

ABSTRACT

Title of Dissertation: APPLYING A GENDERED LENS TO THE
STUDY OF WORK AND CAREGIVING
RESPONSIBILITIES AMONG CHINESE
MIDDLE- TO OLDER-AGED ADULTS

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This dissertation consists of three papers that investigate the working and caregiving roles of middle-to-older adults and their implications for well-being in China. While existing literature predominantly focuses on older adults as care recipients, this research sheds light on the significant number of older individuals who actively participate in the labor market and provide informal caregiving to family members. Studies usually focus on either caregiving or employment while keeping the other in the background, leaving the intersection of work and caregiving responsibilities understudied. I then ask whether and how work-life conflicts, commonly discussed in the context of middle-aged women, are also applicable to the older population and are shaped by gender. Using data from the China Health and Retirement Study, the study investigates work and caregiving patterns among middle-to-older adults and

explores the well-being consequences of juggling these roles. Furthermore, the research examines whether gender-based patterns persist in work and caregiving dynamics during this stage of life. The study is conducted in China, a developing country experiencing accelerated population aging, and the boundaries between work and family responsibilities are less distinct compared to developed societies. Early retirement age in the formal sector provides opportunities for older workers to engage in caregiving, while informal sector and agricultural workers may need to continue working until old age due to low pension rates. The culture of filial piety and intergenerational solidarity further encourages older generations to provide financial and caregiving support to their younger family members, leading to the common occurrence of middle-to-older adults taking on both work and caregiving roles. The first paper explores the association between living arrangements and middle-to-older adults' work prospects, considering gender and work sector differences. The second paper examines the impacts of living arrangements on role transitions, especially the transitions of workers and worker-caregivers given their prevalence, while also considering the moderating effects of gender and residence. The third paper investigates the joint impact of work and informal caregiving on mental well-being, analyzing the differential effects based on intensity, gender, residence, socioeconomic status, and social isolation level. In the context of accelerated aging in developing countries, this dissertation highlights the contributions of middle-to-older adults and emphasizes the need for investment in and design of long-term care services to meet the demands of rapidly aging populations.

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CAREGIVING RESPONSIBILITIES AMONG CHINESE MIDDLE- TO OLDER-
AGED ADULTS

by

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Dedication

This Dissertation is dedicated to my mother (Xiangling Wu) and father (Hanxiong Ye), whose unwavering support has been a constant source of inspiration and motivation throughout the process.

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Introduction

Overview

For generations, older adults have been regarded as care recipients in sociological studies, informal caregivers at most. However, with sweeping demographic and family changes during the last several decades, including longer life expectancy, declines in childbearing, and population migration, older adults may find themselves facing the demands of paid work and informal family care simultaneously. This phenomenon requires more research attention. On the one hand, older populations' contributions to their families and society need to be recognized and emphasized. On the other hand, dual responsibilities could be an added source of stress and negatively influence working caregivers' health and well-being.

At the same time, the landscapes of older populations' productive activity are different for various social groups. Gender and socioeconomic status undoubtedly shape family behaviors earlier in life and consequently lead to a divergence in the working and caregiving patterns of older adults (Flood and Moen 2015). Gender roles and gendered expectations could also lead to the different priority of responsibilities for men and women, suggesting men's preference towards paid labor while women are more likely to be bounded by unpaid care work. Besides, the need-driven nature of caregiving suggests that the older population's working and caregiving trajectories would change in response to family needs, such as the

existence of young grandchildren (Liu et al. 2019). Regarding social stratification, it is prevalent that rural residents' work trajectory and nature of work differ from that of urban residents (Xu, Evandrou, and Falkingham 2021). In addition, economic status and retirement eligibility/pension coverage could strongly influence a household's need for financial support from the older generation, as well as the ability to afford professional care or must count on household members for caregiving.

Aging studies in the context of developing countries are much needed, considering the accelerated aging process and underdeveloped pension system. The context of this study is China, which is characterized by strong intergenerational solidarity, high women labor force participation rate, and a large informal economic sector with a low-leveled social security system (Cai and Cheng 2014; Ling and Chi 2008; Wang and Gonzales 2019). Altogether those factors contribute to the prevalence of multigenerational households and the cultural norm that expects grandparents to care for their family members in need, preferably while working (Sun 2013). The women's labor force participation rate remains high in older age groups, together with common dual-earner households, indicating that older women may be especially vulnerable to work-life conflicts just like younger mothers (Chen, Fan, and Chu 2020). The huge population of informal sector workers only have minimal income maintenance and health insurance, which drives them to continue working in old age, albeit allowing for a certain degree of flexibility to balance work and care (Huang 2009; Xue, Gao, and Guo 2014).

Although a negative relationship between caregiving and paid employment is consistently found and both activities jointly reflect one's everyday life, most aging literature focuses on one factor while keeping the other in the background. However, the role enhancement theory and the role strain theory claim that the burden shouldered by worker-caregivers is not simply adding employment tasks to family responsibilities. Taking multiple roles could help people get extra social and financial resources, keep social connections, and achieve a feeling of role-fulfillment, therefore improving their well-being (Moen, Robison, and Dempster-McClain 1995). The emotional reward of informal caregiving and financially contribute to the household could be more apparent in the Chinese context, which highly values intergenerational solidarity within the family. However, conflicting role expectations and inevitable time scarcity could lead to work-life conflicts, bringing additional stressors and negative emotions to worker-caregivers (Goode 1960). Taking dual roles could be more burdensome than pleasant especially when work and caregiving responsibilities are both intensive. Limited research attention has been directed toward the intertwined pattern of work and care provision in the later life stage and how the older population adjusts their activities to better meet the family needs. Less is known about gender differences and their health implications, let alone patterns shaped by socioeconomic status, living arrangements, and intensity.

This dissertation fills the research gap by combining middle-to-older adults' work and caregiving, examining their patterns, dynamics, and their association with well-being, using

the recent longitudinal data from Chinese Health and Retirement Longitudinal Studies (CHARLS, 2011, 2013, 2015, and 2018).

The first part of this dissertation aims to demonstrate the prevalence of working among the older Chinese population and how caring for grandchildren influences their work prospects. I emphasize that older workers' response to care needs differs by gender and by nature of work. As gender norms shape men and women's choices throughout the life course (Moen 2013), it is hypothesized that when facing the double burden of work and care responsibilities, men tend to increase the work supply for extra financial gain, while women reduce work hours, change to bridge jobs, or exit the labor force to take caregiving responsibilities. Moreover, informal sector workers could assumably benefit from flexible schedules and therefore less likely to scale back their work compared to formal sector counterparts.

In the second part of the dissertation, I explore role transitions and their driving factors, especially the transitions of workers and worker-caregivers given their prevalence. Working at older ages and informal caregiving are quite common in China, and a considerable population juggles the two demanding responsibilities (Liu and Lou 2016). I estimate the predictors of role transition compared with maintaining the current role, with special attention to living arrangements. Gender differences and rural-urban disparities are emphasized due to gendered role expectations and retirement age, as well as the inadequate social security system in rural areas. The presence of grandchildren and parents/in-laws could indicate

caregiving and financial needs, therefore associated with a higher likelihood of transition into and staying in the worker-caregiver category. In contrast, living with adult children possibly means that middle-to-older aged individuals can find someone to share the care and finance responsibilities, therefore lowering the probability of being heavily double-burdened.

The third part of this dissertation focuses on the mental well-being implications of combining work and informal caregiving. The role strain theory assumes a high volume of working and caregiving as stressful events and worker-caregivers who are exposed to a higher degree of stressful experiences over time would result in an accumulated burden (Beitman et al. 2004). Nonetheless, the role enhancement perspective suggests that engaging in multiple roles could associate with enhanced well-being since it provides a sense of purpose and fulfillment (Rozario, Morrow-Howell, and Hinterlong 2004). The two competing theories indicate that it is plausible to have heterogeneous health consequences due to different patterns of paid work and family caregiving over time. In addition, the intensity of the double burden needs to be taken into consideration, since the association between work-and-care load and mental health may not be linear. Therefore, I emphasize that while low-intensity worker-caregivers may benefit from the dual roles, those who have high-intensity responsibilities could suffer adverse mental well-being. Socioeconomic status and social isolation could also moderate the effect of the worker-caregiver role on well-being: high socioeconomic status stands for adequate social resources, and a low level of social isolation indicates access to social support, therefore buffering individuals from devastating stressors.

Taken together, this dissertation research aims to provide a comprehensive understanding of older adults who shoulder the double burden of paid work and informal caregiving in a society where the boundaries of the two are often not as clear-cut as those in developed countries. Specifically, there are three general goals: 1) to explore the association between care responsibilities and work prospects, with special attention to grandchild care; 2) to examine the transitions of people between roles as worker, caregiver, and worker-caregivers, and 3) to estimate the mental well-being consequences of shouldering the double burden of paid work and care work. This study is based on a longitudinal, nationally representative sample of the population aged 45 and older from the China Health and Retirement Longitudinal Study (CHARLS, 2011-2018). It obtained detailed information about older adults' sociodemographic factors, health conditions, well-being, work trajectories, and care provision.

Significance of current study

This study will contribute to the current literature in multiple ways. First, despite the interests and efforts in exploring the health consequences of caregiving or working/retirement in later life stage, most studies to date have only focused on the effect of either care or work while keeping the other in the background, which may underestimate the intercorrelation between these two important parts in older adults' daily life and overlook the process they jointly affect one's health and well-being. This study is therefore among the first to

thoroughly explore the transitions of worker-caregivers at older ages and the health implications of taking the dual responsibilities.

