heavier and more intensive care responsibilities. In this case, I expect that rural caregivers would have worse health outcomes than urban caregivers, due to the lack of economic and social support at home.

Research revealed that the effects of family caregiving could differ significantly by gender (Pinquart and Sörensen 2006). First, due to the ingrained gender role expectations, women are more likely to provide hands-on care and for longer hours than men, so the caregiving burden is much heavier for women. Second, male caregivers are more likely to have additional helpers, either from family members or paid care services, than female caregivers (Yamada et al. 2006). Third, men and women tend to have different coping strategies for family caregiving: male caregivers tend to adopt problem-focused coping strategies, whereas female caregivers tend to use emotional-focused coping strategies. As a result, female caregivers are more likely to be emotionally drained than male caregivers (Folkman 2013; Pinquart and Sörensen 2006). This further makes them vulnerable to cumulative health disadvantages because of caregiving stress (Marks et al. 2002).

In summary, we know how the health implications of each type of care, and how living arrangements, *hukou* status, and gender further complicate the association. Most studies focus on the effects of a singular care experience but neglect the complexities of overall care experiences, as caregivers transition into and out of various care roles over time. As a result, the cumulative costs for family caregivers due to multiple care experiences have long been ignored. Furthermore, studies that use longitudinal data for caregiving research all have an implicit assumption that there is only one care trajectory shared by most of the population, which may not be correct. As the life course perspective posits, individuals bring different social resources into situations and thus have heterogenous life pathways (Elder, Johnson, and Crosnoe 2003;

Fast et al. 2013). Hence, based on the caregiving patterns identified in the first chapter, I further assess how each caregiving pattern translates into health advantages or disadvantages over time. The caregiving patterns include *Temporary Caregivers* who only provide low-level and a short period of childcare to grandchildren, *Intensive Grandchild Caregivers* who provide intensive grandparenting for a long time, *Intensive Spousal Caregivers* who primarily provide intensive and long spousal care, *Sandwiched Caregivers* who are caught between elder care and grandparenting for a relatively long duration, and *Serial Caregivers* who provide short and low-level parental care and grandparenting. Specifically, I investigate which caregiving pattern leads to more deteriorated health outcomes relative to others, and which caregiving pattern yields better physical and mental well-being than others. Lastly, I investigate how living arrangement, *hukou* status, and gender moderates these linkages.

Data and Method

Data and Sample

This study uses four waves of data from the China Health and Retirement Longitudinal Study (CHARLS, 2011, 2013, 2015, and 2018), an ongoing biennial longitudinal survey on a nationally representative sample of Chinese residents aged 45 and older and their spouses, if possible. CHARLS sampled 17,708 residents from 150 counties from 28 provinces in China at the baseline survey in 2011, with a response rate of over 80%. The average age of the respondents was 59.1 at baseline, and around 78% of them were rural residents and 22% were urban residents. This study focused on middle-aged and older adults between ages 45 and 85. Although in Chapter One I primarily focus on caregivers (N=14,787), in this chapter, I add non-caregivers (N=8,034) to the analytical sample, yielding a sample of 22,821 respondents. This allows me to compare the health changes between caregivers and non-caregivers over time. Among these five

patterns, about 81 caregivers classified as intensive caregiving patterns stopped providing care in later waves. On average, each caregiver had more than three person-wave observations, and about 23.8% of the caregivers dropped out of the survey in later waves due to attrition, and 0.3% were deceased. I further added control variables to indicate their attrition statuses and deceased status throughout four survey waves.

Measurement of Key Independent and Dependent Variable

1. Independent variable

The key independent variables are family caregiving patterns. The indicators used to inform family caregiving patterns include the total number of grandchildren ever cared for, the total number of older adults ever cared for, cumulative caregiving load[1] for grandparenting, spousal care and aging parents, total caregiving waves, and the number of overlapping waves (see Chapter 1 for details). Based on the information, I identified five divergent caregiving patterns: *Temporary Caregivers* (53.01%), *Intensive Spousal Caregivers* (6.12%), *Intensive Grandchild Caregivers* (26.38%), *Sandwiched Caregivers* (5.2%), and *Serial Caregivers* (9.30%). It is worth noting that the family caregiving pattern is a time-invariant categorical variable. The detailed characteristics of each caregiving pattern and non-caregivers are shown in Table 2.1. Notably, *Temporary Caregivers* primarily engaged in grandparenting for about 1.31 waves and have very few overlaps with other caregiving roles. *Intensive Grandchild Caregivers* are those who primarily care for grandchildren for 2.9 waves and have an intensive grandparenting cumulative care load of 7.6. Similarly, *Intensive Spousal Caregivers* are those who provide primary and

[1] Cumulative care load = Total care waves * averaged care intensity across four waves. For grandparenting and care to older parents, I use weekly care hours to measure the care intensity. For spousal care, I use the number of ADL assistances of the spouse to inform the care intensity.

intensive spousal care with a cumulative care load of 7.2 for 2.9 waves. *Sandwiched Caregivers* are those with 2 waves of concurrent caregiving roles to grandchildren, the spouse, and parents for a total caregiving duration of 3 waves. *Serial Caregivers* are those who provide care sequentially to grandchildren and parents with very few overlapping waves and lower cumulative care load for a total duration of fewer than two waves. Since this chapter included non-caregivers as the reference group, the demographic characteristics of non-caregivers are also shown in Table 2.1.

--Table 2.1 about here –

2. Dependent variable

The mental and physical health outcomes are measured by four indicators, and they are all time-varying variables. Mental well-being is measured by both depressive symptoms and life satisfaction. Respondents' depressive symptoms were assessed using ten questions from the Center for Epidemiological Studies Depression Scale (CES-D). Respondents rated their feelings and experiences (e.g., *how often do you feel depressed, sad, and lonely; feeling that everything takes an effort, feeling unable to get going, or have trouble sleeping; feeling happy, hopeful, and enjoying life*) with a scale from 0 to 3. All responses of the ten items are summed and scored, with higher values indicating higher levels of depressive symptoms (M = 8.16, SD = 6.23, Range = 0-30, Cronbach's alpha = 0.7). Meanwhile, respondents' life satisfaction is measured by five scales: "1. Not at all satisfied", "2. Not very satisfied", "3. Somewhat satisfied", "4. Very satisfied", "5. Completely satisfied".

I use two variables to gauge caregivers' physical well-being. These variables include self-rated health and the number of functional limitations. Self-rated health is classified into five

categories: “1: poor,” “2: fair,” “3: good,” “4: very good,” “5: excellent.” The functional limitations are measured by a 7-item summary of any difficulty with walking 100m, climbing several flights of stairs, getting up from a chair, stooping or kneeling or crouching, extending arms up, lifting 5 kilograms, and picking up a small coin. The descriptive statistics of the mental and physical health variables by each caregiving pattern for the pooled four-wave sample are shown in Table 2.2.

--Table 2.2 about here--

3. Moderators and other covariates

In this study, I am also interested in how gender, *hukou* status, and living arrangement moderate the linkages between caregiving patterns and mental and physical health outcomes.

Hukou registration indicates whether the respondent is a rural or urban resident (“1” as “Rural”; “0” as “urban”), and it is a time-varying variable. The household structure is measured by how many generations were co-residing in the same household. Altogether, I classify two different living arrangements: 1. “1-gen household or skipped-gen household”, 2 “multi-gen households: including living only with parents, or living only with adult children, or living in a 3- or- 4 -generation in the household.”, and it is also a time-varying variable. Other demographic covariates include age, marital status, financial status in the household, work status (all time-varying variables), and educational attainment (time-invariant). Moreover, to control the effects of significant life transitions on health outcomes, I added several time-invariant binary variables, including whether transitions into retirement, whether any adult child moves out, whether transitions into widowhood and grandparenthood between 2011 and 2018. Lastly, I added health conditions at baseline to control for the health selection effects of caregiving patterns. The

baseline's descriptive statistics of other covariates by each caregiving pattern are also shown in Table 2.2.

Lastly, to adjust the effects of attrition and mortality on older adults' health outcomes, I created two binary variables indicating whether the respondents dropped off in later survey waves and whether they were deceased between 2011 and 2018.

Method

To investigate the association between family caregiving patterns and caregivers' mental and physical health outcomes, I employ linear mixed-effect models to account for both intra-individual and inter-individual differences of CES-D scores, self-rated health, the number of functional limitations, and life satisfaction. The key independent variable, family caregiving pattern (CGP_i), is a time-invariant variable, while dependent variables (Y_{it}), including the CES-D scores, self-rated health, and the number of functional limitations, are all time-varying variables. The moderates include gender, *hukou* status (time-varying), and living arrangement (time-varying). And other covariates include educational attainment, financial status, whether being married, and whether currently working. By allowing random-effect variations (a_i) for individuals, I can account for the unobserved individual heterogeneity that might lead to biased estimates. The linear mixed-effect model is represented in the equations below:

$$Y_{it} = \beta_{0i} + \beta_{1i} * CGP_i + \beta_{2i} * gender_i + \beta_{3i} * \sum moderators_{it} + \beta_{4i} * \sum cov_{it} + a_i + e_{it}; \quad (1)$$

$$Y_{it} = \beta_{0i} + \beta_{1i} * CGP_i + \beta_{2i} * gender_i * CGP_i + \beta_{3i} * CGP_i * moderators_{it} + \beta_{4i} * \sum cov_{it} + a_i + e_{it}; \quad (2)$$

In the first equation, I examine the main longitudinal association between family caregiving patterns and a series of health outcome variables. Then, in the second equation, I

subsequently add interactions of caregiving patterns × gender, caregiving patterns × rural status, as well as caregiving patterns × living arrangement, to examine whether the associations are attenuated or exacerbated by gender, *hukou* status, and living arrangement.

Results

Descriptive statistics

Table 2.2 presents the descriptive statistics for each caregiving pattern from pooled person-wave observations. Overall, *Intensive Spousal Caregivers* have the highest CES-D score (9.76), the number of functional limitations (1.83), and the worst self-rated physical health (2.21). *Sandwiched Caregivers* are second to spousal caregivers. By contrast, *Serial Caregivers* have the lowest CES-D scores (7.47), the least number of functional limitations (0.97), and the best self-rated health (2.54) among all types of family caregivers. Non-caregivers, the reference group, have an averaged CES-D score of 7.97, self-rated health of 2.43, and the number of functional limitations of 1.49. *Intensive Grandchild Caregivers* have the highest level of life satisfaction (3.24), followed by *Temporary Caregivers* (3.21) and *Serial Caregivers* (3.20), whereas *Intensive Spousal Caregivers* have the lowest life satisfaction (3.15). *Intensive Grandchild Caregivers*, *Sandwiched Caregivers*, and *Serial Caregivers* have higher proportion of female caregivers, whereas *Temporary Caregivers* and *Intensive Spousal Caregivers* have higher proportion of male caregivers. Over 21 percent of *Serial Caregivers* and over 31 percent of *Temporary Caregivers* are urban residents, higher than the rest of the caregivers. Lastly, more than half of the *Intensive Grandchild Caregivers* and *Sandwiched Caregivers* lived in multi-generation households, whereas over 67 percent of *Intensive Spousal Caregivers* lived in skipped-generation or single-generation households. As for the reference group, over 51 percent of non-caregivers live in one-generation or skipped-generation households.

The results from linear mixed-effects models on depressive symptoms, self-rated health, the number of functional limitations, and life satisfaction are presented in Tables 2.3, 2.4, 2.5, and 2.6, respectively. The reference groups are non-caregivers in all Tables.

Family caregiving patterns and CES-D scores (depressive symptoms)

Table 2.3 presents the coefficients of linear mixed-effects model on caregivers' CES-D scores.

--Table 2.3 about here--

Model 1 illustrates the main effects of family caregiving patterns on caregivers' CES-D scores. The *Intensive Spousal Caregivers* have significantly higher CES-D scores than non-caregivers by 1.77 ($p<0.001$), and the *Sandwiched Caregivers* have significantly higher CES-D than non-caregivers by 1.34 ($p<0.001$). However, the post-estimates suggest no significant difference in CES-D scores between *Sandwiched Caregivers* and *Intensive Spousal Caregivers* ($p=0.07$). Likewise, while *Temporary Caregivers*, *Serial Caregivers*, and *Intensive Grandchild Caregivers* all have significantly higher CES-D scores than non-caregivers by 0.36, 0.32, and 0.30, respectively, there is no significant difference between these three patterns.

From Model 2 to Model 4, I subsequently add the interactions of caregiving patterns × gender, caregiving patterns × hukou status, and caregiving patterns × living arrangement. Only the interactions of caregiving patterns ×gender is significant, suggesting that the association between family caregiving patterns and caregivers' CES-D scores are moderated by gender.

To better illustrate the interactive effects between caregiving patterns and gender, I display the predicted CES-D scores of each caregiving pattern by gender in Figure 2.1. As Figure 2.1 suggests, female caregivers consistently have significantly higher CES-D scores than male

caregivers across all five caregiving patterns. Moreover, the associations between caregiving patterns and CES-D scores differ significantly between men and women. For men, only *Intensive Spousal Caregivers* and *Sandwiched Caregivers* have significantly higher CES-D scores than male non-caregivers. By contrast, all five types of female caregivers have significantly higher CES-D scores than female non-caregivers. This gendered pattern suggests that women are more vulnerable to the negative effects of family caregiving on their mental well-being, regardless of how intensive their caregiving pattern is.

-- Figure 2.1 about here –

Model 1 suggests that rural residents are associated with a significantly higher CES-D score by 1.27 ($p<0.001$) than urban residents. However, the interaction of caregiving patterns and hukou is not significant (Table 2.3-Model 3). Similarly, while living in a multigenerational household is associated with significantly lower CES-D scores than living in a skipped-generation or one-generation household, the interaction between caregiving pattern and living arrangement is not significant, suggesting that the effects of caregiving pattern on caregivers' CES-D scores do not vary by the living arrangement.

Family caregiving patterns and self-rated physical health

In a similar fashion, Table 2.4 illustrates the results of the linear mixed-effects model on the association between family caregiving patterns and caregivers' self-rated physical health (a higher value indicates a better self-rated physical health outcome). Again, Model 1 presents the main effects of family caregiving patterns. Models 2 to 4 present the interactions of caregiving patterns ×gender, caregiving patterns × hukou status, and caregiving patterns × living arrangement, respectively. As Model 1 suggests, *Intensive Spousal Caregivers*, *Intensive*

Grandchild Caregivers, and *Sandwiched Caregivers* have significantly lower level of self-rated physical health than non-caregivers by 0.14 ($p<0.001$), 0.05 ($p<0.001$), and 0.1 ($p<0.001$), respectively. Conversely, *Serial Caregivers* and *Temporary Caregivers* show no significant difference in self-rated physical health (SRH) than non-caregivers. The post-estimates also suggest that *Intensive Spousal Caregivers* and *Sandwiched Caregivers* have the worst SRH, followed by *Intensive Grandchild Caregivers*. However, there is no significant difference in between *Temporary Caregivers* and *Serial Caregivers* in SRH.

Among all three interaction terms, only the interaction of caregiving pattern × *hukou* is significant. The predicted self-rated physical health by caregiving pattern and *hukou* is shown in Figure 2.2.

--Table 2.4 about here –

--Figure 2.2 about here—

The post-estimates suggest that regardless of types of family caregiving patterns, rural caregivers consistently have significantly worse SRH. Moreover, Figure 2.2 suggests that the association between family caregiving patterns and SRH also vary significantly by rural and urban *hukou* status. Among urban residents, *Serial Caregivers* have significantly better SRH than non-caregivers, but other caregiving patterns show no significant difference in SRH than non-caregivers. By contrast, among rural residents, *Temporary Caregivers*, *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers* all have significantly worse SRH than non-caregivers. This distinctive pattern in SRH by *hukou* status indicates that while urban caregivers may benefit from engaging in *Serial Caregiving*, most rural caregivers experienced significantly worsened SRH.

Family caregiving patterns and functional limitations

Table 2.5 displays the results from the linear mixed-effects model on the association between family caregiving patterns and the number of functional limitations.

--Table 2.5 about here--

Model 1 in Table 2.5 presents the main effects of family caregiving patterns on the number of functional limitations. Compared to non-caregivers, *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers* all have a significantly higher number of functional limitations by 0.26 ($p<0.001$), 0.08 ($p<0.01$), and 0.21 ($p<0.001$), respectively. The post-estimates suggest that *Sandwiched Caregivers* and *Intensive Spousal Caregivers* have the highest level of mobility difficulties, followed by *Intensive Grandchild Caregivers*. Nonetheless, there is no significant difference in the number of functional limitations between *Serial Caregivers*, *Temporary Caregivers*, and non-caregivers.

In Model 2, I added interaction of caregiving patterns × gender, and the interaction is significant. The predicted values of functional limitations by caregiving patterns and gender are shown in Figure 2.3. Across all five caregiving patterns, female caregivers consistently have a higher number of functional limitations than male caregivers. For male caregivers, only *Intensive Spousal Caregivers* and *Sandwiched Caregivers* are associated with significantly higher number of functional limitations. By contrast, among female caregivers, *Temporary Caregivers*, *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers* are all associated with a significantly higher number of functional limitations than non-caregivers.

--Figure 2.3 about here--

In Model 3, I added the interaction of caregiving patterns × *hukou* status, and the interaction is significant. The predicted values of functional limitations by caregiving pattern and

hukou status are shown in Figure 2.4. The rural-urban differential patterns are very distinctive: none of the urban caregivers have significantly different numbers of functional limitations than non-caregivers. However, among rural caregivers, *Temporary Caregivers*, *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers* are all associated with significantly higher number of functional limitations than non-caregivers. This finding confirms that rural caregivers are more likely to have deteriorated health outcomes than urban caregivers.

--Figure 2.4 about here --

Family caregiving patterns and life satisfaction

As previous research suggested that the positive and negative effects of family caregiving might co-exist (Jiang et al. 2020). I investigate the association between caregiving patterns and the level of life satisfaction. The results of the linear mixed-effects model on life satisfaction are shown in Table 2.6.

--Table 2.6 about here--

Model 1 in Table 2.6 illustrates the main effects of caregiving patterns on life satisfaction. Compared to non-caregivers, *Intensive Spousal Caregivers* and *Sandwiched Caregivers* are associated with significantly lower life satisfaction by 0.11 ($p<0.001$) and 0.04 ($p<0.05$), respectively. By contrast, *Serial Caregivers*, *Temporary Caregivers*, and *Intensive Grandchild Caregivers* do not exhibit significantly different levels of life satisfaction than non-caregivers. Moreover, the post-estimates suggest that *Intensive Grandchild Caregivers* have significantly higher level of life satisfaction than *Temporary Caregivers*, but there are no significant differences in life satisfaction between *Temporary Caregivers*, *Serial Caregivers*, and non-caregivers.

I subsequently added interactions of caregiving patterns × gender, caregiving patterns × *hukou* status, and caregiving patterns × living arrangement in Model 2-Model 4. But only the interaction of caregiving patterns × gender is significant. The predicted values of life satisfaction by caregiving patterns and gender are shown in Figure 2.5. Among male caregivers, only *Intensive Spousal Caregivers* are associated with lower life satisfaction than male non-caregivers. In contrast, for female caregivers, *Intensive Grandchild Caregivers* are associated with significantly higher life satisfaction than female non-caregivers, and *Intensive Spousal Caregivers* and *Sandwiched Caregivers* are associated with lower life satisfaction than non-caregivers. When comparing life satisfaction between female and male caregivers, I found that female *Temporary* and *Sandwiched Caregivers* have significantly lower life satisfaction than their male counterparts. However, there is no significant gender difference for *Serial Caregivers*, *Intensive Grandchild Caregivers*, and *Intensive Spousal Caregivers*. This gendered pattern suggests that female caregivers are more likely to have higher life satisfaction when providing intensive grandparenting, despite being likelier to have lower life satisfaction than male caregivers.

--Figure 2.5 about here –

Sensitivity analysis

Previous studies have suggested that family caregivers with a heavy care load are more likely to stop providing care due to their health declines (Horowitz 1992; Pavalko and Woodbury 2000). Therefore, I conducted a sensitivity analysis and found that around 81 *Intensive Spousal Caregivers*, *Sandwiched Caregivers*, and *Intensive Grandchild Caregivers* stopped providing care in later waves. A binary variable is added into the linear mixed-effects model to adjust the effects of transitions; however, the coefficient is not significant, nor does it change the results. In

fact, since older adults with any caregiving experiences were included in the latent profile analysis, older adults who first had intensive care experiences but stopped in later waves are classified as *Temporary Caregivers* or *Serial Caregivers*. To adjust the effects of attrition and mortality, I then added the binary variables to indicate any attrition and whether the respondents passed away throughout four waves (time-invariant variables). Although the coefficients are significant, they do not shift the overall estimates and conclusions from the linear mixed-effects model.