Second, this study takes a comprehensive way to capture the patterns of worker-caregivers' transitions. Making use of longitudinal data, this study can shed light on both the complexities and dynamics of the worker-caregiver groups. By linking middle-to-older adults' transition to living arrangements, this study highlights intergenerational interdependency, provides a more complete picture of productive aging than the existing literature, and helps get a more updated understanding of working and caregiving at a later life stage in a changing society.

Finally, this study contributes to disentangling the puzzle of health consequences of working and caregiving among older adults by understanding the heterogeneities caused by gender, rural/urban residency, workload intensity, socioeconomic status, and social isolation. Although there is a wide discussion on the impacts of working or caregiving on older adults' lives, their joint impact has not been well addressed in the literature. This study can help provide some thoughts on this aspect.

This study also aims to provide insights on how to reform the current formal care policies and pension system to better facilitate productive aging and alleviate the burden of older worker-caregivers. The findings of this study would prompt a better understanding of the diverse patterns and trajectories of older adults' participation in productive activities and identify the population who are the most vulnerable to work labor and care burdens. In that

case, more community-based or home-based care facilities can be built to assist family caregivers and ease their burdens. For developing countries considering the postponement of the legal retirement age, this study calls for higher availability of bridge jobs and higher coverage of the social security system and services to protect older age workers.

1 Exploring the Impact of Living Arrangements on Work Prospect among Chinese Middle-to-Older Aged Adults: Gender Differences and the Role of Work Sector

Abstract

Literature about grandparenthood in China recently has focused predominantly on grandparents' roles as either care recipients or caregivers. Nevertheless, many grandparents become grandparents at a time when they are still working. Our study examines how coresidence with grandchildren affects grandparents' hours of working and labor force participation based on data from the China Health and Retirement Longitudinal Study (2011-2018). Using fixed-effect models, we find that living with grandchildren increases the number of hours worked by women in the informal sector. For women in the formal sector, however, coresidence with grandchildren negatively impacts their work prospects. Furthermore, grandparents in skipped-generation households are less likely to scale back their work than those in multigenerational households, indicating the double burden of work and caregiving. By emphasizing grandparents as active workers, we extend prior work and highlight how to understand work and caregiving in a gendered and dynamic household context.

Introduction

Literature about grandparenthood in China recently has focused predominantly on grandparents' roles as either care recipients or caregivers. Nevertheless, many grandparents become grandparents at a time when they are still working. Facing the accelerated aging process, the Chinese government plans to adjust its retirement policy for older retirement age. It would be more common for older adults to shoulder caregiving responsibilities while maintaining a career job, which could be challenging. They may develop various coping strategies to better meet the needs of both family and workplace, which could be influenced by many factors, including gender, household structure, work sector, socioeconomic status, and so on.

Despite growing public concerns about extending the legal retirement age and interest in its potential impact on reducing childcare supply and middle-aged women's labor force participation, limited research attention has been directed toward the association between grandchild care and work prospect for the older generation. This study examines how coresidence with grandchildren, as a proxy of grandchild caregiving, affects grandparents' hours of working and labor force participation based on data from the China Health and Retirement Longitudinal Study (2011-2018). Using fixed-effect models, I examine the grandchild effects in households with various living arrangements. I am particularly interested in studying how they differ across gender and work sectors.

Theoretical Framework and Literature Review

The life course perspective

The life course perspective provides valuable frameworks for understanding the interconnections between individuals' career trajectories and their family life. According to the life course perspective, individuals' life experiences and choices are shaped by a combination of historical events, social structures, and personal agency (Elder Jr. 1994). Family life, including caregiving responsibilities and the role of being a grandparent, is a significant aspect of an individual's overall life course. The linked lives perspective further emphasizes the interconnectedness of individuals' lives within a broader social network. People are embedded in a large network of social relationships – with parents, children, romantic partners, friends, and others (Carr 2018). These relationships influence individuals' decisions and actions, including their work adjustments. In the context of middle to older ages, the transition into grandparenthood becomes increasingly relevant. As individuals age, many of them become grandparents, and the presence of grandchildren can have a significant impact on their career decisions and labor force engagement. The arrival of grandchildren may lead workers to adjust their work arrangements to better meet the needs and responsibilities associated with caring for and supporting their grandchildren.

The prevalence of multigenerational households and working at older ages in China

Grandparenthood is a salient status and an important experience in middle and older adulthood, yet there exist tremendous variations in grandparents' involvement in their

grandchildren's lives, ranging from occasional visits to interaction with grandchildren daily.

The contours of grandparenthood are undoubtedly shaped by cultural contexts and its associated normative family systems. For example, while the majority of American grandparents enjoy independent living, living in a multigenerational household is a way of life for many Chinese grandparents in contemporary China, signaling a high level of intergenerational solidarity (Luo et al. 2012; C. D. Wang et al. 2019). Recent literature on grandparenthood in China overwhelmingly focuses on the role of grandparents as caregivers for grandchildren (Chen and Liu 2012; Cong and Silverstein 2012; Ko and Hank 2014).

However, the image of a grandchild as an infant or toddler in need of care could be misleading. A considerable number of the coresiding grandparents have grandchildren who are either school-aged children or younger adults (He, Li, and Wang 2018; Ruiz and Silverstein 2007). Although some grandparents do act as primary caregivers, others could be simply providing a helping hand, inactive in caregiving, or could be care recipients themselves.

Indeed, grandparents could be occupying different roles at the same time. It is the purpose of this chapter to explore the role of grandparents as workers and therefore active contributors to household economics. Becoming a grandparent occurs early in both urban and rural China, as the possibility of being a grandparent is 60% for urban residents and 80% for rural residents by the age of 55 (Zhang, Emery, and Dykstra 2018). Despite the early retirement age in formal sectors (60 for men and 50 or 55 for women), grandparents still have about ten years as full-time workers, not to mention that some have the option to postpone

retirement (Cai and Cheng 2014). For older adults with limited pensions or social insurance, working is often a necessity for financial security (Giles, Wang, and Park 2013; Pozen 2013; Zhao and Mi 2019). Furthermore, a substantial portion of the Chinese economy exists in the informal sector, which includes private enterprises, self-employment, and agricultural activities (Huang 2009; National Bureau of Statistics of China 2017; Xu et al. 2021). Therefore, the concept of retirement is limiting, as many adults continue to work well into their sixties and seventies (Benjamin, Brandt, and Fan 2003; Giles, Wang, and Cai 2011).

There is a plethora of studies on the tradeoff between work and childcare from the parent's perspective, particularly the impact of caregiving on mothers' labor force participation. I argue that grandparents' work roles could be understood similarly. For Chinese young couples, living with their parents is common, and children are typically born into multigenerational households (Korinek, Zimmer, and Gu 2011; Yasuda et al. 2006). Therefore, the middle-aged couple's calculation of financial or opportunity costs could also apply to the grandparents. Unlike other social contexts, where the role of grandparents in raising grandchildren is normatively ambiguous, the role of Chinese grandparents, particularly for those living with their grandchildren, is unquestionably salient and has to be integrated into household decision-making processes (Cheng 2019).

Theoretical Perspectives on the Impacts of Grandchildren for Older Workers

Grandchild care responsibilities often come with the presence of grandchildren in the household. However, combining work and care can be problematic. Research consistently

finds a negative relationship between caregiving responsibilities and paid employment (Berecki-Gisolf et al. 2008; Carmichael and Charles 2003). The role strain theory provides a useful framework for studying the impact of caregiving on older workers. It was first defined as the “felt difficulties in fulfilling role obligations” (Goode 1960). In his works, Scharlach further discussed two major types of role strain: role demand overload and perceived role inadequacy (Scharlach 1987, 1994; Scharlach, Sobel, and Roberts 1991). Role demand overload links to the perception of a lack of adequate time, energy, and resources to fulfill multiple role obligations. Perceived role inadequacy means that one’s actions do not measure up to role performance expectations. Both could occur in the relationships between aged grandparents and their grandchildren. Facing the double burden of the caregiver role and the worker role, it is reasonable for older adults to choose to reduce or quit work (Carmichael, Charles, and Hulme 2010). For instance, a study of manufacturing company workers in China found that with an hour increase in care provision, respondents were 5% more likely to experience negative employment consequences, including having to take leaves frequently, considering quitting the job, considering changing positions, and considering early retirement (Pei et al. 2017).

Health issues associated with care work also contribute to a lower labor force supply of worker-caregivers. Researchers found that caregivers tend to have poorer physical and mental health than people who do not provide care (Ma et al. 2022; Pinquart and Sörensen 2003) whereas labor force participation is also reduced by poor health, especially in older people and women (Cai and Kalb 2006). However, the impact of grandchild care on mental health

could be mixed, considering its exhausting yet satisfying nature. Using a cross-sectional dataset, Wang and Gonzales (2019) showed that higher grandchild care intensity was related to more depressive symptoms, but long caregiving duration was related to fewer depressive symptoms for older Chinese grandparents.

However, Sun (2013) disagreed with the zero-sum hypothesis of work and caregiving due to time scarcity. She claimed that older Chinese do not specialize in taking care of grandchildren by abandoning work outside the home; Rather, they do both of them at the same time, thus increasing the overall burden of work, which is consistent with the role constraint perspective.

In addition to rising care demand, having a grandchild could also lead to increasing financial needs, which may encourage older workers to continue working. Chinese older adults often feel strong financial responsibilities to their unmarried children or grandchildren (Tong, Chen, and Su 2019). To compensate for the possible financial deficit of their adult children, they would often contribute directly to the household income by being active in the labor force. In addition, raising children is becoming more demanding than ever. Different from the nation's expectations in the pre-one-child policy era, younger generations are expected to have high levels of education and quality human resources in the era of low fertility rates (Riley 2018). Intensive parental investment in China's generation of only children has been investigated by numerous studies, highlighting parents' attempts to create the social, economic, and cultural conditions that allow for success for their children (Hanser

and Li 2017; Kuan 2015). Feeling that their way of childrearing could be out-of-date and not exactly what their adult children want, grandparents may choose to make contributions financially.

Both caregiving and work responsibilities could be elevated without the middle-aged generation in the households. In rural China, as young adults migrate to work in urban areas, many “left-behind children” live with their grandparents. Such skipped-generational families made up over a quarter of rural households in 2005 (Sun 2013). Grandparents’ role and value have been strengthened in these families, as has the burden placed upon them.

To sum up, there are competing hypotheses on the impacts of grandchildren on grandparents’ labor force involvement. Though older adults with grandchild care need tend to participate in caregiving, their workload may not necessarily reduce in a society that values intergenerational solidarity and support. In this study, I go beyond the traditional view of regarding the older generation as single-role care recipients or providers; instead, by emphasizing grandparents as active workers, I suggest that they could also face the double burden of care and work as their adult children, and estimate their adjustments on work in response to the needs of the new household members.

Gender and Work Sector as Moderators

Men and women could have different responses to issues that arise from the dual worker and elder-caregiver role occupancy of older adults. Adopting the role strain theory framework, Beitman and colleagues (2004) suggested that the role strain pattern was different

for male and female older working caregivers, indicating that employed women reported higher stress levels and difficulty managing their time and arrangements than employed men. Because women caregivers provide more assistance with basic self-care and household chores and visit with their care recipients more frequently, they have less time for other activities. Their findings also echoed previous studies and indicated that women seem less able than men to separate their emotions from the responsibilities of working and caregiving, and thus experience higher levels of strain as a result of their caregiving responsibilities (Barnes, Given, and Given 1995; Kramer and Kipnis 1995). Therefore, women worker-caregivers may reduce their exposure to stressors by reducing labor market participation or taking fewer care responsibilities, the former is more common considering their traditional homemaker gender role. In addition, female worker-caregivers are more likely to have lower income, and worse working conditions such as unsupportive workplace culture, a less flexible schedule, and less access to paid vacation, which may further reduce their attachment to the labor force and lower their opportunity cost to cut back labor support compared to men (Lahaie, Earle, and Heymann 2013; Mitrani et al. 2008).

The nature of work also influences how older people adjust their activities to meet caregiving and work demands. Inflexible work schedules could be an obstacle for worker-caregivers, which limits their accessibility when the grandchildren call for close attention or want their needs to be satisfied immediately. A flexible schedule was found to effectively ensure employed caregivers retain their jobs and receive needed income, while the lack of which makes caregivers being unable to continue to work at the same level or remain in paid

employment (Dembe et al. 2008; Jorgensen et al. 2010; Katz et al. 2011). Additionally, paid leave and a supervisor's support offset some or all of the negative effects of caregiving, especially for women (Earle and Heymann 2011). Informal sector jobs, including self-employed jobs and household business, allows for a higher degree of flexibility compared to formal sector jobs but could be lower paid, less protected by the labor law, and provide less access to support services. Most existing studies are conducted among employees, and detailed discussion on informal sector workers' responses is lacking. In this study, I extend prior work and highlight how to understand work and caregiving in a gendered and dynamic household context, in a developing country with a large population and share of informal sector workers, who may have a blurred boundary between paid labor and care work.

Research objectives

Unlike many other cultural settings, where grandparents often play a peripheral role in raising grandchildren, this study aims to expand the current literature on older adults' productive aging by emphasizing the centrality of Chinese grandparents in their grandchildren's life, particularly for those who reside with their grandchildren, calls for an understanding of their roles going beyond that of a caregiver. I explore how older adults' work prospects adjust in response to the care needs of the younger generation, and further investigate how a series of socio-demographic factors frame the changes in labor force supply. Most importantly, I argue that the existing mechanisms that are well documented in

the work and parenthood literature should be extended to the understanding of grandparents' work.

This study is motivated by the following questions:

- 1) What are the characteristics of Chinese older adults' work and care responsibilities?
- 2) To what extent are Chinese older adults' work influenced by the presence of grandchildren in the household, as a proxy of grandchild care needs?
- 3) To which degree are the grandchild effects alleviated or intensified by the presence of the middle generation?
- 4) How does older workers' response differ by gender and by work sector?

Adopting the role constraint theory, I hypothesize that to meet grandchildren's needs, grandparents tend to cut back their workload and are less likely to stay in the labor market (H1-a). However, in a society with the sharply rising cost of raising children and changed expectations of the younger generation, grandparents may also increase their work supply to financially contribute to the household (H1-b).

Further, grandparents' work prospects as a response to household needs may differ by the household structure. When parents migrate to cities and leave behind their younger kids, the older generation may act as custodian grandparents and face both financial and caregiving challenges simultaneously, especially when remittances are inadequate (Silverstein, Cong, and

Li 2006). Consequently, I hypothesize that the magnitude of grandparents' work change is larger in skipped-household families compared to multigeneration households (H2).

Considering widespread gender differences in family and social life, I further compare older women and men in their response to the presence of a grandchild in the household. In the same way that mothers and fathers with childcare needs adjust their work volume differently due to differences in cultural expectations and opportunity costs (Lumsdaine and Vermeer 2015), I hypothesize that grandmothers are more likely to quit the labor market or reduce hours of work (H3), while grandfathers' labor force involvement remains stable or increase (H4).

Last but not least, the nature of grandparents' employment is certainly crucial since the available choices are different. As wage workers in the formal sector have a rigid schedule and can choose an early retirement before reaching the mandatory retirement age, they have a binary choice of continuing to work or quitting the workforce (H. Li, Shi, and Wu 2016). Therefore, I hypothesize that formal sector workers' labor force consequences are declining labor force participation, rather than reduced hours of work (H5). By contrast, the informal sector may offer grandparents more flexibility by reducing their working hours (H6), allowing them to balance work and family responsibilities.

Data and Method

Data and Sample

This study uses four wave's data from the China Health and Retirement Longitudinal Study (CHARLS, 2011-2018), an ongoing biennial longitudinal survey on a nationally representative sample of Chinese residents and their spouses aged 45 years old and above. CHARLS sampled 17,708 residents from 150 counties from 28 provinces in China at the baseline survey in 2011, with a response rate over of 80%. The average age of the respondents at the baseline survey was 59.1; around 78% of them were rural residents and 22% were urban residents. The analysis is restricted to respondents over the age of 45 and to those who have worked at least once over four longitudinal waves, and the pooled sample includes 61,460 person-wave observations. I exclude observations with missing data, which leads to a sample size shrink of 3,243 missing in whether currently working, 966 missing in whether living with adult children, and 4,084 missing in covariates including ADLs, marital status, and total household assets. After excluding observations with missing data, our analytical sample contains 53,168 person-wave observations originating from 22,036 individuals. The sample size for each wave is 11,073 in 2011, 11,571 in 2013, 13,546 in 2015, and 14,784 in 2018.

Measurements

1. Outcome variables

The main purpose of this study is to explore the impact of living arrangements on older adults' work prospects, which is measured by labor force participation and weekly average hours of work. Labor force participation is a binary variable that indicates whether the respondent engaged in any work in the past year. It is assigned 0 if the respondent is unemployed, retired, or never worked per their labor force status. The other variable, weekly average hours of work, indicate the number of hours per week the respondent worked in the past year, the main job, and other jobs combined. The descriptive statistics for the outcome, independent, and control variables at the baseline are shown in Table 1.1. Over 80% of the respondents worked in the year 2011, with an average weekly working hour of 46.14.

2. Independent variables

The household structure was measured by two sets of independent variables. I examined the effects of living with adult children and grandchildren by using the first set of dummy variables, including having a co-resident grandchild and having a co-resident child. The second set of variables borrowed terminologies from Silverstein and colleagues' work (Silverstein et al. 2006) and creates four types of living arrangements: no coresident grandchild or adult child (isolated household), have coresident grandchild but no coresident adult child (skipped-generation household), have both coresident grandchild and child (multigenerational household) and only have an adult child (truncated stem household). The goal is to emphasize living arrangements since childcare tasks can be shared between generations in multigenerational households but are primarily handled by grandparents in

skipped-generation households (Chen, Liu, and Mair 2011). The descriptive statistics show that more than one-third of respondents lived with a grandchild, and about two-thirds lived with an adult child. As for living arrangements, 7% of older adults lived in skipped-generation households, and 29% lived in multigenerational households.