To address the health selection issues among caregivers, I specifically separated non-caregivers with "poor health" from non-caregivers with "fair", "good", and "excellent" self-rated health, and then I conducted the analysis again. The results are shown in Table 2.7. Overall, the coefficients did not shift for CES-D scores. However, the coefficients shifted moderately for *Temporary Caregivers* and *Serial Caregivers* when predicting self-rated health and functional limitations. Previously, *Temporary Caregivers* and *Serial Caregivers* do not show significantly different self-rated health or functional limitations compared to non-caregivers. After separating out non-caregivers with "poor health", however, *Temporary Caregivers* and *Serial Caregivers* have significantly worse physical well-being than non-caregivers. Despite the moderate shifts, the post-estimation still suggests a consistent pattern. *Intensive Spousal Caregivers* and *Sandwiched Caregivers* have the worst mental and physical health outcomes of all five types of caregivers, then followed *by Intensive Grandchild Caregivers*, *Temporary Caregivers*, and *Serial Caregivers*.

Discussion and Conclusion

Guided by the life course perspective, this study is among the first that investigates health outcomes of heterogenous long-term family caregiving patterns. In the first chapter,

using four waves of longitudinal data from the China Health and Retirement Study (CHARLS, 2011-2018), I identified five long-term family caregiving patterns, including *Temporary Caregivers* (53.0%), *Intensive Grandchildren Caregivers* (26.4%), *Intensive Spousal Caregivers* (6.1%), *Sandwiched Caregivers* (5.2%), and *Serial Caregivers* (9.3%). In this chapter, I employ the linear mixed-effects model and investigate mental and physical health implications of each five caregiving patterns and how the effects vary by gender, *hukou*, and living arrangement.

Overall, compared to non-caregivers, all five family caregiving patterns are associated with worsened depressive symptoms. *Intensive Spousal Caregivers* and *Sandwiched Caregivers* have significantly higher depressive symptoms among all five patterns. Meanwhile, *Intensive Spousal Caregivers* and *Sandwiched Caregivers* have significantly lower life satisfaction than non-caregivers. Further, results also suggest that the implications on mental well-being differ significantly by gender. Male caregivers only have worsened depressive symptoms when engaged in heavier patterns (e.g., Intensive Spousal caregiving and Sandwiched caregiving), whereas female caregivers all suffered worsened depressive symptoms regardless of caregiving pattern. Interestingly, female *Intensive Grandchild Caregivers* reported higher life satisfaction than female non-caregivers. These findings confirm that negative and positive effects of family caregiving can co-exist (Jiang et al. 2020), but they also depend on the caregiver's gender and the relationship to the care recipient. By contrast, the association between caregiving patterns and caregivers' mental well-being does not differ significantly by caregivers' living arrangement.

As for the association between caregiving patterns and physical well-being, I find that only intensive caregiving patterns (e.g., *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers*) are associated with worse SRH and a higher number of functional limitations. The implications of caregiving on physical well-being vary significantly

by *hukou status* but not living arrangement. Among urban caregivers, none of the five caregiving patterns show significantly different functional limitations than non-caregivers. Instead, urban *Serial Caregivers* have better SRH than urban non-caregivers. Rural *Temporary Caregivers*, *Intensive Spousal Caregivers, Intensive Grandchild Caregivers, and Sandwiched Caregivers* are all associated with worse SRH and more functional limitations than rural non-caregivers. The distinctive rural-urban differential pattern mirrors the unequal distribution of medical and formal care resources between rural and urban China. Recent studies suggest that urban residents are more likely to hire in-home caretakers and receive community-based care services than rural residents (Shi and Hu 2020).

The negative implications of family caregiving on caregivers' physical and mental well-being provide evidence to the stress process model and the role conflict perspective (Pearlin et al. 1990), and that caregiving can be stressful and can take a toll on caregivers' mental and physical well-being. In addition to negative implications, positive implications are also detected. For example, female *Intensive Grandchild Caregivers* have higher level of life satisfaction than female non-caregivers, and urban *Serial Caregivers* had better SRH than urban non-caregivers. Caring for grandchildren and elderly parents are well recognized and valued in Chinese society. Therefore, engaging in these care roles fulfills societal role expectations, which may reduce the negative effects of care stressors (Lai 2010). However, the positive implications are not universal; female caregivers experience higher life satisfaction than male caregivers, and urban caregivers experience better physical well-being than their rural counterparts, suggesting the positive effects depend on the care resources at their disposal.

Several limitations in this study deserve noting. First, CHARLS only covers caregiving experiences to grandchildren, a spouse, and elderly parents. Information on caring for siblings or

other relatives is not available. As a result, the five patterns of long-term caregiving experiences might overlook some other care roles and thus might underestimate caregivers' burden over time. Future research should include sibling care and care for other relatives in the scope. Second, while the five caregiving patterns capture long-term care experiences, they are time-invariant variables rather than time-varying variables. Consequently, linear mixed-effects models are unable to estimate corresponding health outcomes of the *current* care status. Third, the association between caregiving patterns and health may be confounded by selection bias, as older adults who remain long-term caregivers are likely to be healthier than shorter-term caregivers or non-caregivers (Fredman et al. 2015). Lastly, due to data limitation, this study was unable to include the use of formal care resources (e.g., home-based, community-based, and institutional formal care facilities) and thus was unable to assess how formal care alleviates family caregivers' physical and mental health toll.

In conclusion, guided by the life course perspective, this study is among the first that captures the most prominent long-term caregiving experiences and investigates their health implications over time. Overall, linear mixed-effects models suggest that *Intensive Spousal Caregivers* and *Sandwiched Caregivers* have the worst physical and mental well-being across all five caregiving patterns. Meanwhile, female caregivers and rural caregivers experienced worsened well-being than their male and urban counterparts. Recent studies indicate that while the Chinese government has begun to develop community-based care services since 2008, today only 1% of older adults live in private or public nursing homes. Moreover, the distinctive rural-urban gap in the quantity and the quality of formal care facilities still exist (Yue et al. 2021). Therefore, more affordable home-based and community-based care services need to be developed in both urban and rural regions to ease family members' long-term care burdens.

Appendix

Table 2.1. The Characteristics of Five Family Caregiving Patterns from 2011 to 2018 (N=14,894)

	Class 1	Class 2	Class 3	Class 4	Class 5
Label	Temporary caregiver	Intensive spousal caregiver	Intensive grandchildren caregiver	Sandwiched caregiver	Serial caregiver
Number of grandchildren ever cared for	0.76	0.43	1.42	1.33	0.39
Number of elders ever cared for	0.65	1.08	0.46	1.71	2.42
Spousal care load	0.66	7.20	0.36	3.41	0.36
Grandparenting load	1.37	1.04	7.57	8.11	1.23
Parental care load	0.38	0.14	0.30	1.94	3.39
Total waves of caregiving	1.31	2.95	2.94	3.36	1.94
Overlapping waves	0.12	0.42	0.31	2.06	0.37
%	53.01%	6.12%	26.38%	5.20%	9.30%

Table 2.2. Descriptive Statistics by Each Caregiving Pattern from Pooled Person-Wave Observations (CHARLS 2011-2018)

	Non-caregivers	Temporary caregivers	Intensive spousal caregivers	Intensive grandchildren caregivers	Sandwiched caregivers	Serial caregiver	p
CES-D	7.97 (6.12)	8.23 (6.29)	9.76 (6.83)	8.44 (6.23)	9.26 (6.62)	7.47 (6.13)	<
Self-rated physical health	2.43 (1.05)	2.42 (1.04)	2.21 (0.96)	2.37 (0.99)	2.33 (1.01)	2.54 (1.01)	<
Number of mobility difficulties	1.49 (1.80)	1.36 (1.65)	1.83 (1.79)	1.35 (1.55)	1.43 (1.54)	0.97 (1.35)	<
Life satisfaction	3.21 (0.54)	3.21 (0.77)	3.15 (0.82)	3.24 (0.76)	3.17 (0.76)	3.20 (0.75)	<
Women	53.6%	47.7%	43.3%	58.5%	52.8%	52.6%	<
Men	46.4%	52.3%	56.7%	41.5%	47.2%	47.4%	
Rural	75.7%	78.9%	82.1%	81.8%	85.3%	68.7%	<
Urban	24.3%	21.1%	17.9%	18.2%	14.7%	31.3%	
Living arrangement							
Multi-gen HH	48.6%	43.8%	32.7%	52.7%	51.4%	48.5%	
One-gen or Skipped-gen HH	51.4%	56.1%	67.3%	47.3%	48.6%	51.5%	<
Age	60.7	60.1	65.5	58.8	58.3	52.8	
Financial Status							
<3,000 yuan	77.6%	76.7%	71.6%	72.7%	71.7%	82.1%	
>3,000 yuan	22.4%	23.3%	28.4%	27.3%	28.3%	17.9%	<
Married	80.8%	87.4%	95.5%	89.1%	96.7%	95.3%	<
Working	62.5%	68.7%	61.4%	68.7%	76.0%	80.4%	<
Educational Attainment							
Elementary school	72.8%	68.4%	77.9%	68.7%	64.5%	44.0%	<
Middle school	16.6%	19.5%	15.5%	20.8%	24.0%	27.2%	
HS +	10.6%	12.1%	6.7%	10.5%	11.5%	28.8%	
Became widowed	4.7%	7.2%	12.2%	5.8%	6.1%	2.8%	
Transition into retirement	21.0%	24.3%	32.9%	32.9%	29.2%	22.5%	<
Adult children moved out	32.2%	38.5%	34.1%	48.9%	51.6%	46.1%	<
Attrition	28.9%	26.7%	15.2%	13.8%	7.2%	26.2%	<

Person-wave obs	20,609	21,833	3,034	13,285	2,886	3,602
(%)	31.6%	33.5%	4.6%	20.4%	4.4%	5.5%

Note: Values for categorical variables are in percent. The mean values are followed by standard errors in parentheses. P-value is based on the chi-square test or anova test.

Table 2.3. Results of the Linear Mixed-Effects Model on CES-D Scores (CHARLS, 2011-2018, N =21,787)

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
Caregiving patterns (ref=non-caregivers)				
Serial caregivers	0.31*	-0.07	0.02	0.25
	(0.15)	(0.22)	(0.26)	(0.18)
Temporary caregivers	0.36***	0.17	0.11	0.44***
	(0.08)	(0.12)	(0.16)	(0.09)
Intensive spousal caregivers	1.82***	1.31***	2.05***	1.68***
	(0.17)	(0.23)	(0.37)	(0.19)
Intensive grandchild caregivers	0.34**	0.13	0.03	0.44***
	(0.10)	(0.15)	(0.20)	(0.11)
Sandwiched caregivers	1.41***	0.95***	1.09*	1.33***
	(0.18)	(0.26)	(0.43)	(0.21)
Women	1.53***	1.22***	1.53***	1.53***
	(0.07)	(0.12)	(0.07)	(0.07)
Serial caregivers #women		0.71*		
		(0.29)		
Temporary caregivers #women		0.33*		
		(0.16)		
Intensive spousal caregivers #women		1.08**		
		(0.34)		
Intensive grandchild caregivers #women		0.37*		
		(0.19)		
Sandwiched caregivers# women		0.84*		
		(0.35)		
Rural	1.29***	1.29***	1.08***	1.29***
	(0.08)	(0.08)	(0.13)	(0.08)
Serial caregivers #rural			0.40	
			(0.30)	
Temporary caregivers #rural			0.32+	
			(0.18)	
Intensive spousal caregivers #rural			-0.27	
			(0.40)	
Intensive grandchild caregivers #rural			0.39+	
			(0.22)	
Sandwiched caregivers #rural			0.39	
			(0.46)	
Multi-gen HH	-0.15**	-0.15**	-0.15**	-0.07
	(0.07)	(0.05)	(0.05)	(0.09)
Serial caregivers #multi-gen HH				0.10
				(0.20)
Temporary caregivers #multi-gen HH				-0.20

				(0.12)
Intensive spousal caregivers #multi-gen HH				0.46
				(0.25)
Intensive grandchild caregivers #multi-gen				-0.23
				(0.13)
Sandwiched caregivers #multi-gen				0.14
				(0.23)
Age (centered at 60)	0.01	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Age-squared (centered at 60)	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Education (ref = primary school)				
Middle school	-0.98***	-0.98***	-0.98***	-0.98***
	(0.09)	(0.09)	(0.09)	(0.09)
HS+	-1.67***	-1.66***	-1.67***	-1.67***
	(0.11)	(0.11)	(0.11)	(0.11)
Married	-1.47***	-1.47***	-1.47***	-1.47***
	(0.10)	(0.10)	(0.10)	(0.10)
Working	-0.31***	-0.31***	-0.31***	-0.31***
	(0.06)	(0.06)	(0.06)	(0.06)
Net transfer > 3,000	-0.16**	-0.16**	-0.16**	-0.16**
	(0.05)	(0.05)	(0.05)	(0.05)
Transition into retirement	0.24**	0.23**	0.25**	0.25**
	(0.08)	(0.08)	(0.08)	(0.08)
Having adult child out	0.28***	0.29***	0.28***	0.28***
	(0.07)	(0.07)	(0.07)	(0.07)
Transition into grandparenthood	0.04	0.11	0.11	0.11
	(0.07)	(0.07)	(0.07)	(0.07)
Attrition	0.52***	0.52***	0.52***	0.52***
	(0.09)	(0.09)	(0.09)	(0.09)
Deceased	1.79**	1.79**	1.78**	1.79**
	(0.74)	(0.74)	(0.75)	(0.75)
Transition into widowhood	0.63***	0.60***	0.63***	0.63***
	(0.14)	(0.14)	(0.14)	(0.14)
#ADL conditions at baseline	1.54***	1.54***	1.54***	1.55***
	(0.04)	(0.04)	(0.04)	(0.04)
wave	0.13***	0.13***	0.13***	0.13***
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	7.08***	7.24***	7.24***	7.06***
	(0.15)	(0.16)	(0.17)	(0.16)
Random effects elements				
Variance (random intercept)	15.21***	15.21***	15.21***	15.21***
	(0.23)	(0.23)	(0.23)	(0.23)
Variance (random residuals)	20.38***	20.38***	20.38***	20.38***

	(0.14)	(0.14)	(0.14)	(0.14)
Observations	61,181	61,181	61,181	61,181
Number of groups	21,782	21,782	21,782	21,782

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 2.4. Results of the Linear Mixed Effects on Self-Rated Physical Health Outcomes (CHARLS, 2011-2018, N =21,865)

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
Caregiving Patterns (ref = non-caregivers)				
Serial caregivers	0.00	0.00	0.11**	0.01
	(0.02)	(0.03)	(0.04)	(0.03)
Temporary caregivers	-0.02	-0.03	0.03	-0.03
	(0.01)	(0.02)	(0.02)	(0.01)
Intensive spousal caregivers	-0.13***	-0.16***	-0.07	-0.12***
	(0.03)	(0.03)	(0.06)	(0.03)
Intensive grandchild caregivers	-0.05***	-0.08***	0.03	-0.05**
	(0.02)	(0.02)	(0.03)	(0.02)
Sandwiched caregivers	-0.10***	-0.12**	-0.01	-0.10**
	(0.03)	(0.04)	(0.07)	(0.03)
Women	-0.12***	-0.14***	-0.12***	-0.12***
	(0.01)	(0.02)	(0.01)	(0.01)
Serial caregivers #women		0.00		
		(0.04)		
Temporary caregivers #women		0.02		
		(0.02)		
Intensive spousal caregivers #women		0.06		
		(0.05)		
Intensive grandchild caregivers #women		0.04		
		(0.03)		
Sandwiched caregivers #women		0.04		
		(0.05)		
Multi-gen HH	0.05***	0.05***	0.01	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Serial caregivers #multi-gen HH				-0.00
				(0.03)
Temporary caregivers # multi-gen HH				0.01
				(0.02)
Intensive spousal caregivers #multi-gen HH				-0.05
				(0.04)
Intensive grandchild caregivers #multi-gen HH				0.00

				(0.02)
Sandwiched caregivers # multi-gen HH				0.02
				(0.04)
Rural	-0.10***	-0.10***	-0.05*	-0.10***
	(0.01)	(0.01)	(0.02)	(0.01)
Serial caregivers #rural			-0.15**	
			(0.05)	
Temporary caregivers #rural			-0.07*	
			(0.03)	
Intensive spousal caregivers #rural			-0.08	
			(0.06)	
Intensive grandchild caregivers #rural			-0.10**	
			(0.03)	
Sandwiched caregivers #rural			-0.10	
			(0.07)	
Age (centered at 60)	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Age-squared (centered at 60)	0.00*	0.00*	0.00**	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)
Education				
(ref =primary school)				
Middle school	0.07***	0.07***	0.07***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
HS+	0.18***	0.18***	0.18***	0.18***
	(0.02)	(0.02)	(0.02)	(0.02)
Married	0.02	0.02	0.02	0.02
	(0.02)	(0.02)	(0.02)	(0.02)
Working	0.14***	0.14***	0.14***	0.14***
	(0.01)	(0.01)	(0.01)	(0.01)
Net transfer >3,000	-0.03***	-0.03***	-0.04***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Transition into retirement	-0.08***	-0.08***	-0.07***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)
Having adult child out	-0.00	-0.00	-0.01	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Transition into grandparenthood	-0.02	-0.02	-0.01	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)
Attrition	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Deceased	-0.17	-0.17	-0.16	-0.17
	(0.13)	(0.13)	(0.13)	(0.13)
Transition into widowhood	-0.01	-0.01	-0.01	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)
# ADL at baseline	-0.20***	-0.20***	-0.20***	-0.20***
	(0.01)	(0.01)	(0.01)	(0.01)
Wave	0.14***	0.14***	0.14***	0.14***

	(0.00)	(0.00)	(0.00)	(0.00)
Constant	1.84***	1.85***	1.82***	1.84***
	(0.02)	(0.03)	(0.03)	(0.02)
Random effect component				
Variance (random slope)	0.31***	0.31***	0.31***	0.31***
	(0.01)	(0.01)	(0.01)	(0.01)
Variance (random residuals)	0.58***	0.58***	0.58***	0.58***
	(0.00)	(0.00)	(0.00)	(0.00)
Observations	59,012	59,012	59,269	59,012
Number of groups	21,865	21,865	21,892	21,865

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 2.5. Results of the Linear Mixed Effects on the Number of Functional Limitations (CHARLS, 2011-2018, N =22,329)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4
Caregiving Patterns (ref = non-caregivers)				
Serial caregivers	0.04	0.03	-0.02	0.04
	(0.03)	(0.05)	(0.06)	(0.04)
Temporary caregivers	0.03	-0.01	-0.06	0.03
	(0.02)	(0.03)	(0.04)	(0.02)
Intensive spousal caregivers	0.26***	0.12*	0.14	0.24***
	(0.04)	(0.05)	(0.08)	(0.04)
Intensive grandchild caregivers	0.08***	-0.01	-0.01	0.09***
	(0.02)	(0.03)	(0.05)	(0.03)
Sandwiched caregivers	0.21***	0.17**	0.06	0.22***
	(0.04)	(0.06)	(0.10)	(0.05)
Women	0.43***	0.36***	0.43***	0.43***
	(0.02)	(0.03)	(0.02)	(0.02)
Serial caregivers #women		0.02		
		(0.07)		
Temporary caregivers #women		0.08*		
		(0.04)		
Intensive spousal caregivers #women		0.32***		
		(0.08)		
Intensive grandchild caregivers #women		0.16***		
		(0.04)		
Sandwiched caregivers #women		0.07		
		(0.08)		
Rural	0.22***	0.23***	0.15***	0.22***
	(0.02)	(0.02)	(0.03)	(0.02)

Serial caregivers #rural			0.08	
			(0.07)	
Temporary caregivers #rural			0.12**	
			(0.04)	
Intensive spousal caregivers #rural			0.16	
			(0.09)	
Intensive grandchild caregivers #rural			0.11*	
			(0.05)	
Sandwiched caregivers #rural			0.19	
			(0.10)	
Multi-gen HH	0.00	0.00	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.02)
Serial caregivers #multi-gen				0.01
				(0.05)
Temporary caregivers #multi-gen				-0.01
				(0.03)
Intensive spousal caregivers # multi-gen				0.08
				(0.06)
Intensive grandchild caregivers #multi-gen				-0.03
				(0.03)
Sandwiched caregivers #multi-gen				-0.02
				(0.06)
Age (centered at 60)	0.03***	0.03***	0.03***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)
Age-squared (centered at 60)	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Education				
(ref = primary school)				
Middle school	-0.19***	-0.19***	-0.19***	-0.19***
	(0.02)	(0.02)	(0.02)	(0.02)
HS+	-0.31***	-0.30***	-0.31***	-0.31***
	(0.03)	(0.03)	(0.03)	(0.03)
Married	-0.08***	-0.08***	-0.08***	-0.08***
	(0.02)	(0.02)	(0.02)	(0.02)
Working	-0.35***	-0.35***	-0.35***	-0.35***
	(0.01)	(0.01)	(0.01)	(0.01)
Net transfer >3,000	0.04***	0.04***	0.04***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)
Transition into retirement	0.09***	0.09***	0.09***	0.09***
	(0.02)	(0.02)	(0.02)	(0.02)
Having adult child out	0.05***	0.05***	0.05***	0.05***
	(0.02)	(0.02)	(0.02)	(0.02)
Transition into grandparenthood	0.01	0.01	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
Attrition	0.11***	0.11***	0.11***	0.11***
	(0.02)	(0.02)	(0.02)	(0.02)