3. Control variables

Time-varying control variables include demographics such as respondents' age, gender (female labeled as 1), and marital status (married or partnered coded as 1 and others as 0). Health conditions are controlled since they affect both the ability to work and the capacity for caregiving. In retirement literature, subjective and objective health are frequently used (Eibich 2015). An individual's self-rated health, which ranged from 1 as very good to 5 as very poor, represented their subjective health. The objective measurements consist of two variables: the number of difficulties in five daily activities (bathing, dressing, eating, getting in and out of bed, and using the toilet); and whether they have any of these chronic diseases (diabetes, cancer, lung disease, heart disease, and stroke) at the time of the interview, with having any of these chronic diseases marked as 1. In terms of socioeconomic status, hukou status (agricultural hukou labeled as 1), household residency (rural residency as 1), and educational attainment levels (less than lower secondary, upper secondary and vocational training, tertiary and above) are used in descriptive statistics but excluded from regression since they rarely change over time. Current work type (agricultural employed, agricultural self-employed, non-agricultural employed, non-agricultural self-employed, non-agricultural

family business, not working) is also presented to show middle-to-older adults' prevalent labor force participation. Quartiles of household assets are used for both descriptive statistics and regressions, indicating the total value of cash and deposits in financial institutions. The descriptive statistics table shows that the average age at baseline was 56.83 years old. 48% of respondents were female. 86% of respondents had agricultural hukou status and 69% lived in rural areas. A self-reported health score of 2.97 indicated that respondents were in fairly good health, and 21% had chronic diseases. In terms of work type, 51% of employees had agricultural jobs, while only 22% had non-agricultural jobs. 89 percent of respondents had less than a lower secondary education level.

--Table 1.1 about here--

Analytical Strategies

Individual-level fixed-effects models are used to control for unobserved, time-invariant individual heterogeneity, such as a preference for work over caregiving. In a two-step framework, I first estimated whether respondents would remain in the labor market, and then moved on to the number of hours they would work each week among those who continued to work. I started with a pooled sample, subsampled by gender, then stratified by gender with formal or informal sector jobs. Respondents who have ever worked in non-agricultural employed jobs were included in the formal sector group. Participants in the informal sector included those who worked in agriculture, self-employment, and family business not related to agriculture. The formal and informal sector groups were mutually exclusive. Among the

other categorizations, I tried defining the formal sector as those who have participated in employment other than agriculture alone or grouping respondents into three categories, formal, informal, and changed occupations. Since the results were not significantly different, I adhered to the dichotomous differentiation above.

Results

In Table 1.2, I show the regression results on the pooled sample. Models 1 and 2 are logit models with whether working as the outcome variable, and models 3 and 4 are linear regression models with weekly average hours of work as the outcome variable. Models 1 and 2, the logit models with whether working as the outcome variable, indicate that living with a grandchild does not affect the probability of working, whereas living with an adult child is expected to be associated with about a 16.8% decrease in the odds of working. Model 3 shows that while living with a grandchild increases work hours by .88 hours, living with an adult child reduces them by .82 hours, controlling for all other covariates in the model. Model 4 demonstrates that compared with those who do not live with adult children or grandchildren, respondents who enter into skipped-generation households and multigenerational households show no difference, while those who live with an adult child have a reduction in hours of work by .96 hours.

-----Table 1.2 about here -----

I run separate models for men and women considering gender may moderate living arrangements influence work prospects. The results are shown in Table 1.3. The presence of grandchildren does not have any effect on men's or women's work prospects. However, living with an adult child decreases hours of working for men by 1.17 hours. Besides, having an adult child in the household lowers the odds of working by 25.6% for men and by 10.9%. Compared to their counterparts who do not have a coresident child or grandchild, men and women who lived with adult children have lower odds of working by 23.8% and 20.3% respectively.

-----Table 1.3 about here -----

My study further subsamples the respondents based on their formal and informal work sectors, with the hypothesis that workers' flexibility to adjust workloads and schedules may vary. The regression results for informal sector workers are shown in Table 1.4. For men, living with a grandchild has no effect on their probability and hours of work. In contrast, living with an adult child reduces men's chances of working and the hours they work. Interestingly, grandchildren do not accelerate women's exit from the labor force, and their weekly working hours even increase by 1.39 hours after the presence of grandchildren. Compared with women who do not live with an adult child or grandchild, women who live with adult children are less likely to work, and those living in multigenerational households will have an even greater chance of quitting the labor market.

-----Table 1.4 about here -----

The results for formal sector workers are presented in Table 1.5. Men's hours of working are not influenced by changes in coresidence, but their odds of working are reduced by 22.8% if they have a coresident child. It is consistent with the finding from the household structure that men in adult-only households have a lower likelihood of working, by 22.4% compared to the households without a younger generation. There is a clear negative association between grandparenthood and labor supply for women. A coresident grandchild significantly lowers their odds of working by 28.0%. Household structure change, however, failed to show a similar pattern.

-----Table 1.5 about here -----

Regarding covariates, as expected, older ages and poorer health conditions are associated with a lower probability of working and shorter hours of working for men and women across all employment sectors. Compared to non-married older workers, those who are married or partnered tend to work more and have longer work hours, probably because they are healthier or less likely to be cared for by adult children.

Discussion

Despite economic reforms and government policies, intergenerational solidarity remains an important aspect of Chinese family life. This chapter adds to the understanding of

grandparents' contributions to households as workers who adjust their work plans in response to changes in living arrangements.

The impact of living with an adult child or grandchild on employment prospects varies based on gender and the work sector. Living with a grandchild increases the average weekly hours of working while living with an adult child decreases the probability as well as the work hours. The effects cancel each other out in multigenerational households. It is important to note that, regardless of the work sector, the negative effect of coresident adult children works consistently for grandfathers and grandmothers, whereas grandchild effects vary by gender and by work sector. The impact of coresidence with a grandchild is positive for grandfathers, although it failed to show statistical significance. The study expands on (Feng and Zhang 2018)'s statement that grandfathers prolong grandchild care time in response to an increase in demand, suggesting that grandparents can also financially support their families by raising their labor force supply.

The impact of living arrangements on a woman's employment prospects varies based on the nature of her job. With the arrival of grandchildren, only those employed in formal sectors tend to leave the workforce. This illustrates how formal sector jobs tend to be rigid, posing a challenge for female employees who want to balance family life and paid work. Meanwhile, it emphasizes women's responsibilities as caregivers as opposed to men's income-earning roles, thereby reducing labor supply due to grandchild care needs, which is in line with the finding that women are more likely to exit from the labor market or take time off

due to informal care (Smith et al. 2020). In contrast, grandmothers with informal sector jobs extend their hours of working when living with their grandchildren. It suggests that the flexible nature of informal sector employment makes it easier to take care of grandchildren while still working. Moreover, it showed that grandmothers, who are presumed to be caregivers of grandchildren, also make significant contributions to the household in order to meet the additional needs brought about by younger generations.

This study is not without limitations. Financial resources such as intergenerational transfer, wealth, and pension income, could shape work decisions and living arrangements simultaneously directly or by influencing health conditions (Ogawa, Matsukura, and Maliki 2009; Silverstein et al. 2006). I use household assets as a proxy for family socioeconomic resources due to the high missing rates of household income and household wealth in the dataset, which may not be the ideal solution. Additionally, I did not consider the important aspect of grandchild care for grandchildren in different age groups. Further research can examine and compare grandparents' labor force participation and labor supply in response to the grandparenting needs of toddlers, preschoolers, school-age children, and adolescents, respectively. Furthermore, a more comprehensive operationalization of the nature of work could be framed to capture the reasons embedded in the formal sector employment that led grandparents, especially grandmothers, to reduce their labor supply.

In conclusion, this longitudinal study sheds light on grandparents' roles as financially contributing members of the household and highlights gender roles in response to grandchild

needs. The findings may be used to inform discussions of raising the mandatory retirement age when grandmothers burden a considerable share of grandchild care. Policies that improve the public provision of care and maximize opportunities for women to occupy multiple roles (e.g., working and providing care) while minimizing the gendered division of labor and caregiving should be encouraged.

Tables

Table 1.1. Descriptive Statistics in CHARLS Baseline (2011)

Variable	Mean/Proportion	SD
Whether working (yes=1)	0.82	0.38
Total hours worked per week	46.14	23.43
Co-resident grandchild (yes=1)	0.36	0.48
Co-resident child (yes=1)	0.64	0.48
Living arrangement		
No coresident child or grandchild	0.29	0.45
Skipped generation (grandchild only)	0.07	0.26
Adult child only	0.34	0.48
Multigeneration (grandchild and adult child present)	0.29	0.45
Age	56.83	8.18
Female (yes=1)	0.48	0.50
Agriculture Hukou (yes=1)	0.86	0.34
Rural household residency (yes=1)	0.69	0.46
Sum of ADL-5	0.20	0.66
Self-reported health (very good=1, very poor=5)	2.97	0.89
Have any chronic disease (yes=1)	0.21	0.41
Married or partnered (yes=1)	0.91	0.28
Work type		
Agricultural employed	0.04	0.18
Agricultural self-employed	0.47	0.50
Non-agricultural employed	0.22	0.41
Non-agricultural self-employed	0.08	0.28
Non-agricultural family business	0.02	0.14
Not working	0.18	0.38
Education attainment		
Less than lower secondary	0.89	0.31
Upper secondary & vocational training	0.09	0.29
Tertiary	0.01	0.11
Household asset in quartiles		
The lowest quartile	0.26	0.44
The second quartile	0.24	0.43
The third quartile	0.24	0.43
The highest quartile	0.25	0.44
N	13267	

Table 1.2. Fixed-Effects Models on Work Prospects, Full sample, CHARLS 2011 to 2018

Variable	Whether working		Hours of working	
	Model 1	Model 2	Model 3	Model 4
	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)
Co-resident grandchild (yes=1)	-0.016 (0.046)		0.875* (0.424)	
Co-resident adult child (yes=1)	-0.184*** (0.043)		-0.815* (0.386)	
Household structure (ref=no coresident child or grandchild household):				
Skipped generation household		0.068 (0.077)		0.486 (0.678)
Multi-generation household		-0.209*** (0.059)		0.111 (0.550)
Adult child only household		-0.157*** (0.047)		-0.956* (0.430)
Age	-0.093*** (0.006)	-0.093*** (0.006)	-1.060*** (0.057)	-1.061*** (0.057)
Married or partnered (yes=1)	0.407*** (0.108)	0.407*** (0.108)	2.940* (1.243)	2.930* (1.243)
Sum of ADL-5	-0.149*** (0.023)	-0.149*** (0.023)	-0.556 (0.294)	-0.550 (0.295)
Self-reported health	-0.151*** (0.023)	-0.152*** (0.023)	-0.644** (0.210)	-0.645** (0.210)
Any chronic disease (yes=1)	-0.267*** (0.062)	-0.267*** (0.062)	-0.834 (0.577)	-0.839 (0.578)
Household asset in quartiles (ref=the lowest quartile):				
The second quartile	0.202*** (0.048)	0.201*** (0.048)	-1.335** (0.461)	-1.332** (0.461)
The third quartile	0.225*** (0.053)	0.222*** (0.053)	-0.990* (0.496)	-0.986* (0.496)
The highest quartile	0.312*** (0.063)	0.310*** (0.063)	0.034 (0.559)	0.039 (0.559)
Constance			104.877*** (3.730)	105.002*** (3.734)
N (observations)	53168	53168	35388	35388

Note: standard error in parentheses. ***p<.001, **p<.01, *p<.05

Table 1.3. Fixed-Effects Models on Work Prospects, Stratify by Gender, CHARLS 2011 to 2018

	Men				Women			
	Whether working		Hours of working		Whether working		Hours of working	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)
Co-resident grandchild (yes=1)	0.119 (0.074)		1.023 (0.578)		-0.103 (0.058)		0.662 (0.623)	
Co-resident adult child (yes=1)	-0.295*** (0.069)		-1.172* (0.522)		-0.115* (0.055)		-0.377 (0.572)	
Household structure (ref=no coresident child or grandchild household):								
Skipped generation household		0.192 (0.126)		1.326 (0.934)		-0.011 (0.098)		-0.441 (0.987)
Multi-generation household		-0.184 (0.095)		-0.190 (0.749)		-0.083 (0.061)		-0.799 (0.643)
Adult child only household		-0.272*** (0.076)		-1.067 (0.580)		-0.227** (0.075)		0.424 (0.812)
Age	-0.115*** (0.010)	-0.115*** (0.010)	-0.952*** (0.077)	-0.951*** (0.077)	-0.079*** (0.008)	-0.079*** (0.008)	-1.202*** (0.086)	-1.203*** (0.086)
Married or partnered (yes=1)	0.679*** (0.198)	0.678*** (0.198)	3.968 (2.070)	3.964 (2.070)	0.324* (0.130)	0.325* (0.130)	1.880 (1.567)	1.832 (1.568)
Sum of ADL-5	-0.207*** (0.040)	-0.208*** (0.040)	-0.472 (0.460)	-0.475 (0.460)	-0.116*** (0.029)	-0.118*** (0.029)	-0.590 (0.384)	-0.571 (0.384)

Table 1.3. Fixed-Effects Models on Work Prospects, Stratify by Gender, CHARLS 2011 to 2018, continued.

	Men				Women			
	Whether working		Hours of working		Whether working		Hours of working	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)
Self-reported health	-0.173*** (0.036)	-0.174*** (0.036)	-0.775** (0.284)	-0.773** (0.284)	-0.130*** (0.030)	-0.131*** (0.030)	-0.499 (0.311)	-0.498 (0.311)
Any chronic disease (yes=1)	-0.369*** (0.098)	-0.371*** (0.098)	-0.229 (0.787)	-0.225 (0.787)	-0.192* (0.081)	-0.191* (0.081)	-1.496 (0.851)	-1.507 (0.851)
Household asset in quartiles (ref=the lowest quartile):								
The second quartile	0.188* (0.075)	0.187* (0.075)	-2.040** (0.634)	-2.043** (0.634)	0.216*** (0.062)	0.215*** (0.062)	-0.548 (0.671)	-0.542 (0.671)
The third quartile	0.269** (0.083)	0.266** (0.083)	-1.372* (0.673)	-1.374* (0.673)	0.203** (0.070)	0.200** (0.070)	-0.598 (0.734)	-0.580 (0.734)
The highest quartile	0.398*** (0.098)	0.396*** (0.098)	-0.162 (0.752)	-0.167 (0.752)	0.263** (0.082)	0.260** (0.082)	0.180 (0.837)	0.185 (0.837)
Constant			100.806*** (5.116)	100.710*** (5.122)			110.226*** (5.524)	110.560*** (5.528)
N (observations)	26462	26462	18984	18984	26706	26706	16404	16404

Note: standard error in parentheses. ***p<.001, **p<.01, *p<.05

Table 1.4. Fixed-Effects Models on Work Prospects, Stratify by Gender and Work Sector, Informal Sector, CHARLS 2011 to 2018

	Men				Women			
	Whether working		Hours of working		Whether working		Hours of working	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)
Co-resident grandchild (yes=1)	0.088 (0.093)		0.455 (0.780)		-0.031 (0.065)		1.394* (0.689)	
Co-resident adult child (yes=1)	-0.335*** (0.087)		-1.734* (0.718)		-0.183** (0.062)		-0.180 (0.640)	
Household structure (ref=no coresident child or grandchild household):								
Skipped generation household		0.174 (0.157)		1.431 (1.246)		0.028 (0.107)		0.575 (1.063)
Multi-generation household		-0.257* (0.118)		-1.392 (1.020)		-0.218* (0.085)		1.303 (0.903)
Adult child only household		-0.307** (0.096)		-1.364 (0.807)		-0.160* (0.071)		-0.540 (0.733)
Age	-0.110*** (0.013)	-0.110*** (0.013)	-1.612*** (0.107)	-1.610*** (0.107)	-0.064*** (0.009)	-0.065*** (0.009)	-1.472*** (0.098)	-1.473*** (0.098)
Married or partnered (yes=1)	0.651** (0.225)	0.651** (0.225)	1.598 (2.632)	1.577 (2.632)	0.435** (0.145)	0.434** (0.145)	4.325* (1.758)	4.285* (1.759)
Sum of ADL-5	-0.200*** (0.044)	-0.201*** (0.044)	0.193 (0.523)	0.176 (0.523)	-0.133*** (0.031)	-0.133*** (0.031)	-0.496 (0.399)	-0.483 (0.399)

Table 1.4. Fixed-Effects Models on Work Prospects, Stratify by Gender and Work Sector, Informal Sector, CHARLS 2011 to 2018, continued.

	Men				Women			
	Whether working		Hours of working		Whether working		Hours of working	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)
Self-reported health	-0.084 (0.045)	-0.084 (0.045)	-1.096** (0.386)	-1.090** (0.386)	-0.129*** (0.034)	-0.130*** (0.034)	-0.271 (0.350)	-0.272 (0.350)
Any chronic disease (yes=1)	-0.379** (0.123)	-0.383** (0.123)	-0.489 (1.057)	-0.466 (1.057)	-0.116 (0.092)	-0.114 (0.092)	-1.116 (0.952)	-1.123 (0.952)
Household asset in quartiles (ref=the lowest quartile):								
The second quartile	0.215* (0.091)	0.214* (0.091)	-1.350 (0.823)	-1.353 (0.823)	0.196** (0.069)	0.196** (0.069)	0.004 (0.738)	0.003 (0.738)
The third quartile	0.178 (0.104)	0.174 (0.104)	-1.933* (0.897)	-1.926* (0.897)	0.135 (0.080)	0.133 (0.080)	0.217 (0.819)	0.227 (0.819)
The highest quartile	0.371** (0.129)	0.368** (0.129)	-1.724 (1.047)	-1.724 (1.047)	0.194* (0.095)	0.192* (0.096)	0.358 (0.956)	0.358 (0.956)
Constant			143.608*** (7.302)	143.319*** (7.307)			121.841*** (6.405)	122.083*** (6.410)
N (observations)	13634	13634	8878	8878	19578	19578	11597	11597

Note: standard error in parentheses. ***p<.001, **p<.01, *p<.05

Table 1.5. Fixed-Effects Models on Work Prospects, Stratify by Gender and Work Sector, Formal Sector, CHARLS 2011 to 2018