Deceased	0.34*	0.34*	0.34*	0.34*
	(0.17)	(0.17)	(0.17)	(0.17)
Transition into widowhood	0.03	0.02	0.03	0.03
	(0.03)	(0.03)	(0.03)	(0.03)
# ADL at baseline	0.76***	0.76***	0.76***	0.76***
	(0.01)	(0.01)	(0.01)	(0.01)
Wave	0.05***	0.05***	0.05***	0.05***
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.75***	0.79***	0.81***	0.75***
	(0.04)	(0.04)	(0.04)	(0.04)
Random-effects (variance)				
Variance (random slope)	0.72***	0.72***	0.72***	0.72***
	(0.01)	(0.01)	(0.01)	(0.01)
Variance (residuals)	1.26***	1.26***	1.26***	1.26***
	(0.01)	(0.01)	(0.01)	(0.01)
Observations	65,369	65,369	65,369	65,369
Number of groups	22,329	22,329	22,329	22,329

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 2.6. Results of the Linear-Mixed Effects Model on Life Satisfaction (CHARLS, 2011-2018, N =21,632)

VARIABLES	(1) model 1	(2) model 2	(3) model 3	(4) model 4
Caregiving Patterns (ref= non-caregivers)				
Serial caregivers	0.02	0.03	0.02	0.03
	(0.02)	(0.03)	(0.03)	(0.02)
Temporary caregivers	-0.01	-0.00	-0.01	-0.02
	(0.01)	(0.01)	(0.02)	(0.01)
Intensive spousal caregivers	-0.11***	-0.11***	-0.14**	-0.11***
	(0.02)	(0.03)	(0.04)	(0.02)
Intensive grandchild caregivers	0.02*	0.01	0.03	0.02
	(0.01)	(0.02)	(0.02)	(0.01)
Sandwiched caregivers	-0.04*	0.01	-0.08	-0.02
	(0.02)	(0.03)	(0.05)	(0.03)
Women	-0.03***	-0.02	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Serial caregivers #women		-0.03		
		(0.03)		
Temporary caregivers #women		-0.02		
		(0.02)		
Intensive spousal caregivers #women		-0.01		
		(0.04)		
Intensive grandchild caregivers #women		0.02		
		(0.02)		
Sandwiched caregivers #women		-0.11*		
		(0.04)		
Rural	-0.06***	-0.06***	-0.06***	-0.06***
	(0.01)	(0.01)	(0.02)	(0.01)
Serial caregivers #rural			-0.00	
			(0.04)	
Temporary caregivers #rural			-0.00	
			(0.02)	
Intensive spousal caregivers #rural			0.04	
			(0.05)	
Intensive grandchild caregivers #rural			-0.01	
			(0.03)	
Sandwiched caregivers #rural			0.05	
			(0.06)	
Multi-gen HH	0.02**	0.02**	0.02**	0.02
	(0.01)	(0.01)	(0.01)	(0.01)
Serial caregivers #multi-gen				-0.03
				(0.03)
Temporary caregivers #multi-gen				0.01
				(0.02)

Intensive spousal caregivers #multi-gen				-0.02
				(0.03)
Intensive grandchild caregivers #multi-gen				0.01
				(0.02)
Sandwiched caregivers #multi-gen				-0.05
				(0.03)
Age (centered at 60)	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Age-squared (centered at 60)	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Education				
(ref = primary school)				
Middle school	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
HS+	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Married	0.10***	0.10***	0.10***	0.10***
	(0.01)	(0.01)	(0.01)	(0.01)
Working	0.03***	0.03***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)
Net transfer > 3,000	0.07***	0.07***	0.07***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
Transition into retirement	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Having adult child out	-0.02**	-0.02**	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)
Transition into grandparenthood	-0.02*	-0.02*	-0.02*	-0.02*
	(0.01)	(0.01)	(0.01)	(0.01)
Attrition	-0.03**	-0.03**	-0.03**	-0.03**
	(0.01)	(0.01)	(0.01)	(0.01)
Deceased	-0.08	-0.08	-0.08	-0.08
	(0.10)	(0.10)	(0.10)	(0.10)
Transition into widowhood	-0.05**	-0.05**	-0.05**	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)
# ADL at baseline	-0.08***	-0.08***	-0.08***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)
Wave	0.03***	0.03***	0.03***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	3.08***	3.07***	3.08***	3.08***
	(0.02)	(0.02)	(0.02)	(0.02)
Random effects (variance)				
Variance (random slope)	0.16***	0.16***	0.16***	0.16***
	(0.00)	(0.00)	(0.00)	(0.00)
Variance (residuals)	0.42***	0.42***	0.42***	0.42***
	(0.00)	(0.00)	(0.00)	(0.00)
Observations	59,826	59,826	59,826	59,826

Number of groups	21,632	21,632	21,632	21,632

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 2.7. Results of the Linear-Mixed Effects on CES-D, SRH, Number of Functional Limitations, and Life Satisfaction (CHARLS, 2011-2018)

VARIABLES	CES-D Model 1	SRH Model 2	Functional limitations Model 3	Life satisfaction Model 4
Caregiving patterns (ref = non-caregivers with fair, good, or excellent health)				
Serial caregivers	0.69***	-0.20***	0.14***	-0.01
	(0.15)	(0.02)	(0.03)	(0.02)
Temporary caregivers	0.79***	-0.25***	0.14***	-0.05***
	(0.08)	(0.01)	(0.02)	(0.01)
Intensive spousal caregivers	2.27***	-0.38***	0.38***	-0.15***
	(0.17)	(0.02)	(0.04)	(0.02)
Intensive grandchild caregivers	0.77***	-0.29***	0.19***	-0.01
	(0.10)	(0.01)	(0.02)	(0.01)
Sandwiched caregivers	1.83***	-0.33***	0.32***	-0.08***
	(0.18)	(0.03)	(0.04)	(0.02)
Non-caregivers with poor health	2.75***	-1.35***	0.73***	-0.22***
	(0.11)	(0.02)	(0.03)	(0.02)
Age centered at 60	0.00	-0.00***	0.03***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Age squared	-0.00***	0.00	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)
Women	1.51***	-0.10***	0.43***	-0.03***
	(0.07)	(0.01)	(0.02)	(0.01)
Multi-gen HH	-0.13**	0.04***	0.01	0.02**
	(0.05)	(0.01)	(0.01)	(0.01)
Rural	1.26***	-0.08***	0.22***	-0.06***
	(0.08)	(0.01)	(0.02)	(0.01)
Education (ref = primary school)				
Middle school	-0.97***	0.07***	-0.19***	-0.01
	(0.09)	(0.01)	(0.02)	(0.01)
HS+	-1.64***	0.17***	-0.30***	-0.01
	(0.11)	(0.02)	(0.03)	(0.01)
Married	-1.43***	-0.00	-0.07***	0.09***
	(0.09)	(0.01)	(0.02)	(0.01)
Working	-0.27***	0.11***	-0.34***	0.03**

	(0.06)	(0.01)	(0.01)	(0.01)
Net transfer >3,000 yuan	-0.16**	-0.03***	0.04***	0.07***
	(0.05)	(0.01)	(0.01)	(0.01)
Transition into retirement	0.22**	-0.07***	0.09***	-0.00
	(0.07)	(0.01)	(0.02)	(0.01)
Having adult child out	0.28***	-0.00	0.05***	-0.02**
	(0.07)	(0.01)	(0.01)	(0.01)
Transition into widowhood	0.66***	-0.04	0.03	-0.06***
	(0.14)	(0.02)	(0.03)	(0.02)
Transition into grandparenthood	0.10	-0.01	0.01	-0.02*
	(0.07)	(0.01)	(0.02)	(0.01)
Attrition	0.48***	0.03**	0.10***	-0.03**
	(0.09)	(0.01)	(0.02)	(0.01)
Deceased	1.94**	-0.29*	0.39*	-0.09
	(0.74)	(0.12)	(0.17)	(0.10)
# ADL at baseline	1.44***	-0.15***	0.73***	-0.08***
	(0.04)	(0.01)	(0.01)	(0.01)
Wave	0.15***	0.13***	0.05***	0.02***
	(0.01)	(0.00)	(0.00)	(0.00)
Constant	6.57***	2.14***	0.61***	3.12***
	(0.15)	(0.02)	(0.04)	(0.02)
Observations	61,181	59,012	65,369	59,826
Number of groups	21,782	21,865	22,329	21,632

Standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Figures

Figure 2.1: Predicted CES-D Scores by Caregiving Patterns and Gender from the Linear Mixed-Effects Model

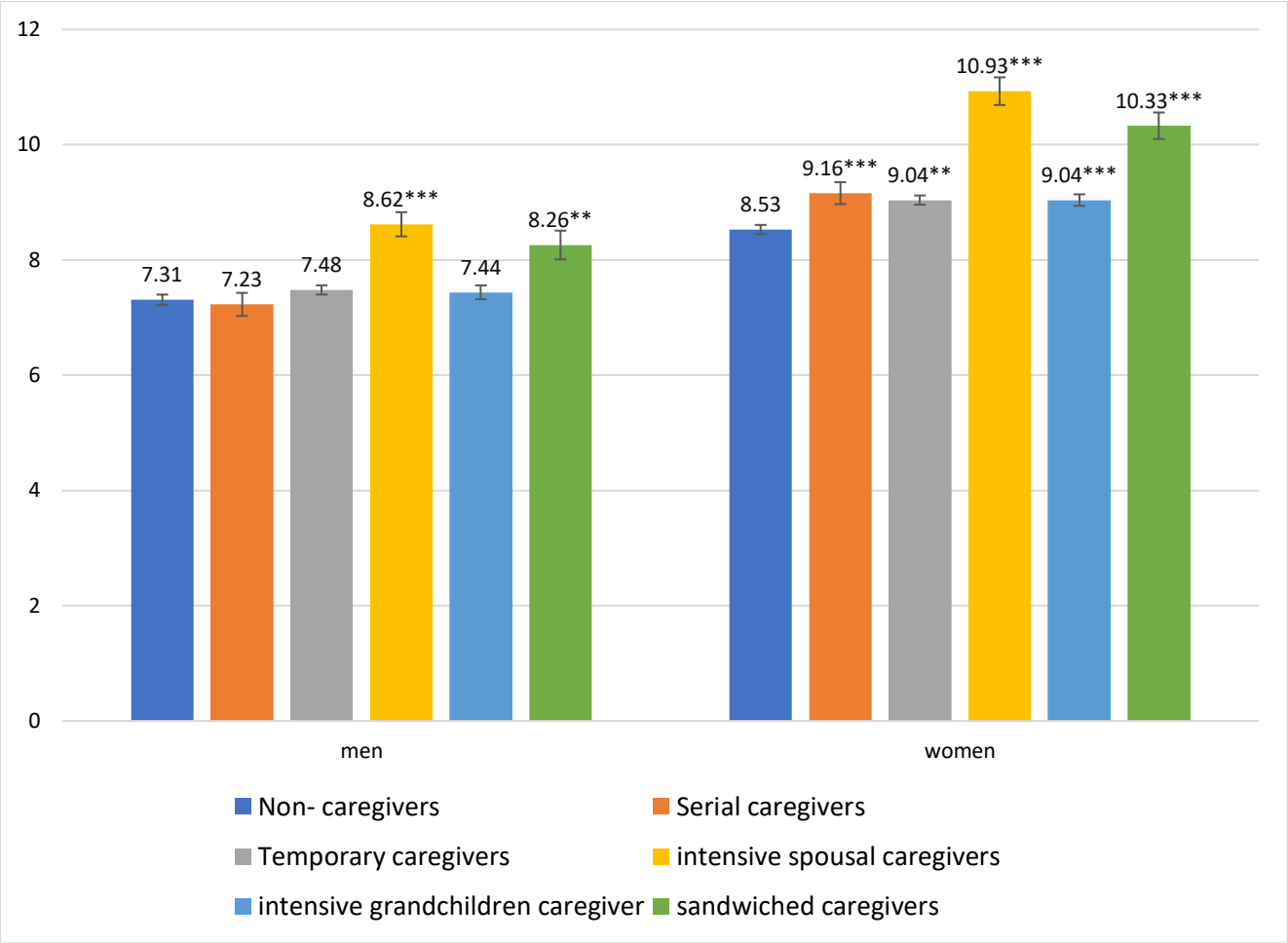


Figure 2.2: Predicted Self-Rated Health by Caregiving Patterns and *Hukou* Status from the Linear Mixed-Effects Model

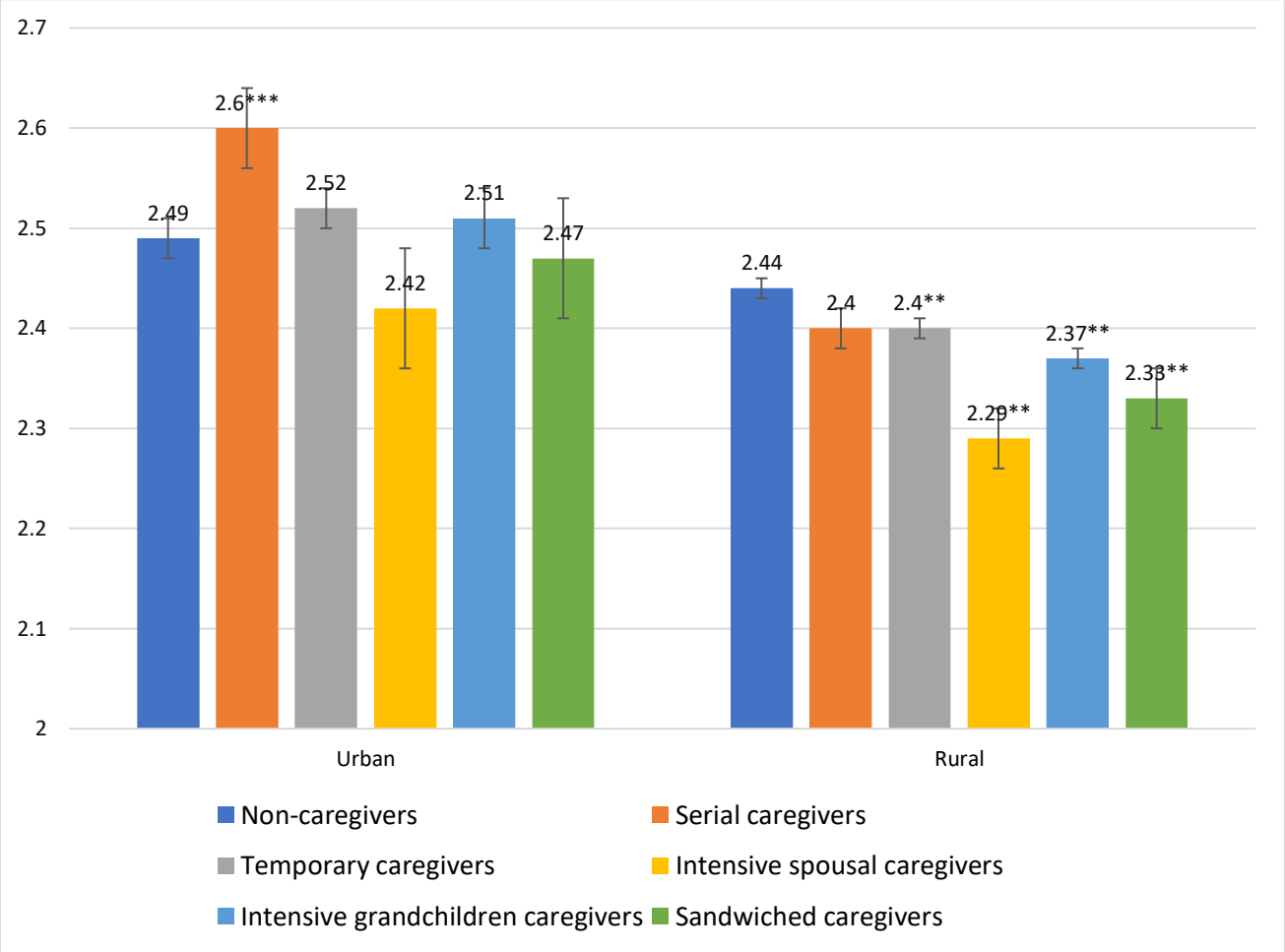


Figure 2.3: Predicted Number of Functional Limitations by Caregiving Patterns and Gender from the Linear Mixed-Effects Model

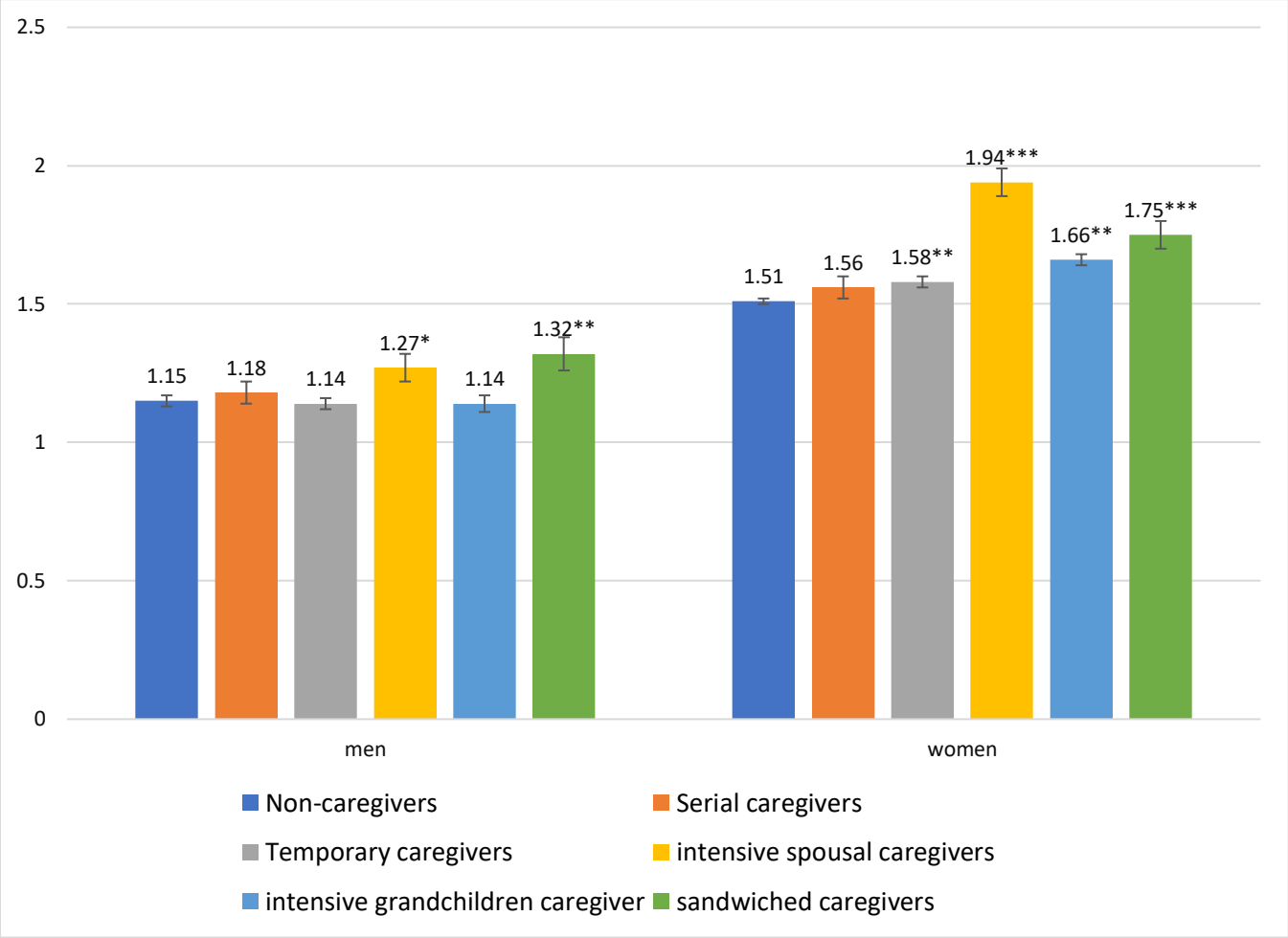


Figure 2.4: Predicted Number of Functional Limitations by Caregiving Patterns and *Hukou* Status from the Linear Mixed-Effects Model