	Men				Women			
	Whether working		Hours of working		Whether working		Hours of working	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Log odds	Log odds	Coefficient	Coefficient	Log odds	Log odds	Coefficient	Coefficient
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
Co-resident grandchild (yes=1)	0.180 (0.124)		1.176 (0.840)		-0.328* (0.132)		-2.598 (1.382)	
Co-resident adult child (yes=1)	-0.259* (0.116)		-0.257 (0.748)		0.084 (0.118)		-0.306 (1.219)	
Household structure (ref=no coresident child or grandchild household):								
Skipped generation household		0.200 (0.214)		0.812 (1.371)		-0.289 (0.248)		-4.522 (2.431)
Multi-generation household		-0.082 (0.162)		0.974 (1.078)		-0.250 (0.166)		-2.594 (1.760)
Adult child only household		-0.254* (0.125)		-0.371 (0.821)		0.092 (0.126)		-0.755 (1.306)
Age	-0.124*** (0.017)	-0.124*** (0.017)	-0.421*** (0.109)	-0.422*** (0.109)	-0.121*** (0.017)	-0.121*** (0.017)	-0.495** (0.174)	-0.498** (0.174)
Married or partnered (yes=1)	0.816 (0.418)	0.814 (0.418)	6.614* (3.198)	6.616* (3.198)	-0.107 (0.297)	-0.104 (0.298)	-4.981 (3.299)	-5.037 (3.299)
Sum of ADL-5	-0.253** (0.089)	-0.253** (0.089)	-1.507 (0.848)	-1.507 (0.848)	-0.009 (0.080)	-0.009 (0.080)	-0.816 (1.104)	-0.760 (1.105)

Table 1.5. Fixed-Effects Models on Work Prospects, Stratify by Gender and Work Sector, Formal Sector, CHARLS 2011 to 2018, continued

	Men				Women			
	Whether working		Hours of working		Whether working		Hours of working	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)	Log odds (SE)	Log odds (SE)	Coefficient (SE)	Coefficient (SE)
Self-reported health	-0.330*** (0.061)	-0.331*** (0.061)	-0.484 (0.411)	-0.485 (0.411)	-0.128 (0.066)	-0.129 (0.066)	-1.049 (0.651)	-1.037 (0.651)
Any chronic disease (yes=1)	-0.359* (0.164)	-0.359* (0.164)	0.455 (1.147)	0.453 (1.147)	-0.468** (0.179)	-0.468** (0.179)	-1.853 (1.816)	-1.863 (1.816)
Household asset in quartiles (ref=the lowest quartile):								
The second quartile	0.155 (0.135)	0.155 (0.135)	-2.900** (0.956)	-2.895** (0.956)	0.335* (0.142)	0.334* (0.142)	-2.842 (1.510)	-2.775 (1.511)
The third quartile	0.441** (0.141)	0.440** (0.141)	-1.343 (0.993)	-1.335 (0.993)	0.453** (0.151)	0.451** (0.151)	-3.620* (1.590)	-3.545* (1.592)
The highest quartile	0.475** (0.156)	0.475** (0.156)	0.296 (1.077)	0.308 (1.077)	0.517** (0.169)	0.517** (0.169)	-1.354 (1.714)	-1.299 (1.715)
Constant			68.690*** (7.141)	68.803*** (7.150)			83.471*** (10.754)	83.797*** (10.759)
N (observations)	12828	12828	10106	10106	7128	7128	4807	4807

Note: standard error in parentheses. ***p<.001, **p<.01, *p<.05

2 Worker-Caregiver Roles and Transitions among middle-to-older adults in China

Abstract

Despite middle-to-older adults' active participation in productive activities, empirical studies have fewer investigations on the prevalence of worker-caregivers at the later stage of life, as well as the factors influencing their transitions between work and caregiving roles. Using data from four waves of the China Health and Retirement Longitudinal Study (CHARLS 2011-2018), I categorized respondents into four categories based on their work and caregiving status. Workers were found to be the most populated group, followed by worker-caregivers. Linking observations from various waves of interviews, common transitions include maintaining the same role as workers or worker-caregivers and transitioning between worker and worker-caregiver roles. Furthermore, the study examines how changes in living arrangements, gender, and rural/urban residence influence these transitions. Analyses from multinomial logistic regression models indicate that living with family members, especially young grandchildren, is associated with a higher likelihood of taking up caregiving for workers, and a lower likelihood of exiting caregiving for worker-caregivers. In the presence of coresident relatives, female and rural workers are more likely to transition into worker-caregivers compared to their male and urban counterparts. Interestingly, living with adult children and a spouse lowers the probability of transitioning

out of worker-caregiver, but only for men. These findings highlight the role of social relationships in shaping individuals' trajectories and underscore the importance of considering living arrangements in understanding work and caregiving dynamics among middle-to-older adults.

Introduction

Caregiving behaviors may bring emotional rewards (Silverstein and Giarrusso 2010), but they are less likely to result in economic gains (Zuba and Schneider 2013). In the face of financial disadvantages, some caregivers may need to work for a living, resulting in a dual burden of employment and domestic duties, which is characterized by the term “double burden” (Chen et al. 2018). Most of the research on the double burden has been conducted on middle-aged mothers (Bianchi 2000; Craig 2007). It is absent from the literature how the double burden extends into the later life course (Moen and Flood 2013). In the transition to older adulthood, child-care responsibilities decrease as children grow up, while grandchild care responsibilities, parental care, as well as spousal care loads increase. It is especially true when individuals become grandparents at a young age, which means they are still actively participating in the labor force. Grandparents, particularly grandmothers, may find themselves once again having to balance family and work responsibilities at a later stage of life (Flood and Moen 2015).

This study is set in China, a country facing accelerated population aging with undeveloped social support systems in eldercare (Ning et al. 2016). When resources provided

by the pension system are inadequate, Chinese older adults may depend on strong family ties for instrumental and financial support (Silverstein et al. 2006). With the cultural expectation of grandparents actively caring for grandchildren and the prevalent practice of intergenerational co-residence, many grandparents are taking the role of caregivers (Chen and Liu 2009, 2012; Feng and Zhang 2018). In addition, a large informal economy indicates that compared to workers in the formal sector, their counterparts may have different, usually more flexible, adjustments in their schedule and workload when faced with care demand (Chen and Hamori 2013; Gamble and Huang 2009; Huang 2009). Given the financial need, cultural norms, and feasibility, it is likely that a considerable population is juggling work and care.

People who take on both work and informal caregiving responsibilities could face extra challenges caused by conflicting role expectations. Additionally, more than 20% of older adults are working grandparents in urban China (Liu and Lou 2016), showing the prevalence of the dual-role group. Considering their challenging responsibilities and huge population, worker-caregivers need more academic attention. Utilizing data from the Chinese Health and Retirement Longitudinal Study (CHARLS), this study explores the prevalence of worker-caregivers and the common role transitions and further investigates the factors that motivate middle-to-older adults to transition into or stay in the dual-role group. Given the differences in gender roles and social context between urban and rural areas, the estimation is conducted by highlighting the gender and rural-urban disparities.

Theoretical Approaches and Literature Review

The life course perspective

The life course perspective proposes that each person experiences a sequence of socially defined transitions in roles and statuses over time (Elder Jr. 1994). It emphasizes the interweave of trajectories: for instance, unlike the focus on single careers, the life course perspective offers a framework for exploring multiple interdependent pathways, such as work careers and family pathways. The transitions in one's work prospects are not only caused by work-related factors but also influenced by factors that are associated with fields such as family and social constructs. Therefore, this study explores middle-to-older aged adults' role transitions and highlights that the trajectories of worker-caregivers are distinctive from those of workers or caregivers. The reasons that drive individuals to take dual responsibilities are not merely adding the driving motivation to become workers to the factors to become caregivers. Additionally, the transitions are shaped by individuals' experience in both work and family arena, especially kin. Middle-to-older adults' role transitions are not personal decisions but typically involve family members' misfortune, opportunity, and personal problems.

The Chinese context: the prevalence of worker, caregiver, and worker-caregiver

In China, the majority of middle-to-older adults take on the role of workers. Female labor force participation rates remain high across all age groups, with a rate of 68.8% for working-aged women in 2017, which is higher than that of OECD countries and the US (Xiao and

Asadullah 2020). In 2010, among individuals aged 50 to 74, 58.9% of rural women and 20.7% of urban women remained in the labor force (Connelly, Maurer-Fazio, and Zhang 2014). While recent evidence has suggested a trend toward delayed retirement in many Western countries (Dosman et al. 2006), employment among Chinese urban seniors is framed by comparatively early mandatory retirement age (60 for males, 55 for female cadres, and 50 for female workers). Nevertheless, continued work to maintain economic security has become a necessity for many Chinese retirees (Ling and Chi 2008). For instance, a notable number of reemployed urban seniors (8-10%) were reported from 2010 to 2012 (Liu and Lou 2016). However, agricultural workers in rural areas are described as experiencing ceaseless toil, with weekly average working hours only falling under 20 hours when they reach 75 years old for men and 65 years old for women (Giles et al. 2011). This trend persisted for a decade from 1991 to 2009 and shows little evidence of change. One of the reasons for this is the inadequate social security system. In the cities, the vast rural-to-urban migrant workers and workers in the booming private sector, who account for a considerable part of total workers are not covered by social security systems. In 2007, only 65 percent of the urban workforce was covered by the basic pension system or an alternative system for civil servants (Cai and Du 2015; Majid 2015). The rural older population are not covered by any social security system until China introduced the New Rural Social Pension in 2008, but its effect on easing the burden of rural residents is debatable, as some scholars find no evidence that it significantly induces the elderly to withdraw from the labor market (Cai and Cheng 2015;

Ning et al. 2016). To sum up, without adequate protection of social security, middle-aged and older adults tend to remain in the workforce.