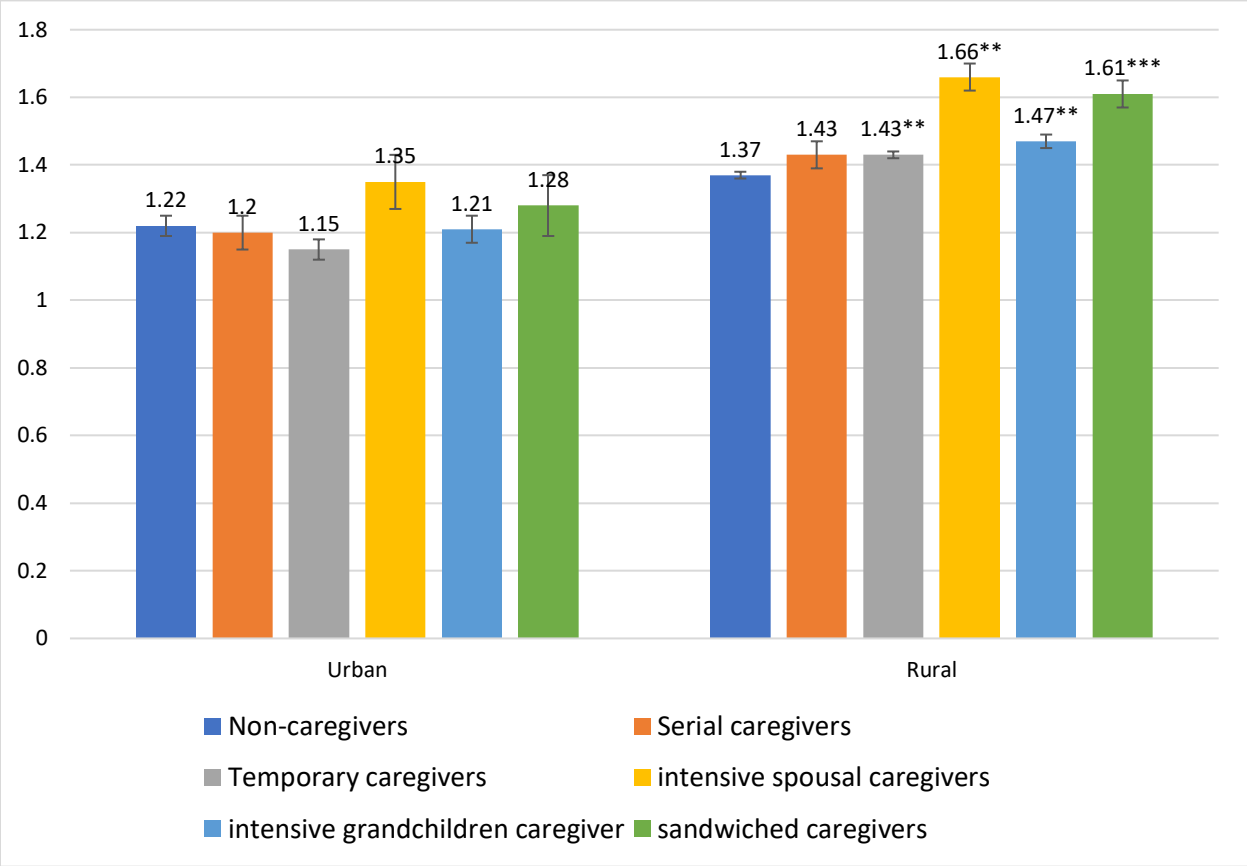
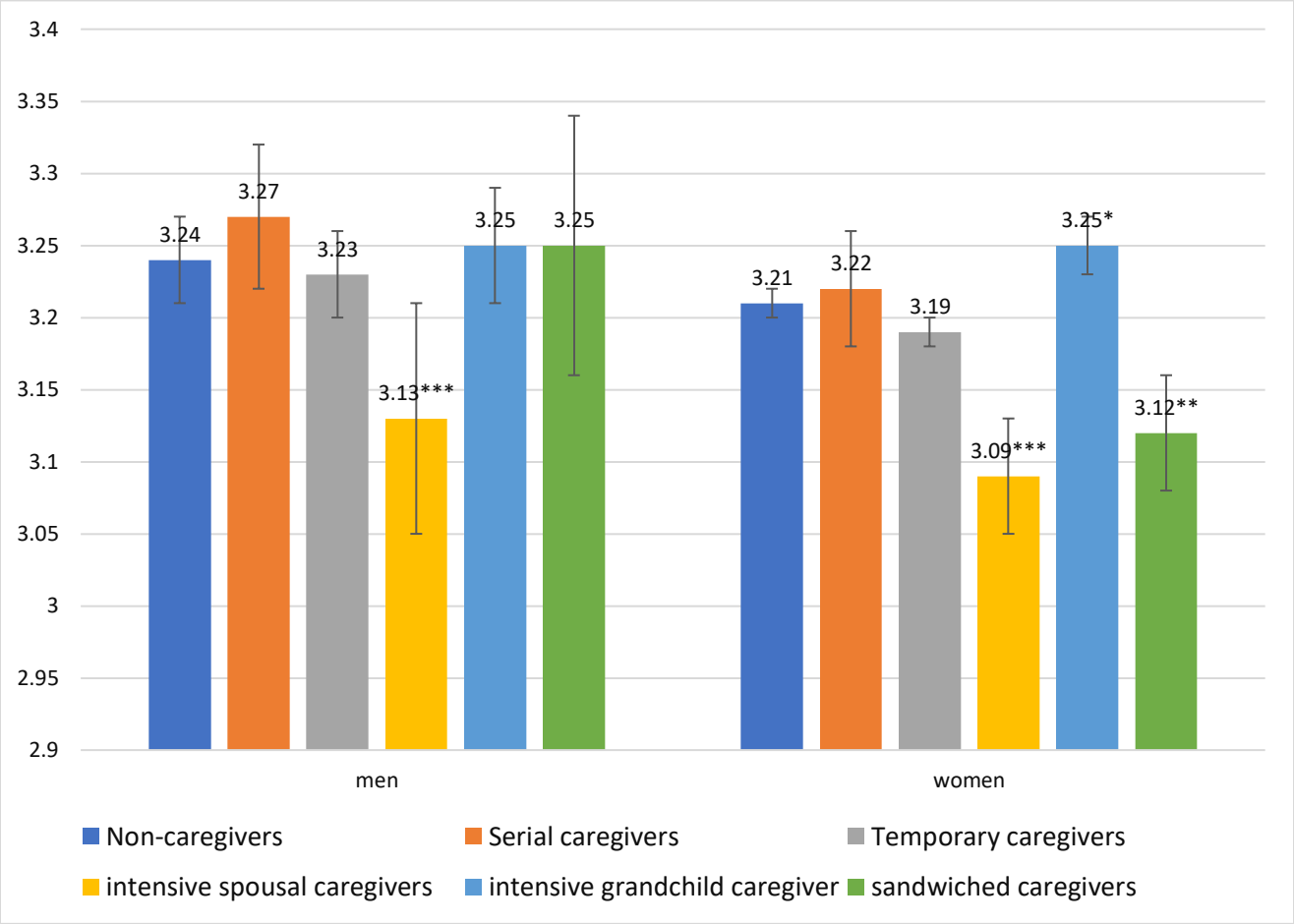


Figure 2.5: Predicted Life Satisfaction by Caregiving Patterns and Gender from the Linear Mixed-Effects Model



Chapter Three

Changing family destinies, divergent family caregiving patterns: Do birth cohorts, gender, race, and SES matter?

Abstract

Over the past few decades, Americans have experienced a series of demographic transitions, including prolonged longevity and a rise in the complexities of family structures. The Baby Boomer cohort is at the forefront of these transitions, which has profound implications on their later-life family relations and practices of family caregiving. Most caregiving literature focuses on static care experiences over a short time while neglecting long-term care experiences. Using ten waves of longitudinal data from HRS (2000-2018) and latent profile analysis, I identified five prominent long-term caregiving patterns: *Light Parental Caregivers* (44.1%), *Intensive Spousal Caregivers* (5.6%), *Sandwiched Caregivers* (5.5%), *Light Grandchild Caregivers* (38.7%), and *Intensive Grandchild Caregivers* (6.2%). Further, I conduct multinomial logistic regression to investigate how birth cohorts, gender, race, and education shape these patterns. Results suggest that caregivers of later cohorts have a significantly lower likelihood of being *Intensive Spousal Caregivers* and *Intensive Grandchild Caregivers*, but a higher likelihood of being *Light Parental Caregivers* than caregivers of the War Babies cohort. Women are more likely to be *Sandwiched Caregivers* than men, and Black caregivers are more likely to be *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers* than white caregivers. By contrast, white and more educated caregivers are more likely to be *Light Parental Caregivers*, and this pattern becomes more pronounced in later cohorts. The findings suggest divergent destinies of family caregiving patterns among later cohorts. More socioeconomically disadvantaged groups are shouldering heavier care responsibilities than advantaged groups.

Targeted care services should be implemented to ease the care burdens experienced by vulnerable populations.

Introduction

Family caregiving is one of the most important roles among middle-aged and older adults in the U.S. Today, more than one in five Americans have cared for their family members at some point in their lives (AARP 2020). Family caregivers have always been part of the essential fabric of long-term care in the U.S. The cost of unpaid caregiving has been estimated to be $470 billion, exceeding total Medicaid spending (Reinhard et al. 2019).

Over the past few decades, the classic and the second demographic transitions have transformed family structures and intergenerational relations among Americans. The Baby Boomer cohort is at the forefront of these demographic transitions, which has profound implications on their later-life family relations and practice of family caregiving. First, the prolonged life expectancy has created longer years of shared lives with family members across multiple generations than preceding birth cohorts. As a result, middle-aged and older adults today are more likely to engage in eldercare to parents and grandparenting for a longer duration than in previous cohorts (AARP 2020; Margolis and Wright 2017). Second, the delay in fertility over the past few decades has also led to the rise of the "sandwiched generation", who provide childcare and eldercare to aging parents simultaneously (Pew 2013). Third, Americans have seen a decline in marriage rates, a rise in divorce rates, and a rise in living-apart-together (LAT) relationships, especially among older adults (Hughes and Waite 2007; Agree 2018). This changes in marriage and partnership have profound implications on later-life family relations (Carr and Utz 2020). For one, the rising divorce rates and live-apart-together (LAT) relationships might weaken bonds between couples, further decreasing the practice of spousal caregiving

(Taylor and Chatters 1991; Swinkels et al. 2019). Moreover, recent research also suggests that divorced men are likely to lose contact with their children, which would then weaken their ties with grandchildren (Silverstein and Giarrusso 2010).

Compared to previous cohorts, the Baby Boomer birth cohort is more diverse in terms of race/ethnicity and socioeconomic status (Agree 2017). Most studies on family caregiving have predominantly focused on caregivers who were born in the 1930s and the early 1940s (Barnett 2015; Dunkle et al. 2014; Fast et al. 2021), which neglects the diversity and the complexity in the patterns of family caregiving among older adults of later cohorts.

Caring for a spouse, parents, parents-in-law, and grandchildren are the most common caregiving activities in the U.S. (AARP 2020). We have extensive knowledge about the prevalence of each type of care (Freedman et al. 2019; Barnett 2015; Chen et al. 2015). Compared to previous cohorts, caregivers today tend to have multiple care episodes and more divergent caregiving patterns in terms of the timing, sequence, and duration (Keating et al. 2019; Fast et al. 2021). However, most studies predominantly focus on singular care experiences over a short period time and often neglect patterns in long-term caregiving experiences, as one transitions from middle life to later ages. The life course perspective offers me a theoretical foundation to move beyond studying monolithic care experiences, and focus more on long-term caregiving patterns over time (Marks et al. 2008; Keating et al. 2019; Fast et al. 2021).

In summary, over the past few decades, the U.S. has undergone a series of demographic transitions, which might result in longer, more diverse, and more complex family caregiving patterns among older adults today. Taking a life course approach and using ten waves of longitudinal data from the Health Retirement Study (HRS, 2000 to 2018), this study aims to fill the gaps in the literature by building a care typology that captures the most prominent long-term

caregiving patterns as older Americans transition from the midlife to later ages. After constructing the care typology, I ask several research questions below:

1. How do the family caregiving patterns of the Baby Boomer cohorts (including both Early Baby Boomers and Middle/Late Baby Boomers) differ from that of the previous cohort (e.g. "1931-1946" the War Babies cohort)?
2. How do gender, race/ethnicity, and SES shape long-term patterns of family caregiving?
3. Do caregivers from the Baby Boomer cohort show more pronounced differential long-term caregiving patterns by gender, race, and SES than previous cohorts?

Background and Literature Review

Demographic Transitions and Changes in the Patterns of Family Caregiving

The classic and the second demographic transitions over the past few decades have transformed multigenerational relationships and caregiving patterns among older adults in the U.S. (Bengtson 2001; Swartz 2009).

First, the increase in longevity and the decline in fertility have caused the aging population to grow from 9% in the 1960s to 17% in 2020 (AARP 2020). Therefore, older adults today may spend longer years with their parents, and thus are more likely to provide care to parents for a longer time than previous cohorts. In addition to eldercare, the prevalence of grandparenting, ranging from intermittent assistance to intensive custodial grandparenting, is on the rise as well (US Census Bureau 2017). Moreover, due to a decline in family size, adults today are facing an increasingly shrinking family network and may engage in multiple caregiving roles simultaneously. Most studies on multiple family caregiving focused on "sandwiched" caregivers who care for elderly parents and young children; however, research has shown that that simultaneously caring for young grandchildren and older parents are more common among Early

and Middle/Late BBM cohorts (Agree, Bissett, and Rendall 2003; Grundy and Henretta 2006; Margolis and Wright 2017). Earlier transitions into grandparenthood and shorter generational length are the drivers of this type of sandwiched caregiving, and it is particularly more common among less educated, Blacks, and Hispanics, who also have an extensive tradition of grandparenting or intergenerational assistance on average (Henretta, Grundy, and Harris 2002; Margolis and Wright 2017). By contrast, this type of sandwiched caregiving is less common among more educated groups due to increased labor force participation, and a delay in childbearing among women of later cohorts. Therefore, the divergent patterns in the timing of childbearing, which are complicated by SES and race, would translate among older adults in later life into differing grandparenting patterns and even different patterns of sandwiched caregiving to parents and grandchildren.

Second, in addition to changes in patterns of mortality and fertility, Americans have also experienced changes like the decline in marriage, the rise in divorce and living-apart-together relationships (especially among older adults), and the rise in life-long singlehood (Agree 2017). Scholars referred to these changes in family structures as the Second Demographic Transitions (SDT) (Lesthaeghe 2010). These changes in family structures could have profound impacts on family relationships as well. First, the rise in divorce, living-apart-relationships, and life-long singlehood could lead to a decline in the practice of spousal caregiving in later life, as the commitment in spousal caregiving in latter relationships is loosely defined compared to married couples (Hughes and Waite 2007). Second, divorces may affect the practice of intergenerational caregiving as well. Previous studies have suggested that having a divorce or remarriage may weaken ties with their own children, which further weaken connections with grandchildren, and that it is more pronounced among divorced men than divorced women (Shapiro 2003). As a

result, older adults who were divorced may be less likely to engage in grandparenting than those who remain married.

Most studies on caregiving in the middle and later life focused on older adults who were born in the 1920s and 1930s. However, as Baby Boomers age into later life, their complex marital and family structures can have important implications for their later-life family caregiving practices (Fingerman et al. 2012). Moreover, it is also worth noting that some of the changes in the family did not occur equally across race/ethnicity and socioeconomic status, and as a result, Baby Boomers would have much more divergent later-life family relationships and heterogenous family caregiving patterns compared to previous birth cohorts (Silverstein and Giarrusso 2010). Hence, it is imperative for scholars to gain a better understanding of divergent family caregiving patterns among older adults today, and to what extent they are different from previous birth cohorts.

Theoretical Framework

Scholars have called for incorporating the life course perspective into family caregiving studies for more than a decade, because better understanding of the complexities in long-term caregiving trajectories would shed light on later-life health outcomes and well-being (Moen et al. 1995; Marks et al. 2008; Elder, Johnson, and Crosnoe 2003).

First, the life course perspective posits that individuals' life courses are embedded and shaped by historical times and places over the lifetime (Elder et al. 2003). The Baby Boomer cohort (both Early and Mid/Late Baby Boomers), who were born after WWII, have benefited from advances in modern medicine and have seen a drastic increase in their life expectancy. Meanwhile, redefined gender roles since the 1960s have translated into delayed and declined

fertility, retreat from marriage, rise in divorce, and other alternative partnerships to marriage, such as cohabitation and LAT relationships (Goldstein 1999; Pessin 2018). These series of societal changes have left imperative imprints in individuals' life courses and thus created more divergent family life pathways compared to previous birth cohorts (Seltzer 2019). Consequently, the heterogenous changes in family structures in earlier life can also lead to divergent family relationships and caregiving patterns among older adults today.

Second, the life course perspective argues that individuals' life trajectories are embedded in and constructed through relationships with other family members. For example, a daughter's early transition into motherhood might lead to her older parents' earlier transition to grandparenthood, which might further indicate engagement in caregiving roles to older parents and young grandchildren at the same time. Likewise, the delay of childbearing among adult children would mean the delay in the timing of grandparenting among older adults. Moreover, having divorce(s) in early life can weaken the bonds between children and then grandchildren, which could affect the practice of grandparenting in later life.

Third, the life course perspective prompts scholars to assess long-term caregiving patterns, especially for individuals with multiple care episodes (Keating et al. 2019). Existing studies on family caregiving overwhelmingly focus on the experiences of a singular care experience. However, prolonged longevity has created longer years of shared lives among family members (Bengtson 2001); therefore, individuals today may be involved in multiple caregiving roles with much more diverse patterns across the life course than previous birth cohorts (Fast et al. 2013). Some may engage in a less intensive caregiving episode over a very short period, whereas others might have multiple intensive care episodes concurrently or sequentially over time. A better understanding of what are the most prominent caregiving patterns of older adults

today and which populations are more vulnerable to long-term and intensive caregiving burdens would help policymakers allocate resources effectively to alleviate their caregiving burdens.

Grounded in the life course perspective, Keating and her colleagues (2019) proposed the theory on family care trajectory and identified multiple family caregiving trajectories among Canadians. Their work pioneered studying long-term family caregiving patterns over the life course, however, the caregivers in their sample were born in the 1930s and predominately white. Therefore, the caregiving trajectories identified in Fast and her colleagues' work (2021) probably could not reflect the increasing heterogeneity in family relations and practice of family caregiving among older Americans, especially for the Baby Boomer cohort. Regardless, Keating, Fast, and her colleagues' (2019, 2021) work sets an example and motivates future scholars to assess family caregiving experiences with a life course approach.

Since the later birth cohorts have experienced a prolonged life expectancy, longer years of shared lives across generations, and diversifying family structures including heterogenous timing in childbearing and retreat from marriage, I hypothesize that:

H1: Compared to previous birth cohorts, caregivers of the Baby Boomer birth cohort are likely to see an increase in sandwiched caregiving to older parents and grandchildren, an increase in parental caregiving, and a decrease in intensive spousal caregiving.

The Care Context by Gender, Race, and Socioeconomic Status

So far, I have discussed how demographic transitions can affect later-life family relationships and the practice of family caregiving. It is worth noting that gender, race, and SES all play important roles in shaping the duration, intensity, and number of care roles over time.

Gender

Many studies have suggested that family caregiving is gendered (Marks, Lambert, and Choi 2002; Yee and Schulz 2000). Women are more likely to engage in caregiving than men, and they are also engage more in hands-on and more complex tasks than men (Yee and Schulz 2000; Pinquart and Sörensen 2006). Moreover, women's longer life expectancy leads to longer years of shared lives with family members than men. Hence, women are more likely to engage in longer duration and multiple care episodes than men (Patterson and Margolis 2019). In addition, the rises in "grey divorce" and LAT relationship would equally decrease spousal caregiving for both genders. Divorced men are more likely to experience weakened bonds with their children and then grandchildren, which could further translate into a lower prevalence of grandparenting in later life (Silverstein and Giarrusso 2010).

Therefore, I hypothesize that:

H2: Female caregivers are more likely to engage in family caregiving of higher intensity and longer durations and are more likely to engage in sandwiched caregiving for older parents and grandchildren than male caregivers.

H2a: Moreover, the gendered differences in grandparenting and sandwiched caregiving are more pronounced in the Baby Boomer birth cohort than that of previous cohorts.

Race/ethnicities and SES

In addition to gender, race and SES also shape individuals' family caregiving patterns through kinship availability, access to formal care resources, and traditions in family caregiving (Margolis and Wright 2017; Rote and Moon 2018; Dilworth-Anderson et al., 2002).

First, the timing of childbearing affects kinship availability and generational length, and they vary drastically by race/ethnicity and socioeconomic status (Cravey and Mitra 2011).