In Chinese society, family life plays a crucial role in fulfilling their contributory roles and expectations of reciprocity among older adults, as highlighted by previous studies (Mjelde-Mossey et al. 2009). It is common for urban seniors to provide informal care to a close family member, usually a spouse, parent or parent-in-law, or young grandchild (Sun 2013), and possibly true for rural older adults as well. The nature of caregiving obligations varies depending on the relationship between the caregiver and the care recipient (Penning and Wu 2016). Providing care to a spouse is viewed as a highly obligatory responsibility, whereas caring for a parent is linked to the cultural norm of filial piety (Cheng and Chan 2006). In contrast, taking care of a grandchild provides older adults with more choices regarding participation, while also representing a highly valued productive role in the Chinese aging tradition (Mjelde-Mossey et al. 2009; Silverstein et al. 2006). Regardless of the relationship with the care recipient, it is common for older adults to actively care for household members, as evidenced by a national survey that estimates 41.7% of Chinese adults aged 45-64 provided care for older and/or younger generations in 2011, a proportion that may even be higher if spousal caregivers are included (Liu and Chen 2022). As care needs diminish, such as following the grown-up of grandchildren or the passing of a spouse or parents, individuals may exit caregiving and re-enter the workforce or become care recipients themselves.

The prevalence of continued work, together with the cultural expectation of providing care to family members, drive Chinese middle-to-older aged adults to deal with the dual responsibilities of work and informal care, which has become an increasingly significant challenge in society, as Chen and colleagues pointed out (Chen et al. 2020). Indeed, according to Liu and Lou's (2016) research, a substantial 21.7% of Chinese urban older adults are categorized as working grandparents who simultaneously hold a job and care for their grandchildren under the age of 16. After spousal caregivers, the working grandparents are the second largest group. However, there is a research gap regarding the specific group of worker-caregivers. The majority of studies examining productive activity engagements tend to focus on employment and caregiving as separate entities, failing to recognize and investigate the unique combination of these roles that worker-caregivers undertake (Liu and Lou 2016). Given the prevalence of older adults balancing both work and caregiving responsibilities, a significant portion of the population may experience transitions between the roles of worker, caregiver, and worker-caregiver.

Factors influencing work-caregiving transitions

Various reasons motivate individuals to become worker-caregivers. For those who change from worker to worker-caregiver, taking up informal caregiving can be driven by care needs and therefore commerce independent of employment opportunities. It is not uncommon for middle-to-older aged adults to become caregivers to their family members, such as grandparents being the primary caregiver of the “left-behind children” (Sun 2013). As people

age, they may also be more likely to provide spousal care (Zhao et al. 2022). The need for care should therefore be the main factor that drives the transition from worker to worker-caregiver and encourages worker-caregivers to maintain their caregiving role, regardless of gender or socioeconomic status. Living arrangements can be regarded as indicators of care needs, with those living with care recipients typically having a higher workload and greater intensity of care than those who do not live with them. For middle-to-older aged adults, living with grandchildren, parents or in-laws, or a spouse with functional limitations may represent higher care needs, while adult children could share caregiving responsibilities.

In addition to care needs, the role transition could be influenced by the worker's employment condition and human capital. It has been suggested that individuals with limited employment opportunities or weak attachment to the labor force may 'self-select' into the caregiving role (Alpass et al. 2017; Carmichael et al. 2010). In contrast, workers with high human capital tend to stay in the labor force and therefore become worker-caregivers, rather than exit the labor force and become sole caregivers. It is supported by Liu and Lou (2016)'s latent class analysis on Chinese adults aged 60 and above, which found that men and highly educated individuals are more likely to become working caregivers rather than spousal caregivers. Additionally, for female workers in their 50s, financial difficulties are associated with starting caregiving and reducing work hours, indicating a transition into sole caregiver rather than working caregiver (Berecki-Gisolf et al. 2008). Transition-wise, workers with lower attachment to the labor force and lower opportunity costs, such as women and those with lower socioeconomic status, may be more likely to cut back on work and take on

caregiving, leading to a transition from worker to worker-caregivers. In the same vein, women and socioeconomically disadvantaged worker-caregivers are more likely to stay as worker-caregivers rather than transition into sole workers.

The cause and effect of work and informal caregiving are further complicated by health issues, which are related to both caregiving and employment. Poor health, particularly among older adults and women, can lead to reduced labor force participation (Lee and Tang 2015).

The existing empirical studies predominantly focus on estimating the factors associated with transitions from being solely a worker to becoming a caregiver. However, there is a significant knowledge gap when it comes to understanding the transitions into the worker-caregiver role, despite the increasing prevalence of this group. The factors that drive individuals to take on caregiving responsibilities while simultaneously remaining in the labor force, rather than exiting, have received limited attention and require further exploration. Additionally, to obtain a comprehensive understanding of the trajectories of worker-caregivers, it is essential to not only examine the transition into this role but also investigate the factors that contribute to transitioning out of it. Longitudinal data provides the opportunity to track individuals' transitions over time and enables the estimation of factors that influence individuals' decisions to undertake dual roles. By addressing these gaps, this research aims to provide insights into the dynamics of worker-caregivers' experiences.

Research Question and Hypothesis

This study is designed to explore the work-and-care-related transition among the middle-to-older population in China using a longitudinal data structure. The first objective is to explore the prevalence of the worker-caregiver role by categorizing individuals into four distinct groups: non-worker or caregiver, sole worker, sole caregiver, and worker-caregiver, based on their work and caregiving statuses and examining the distribution of each category. Subsequently, the study analyzes the transitions between worker-caregiver categories and identifies the most commonly observed trajectories. Considering the high labor force participation rates observed across different age groups, it is expected that the transitions involving the sole worker role are the common trajectories.

Comparisons are then made between individuals whose worker-caregiver category changed and those who remained unchanged, aiming to estimate the factors that contribute to these role transitions. Given that those who shoulder both work and caregiving responsibilities may encounter particular challenges, this study pays special attention to individuals who (1) take on caregiving responsibilities and transition from workers to worker-caregivers, and (2) cease caregiving duties and transition from worker-caregivers to workers.

Adopting the view that caregiving behavior is driven by needs, this study places emphasis on the household structure status, as signaled by the presence of a spouse, adult children, parents or in-laws, and grandchildren, which not only represent the demand for care but also the potential caregivers who can share the responsibilities. As individuals enter the

later stage of life, childcare needs decrease as their children grow up, while the need for spousal care, parental care, as well as grandchild care, emerges. Regardless of gender and residency, the presence of young grandchildren (aged below 16) could be interpreted as an indicator of heightened care need and, therefore, is associated with a greater likelihood of assuming or continuing caregiving responsibilities (Hypothesis 1-a). Conversely, adult children's presence can help in sharing the financial and caregiving tasks, which helps to reduce the chances of taking on working and caregiving responsibilities (Hypothesis 1-b). The influence of having a spouse in the household could be mixed, as a healthy and capable spouse could share responsibilities, but a spouse in poor health could indicate a higher care need. Given that this study's focus is on the middle-to-older aged group, it is more likely that the presence of a spouse is associated with spousal caregiving needs, thus linked with a greater likelihood of assuming caregiving responsibilities or continuing in the caregiver role (Hypothesis 1-c). Similarly, the presence of parents and in-laws could also signal higher care demand, which could increase the probability of assuming or continuing work as caregivers (Hypothesis 1-d).

Since sociodemographic factors influence both employment and caregiving, gender differences and rural-urban disparity are discussed. Women could be more likely to opt out of the labor force given their weaker attachment to the labor force and expectations as caregivers, therefore, it is assumed that female workers are more likely to take on caregiving responsibilities and less likely to quit caregiving compared to their male counterparts (Hypothesis 2-a). Moreover, it is assumed that urban residents are less likely to provide

informal care due to the greater availability of formal care facilities and higher affluence levels, while rural residents may have fewer options and may be more likely to provide care themselves (Hypothesis 2-b). Additionally, lower socioeconomic status, as indicated by lower education and household assets, may be associated with a greater likelihood of providing informal care. The nature of one's job, indicated by formal sector job and long work hours, could suggest a more rigid schedule, and limit one's available time for caregiving, resulting in a greater likelihood of exiting the workforce or assuming a sole caregiver role instead of balancing work and caregiving responsibilities (Chen and Hamori 2013).

Poor health is a crucial factor that restricts individuals from participating in the labor force and caring for their family members in need. Those with poor health are less likely to take on the double burden of work and caregiving and are more likely to transition out of the dual role if they are already in it. As individuals age, they become frailer, and their capacity to manage the demands of both roles decreases. Hence, both poor health and advanced age are assumed to be associated with a transition to non-worker-or-caregiver status.

Methods

Data

This study uses data from the 2011-2018 China Health and Retirement Longitudinal Study (CHARLS). It is a nationally representative study that has tracked respondents aged 45

and over and their spouses biennially since 2011, with information on respondents' work, retirement, demographic characteristics, health, as well as care responsibilities. The 2011 pilot study received 17,706 observations. 441 respondents passed away between 2011 and 2013, and 2834 respondents were added in 2013. The 2015 wave lost 689 individuals due to mortality, and 574 individuals were added. The 2018 wave lost 997 observations due to mortality and had 315 new interviewees.