Earlier childbearing is more prevalent among the less educated, Hispanics, and Blacks, which thus leads a high likelihood of having four-generation household– older parents, adult children, and grandchildren. Therefore, sandwiched caregiving to older parents and grandchildren is more common for lower SES and racial minority groups. By contrast, the delay in childbearing and voluntary childlessness is more common among highly educated and white groups among the Early and Middle/Late BBM cohorts. As a result, the delay in childbearing would result in a later transition to grandparenthood and thus a lower likelihood of having a four-generation household. Moreover, the higher life expectancy among white and more educated groups has increased the years of shared time with older parents, which is more significant in later cohorts. This thus leads to higher prevalence or longer duration of eldercare to parents among white and more educated caregivers of later cohorts.

Second, access to formal care resources and traditions in family caregiving also affect the pattern, intensity, and duration of long-term family caregiving. Previous studies have suggested that Blacks and Hispanics are more likely to rely heavily on informal support networks due to higher poverty rates than whites (Rote and Moon 2018; Dilworth-Anderson et al. 2002). Moreover, Blacks and Hispanics are more likely to live in multigenerational households than whites, leading to a higher likelihood of custodial grandparenting and co-residential eldercare than whites (Keene and Batson 2010; Peek, Coward, and Peek 2000). From the perspective of cultural practices in family caregiving, black families have a long tradition of intergenerational assistance in the face of external adversity (Uhlenberg and Hammill 1998). Hispanic families, too, have strong familial values and emphasize family ties and support (Kataoka-Yahiro, Ceria, and Caulfield 2004). Lastly, socioeconomic status also plays a crucial role in shaping the patterns of family caregiving, and it is often intertwined with other factors such as race/ethnicity (Cohen

et al. 2019). The usage of formal care services such as home-aides and community-based services can help alleviate the intensity and burden among family caregivers (Gaugler et al. 2003; Lyons and Zarit 1999). However, individuals with lower SES have less access to formal care services, leading to higher reliance on informal care (McMaughan et al. 2020). Hereby, I hypothesize that:

H3: The practice of sandwiched caregiving to older parents and grandchildren is more common among lower SES, Hispanics, and Black older adults.

H3a: By contrast, white and more educated caregivers are less likely to engage in the sandwiched caregiving, intensive spousal care, or grandparenting, but are more likely to provide eldercare to parents, especially among Baby Boomer cohorts.

The Significance of This Study

Guided by the life course perspective, this study aims to build a typology that captures the long-term family caregiving patterns among older adults in the U.S. While Fast and her colleagues (2021) identified heterogeneous family caregiving trajectories for Canadian older adults, there are several limitations in their study that preclude scholars from using their results to infer the caregiving patterns among older adults in the U.S. First, Fast and her colleagues (2021) only focused on caregivers who were born in the 1930s and were predominately white, which is different from the divergent family structures among older Americans with an increasingly diverse background, especially for Baby Boomers. Moreover, Fast and her colleagues (2021) did not include grandparenting in the scope of their research. Nonetheless, grandparenting or intergenerational family support has always been a long and highly valued tradition among racial minority groups. Therefore, not only grandparenting was left out of the picture, but the practice

of sandwiched care for grandchildren and older parents was overlooked as well. Further, while Fast and her colleagues' care trajectories incorporated the duration of each care role when constructing their care trajectories, they overlooked the intensity of caregiving roles, which again vary drastically by gender, race, and SES in the U.S, and can have different implications on caregivers' well-being. Lastly, the data they used was cross-sectional and retrospective, which may introduce measurement errors in the durations of the care roles.

Moving beyond Fast and her colleagues' work (2021) and using ten waves of longitudinal data from the Health and Retirement Study (HRS, 2000-2018), this study aims to develop a typology that better captures the long-term caregiving patterns among older Americans when they transit from the midlife to later ages, especially for caregivers of later birth cohorts and have experienced substantial changes in family structure over the past few decades. Extending Fast and her colleagues' work, I pay more attention to assessing the intensity and the duration of caregiving roles, including eldercare to parents, grandparenting, and spousal care. Lastly, the large range of birth cohorts in the HRS (2000-2018) enables me to compare the caregiving experiences of recent cohorts to previous cohorts. In this way, I can assess how changes in family structure over the past few decades affect older adults' later-life family caregiving experiences.

Data and Method

Data

This study uses ten waves of longitudinal data from the Health and Retirement Study (HRS, 2000-2018) and RAND HRS (2000-2018), a user-friendly version of the original HRS. Beginning in 1992, HRS has interviewed around 42,233 respondents aged 50 every other year. In this study, I restricted the sample to those who responded to the survey between 2000 and 2018

and were born between 1930 to 1965 (N= 26,567). Around 15,545 respondents have ever cared for a spouse, grandchildren, or older parents from 2000 to 2018. In the analytical sample (N=15,545), around 46.7% were born between 1931 and 1946 (the War Babies cohort), 19.7% were born between 1947 and 1953 (the Early Baby Boomer cohort), and 33.6% were born between 1954 and 1965 (the Middle/Later Baby Boomer cohort). The average age at the baseline survey was 57. Figure 3.1 shows the age range when respondents first entered the survey by each birth cohort. As Figure 3.1 suggests, caregivers of the War Babies cohort have the largest range (from 52 to 87). In contrast, the Early Baby Boomers (1947-1953) and the Middle/Late Baby Boomers (1954-1965) have very similar age ranges but tend to be younger than the War Babies cohort.

--Figure 3.1 about here --

Table 3.1 displays demographic characteristics by each birth cohort at baseline. As the Table 3.1 suggests, the proportions of Blacks, Hispanic and foreign-born respondents among the Baby Boomers (both Early Baby Boomers and Middle/Late Baby Boomers) are substantially higher than in previous cohorts. Moreover, both Early and Middle/Late Baby Boomers are less likely to be married but are more likely to divorced or never married than the War Babies cohort.

--Table 3.1 about here--

Measurement

I use multiple caregiving indicators to inform older adults' long-term family caregiving patterns. The indicators include the number of grandchildren as care recipients, number of older adults as care recipients, cumulative spousal care load, cumulative grandparenting load, cumulative

parental care load, overlapping caregiving waves, and total caregiving waves (excluded overlapping waves) between 2000 and 2018.

--Table 3.2 about here—

1). Grandparenting

In each survey wave, respondents were asked whether they had spent any hour taking care of their grandchildren in the past year. If a respondent answered "yes", I identified them as grandchild caregivers at the current wave. Then, the survey asked how many hours they provided care to their grandchildren in the past year. The intensity of grandparenting was coded based on the hours provided per year. Specifically, not providing any grandparenting was coded as "0", providing less than 300 hours was coded as "1: low intensity", and providing more than 300 hours per year were coded as "2: high intensity". Older adults who live with their young grandchildren were not eligible to answer the questions on care hours. Therefore, I identified older adults who live with young grandchildren under age 16 as "high-intensity" grandchild caregivers.

2). Eldercare to parents

In each wave, respondents were asked whether they provided IADL assistance (e.g., housekeeping, preparing meals, managing finances and medication, transportation) or ADL assistance (e.g., getting into/out of bed, toileting, bathing, eating, and dressing) to older parents because of their parents' functional limitations. If respondents answered "yes", I identified them as elderly caregivers to parents. The intensity of eldercare to parents was coded based on the amount of ADL assistance provided— "0" means not providing care to parents, providing only IADL assistance was coded as "1: low intensity", and providing at least one ADL assistance was

coded as “2: high intensity”. As for coresidential elder caregivers, I used caregivers’ parents’ functional limitations to denote the care intensity –older adults who live with parents with at least one ADL assistance are coded as “high-intensity” caregivers to parents, whereas living with parents who need only IADL assistance is coded as “low-intensity”.

3). Spousal care

The respondents’ spousal caregiving status was obtained based on the report of their spouse. For example, if the respondent’s spouse reported that himself/herself needed help with IADLs (household chores, errands, and transportation) or ADLs (dressing, eating, bathing, or getting out of the bed) and reported the respondent as the primary caregiver, I then classified the respondent as a primary spousal caregiver. The intensity of spousal caregiving was classified based on the number of ADLs provided to the spouse. Specifically, not providing any spousal care was coded as “0: non-spousal caregiver”, providing only IADL assistance was coded as “1: low intensity of care”, and providing one or more ADL assistance was coded as “2: high intensity of care”.

4). Overlapping and the overall total caregiving waves

The overlapping caregiving waves are the number of waves that a respondent provided care to multiple family members concurrently. The total caregiving waves were calculated by taking the total waves of each care role minus the total overlapping waves. Based on the statistics from Table 3.2, the Early Baby Boomer cohort have the highest overlapping waves (0.36), then followed by the Middle/Late Baby Boomer (0.29), and the War Babies cohort had the least overlapping caregiving waves (0.24). Overall, the Early Baby Boomers have the highest number

of total caring waves (2.90), then followed by the War Babies (2.81), and finally the Middle and Late Baby Boomers (2.09).

5). Cumulative caregiving load

To gauge the cumulative stress exposure of each care role, I first calculated the averaged care intensity for each care role across all waves. Then, I multiplied each care role's averaged caregiving intensity by its total care waves, and the products are defined as cumulative caregiving load. The cumulative caregiving load was calculated for grandparenting, parental care, and spousal care separately. Table 3.2 shows the matrices for cumulative spousal care load, cumulative grandparenting load, and cumulative parental care load. The cumulative spousal care load is the highest among the War Babies (1.27), followed by the Early Baby Boomers (0.79), and is the lowest among the Middle/Late Baby Boomers (0.53). The cumulative grandparenting load is the highest among the Early Baby Boomers (2.26), followed by the War Babies cohort (2.24), and is the lowest among Middle and Late Baby Boomers (1.47). The cumulative parental care load is the highest among the Early Baby Boomers (1.27), followed by the Mid/Late Baby Boomers (1.23), and is the lowest among the War Babies (0.59).

Method

The statistical analyses are conducted in two steps. First, the latent profile analysis (LPA) is employed to identify heterogeneous long-term caregiving patterns based on the information on the number of grandchildren one ever cared for, the number of adults one ever cared for, cumulative caregiving load to grandchildren, spouse, and parents, overlapping care waves, and total care waves between 2000 and 2018. The family caregiving patterns will be a time-invariant

categorical variable representing the overall care patterns from 2000 to 2018. The LPA is a person-centered and probability-based approach, and it takes measurement error into account and provides a statistical test for the number of profiles (Lubke and Muthén 2005). The AIC and BIC are used to determine the appropriate number of profiles.

After determining the suitable number of latent profiles, I further use multinomial logistical regression models to assess how birth cohorts, gender, race, and SES are associated with respondents' family caregiving patterns.

It is also worth noting that the caregivers in the analytical sample have different age ranges across each birth cohort, which makes the cohort comparisons of family caregiving patterns challenging. As Table 3.2 suggested, the War Babies were around 60.7 in the baseline, whereas the Baby Boomers entered the survey at around 53. Despite the difference of the age ranges, Figure 3.1 also indicates that the War Babies, the Early and Middle/Late Baby Boomers share a similar age range from 50s to 60s, when most caregiving activities occur in the later life. Moreover, the baseline age is controlled when conducting the multinominal logistic regressions to adjust the age range discrepancies.

Results

1. Heterogenous Family Caregiving Patterns: the results from the latent profile analysis

LPA fit statistics for one to six-class solutions are summarized in Table 3.3. The five-class solution appeared to be the best fitted. While the fit statistics (AIC and BIC) of the six-class solution are smaller than that of the five-class solution, the additional class of the six-class solution does not inform a qualitatively different long-term care pattern. The entropy measures to what extent the identified classes are different from one other. The entropy value ranges from 0

to 1, and a value higher than 0.8 usually indicates a good distance from other identified profiles (Lubke & Muthen 2007). The entropy of the five-class solution is 0.88, suggesting a good fit.

--Table 3.3 about here—

Table 3.4 summarizes the care measurements of each five class based on the total number of older adults, the total number of grandchildren one ever cared for, cumulative spousal care load, cumulative grandparenting load, cumulative older parental care load, overlapping care waves, and overall total care waves (excluding overlapping waves) between 2000 and 2018. The five classes are labeled as *Light Parental Caregiver*, *Light Grandchildren caregiver*, *Intensive Grandchild Caregiver*, *Intensive Spousal Caregiver*, and *Sandwiched Caregiver*, respectively. The *Light Parental Caregivers* account for about 44.1% of all caregivers, and on average they cared for 1.3 older adults for over two waves, with a cumulative parental care load (averaged parental care intensity × total waves cared for parents) of 1.45. *Light Parental Caregivers* also demonstrated a lower engagement in spousal care (0.67) and grandparenting (0.55) compared to other types of caregivers. The second common pattern is the *Light Grandchildren Caregiver* (38.7%), who distinguish themselves by a cumulative grandparenting load of 2.1 for slightly over two waves but relatively lower engagement in spousal care (0.18) and parental care (0.16). About 6.2% of the caregivers are labeled as *Intensive Grandchild Caregiver*, who have the highest level of cumulative grandparenting load (9.8) and longest total caregiving waves (5.7) across all five classes. On average, *Intensive Grandchild Caregivers* cared for 1.9 grandchildren during ten waves of the survey window. *Intensive Spousal Caregivers* account for 5.6% of all caregivers, and they primarily care for their spouses (cumulative spousal care load is 8.4) for almost five waves. Finally, the least common pattern, *Sandwiched Caregivers* (5.5%), are

characterized by 2.5 overlapping care waves and high-level cumulative loads for both grandparenting (5.02) and elder parents (3.9), with a total care duration of 5.1 waves.

--Table 3.4 about here—

2. Cohort, gender, race, SES, and long-term family caregiving patterns

Multinomial logistic regression is employed to investigate how birth cohort, gender, race, and SES shape the long-term family caregiving patterns. In the multinomial logistic regression, the dependent variable is the five-class family caregiving patterns, and the independent variables include birth cohort, gender, race, and educational attainment. The results of multinominal logistic regression models are shown in Table 3.5.

--Table 3.5 about here--

Table 3.5 presents a set of predictors, including birth cohort, gender, race, and educational level, for the five caregiving patterns, after controlling for demographics and health conditions at the baseline. The reference group is the *Light Parental Caregivers*. The analytical sample is N=14,890, because I excluded the respondents whose race were missing or unknown. The sensitivity analysis suggested the results remain consistent when including the respondents whose race was missing.

Both Early and Middle/Late Baby Boomer caregivers have a significantly lower relative risk ratio in being *Intensive Spousal Caregivers* (RRR_{EBB}= 0.66, $RRR_{M/LBB}$ = 0.29), Light Grandchild Caregivers (RRR_{EBB}= 0.87, $RRR_{M/LBB}$ = 0.72) , and *Intensive Grandchild Caregivers* (RRR_{EBB}= 0.65, $RRR_{M/LBB}$ = 0.21) as opposed to being *a Light Parental Caregiver* compared to War Babies caregivers. As for *Sandwiched Caregivers*, only the Middle/Late Baby Boomer caregivers have a significantly lower relative risk ratio of being a *Sandwiched Caregiver* as opposed to a *Light Parental Caregiver* than the War Babies caregivers ($RRR_{M/LBB}$ = 0.53).

Yet, there is no significant difference between the Early Baby Boomer and the War Babies caregivers.

In terms of gender differences, women have a significantly higher relative risk ratio of being a *Sandwiched Caregiver* as opposed to being *a Light Parental Caregiver* than male caregivers (RRR=1.44). However, there are no significant gender differences in other types of caregivers.

In terms of racial differences, Black caregivers have a significantly higher risk ratio of being an *Intensive Spousal Caregiver*, a *Sandwiched Caregiver*, a *Light Grandchild Caregiver*, and an *Intensive Grandchild Caregiver* than being a *Light Parental Caregiver* than white caregivers. Yet, there are no significant differences in being these four types of caregivers between Hispanic and white caregivers.

Lastly, as for the association between educational attainment and caregiving patterns, compared to caregivers with less than HS education, caregivers with HS, some college, and caregivers with college education all have a significantly lower relative risk ratio of being an *Intensive Spousal Caregiver* and a *Light Grandchildren Caregiver* than being a *Light Parental Caregiver*. Particularly, caregivers with HS or some college education have a significantly higher risk ratio of being a *Sandwiched Caregiver* than caregivers with less than HS education ($RRR_{HS\ or\ GED}$= 1.57, $RRR_{some\ college}$ = 1.89). Moreover, caregivers with college education have a significantly lower risk ratio of being an *Intensive Grandchild Caregiver* ($RRR_{college+}$ = 0.68) relative to being a *Light Parental Caregiver* than caregivers with less than a HS degree.

3.Interaction effects between cohort and gender

I added the interaction of birth cohort × gender to assess whether women and men exhibited differential caregiving patterns across three birth cohorts. Results are shown in Table 3.6.

The interaction of birth cohort × gender is significant for *Intensive Grandchild Caregivers* than being a *Light Parental Caregiver*. The predicted probability of each caregiving type is shown in Figure 3.2. Next, I specifically discuss the gender differences in the predicted probability of being each caregiving pattern by three cohorts.

--Table 3.6 about here --

--Figure 3.2. about here --

1). Sandwiched caregivers: Female caregivers have a significantly higher probability of being a *Sandwiched Caregiver* than that of male caregivers, and this pattern is consistent across all three birth cohorts. For both male and female caregivers, the probability of a *Sandwiched Caregiver* is significantly lower in the Middle/Late BBM cohort than that of Early BBM or War Babies cohorts. However, there is no significant difference in being a *Sandwiched Caregiver* between War Babies and Early BBM for both male and female caregivers.

2). Intensive grandchild caregivers: Among the Early Baby Boomer cohort and Middle/Late Baby Boomer cohort, female caregivers have a significantly higher probability of being an *Intensive Grandchild Caregiver* than male caregivers. Yet, there is no significant gender difference in being an *Intensive Grandchild Caregiver* among the War Babies cohort. As for gendered differential patterns, male caregivers of the Early and Middle/Late BBM cohorts have a significantly lower probability of being an *Intensive Grandchild Caregiver* than those of the War Babies cohort. By contrast, female caregivers only see a declined probability in being an

Intensive Grandchild Caregiver among the Middle/Late cohort, but there is no significant difference between the Early BBM and War Babies cohorts.

3). Intensive spousal caregivers: For both male and female caregivers, the probability being an *Intensive Spousal Caregiver* of the Early and Middle/Late BBM cohorts is significantly lower than that of the War Babies cohort. Nonetheless, no significant gendered patterns were detected, meaning that there are no significant gender differences in being an *Intensive Spousal Caregiver* in any of the three cohorts.

4). Light parental caregivers and light grandchildren caregivers: Both male and female caregivers of the Early and the Middle/Late cohorts have a significantly higher probability of being a *Light Parental Caregiver* than the War Babies cohort. However, no gendered differences are found in any of the three cohorts. Similarly, as for *Light Grandchild Caregivers*, no significant gender difference is found in any of the three cohorts.

4. Interaction effects between cohort and race

Similarly, I added the interaction term of birth cohort × race to examine the racial differences in the probability of each family caregiving pattern across three cohorts. Results are shown in Table 3.7. The interaction is significant for *Sandwiched Caregivers* and *Light Grandchild Caregivers* as opposed to being a *Light Parental Caregiver*, but not for *Intensive Spousal Caregivers* or *Intensive Grandchild Caregivers*. The predicted probability of each caregiving pattern by race and cohort is shown in Figure 3.3.

--Table 3.7 about here --

--Figure 3.3 about here--

1). Sandwiched Caregivers: White caregivers of the Middle/Late BBM cohort have a significantly lower probability of being a *Sandwiched Caregiver* than those of the War Babies and the Early BBM cohorts. Nonetheless, Black and Hispanic caregivers of the Early and Middle/Late BBM cohorts do not show any significant difference in being a *Sandwiched Caregiver* compared to their counterparts of the War Babies cohort. As for racial differences within each cohort, no significant racial difference is found for either the War Babies or the Early Baby Boomer cohort, but among the Middle/Late Baby Boomer cohort, white caregivers have a significant lower probability of being a *Sandwiched Caregiver* than black caregivers by 37.5% = (5.5%-4.0%)/4.0%. However, there is no significant difference between Hispanic and black caregivers. This suggests that the racial differences in being a *Sandwiched Caregiver* between black and white caregivers are more pronounced among the Middle/Late cohort than in the earlier cohorts.

2). Light Parental Caregivers: Across all three races, the probability of being a *Light Parental Caregiver* is significantly higher among the Early and the Middle/Late Baby Boomer cohorts than that of the War Babies cohort. Regarding racial differences within each cohort, among Early and Middle/Late Baby Boomer cohorts, white caregivers have a significantly higher probability of being a *Light Parental Caregiver* than their black and Hispanic counterparts. Black caregivers have a significantly lower probability of being a *Light Parental Caregiver* than their white and Hispanic counterparts, and this pattern is consistent across all three birth cohorts.

3). Light Grandchild Caregivers: Black caregivers show a significantly higher probability of being a *Light Grandchild Caregiver* than their white and Hispanic counterparts across all three birth cohorts, but this pattern became more pronounced in the Middle/Late Baby Boomer cohort. White caregivers of the Middle/Late Baby Boomer cohort show a significantly lower probability

of being *a Light Grandchild Caregiver* than the War Babies cohort. Yet Black and Hispanic caregivers do not show significant differences in the probability of being a *Light Grandchild Caregiver* than their counterparts of other cohorts.

4). Intensive Spousal Caregivers: All three races of later cohorts (both Early and Middle/Late Baby Boomer cohorts) have a significantly lower probability of being an *Intensive Spousal Caregiver* as opposed to the War Babies cohort. However, there is no significant racial difference in the probability of being an *Intensive Spousal Caregiver* within each cohort.

5). Intensive Grandchild Caregivers: White caregivers of Early and Middle/Late Baby Boomer cohorts have a significantly lower probability of being an *Intensive Grandchild Caregiver* than those of the War Babies cohort. By contrast, Black and Hispanic caregivers of the Baby Boomer cohorts do not exhibit any significant difference compared to their counterparts in the War Babies cohort. Moreover, within each cohort, Black caregivers consistently have the higher probability of being an *Intensive Grandchild Caregiver* than their white and Hispanic caregivers.

5. Interactions between birth cohort and education

Lastly, I added the interaction of cohort × education to assess different patterns by educational attainment across three cohorts. Results are shown in Table 3.8. The interaction is significant for *Intensive Spousal Caregivers, Sandwiched Caregivers, Light Grandchild Caregivers*, and *Intensive Grandchild Caregivers* relative to being a *Light Parental Caregiver*. The predicted probability of each caregiving pattern by educational attainment and cohort is shown in Figure 3.4.

--Table 3.8 about here --

--Figure 3.4 about here—

1). Intensive spousal caregivers and intensive grandchild caregivers: The patterns for *Intensive Spousal Caregivers* and *Intensive Grandchild Caregivers* are very similar. For caregivers across all educational backgrounds, the probability of being *an Intensive Spousal Caregiver* and being *an Intensive Grandchild Caregiver* is significantly lower in the Middle/Late BBM than that of the War Babies cohort. As for educational differences within each cohort, there is no significant difference among the War Babies cohorts. However, among the Early BBM and the Middle/Late BBM cohorts, higher education, especially college+, is associated with a significantly lower probability of being an *Intensive Spousal Caregiver* or an *Intensive Grandchild Caregiver*. This suggests that the educational differences in being an *Intensive Spousal Caregiver* and *Intensive Grandchild Caregiver* became more pronounced in later cohorts (both Early and Middle/Late Baby Boomer cohorts).

2). Light parental caregivers: As for the educational difference in being a *Light Parental Caregiver* within each cohort, no significant difference is found among caregivers of the War Babies cohort. However, the differences by educational attainment are significant among the Middle/Late cohort: the more educated the caregivers are, the higher likelihood of being a *Light Parental Caregiver*. No significant difference is found for caregivers with less than HS degree across three cohorts. By contrast, for caregivers with more than an High School education, later cohort caregivers all have significantly higher probability of being a *Light Parental Caregiver* than their counterparts of previous cohorts. As Figure 3.4 indicates, the differences in being a *Light Parental Caregiver* by educational attainment have become more pronounced in the Early and Middle Late BBM cohorts.

3). Light grandchild caregivers: The probability of being a *Light Grandchild Caregiver* does not differ significantly by educational attainment in the War Babies cohort. However, the

differences (by educational attainment) are significant among the Early and Middle/Late BBM cohorts: the more educated the caregivers are, the less likely they will be a *Light Grandchild Caregiver*. For example, caregivers with less than a High School education in later cohorts have a significantly higher probability of being a *Light Grandchild Caregiver* than previous cohorts. Nonetheless, caregivers with a college education in later cohorts have a significantly lower probability of being a *Light Grandchild Caregiver* than their counterparts in the previous cohort.

4). Sandwiched caregivers: Among the War Babies cohort, caregivers with a college degree are associated with a significantly higher probability of being a *Sandwiched Caregiver*. However, this pattern changed in the Early BBM and Middle/Late BBM cohorts: Caregivers with HS or some college education have the highest probability of being a *Sandwiched Caregiver* in later cohorts.

Sensitivity analysis

To address the selection issues of caregivers, I further conducted a sensitivity analysis to compare the results of multinomial logistic regression when adding non-caregivers as the reference group. The descriptive statistics of baseline characteristics of caregivers and non-caregivers are shown in Table 3.9. Compared to other caregivers, non-caregivers have a lower proportion of married older adults, but higher proportions of separated, divorced, or never married older adults. Moreover, non-caregivers also have a higher attrition rate than other caregivers. There is no significant difference in the baseline age between caregivers and non-caregivers.

I added non-caregivers in the multinomial logistic regression and treated them as the reference group. The coefficients for birth cohort, race, and educational attainment did not shift significantly. But the coefficient for gender is significant for *Intensive Spousal Caregivers* than

being a non-caregiver: compared to older men, older women have relative higher risk ratio to be *Intensive Spousal Caregivers* as opposed to being a non-caregiver. Similarly, older women have higher relatively risk ratio of being a *Light Parental Caregiver* relative to being a non-caregiver than older men.

--Table 3.9 about here—

Previous studies suggest that care recipients' enrollment into long-term care insurance (LTI) or Medicaid may change caregivers' burden. However, older parents' enrollment status for LTI or Medicaid was not available in the data. I did control for spouses' enrollment status in the multinominal logistic model, but it did not shift the results either. Nevertheless, it is interesting to note that having a spouse enrolled in LTC or Medicaid is still associated with significantly higher relative risk ratio of being an *Intensive Spousal Caregiver* as opposed to being a *Light Parental Care* or a non-caregiver.

Discussion and Conclusion

Guided by the life course perspective, using ten waves of longitudinal data from the HRS, this study is among the first that identified prominent long-term family caregiving patterns among American older adults. Extending Fast and her colleagues' work on life-course family caregiving trajectories, this study takes a step further by considering the care intensity when constructing the long-term caregiving typology. Moreover, this study investigates how these five caregiving patterns are associated with caregivers' birth cohort, race, gender, and educational attainment.

I identified five prominent long-term caregiving patterns of older adults using the latent profile analysis. The five caregiving patterns are *Light Parental Caregivers* (44.3%), *Light*

Grandchild Caregivers (38.6%), *Intensive Grandchild Caregivers* (6.1%), *Sandwiched Caregivers* (5.5%), and *Intensive Spousal Caregivers* (5.5%).

The findings from the multinomial logistic regression suggest that, overall, caregivers of later cohorts have a significantly lower probability of being an *Intensive Spousal Caregiver*, *Light Grandchild Caregiver*, and *Intensive Grandchild Caregiver*, but have a significantly higher probability of being a *Light Parental Caregiver* than War Babies caregivers. Only the Middle/Late Baby Boomer cohort have a significantly lower probability of being a *Sandwiched Caregiver* than War Babies caregivers. These findings support the hypothesis (H1) that later cohorts have a higher likelihood of being a *Light Parental Caregiver* due to the prolonged life expectancy and longer years of shared lives across family members. In addition, the lower probability of being an *Intensive Spousal Caregiver* among later cohorts indicates the weakened bonds between couples due to the increased divorces and never married population (Shapiro 2003). In addition, the lower probability of being *Light and Intensive Grandchildren Caregivers* among later cohorts may also mirror the delay in the time of childbearing and further the delayed timing of grandparenting (Furstenberg 2006). While I hypothesized that later cohorts would see a higher likelihood of being a *Sandwiched Caregiver* to older parents and grandchildren, the results suggest that caregivers of the Middle/Late Baby Boomer cohort have a significantly lower probability than the War Babies cohort. No significant difference in being a *Sandwiched Caregiver* between the War Babies and the Early Baby Boomer caregivers (the sensitivity analysis suggests the similar pattern too). This is because although the Middle/Late Baby Boomer cohort shared longer years with their parents, they also have experienced a significant delay in childbearing and further delay in grandparenting than the Early Baby Boomer cohort. Therefore, caregivers of the Middle/Late Baby Boomer cohort shared fewer overlapping years

with their older parents and grandchildren and were less likely to be a *Sandwiched Caregiver* than previous cohorts.

The results from multinomial logistic regression also suggest that female caregivers have a significantly higher probability of being a *Sandwiched Caregiver* than male caregivers. There is no significant difference in being an *Intensive Spousal Caregiver, Light Grandchild Caregiver, Heavy Grandchild Caregiver, or Light Parental Caregiver* between male and female caregivers. However, if I add non-caregivers into the regression (as shown in sensitivity analysis in Table 3.10), as opposed to being a non-caregiver, older women consistently have a higher relative risk ratio of being any type of caregiver than older men.

When assessing the gendered patterns across three birth cohorts, female caregivers are more likely to be a *Sandwiched Caregiver* than male caregivers consistently across three birth cohorts. Both female and male of the Middle/Late BBM cohort show a significantly lower probability of being a *Sandwiched Caregiver* than their counterparts of the Early Baby Boomer and the War Babies cohorts. Moreover, male caregivers of both Early and Middle/Late Baby Boomer cohorts have a significantly lower probability of being an *Intensive Grandchild Caregiver* than their counterparts of the War Babies cohort. By contrast, only female caregivers of the Middle/Late Baby Boomer cohort have a significantly lower probability of being an *Intensive Grandchild Caregiver* than previous cohorts. It is worth noting that female caregivers consistently have a higher probability in being an *Intensive Grandchild Caregiver* than male caregivers across all three cohorts. These findings all lend support for *H2* that female caregivers are more likely to shoulder a heavier care burden than their male counterparts. Moreover, these findings are consistent with previous studies' findings on women's caregiving engagement, despite of the rise in women's labor force participation among the Baby Boomers cohort, women

continue sharing a larger bulk of family care responsibilities than men (Bianchi and Milkie 2010; Sayer and Gornick 2012). Further, this study also suggests that an uneven share of family caregiving is persistent in later life too (Lee and Tang 2015). Male caregivers have seen a retreat from intensive grandparenting starting from the Early BBM, but it is not until the Middle/Late cohort did female caregivers see a decrease in intensive grandparenting compared to the previous cohort. This partially provides support for *H2a* that despite the overall cohort changes in the decline of intensive grandparenting, female caregivers experienced a delay in the change until the latest birth cohort.

The results from the multinomial logistic regressions reveal that family caregiving patterns varied significantly by race. Overall, Black caregivers have a significantly higher probability of engaging in heavier long-term caregiving patterns (e.g., *Intensive Spousal Caregivers, Sandwiched Caregivers, Light Grandchildren Caregivers, and Intensive Grandchildren Caregivers*) than white caregivers. This provides support for the hypothesis (*H3*) that black caregivers are more likely to engage in heavier caregiving patterns than white caregivers. Further, the cohort changes in family caregiving patterns did not occur uniformly across races, lending support to *H3a.* White caregivers of the Middle/Late Baby Boomer cohort have seen a significantly lower probability of being a Sandwiched Caregiver than white caregivers of previous cohorts. In contrast, black and Hispanic caregivers of later cohorts do not experience significant changes in being a *Sandwiched Caregiver*. Further, the Black-white difference in being a *Sandwiched Caregiver* is significant in the Middle/Late Baby Boomer cohort: Black caregivers show significantly higher probability of being a *Sandwiched Caregiver* than their white counterparts. In terms of *Light Grandchild Caregivers* and *Intensive Grandchild Caregivers*, Black caregivers show a significantly higher probability of being a *Light and*

Intensive Grandchild Caregiver than white and Hispanic caregivers. This is consistent across three cohorts. Moreover, white caregivers of the Middle/Late Baby Boomer cohort show a significantly lower probability of being a *Light and Intensive Grandchild Caregiver* than those of the War Babies cohort, whereas Black and Hispanic caregivers of later cohorts do not exhibit significant differences than their counterparts of the War Babies cohort. The decline in the probability of being *a Sandwiched Caregiver, Intensive Grandchild Caregiver, and Light Grandchild Caregiver* of white caregivers mirrored a more pronounced delay in childbearing and grandparenting among white older adults of the later cohorts. Hispanic and Black caregivers, on the other hand, continue their engagement in intensive grandparenting and sandwiched caregiving. These findings further confirmed that despite the demographic transitions in later cohorts, intergenerational caregiving, especially intensive caregiving, is still common among racial minority caregivers (Cohen et al. 2019; Rote and Moon 2018). Lastly, white caregivers of later cohorts show a significantly higher probability of being a *Light Parental Caregiver* than their Black and Hispanic counterparts. This again mirrored persistent racial gaps in life expectancy, and that whites' longer life expectancies have led longer years of shared lives with their older parents than Blacks and Hispanics.

Lastly, findings from the multinomial logistic regression also suggest that educational attainment plays an important role in shaping caregivers' long-term caregiving patterns. The more educated caregivers are, the more likely they would be a *Light Parental Caregiver* as opposed to other patterns. This trend has become more pronounced among Early and Middle/Late Baby Boomer cohorts, lending supports for *H3a* that caregivers with higher SES are more likely to provide eldercare to their parents, and less likely to engage in intensive grandparenting and spousal caregiving than those of lower SES. Interestingly, only caregivers

with HS/GED or some college education are more likely to be a *Sandwiched Caregiver*, whereas caregivers with less than HS degree or college education are less likely to be a *Sandwiched Caregiver*. Moreover, the changes in the probability of being a Sandwiched Caregiver of later cohorts are more pronounced among those with college education than those with less than an HS degree. This again confirms previous literature that sandwiched caregiving itself depends on the availability of both kins (older parents and grandchildren) (Margolis and Wright 2017). While college-educated groups have much improved life expectancy and thus have longer shared lives with their parents, they also have seen much delayed childbearing, especially among the Middle/Late Baby Boomer cohort. Therefore, the likelihood of being sandwiched between older parents and grandchildren decreased drastically among more educated groups of later cohorts.

Despite the efforts to use a life-course approach to dissect long-term family caregiving patterns among older adults, there are several limitations in this study worth mentioning. First, this study only includes caregivers in the analysis. It is entirely likely that most disadvantaged older adults who are kinless are excluded from the analysis, which makes the results less representative of the total population (Margolis and Verdery 2017). To address this concern, I conduct a sensitivity analysis by including never-caregivers in the multinomial logistic regression (Table 3.10). The results remain consistent, despite older women have a higher probability of being any type of caregiver than male older adults. Second, while this study considers caregiving intensity when construct the care typology, care intensity, especially for parental care and grandparenting, is measured by hours during the past year instead of per week, which is a relatively crude measure and may not be the most accurate. As a result, caregiving patterns classified from the LPA model ultimately reflect more of the care duration than care intensity. Third, limited by the available caregiving information from HRS, I could not obtain

other care activities such as care for siblings and care for adult children with disability. In that sense, I might underestimate the family caregiving burdens among older Americans. Yet, to my knowledge, care for siblings or adult children is relatively rare compared to caring for spouse, parents, and grandchildren in later life (AARP 2020), which probably will not significantly change the results predicted by the LPA model. Fourth, caregivers of these three cohorts have different age ranges in the analytical sample, with the War Babies entering the survey at around their 60s whereas the Baby Boomers entering at around their early 50s. Despite the efforts to control the baseline age in the regression, the lower likelihood of being an Intensive Spousal Caregiver or Intensive Grandchild Caregiver among the Baby Boomers might mirror more of the life stage differences than cohort changes. Hence, as more waves of data from HRS come out, researchers should incorporate future waves to capture more comprehensive family caregiving experiences in later life. Lastly, while findings from this study suggest the Middle/Late Baby Boomer cohort are less likely to engage in sandwiched caregiving to older parents and grandchildren, recent studies suggested that they are more likely to engage in another type of sandwiched caregiving, for instance, simultaneously caring for older parents and young children (Horowitz 2022). However, caring for young children (not grandchildren) is not available from HRS. As the delay of childbearing has become more common among later cohorts (especially those born after 1965s), future waves of HRS should consider adding care information for young children under 18 in the household.

In summary, the findings from this study indicate that, overall, older caregivers of later cohorts have lower probability of being an *Intensive Spousal Caregiver* and *Intensive Grandchild Caregiver* but a higher probability of being a *Light Parental Caregiver* than the War Babies cohort. These changes in caregiving patterns reflect the significant demographic transitions over

the past few decades and their implications on intergenerational relations. Nonetheless, the changes in the family caregiving patterns did not occur uniformly across all demographic groups. White and college-educated caregivers of later cohorts have a significantly lower likelihood of engaging in intensive caregiving patterns but a higher likelihood of being a *Light Parental Caregivers* than other white caregivers from the War Babies cohort. This reflects white and more educated caregivers experience improved life expectancies and delayed or declining childbearing rates than other demographic groups. By contrast, less educated caregivers, racial minorities, and women of later cohorts are still more likely to engage in intensive caregiving patterns.

These findings confirmed caregiving burdens are not distributed evenly across gender, race, and SES, and that socioeconomically disadvantaged groups are more likely to take on intensive care activities and more likely to be needed across generations in the household (Anderson et al. 2013; Do, Cohen, and Brown 2014). As a result, family caregiving of higher intensity and longer duration leads to greater opportunity costs, financial losses, and deteriorated health outcomes (Carmichael and Charles 2003; Bauer and Sousa-Poza 2015). Compared to the War Babies cohort, the Baby Boomer cohorts are much more racially and socioeconomically diverse. Therefore, gender and racial disparities of caregiving burden might in return perpetuate the income and health disparities among older adults of the Baby Boomer cohort (Cohen et al., 2019; Wakabayashi and Donato 2006; Lee et al. 2015). As the Baby Boomers are aging at record numbers, it is imperative to expand Medicaid services or long-term care services to address uneven caregiving burden across gender, race, and SES.

Appendix

1. Descriptive Statistics

Table 3.1: Baseline demographic characteristics of each birth cohort (N= 15,545)

Birth Cohorts	War Babies 1931-1947 cohort		Early Baby Boomer 1948-1953 cohort		Middle/Late Baby Boomer 1954-1965 cohort	
	N=7,250		N=3,067		N=5,209	
	Mean/Prop.	SD	Mean/Prop.	SD	Mean/Prop.	SD
Race						
White	0.75		0.58		0.49	
Black	0.16		0.24		0.31	
Hispanic	0.09		0.18		0.20	
Female	0.55		0.58		0.58	
Age at baseline	60.70	4.76	53.90	3.74	52.57	2.90
Educational Attainment						
Less than HS	0.21		0.15		0.15	
GED or HS	0.37		0.30		0.32	
Some college	0.22		0.30		0.31	
College and above	0.20		0.25		0.22	
Marital Status						
Married	0.79		0.68		0.60	
Partnered	0.04		0.06		0.11	
Separated/ divorced	0.09		0.17		0.18	
Widowed	0.07		0.04		0.03	
Never married	0.01		0.04		0.08	
Labor force status						
Working	0.46		0.69		0.66	
Not in the labor force	0.54		0.17		0.20	
Retired	0.38		0.14		0.13	
Household Income	68644.16	126754.3	75494.53	91016.88	76771.96	118827.1
Foreign-born	0.10		0.14		0.17	

Table 3.2: Caregiving Measurement between of the analytical sample between 2000-2018 (N=15,545)

	War Babies		Early Baby Boomer		Middle/Late Baby Boomer	
	1931-1947 cohort		1948-1953 cohort		1954-1965 cohort	
	Mean/Prop.	SD	Mean/Prop.	SD	Mean/Prop.	SD
Age at baseline	60.7	4.77	53.8	3.75	52.6	2.9
Number of grandchildren cared for	1.25	1.04	1.12	0.98	0.92	1
Number of adults cared for	0.86	0.81	0.88	0.75	0.91	0.71
Total care waves	2.81	1.94	2.9	1.83	2.09	1.29
Total overlapping waves	0.24	0.67	0.36	0.84	0.29	0.68
Grandparenting 2000-2018						
Total waves of grandparenting	1.77	1.8	1.7	1.77	1.08	1.27
Averaged intensity of grandparenting						
0: no care	0.28		0.32		0.44	
1: low intensity (<300 hr)	0.61		0.54		0.41	
2: high intensity (> 300hr or live w/ grandchildren)	0.11		0.14		0.15	
Cumulative grandparenting load	2.2	2.9	2.3	3.03	1.47	2.11
Eldercare to parents 2000-2018						
Total eldercare waves	0.57	1.1	1.12	1.56	1.03	1.22
Averaged intensity of eldercare						
0: no care	0.70		0.51		0.43	
1: low intensity (only IADL)	0.30		0.46		0.49	
2: high intensity (ADL or live w/parents)	0.09		0.04		0.07	
Cumulative eldercare load	0.6	1.31	1.26	2.1	1.23	1.74
Spousal care 2000-2018						
Total spousal care waves	0.73	1.8	0.45	1.11	0.3	0.83
Averaged spousal care intensity 2000-2018						
0: no care	0.61		0.74		0.77	
1: low intensity (only IADL)	0.13		0.09		0.07	
2: high intensity (ADL assistance)	0.25		0.18		0.16	
Cumulative spousal care load	1.5	2.85	1.02	2.33	0.75	1.83

Table 3.3. Fit Statistics of the latent profile analysis

	Log-likelihood	DF	AIC	BIC	Entropy	N
Class 2	-181780.4	22	363604.9	363773.2	0.73	15,545
Class 3	-177850.8	30	355761.6	355991.2	0.83	15,545
Class 4	-172566.9	48	345209.8	345500.6	0.87	15,545
Class 5	-166408.5	46	332908.9	333260.9	0.88	15,545
Class 6	-163065.8	54	326239.5	333260.9	0.90	15,545

Table 3.4. Characteristics of Five Long-Term Family Caregiving Patterns (N=15,545)

	Class 1	Class 2	Class 3	Class 4	Class 5
Label	Light parental caregiver	Intensive spousal caregiver	Sandwiched caregiver	Light grandchildren caregiver	Intensive grandchildren caregiver
# Grandchildren ever cared for	0.51	0.91	1.73	1.62	1.94
# Adults ever cared for	1.32	1.36	1.62	0.27	0.62
Cumulative Grandparenting load	0.55	0.94	5.02	2.10	9.77
Cumulative spousal Care load	0.67	8.44	1.58	0.18	0.38
Cumulative care load to Aging parents	1.45	0.27	3.88	0.16	0.37
Overlapping waves	0.15	0.55	2.51	0.07	0.33
Total care waves	2.07	4.92	5.11	2.04	5.67
%	44.14%	5.55%	5.49%	38.65%	6.18%

Table 3.5: Multinomial logistic regression results for predictors and five caregiving patterns (N=14,890)

	Intensive spousal caregiver	Sandwiched caregiver	Light grandchild caregiver	Intensive grandchild caregiver
Birth cohort (ref= War Babies)				
Early Baby Boomer	0.62***	0.87	0.87*	0.61***
	(0.08)	(0.11)	(0.05)	(0.06)
Middle/Late Baby Boomer	0.25***	0.44***	0.71***	0.18***
	(0.03)	(0.05)	(0.04)	(0.03)
Women	1.10	1.40***	1.01	1.16
	(0.08)	(0.11)	(0.04)	(0.09)
Education (ref = less than HS)				
HS or GED	0.69**	1.50**	0.80***	0.96
	(0.08)	(0.22)	(0.05)	(0.11)
Some college	0.65**	1.80***	0.72***	0.90
	(0.08)	(0.28)	(0.04)	(0.11)
College+	0.44***	1.02	0.50***	0.61**
	(0.06)	(0.17)	(0.03)	(0.09)
Race (ref = white)				
Black	1.27*	1.35***	1.50***	1.21+
	(0.14)	(0.14)	(0.07)	(0.12)
Hispanic	0.92	1.14	1.08	0.80
	(0.13)	(0.16)	(0.07)	(0.13)
Baseline Age	1.02	0.90***	1.03***	0.95***
	(0.01)	(0.01)	(0.01)	(0.01)
Marital status (ref= married)				
Partnered	0.66*	0.69*	0.95	0.57**
	(0.11)	(0.11)	(0.07)	(0.11)
Separated/divorced	0.04***	0.69*	1.15*	0.82
	(0.01)	(0.09)	(0.07)	(0.10)
Widowed	0.06***	0.78	2.03***	1.41*
	(0.03)	(0.18)	(0.18)	(0.24)
Never married	0.01***	0.20***	0.56***	0.38***
	(0.01)	(0.06)	(0.06)	(0.10)
Labor status (ref=working)				
Not in LF	0.81	0.99	0.96	0.89
	(0.09)	(0.11)	(0.05)	(0.10)
Retired	0.77*	1.23	1.01	0.98
	(0.08)	(0.13)	(0.05)	(0.10)
Foreign born	1.29	0.72*	1.19*	0.79
	(0.18)	(0.11)	(0.08)	(0.12)
Household income				
2nd quantile	0.70**	1.11	1.09	1.09
	(0.07)	(0.15)	(0.06)	(0.13)
3rd quantile	0.45***	1.31*	1.26***	1.51***
	(0.06)	(0.18)	(0.08)	(0.19)
4th quantile	0.25***	1.17	1.36***	1.26
	(0.04)	(0.17)	(0.09)	(0.19)

# Chronic conditions	1.05	1.00	1.04*	1.03
	(0.03)	(0.03)	(0.02)	(0.03)
# ADL needs	1.16**	1.00	1.03	0.98
	(0.06)	(0.06)	(0.03)	(0.06)
Attrition	0.54***	0.46***	0.97	0.48***
	(0.05)	(0.04)	(0.04)	(0.04)
Constant	0.28**	30.23***	0.20***	5.37**
	(0.17)	(19.92)	(0.06)	(3.16)
Observations	14,890	14,890	14,890	14,890

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

(Note: coefficients are in relative risk ratio, light parental caregiver is the reference group)

Table 3.6. Multinominal logistic regression results for predictors and five caregiving patterns with gender and cohort interaction (N=14,890)

	Intensive Spousal Caregiver		Sandwiched Caregiver		Light Grandchild Caregiver	
Birth Cohort	RRR	S.E	RRR	S.E	RRR	S.E
Early Baby Boomer	0.69***	(0.11)	0.88	(0.15)	0.85*	(0.07)
Middle/Late Baby Boomer	0.22 **	(0.04)	0.47***	(0.08)	0.66***	(0.05)
Women	1.04	(0.1)	1.41**	(0.19)	0.95	(0.05)
Early BBM * Gender	0.79	(0.16)	0.99	(0.2)	1.05	(0.11)
Middle/Late BBM * Women	1.24	(0.27)	0.95	(0.18)	1.16	(0.1)

*** p<0.001, ** p<0.01, * p<0.05
(Note: coefficients are in relative risk ratio, light parental caregiver is the reference group)

Table 3.7. Multinominal logistic regression results for predictors and five caregiving patterns with race and cohort interaction (N=14,890)

	Intensive Spousal Caregiver		Sandwiched Caregiver		Light Grandchild Caregiver	
Birth Cohort	RRR	S.E	RRR	S.E	RRR	S.E
Early Baby Boomer	0.63***	(0.10)	0.84	(0.11)	0.87	(0.06)
Middle/Late Baby Boomer	0.24***	(0.04)	0.39***	(0.05)	0.64***	(0.04)
Race						
Black	1.3	(0.17)	0.97	(0.19)	1.33***	(0.10)
Hispanic	0.79	(0.14)	0.98	(0.25)	0.94	(0.10)
Early BBM * Black	0.98	(0.26)	1.34	(0.36)	1.09	(0.14)
Early BBM * Hispanic	1.02	(0.27)	1.14	(0.37)	1.04	(0.15)
Middle/Late Baby Boomer * Black	0.74	(0.22)	1.75 *	(0.42)	1.32 **	(0.14)
Middle/Late Baby Boomer * Hispanic	1.57	(0.42)	1.33	(0.4)	1.37 *	(0.17)

*** p<0.001, ** p<0.01, * p<0.05
(Note: coefficients are in relative risk ratio, light parental caregiver is the reference group)

Table 3.8. Multinomial logistic regression results for predictors and five caregiving patterns with education and cohort interaction (N=14,890)

	Intensive Spousal Caregiver		Sandwiched Caregiver		Light Grandchild Caregiver	
Birth Cohort	RRR	S.E	RRR	S.E	RRR	S.E
Early Baby Boomer	0.73	(0.16)	0.59	(0.22)	1.30*	(0.17)
Middle/Late Baby Boomer	0.43***	(0.09)	0.70	(0.20)	1.33**	(0.15)
Education						
GED or HS	0.74*	(0.09)	1.32	(0.29)	0.93	(0.07)
Some college	0.82	(0.12)	1.82**	(0.41)	0.96	(0.08)
College +	0.65*	(0.11)	1.62*	(0.38)	0.88	(0.08)
Early BBM * GED or HS	1.13	(0.31)	2.06	(0.82)	0.78	(0.12)
Early BBM * some college	0.83	(0.25)	1.63	(0.66)	0.65**	(0.10)
Early BBM * college +	0.45*	(0.16)	0.85	(0.35)	0.42***	(0.07)
Middle/Late VVM * HS or GED	0.69	(0.18)	0.87	(0.27)	0.66***	(0.08)
Middle/Late BBM * some college	0.42**	(0.13)	0.68	(0.21)	0.49***	(0.06)
Middle/Late BBM * college +	0.43*	(0.15)	0.30***	(0.10)	0.28***	(0.04)

*** p<0.001, ** p<0.01, * p<0.05

(Note: coefficients are in relative risk ratio, light parental caregiver is the reference group)

Table 3.9. Demographic Statistics at the baseline by non-caregivers and other five caregiving patterns (N=26,56

	Non-Caregivers	Intensive spousal caregivers	Sandwiched caregivers	Light parental caregivers	Light grandchild caregivers
Birth Cohort					
War Babies	43.9%	68.7%	35.8%	39.3%	51.6%
Early Baby Boomer	15.9%	17.0%	28.5%	19.5%	18.4%
Middle/Late Baby Boomer	40.1%	14.3%	35.7%	41.2%	30.1%
Gender					
Men	47.8%	46.8%	33.8%	43.9%	43.0%
Women	52.2%	53.2%	66.2%	56.1%	57.0%
Educational Attainment					
Less than HS	20.7%	31.5%	8.8%	14.9%	21.6%
GED or HS	31.7%	36.0%	34.6%	32.3%	35.4%
Some College	24.3%	20.4%	35.3%	26.7%	25.3%
College +	23.1%	12.0%	21.2%	26.1%	17.8%
Race					
White	60.6%	62.2%	66.1%	65.2%	59.6%
Black	22.4%	18.5%	21.7%	20.4%	25.6%
Hispanic	16.9%	19.3%	12.2%	14.4%	14.8%
Age	57.6 (6.0)	58.6 (5.9)	54.3 (4.6)	55.9 (5.4)	57.5 (5.6)
Marital Status					
Married	55.4%	92.4%	78.0%	68.3%	67.5%
Partnered	7.8%	5.9%	6.0%	7.5%	6.6%
Separated/Divorced	19.7%	1.1%	11.9%	14.5%	15.3%
Widowed	8.0%	0.0%	2.7%	3.3%	7.7%
Never married	9.2%	0.1%	1.4%	6.4%	3.0%
Labor Force Status					
Working	52.9%	48.5%	64.8%	59.6%	54.2%
Not in LF	19.2%%	21.4%	15.5%	17.7%	17.5%
Retired	27.9%	30.1%	19.7%	22.6%	28.3%
Foreign born	18.3%	17.5%	8.7%	13.0%	14.2%
Household Income					
1st quantile	29.2%	30.8%	15.1%	22.2%	24.3%
2nd quantile	24.4%	34.8%	24.0%	25.1%	26.7%
3rd quantile	22.2%	23.4%	31.9%	26.0%	26.1%
4th quantile	24.3%	11.0%	29.0%	26.7%	22.9%
# Chronic conditions at baseline	1.5	1.5	1.2	1.3	1.4

# ADL needs	0.3 (0.9)	0.3 (0.8)	0.2 (0.7)	0.2 (0.7)	0.2 (0.8)
Attrition	55.2%	37.3%	24.5%	41.5%	44.4%
N of respondents	11022	847	849	6897	6005
%	41.5%	3.2%	3.2%	26.0%	22.6%

Note: Values for categorical variables are in percent. The means values, followed by standard errors are in parentheses for other variables. P-value is based on chi-square test or anova test.

Table 3.10. Multinominal logistic regression results for predictors and five caregiving patterns (non-caregivers are reference group, N= 25,307)

VARIABLES	Intensive spousal caregivers	Sandwiched caregivers	Light parental caregivers	Light grandchild caregivers	Intensive grandchild caregivers
Birth cohort					
(ref = War Babies)					
Early Baby Boomer	0.46***	0.67***	0.78***	0.68***	0.48***
	(0.06)	(0.08)	(0.04)	(0.04)	(0.05)
Middle/Late Baby Boomer	0.13***	0.24***	0.54***	0.39***	0.10***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.01)
Women	1.18*	1.67***	1.20***	1.21***	1.31***
	(0.09)	(0.13)	(0.04)	(0.04)	(0.10)
Education					
(ref = less than HS)					
HS/GED	0.82*	1.77***	1.19**	0.96	1.15
	(0.08)	(0.26)	(0.06)	(0.05)	(0.13)
Some college	0.81	2.25***	1.26***	0.92	1.14
	(0.09)	(0.33)	(0.07)	(0.05)	(0.14)
College	0.56***	1.27	1.29***	0.65***	0.79
	(0.08)	(0.21)	(0.08)	(0.04)	(0.11)
Race					
(ref = white)					
Black	1.27*	1.39***	1.03	1.52***	1.23*
	(0.13)	(0.14)	(0.04)	(0.07)	(0.12)
Hispanic	1.00	1.25	1.07	1.14*	0.87
	(0.14)	(0.18)	(0.06)	(0.07)	(0.13)
Age at baseline	0.94***	0.84***	0.92***	0.95***	0.88***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)
Marital status at baseline					
(ref= married)					
Partnered	0.48***	0.54***	0.77***	0.70***	0.41***
	(0.08)	(0.08)	(0.05)	(0.05)	(0.08)
Separated/Divorced	0.02***	0.37***	0.52***	0.58***	0.42***
	(0.01)	(0.05)	(0.03)	(0.03)	(0.05)
Widowed	0.02***	0.28***	0.35***	0.67***	0.49***
	(0.01)	(0.06)	(0.03)	(0.05)	(0.08)
Never married	0.01***	0.09***	0.47***	0.25***	0.16***
	(0.01)	(0.03)	(0.03)	(0.02)	(0.04)
Labor status at baseline					
(ref = working)					
Not in LF	0.89	1.01	1.03	0.99	0.91
	(0.10)	(0.11)	(0.05)	(0.05)	(0.10)
Retired	0.82*	1.30*	1.06	1.08	1.03

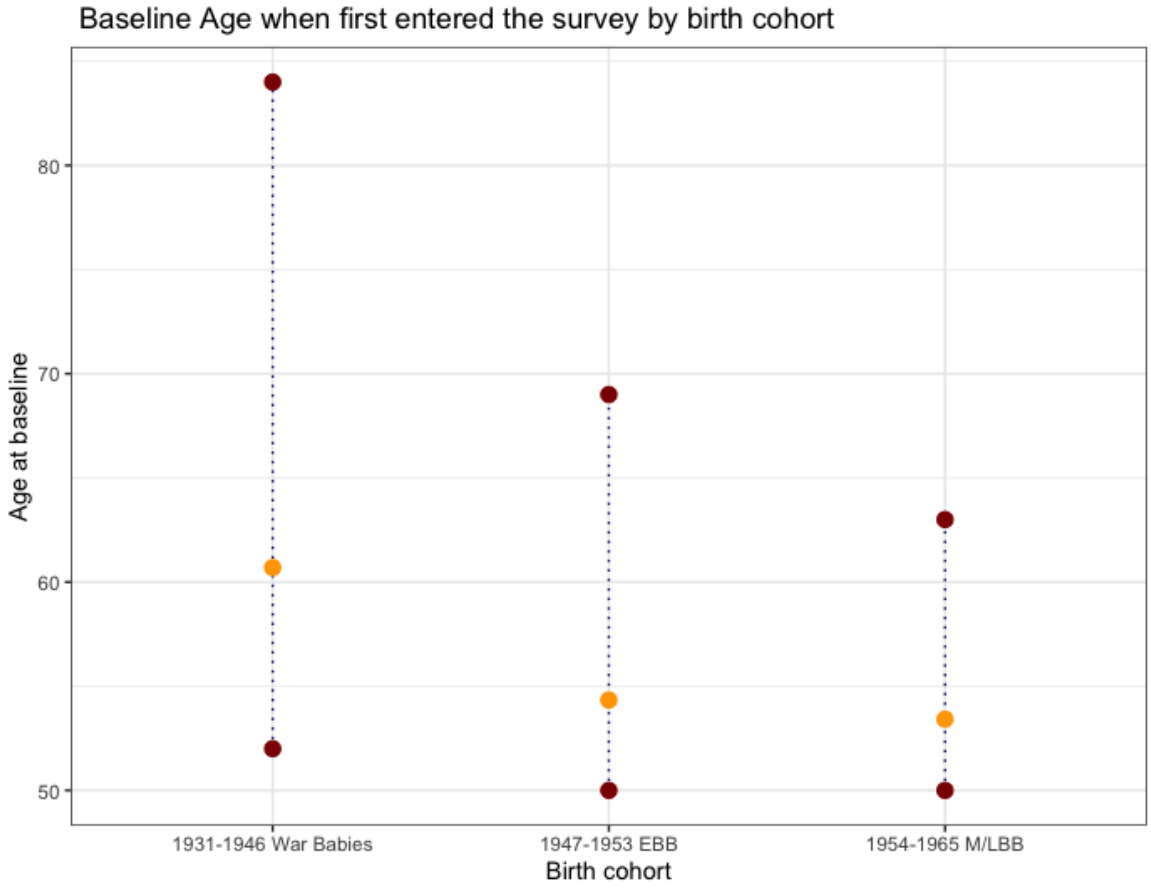
	(0.08)	(0.14)	(0.05)	(0.05)	(0.10)
Foreign-born	0.77*	0.41***	0.59***	0.71***	0.48***
	(0.10)	(0.07)	(0.04)	(0.04)	(0.07)
Household income (ref= 1st quantile)					
2nd quantile	0.70***	1.12	1.02	1.12*	1.13
	(0.07)	(0.14)	(0.05)	(0.06)	(0.14)
3rd quantile	0.39***	1.15	0.88*	1.11	1.35*
	(0.05)	(0.15)	(0.05)	(0.06)	(0.17)
4th quantile	0.18***	0.81	0.69***	0.95	0.91
	(0.03)	(0.12)	(0.04)	(0.06)	(0.13)
# chronic conditions at baseline	0.99	0.95	0.95***	0.99	0.98
	(0.03)	(0.03)	(0.01)	(0.01)	(0.03)
# ADL at baseline	1.05	0.93	0.92***	0.93**	0.90
	(0.05)	(0.05)	(0.02)	(0.02)	(0.05)
Attrition between 2000-2018	0.29***	0.24***	0.57***	0.54***	0.26***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Constant	40.07***	3,618.23***	116.85***	27.46***	583.06***
	(23.03)	(2,351.82)	(32.56)	(7.69)	(335.91)
Observations	25,307	25,307	25,307	25,307	25,307

(coefficients are in relative risk ratio, non-caregivers are the reference group)

*** p<0.001, ** p<0.01, * p<0.05

Figures

Figure 3.1: Age Range of Each Birth Cohort at Baseline



(*Note*: yellow dotes indicate mean of age, brown dots suggest min and max of the age range)

Figure 3.2. Predicated Probability of Each Family Caregiving Pattern by Gender and Cohort

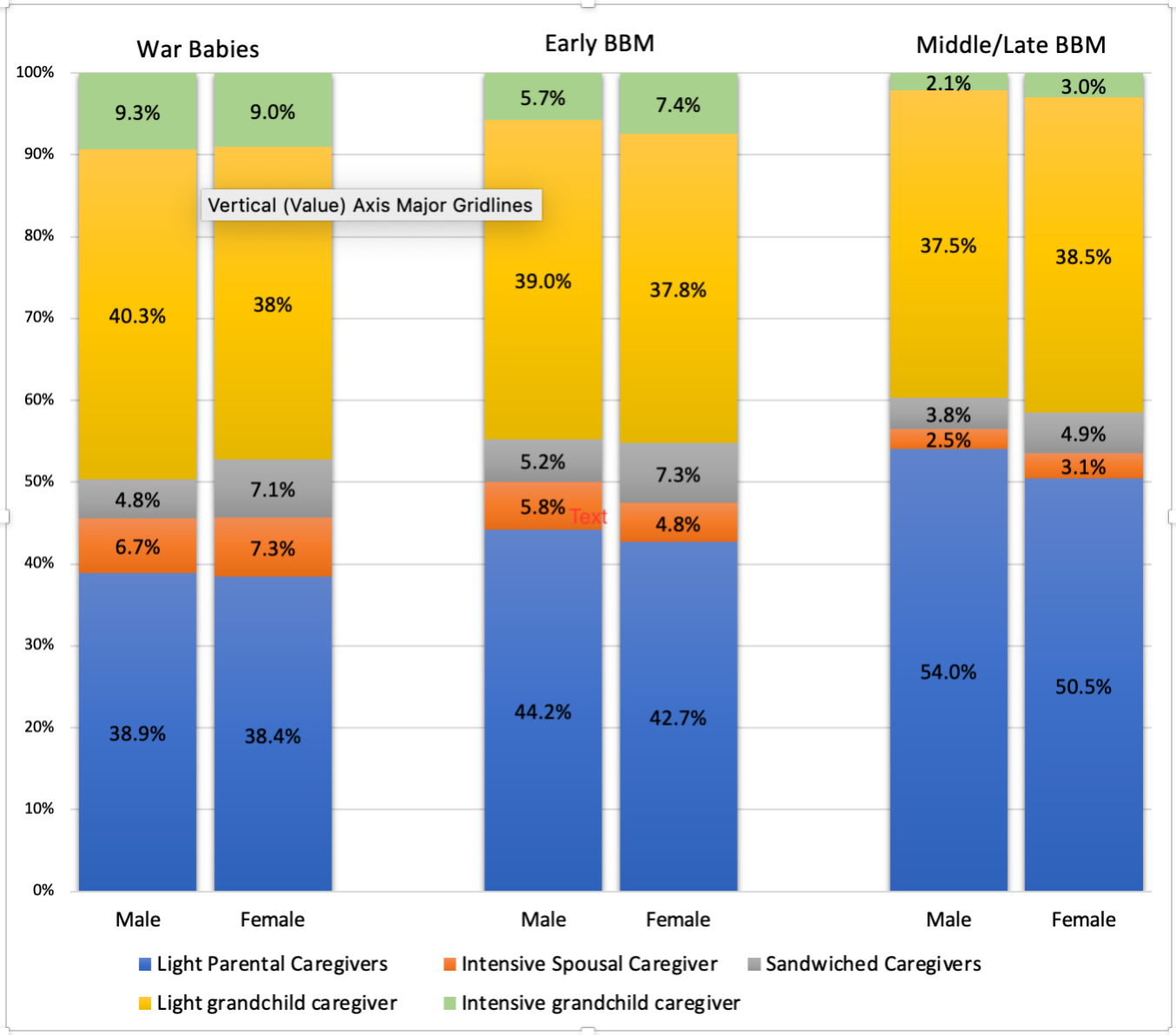


Figure 3.3. Predicated Probability of Each Family Caregiving Pattern by Race and Cohort

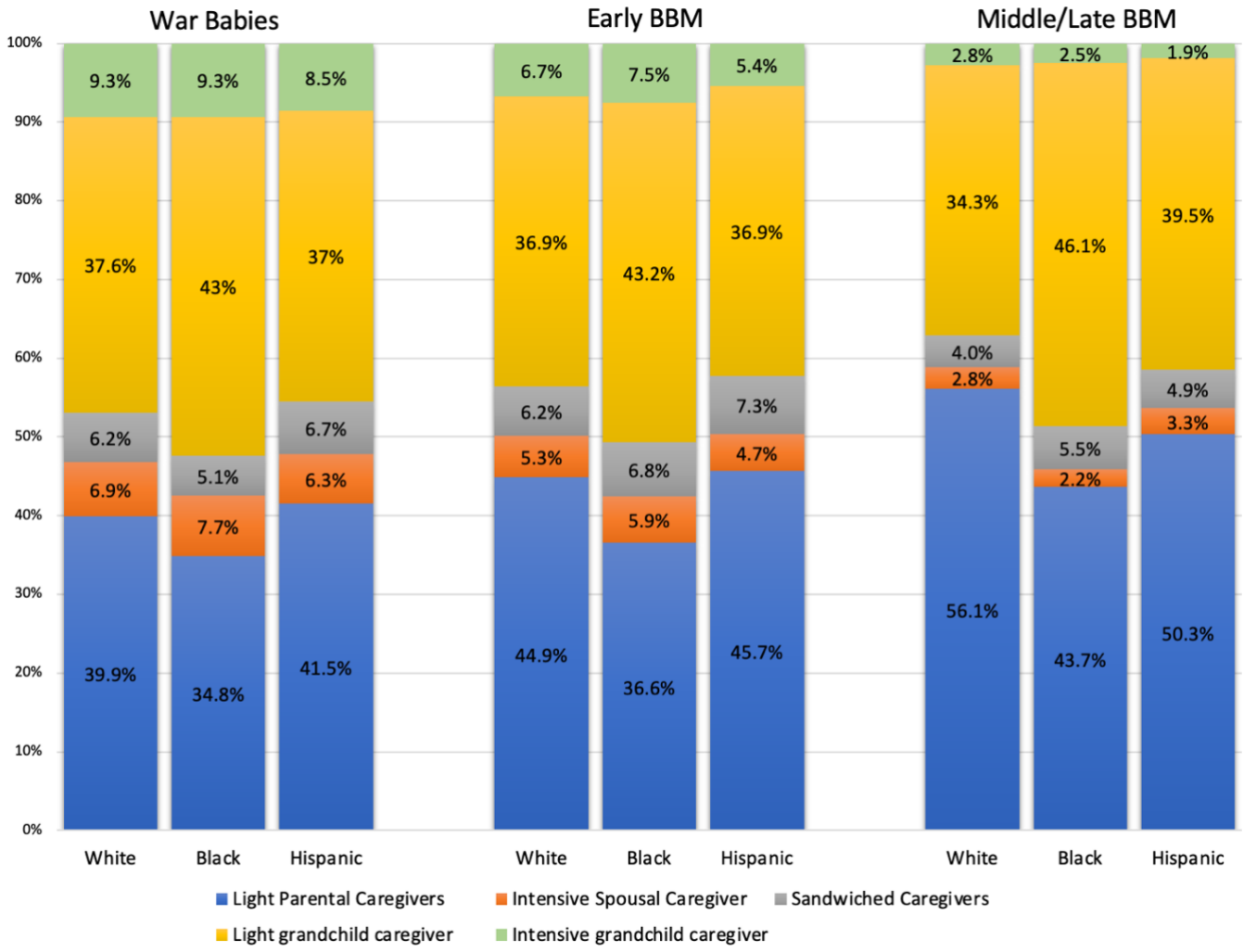
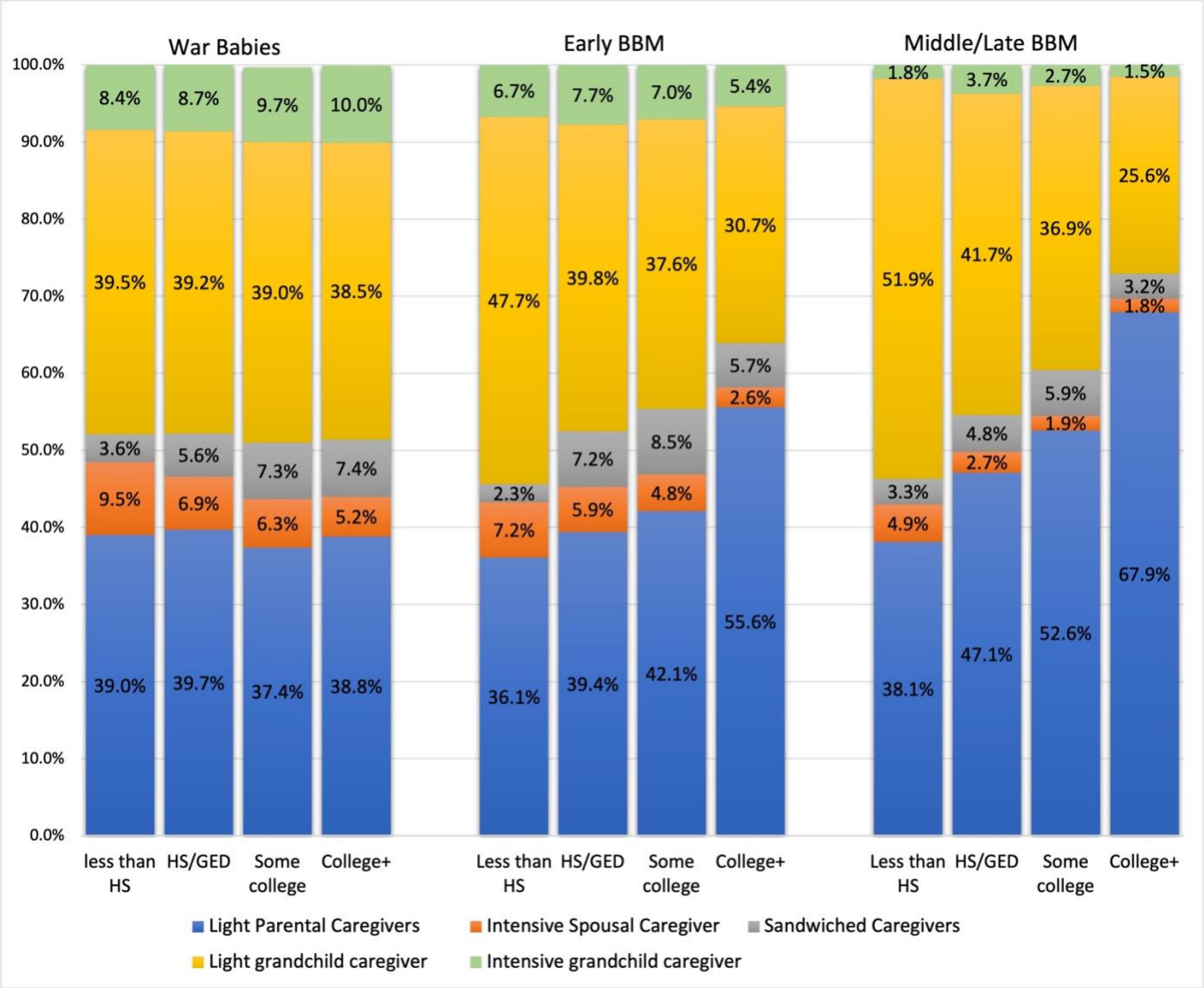


Figure 3.4. Predicated Probability of Each Family Caregiving Pattern by Education and Cohort



Conclusion

Grounded in the life course perspective, the three papers in this dissertation altogether provide thorough investigations of the long-term caregiving patterns among Chinese and American older adults. In the context of global aging, prolonged life expectancy, and declined family size, older adults today from both China and the U.S. are more likely to care for family members for longer years and care for multiple family members than previous cohorts. After identifying the long-term caregiving patterns, I subsequently investigate the associations between crucial social determinants and these caregiving patterns (Chapter One and Chapter Three). Finally, I explore the health implications of each caregiving pattern compared to non-caregivers among Chinese older adults (Chapter Two). Results from linear mixed-effects models suggest the heterogenous health outcomes of each caregiving pattern, and that older adults with intensive caregiving patterns have the worst physical and mental well-being.

1. Summaries for each three chapter

Using four waves of longitudinal data from the China Health and Retirement Study (CHARLS, 2011-2018), I identified five prominent caregiving patterns, including *Temporary Caregivers*, *Serial Caregivers*, *Intensive Grandchild Caregivers*, *Intensive Spousal Caregivers*, and *Sandwiched Caregivers*. Further results of multinomial logistic regression indicate that these five patterns are not evenly distributed across demographic groups: female caregivers are more likely to become an *Intensive Grandchild Caregiver* and a *Sandwiched Caregiver* than male caregivers, and rural caregivers are more likely to be an *Intensive Spousal Caregiver* than urban caregivers. The most disadvantaged group, rural female caregivers, have the highest likelihood of being an *Intensive Grandchild Caregiver*. The living arrangement also shapes older adults' caregiving patterns. Living in a multi-generation household increases the likelihood of being an

Intensive Grandchild Caregiver and *Sandwiched Caregiver*. Living with an adult child is associated with lower likelihood of engaging in intensive caregiving patterns. Over the past few decades, a significant number of rural migrant workers moved to urban regions for better work opportunities (Wen et al. 2019), leaving their children in the countryside under the care of their elderly parents. This results in a significant rise in skipped-generation households in China (Zhang 2013). The results from multinomial logistic model suggest that living in a skipped-generation household is associated with a higher likelihood of being an *Intensive Grandchild Caregiver* and a *Sandwiched Caregiver*. Overall, the five caregiving patterns capture some signs of engaging in multiple care roles among Chinese older adults (e.g., *Sandwiched Caregivers* and *Serial Caregivers*). As the one-child generation continues aging into midlife, they are facing drastically higher caregiving demands from both their parents and parents-in-law. Therefore, they are more likely to have multiple care experiences later in life. Future studies should pay close attention to the one-child generation's caregiving experiences, especially for those who are caught between young children and four aging parents ("4-2-1" family structure).

Built upon the care typology developed from the first chapter, the second chapter further explores each caregiving pattern's physical and mental health implications in China. Compared to non-caregivers, all five types of caregivers are associated with significantly higher depressive symptoms, but only *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers* are associated with significantly worse physical well-being. Positive implications of family caregiving are detected too. Female *Intensive Grandchild Caregivers* are associated with higher life satisfaction, and urban *Serial Caregivers* also have better self-rated physical health than non-caregivers. Altogether, these findings suggest that positive and negative implications of family caregiving might co-exist, lending evidence to both the stress process

model and role enrichment perspective. Moreover, the results also indicate the health implications of care patterns are moderated by gender and *Hukou* status: female and rural caregivers are more vulnerable to the negative effects than male and urban caregivers.

Similarly, Chapter Three investigates prominent long-term caregiving patterns among American older adults of the War Babies cohort and Early, Middle/Late Baby Boomers cohort. In addition to the prolonged longevity and the decline in family size, the U.S. has experienced rises in divorces, declines in marriage and childbearing, increases in cohabitation, and childbearing outside marriages over the past few decades (Cherlin 2010). The Baby Boomer cohorts are at the forefront of these societal transitions, leading to diverse family networks and profound changes in family relations in their later life (Wachter 1997; Agree and Glaser 2009). With this in mind, using 10-wave longitudinal data from HRS (2000-2018), I identified five caregiving patterns, including *Light Parental Caregivers*, *Intensive Spousal Caregivers*, *Sandwiched Caregivers*, *Light grandchild Caregivers*, and *Intensive Grandchild Caregivers.* The results of multinomial logistic regression indicate that both Early and Middle/Late Baby Boomer cohorts have a lower likelihood of being an *Intensive Spousal Caregiver*, a *Light Grandchild Caregiver*, and an *Intensive Grandchild Caregiver* but a higher likelihood of being a *Light Parental Caregiver* than the War Babies cohort. These findings indicate the weakening bonds between spouses, delay in grandparenthood, and loosened connection with grandchildren among the Baby Boomer cohorts. Moreover, these cohort changes in family caregiving patterns do not occur evenly across gender, race, and SES. Female caregivers, black and Hispanic caregivers do not exhibit significant changes in engaging in intensive caregiving patterns in later cohorts. By contrast, male caregivers and white caregivers exhibit a significantly lower probability of engaging intensive caregiving patterns in later cohorts. Caregivers with a college degree have a

lower probability of being intensive caregivers, but a higher probability in being a *Light Parental Caregiver*, and this trend has become more pronounced among the Baby Boomers' cohort.

2. Similarities and differences of long-term caregiving patterns between Chinese and American older adults

When comparing the long-term caregiving patterns between Chinese and American older adults, it is interesting to find that they share similarities to a certain degree. For example, they both have patterns of *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers.* Most caregivers engage in relatively less intensive caregiving patterns (e.g., *Temporary Caregivers* for Chinese older adults and *Light Parental Caregivers* for American older adults). Moreover, in both countries, socioeconomically disadvantaged groups are more likely to engage in intensive caregiving patterns (e.g., *Intensive Spousal Caregivers*, *Intensive Grandchild Caregivers*, and *Sandwiched Caregivers*) than more advantaged groups.

Several differences that deserve noting. While HRS has 10-waves survey data whereas CHARLS only has 4-waves data, the values of cumulative load and total care waves for Chinese and American older adults are very close. This might suggest that Chinese family caregivers may engage in longer and more intensive caregiving burden than caregivers in the U.S. There are two explanations for this difference. One of the reasons is that the expansion of formal care facilities (e.g., nursing homes, community-based care, and home-based care) in the U.S., which might help alleviate family caregivers' burden to some degree. By contrast, over 90% of caregiving burdens are shared among family members in China (Li, Wang, and Wong 2018). Despite the expansion of formal care investment, the Chinese government still emphasizes the family members' role in long-term care services and even mandates that adult children provide support

to their parents over 60 (Chou 2011). In addition to the discrepancy of formal care investment, culturally, traditional Chinese social norms highly value intergenerational support, and grandparenting and eldercare to parents is a strongly expected to promote family solidarity and collective interests (Xu 2019). In contrast, in western contexts, full-time and custodial grandparenting is not culturally expected unless adult children lose their custody because of incarceration, poverty, or substance abuse (Goodman and Silverstein 2001). Likewise, the care practices to older parents are not strongly expected but depend on the level of interdependence in the family: collectivist families are more likely to provide more family care whereas individual families tend to minimize their caregiving and rely on formal care supports (Pyke and Bengtson 1996; Pyke 1999). In this regard, intergenerational caregiving, especially with high intensity, is more common in China and the U.S.

Second, as mentioned earlier in Chapter One, the average age of each caregiving pattern among Chinese older adults at baseline suggests the sequence of care roles from the midlife to later ages: first as caregivers to parents, then to grandchildren, and finally to the spouse. However, there is no such age sequence for caregivers in the U.S. This indicates that American older adults experience less uniformed but rather more diverse family caregiving role sequences or transitions, reflecting the increased diversity in family structures and complexity of intergenerational relationships over the past few decades (Askham et al. 2007; Fingerman et al. 2012 2001).

3. Methodological challenges, selections of family caregivers and cohort effects

First, as previous studies suggested, when assessing the health implications of family caregiving, it has always been a challenge to address health selection effects among caregivers (the healthy

caregiver hypothesis). Older adults who are healthier are more likely to become caregivers and continue in care roles (McCann et al. 2004; Fredman et al. 2015). This is an important issue for Chapter Two, especially when the results of linear mixed effects suggest female *Intensive Grandchild Caregivers* yield higher life satisfaction and urban *Serial Caregivers* have better self-rated physical health than non-caregivers. To address the selection issues, I singled out non-caregivers with "poor health" from the analysis. Although the health "benefits" becomes not significant, the female *Intensive Grandchild Caregivers* and urban *Serial Caregivers* still have the higher level of well-being compared to other types of caregivers. For the next step, I will conduct inverse probability weighting to address the selection issues among caregivers.

Second, when comparing the caregiving patterns across the War Babies cohort, Early Baby Boomer cohort, and Middle/Late Baby Boomer cohort in Chapter Three, the challenge lies in distinguishing cohort effects from age effects. Moreover, the Middle/Late Baby Boomer cohort was not included until 2010; therefore, the observational widow for this cohort might not be long enough to capture their long-term caregiving patterns. As more survey waves come out, I plan to employ the Age-Period-Cohort model (Yang et al. 2008) to distinguish age effects from cohort effects.

4. Contributions and implications for future research

This dissertation research contributes to the current literature in multiple ways:

1). Using multiple waves of longitudinal survey data, this study is among the first that captures long-term caregiving patterns as older adults transition from midlife to later ages. The care typologies highlight the complexities and heterogeneities of long-term caregiving patterns among Chinese and American older adults.

2). The results from multinomial logistic regressions indicate that the older adults' long-term caregiving patterns are associated with a series of social determinants, such as gender, *hukou*, and living arrangement for Chinese older adults, and gender, race, and educational attainment for American older adults.

3). The health implications of each long-term caregiving pattern differ drastically, indicating that the implications not only vary by the care duration and intensity but also differ by the relationships to the care recipients.

This dissertation predominantly focuses on older adults' care experiences, nonetheless, previous research suggests caregivers today, especially for the Baby Boomers cohort, are likely to engage in both work and family roles simultaneously (Barnett 2013; Duan and Chen 2022; Liu et al. 2019), and older adults also have diverging work-family pathways and thus have heterogeneous health outcomes in later life (Ice et al. 2020; Barnett 2015). Hence, future studies should consider adding paid work (either part-time or full-time) into the framework when assessing caregivers' health outcomes.

5. Policy Implications

This dissertation research provides guidance for the investment and design of the long-term care services in the rapidly aging contexts.

China has been aging rapidly over the past decade, and the prevalence rate of dementia has also increased significantly over the past five years (Rakusa, Struhal, and Sellner 2014). In the meantime, over 90% of care is still shared by family members currently. However, this might not be sustainable given the declined availability of the family care network. Moreover, with the significant rise in migrant workers, older adults in rural regions also face unmet care needs.

Therefore, more targeted support, such as affordable home-based and community-based care facilities, should be invested in these communities.

In the U.S., the complex family structures of the Baby Boomer cohorts have prompted more adoption for community-based care, assisted living facilities, and home-based care facilities ("age in place") (Agree and Glaser 2009). Nonetheless, previous studies have found racial minorities, especially Asian and Hispanics, are more likely to rely on family members instead of formal care resources for long-term care support (AARP 2015; Kirby and Lau 2010; Orlovic et al. 2019). Therefore, an integration of formal and informal long-term care services, especially home-based services and "aging in place" design (Wiles et al. 2012), need to be considered in future long-term care services planning.

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