Measures

Worker-caregiver category and transition

The present study focuses on the middle-to-older adults' role transition in terms of time burden. The measurement of work and caregiving is based on the weekly average hours spent on paid work or informal caregiving, resulting in two work groups (working and not working) and two caregiving groups (caregiving and not caregiving). Work includes all forms of paid work such as agricultural work, employed work, household business, and self-employed work. Caregiving involves informal caregiving to household members, including parents/in-laws, spouses, adult children, and grandchildren. It needs to be mentioned that spousal caregiving time was only recorded when the spouse was reported to have difficulties in basic (ADL) or instrumental activities of daily living (IADL). Consequently, the work-caregiving type is a categorical variable with four categories: non-worker or caregiver, sole worker, sole caregiver, and worker-caregiver. The distribution of worker-caregiver categories by year is shown in Table 2.1. In 2011, there are 2542 respondents categorized as non-worker or caregivers, 4489 as sole workers, 1716 as sole caregivers, and 3779 as worker-caregivers

in the analytical sample. Observations of four waves combined, there are 8557 individual-year observations as non-worker or caregivers, 18426 as sole workers, 7590 as sole caregivers, and 15755 as worker-caregivers. Notably, the worker-caregiver category constituted the second largest group, underscoring its prevalence among the middle-to-older aged population.

I then construct transitions of the worker-caregiver category between two study waves to examine the most common experiences among middle-to-older-aged adults. Due to this analytical design, only respondents who participated in at least two waves of the survey were included in the analysis. The analytical sample was limited to respondents aged 45 to 75 years, as this age group has a higher frequency of transitions than middle-old and oldest-old adults.

The construction of transitions involved pairing observations from each possible baseline and follow-up wave. For instance, for those who responded in both the 2011 and 2013 waves, their worker-caregiver category in 2011 is considered their baseline category, and the category in 2013 is used as the follow-up category. Some respondents were absent during certain waves of the interview. In that case, the follow-up category is the observation of the next available wave. For instance, if the respondent didn't answer the 2013 wave, but participated in the 2011 and 2015 waves, then this individual's baseline wave is 2011 and the follow-up wave is 2015. The interval between any two waves contributes to one observation. Each respondent could contribute multiple transition observations if they responded to multiple waves of the survey. For example, those who participated in the 2011, 2013, and

2015 waves have two records of transitions: (1) baseline 2011, follow-up 2013, and (2) baseline 2013, follow-up 2015.

Given that there are four categories at two time points, there are a total of 16 types of transitions (and non-transitions). For instance, for those who participated in the 2011 and 2013 waves, among those who reported as non-worker or caregivers in 2011, 47.58% stayed as non-worker or caregivers, 23.26% changed to sole workers, 18.41% to sole caregivers and 10.76% to worker-caregivers in 2013. Among sole workers in 2011, 13.28% turned into non-worker or caregivers, 52.83% stayed as sole workers, 6.31% changed to sole caregivers, and 27.58% to worker-caregivers. In the analytical sample, a total of 34,461 transitions are observed. The worker-caregiver type transition by year is shown in Table 2.2.

Among the 16 possible transitions, the most frequently observed (non)transitions are individuals maintaining a sole worker role and those maintaining a worker-caregiver role, comprising 20.15% and 15.82% of the total sample, respectively. Furthermore, 10.53% of the total sample transitioned from sole worker to worker-caregiver, and another 8.97% transitioned from worker-caregiver to sole worker. Given the prevalence of these four groups, which appear to be common choices among middle-to-older aged adults, I restricted the multinomial regression models to eight transitions: the four transitions of baseline sole workers and the four transitions of baseline worker-caregivers. As displayed in Figure 2.1, among baseline sole workers, 53.68% remained as such at the follow-up wave, while 28.06% transitioned into worker-caregivers. Among baseline worker-caregivers, 51.62% continued their dual role, while 29.28% exited caregiving and became sole workers. Given their

commonness, in multivariate logistic regressions, those who stayed in their baseline worker-caregiver category are used as the reference group, and special attention is paid to those who reported transition from sole worker to worker-caregiver (i.e., those who undertook caregiving responsibilities) and from worker-caregiver to sole worker (i.e., those who discontinued caregiving).

Living Arrangements

The key independent variables are living arrangements, measured by the presence of family members. Four dichotomous variables are used to indicate the presence of grandchildren, adult children, spouses, and parents or in-laws. Since living arrangements are a representation of care demand, the variables are coded based on the presence of family members at the baseline wave and during the time interval. For example, the variable for living with grandchildren is coded as 1 if the respondent continued to report living with grandchildren (continuing need), or if the respondent did not live with a grandchild initially but later reported living with one (emerging need). In comparison, those who did not live with grandchildren throughout the study (no need) or those who lived with grandchildren initially but no longer did at follow-up (need disappeared) are coded as 0.

Subgroups and Covariates

To comprehensively explore the factors associated with the selection process into specific worker-caregiver categories, several covariates are considered in the analysis.

Gender is a crucial factor that influences the work-caregiving transition as men and women have different expectations regarding their social roles. Other demographic factors such as age group and rural/urban residency are included as well. Marital status, which is highly correlated with living with a spouse, is not analyzed. Health conditions are also taken into account since they impact the ability to work and provide care. Health is measured by self-rated health, ranging from 1 to 5, with 1 representing very good and 5 representing very poor, and the total number of reported difficulties in activities of daily living, such as dressing, bathing, eating, getting in and out of bed, and using the toilet. Socioeconomic factors such as educational attainment, with 1 representing less than lower secondary, 2 representing upper secondary and vocational training, and 3 representing tertiary education, and quartiles of household assets, which indicate the total value of cash and deposits in financial institutions at the couple level, with 1 representing the lowest quartile and 4 representing the highest quartile, are considered. The nature of work is measured by the work sector of the major job and whether it is a full-time job. Non-agricultural employed jobs are defined as formal sector jobs, while agricultural employed, agricultural self-employed, non-agricultural self-employed, and non-agricultural family business are considered informal sector jobs. A full-time job is identified if the reported weekly average working hours are equal to or exceed 40 hours.

Analytical Strategies

Because the dependent variable, the worker-caregiver category at the follow-up wave is a categorical variable, multinomial logistic regression is used to estimate the factors associated with the probability of transition into a particular category (Berecki-Gisolf et al. 2008). The robust standard error is used to control heterogeneity, given that individuals may have multiple observations over time.

Since the most frequently observed transitions among the 16 possible transitions are maintaining sole worker, maintaining worker-caregiver, transitioning from sole worker to worker-caregiver, and transitioning from worker-caregiver to sole worker, the multinomial logistic regression models are restricted to eight specific transitions. These transitions encompass the four transitions from baseline sole workers to various worker-caregiver categories and the four transitions from baseline worker-caregivers to various worker-caregiver groups. To address the factors that are linked with transitions of baseline sole workers, I use those who maintained to be sole workers at the follow-up wave as the reference group and compare them with those who transit to other categories at the follow-up wave. Particular attention is paid to those who take on caregiving responsibilities and become worker-caregivers. In the same vein, to explore the factors that contribute to baseline worker-caregivers' transitions, multinomial logistic regressions are conducted using those who remain in the worker-caregiver group as the reference and comparing them with those who transit to other categories at the follow-up wave.

Furthermore, I explore the potential differences in the effects of living arrangements on work-caregiving transitions among different gender and residency groups. Given the

complexity of interpreting coefficients for interactions among multiple variables, I conduct separated models for the full sample (Model 1), men (Model 2), women (Model 3), urban residents (Model 4), and rural residents (Model 5), with sociodemographic covariates included in all models.

Results

Table 2.3 presents the descriptive statistics of the pooled sample and its respective subsamples at the baseline wave. Across all subgroups, the most prevalent worker-caregiver category is sole worker, although the proportion is higher among men and rural residents. Worker-caregiver is the second most common category, except for urban residents, for whom it is not applicable. Regarding care needs as indicated by living arrangements, over 80% of respondents cohabit with their spouse, with about half having a co-residing adult child. 10% of respondents live with their young grandchildren, and few cohabit with their parents or in-laws. In terms of demographic characteristics, the late middle-aged population (ages 45 to retirement and retirement to 65) each accounted for 40% of the pooled sample, followed by the youngest old (20%). The male subsample has a higher proportion of the youngest age group, while the female subsample has a higher proportion of the retirement age to 64 age group. Women account for 52% of the pooled sample, and 63% of respondents reside in rural areas. On average, the self-rated health of the sample is fair, with men and rural residents reporting slightly better health conditions. In contrast, women and rural subsamples reported

slightly higher numbers of difficulties in daily activities of daily living. Nearly 80% of the sample reported having an education level below lower secondary. In terms of household assets, urban residents are relatively better off than their rural counterparts, with a higher proportion of individuals falling in the highest quantile. On average, 17% of individuals in the sample hold formal sector jobs, with the proportion being higher among men and urban residents. Approximately half of the sample reported working 40 or more hours per week, especially among men and rural residents.

Baseline sole workers' transitions

Table 2.4 displays the variables associated with the transition from baseline sole workers to various worker-caregiver categories at follow-up. Across all subgroups, living with young grandchildren is positively associated with the likelihood of transitioning to caregiving roles, either as sole caregivers or worker-caregivers, when compared to those who continue as sole workers. The presence of adult children in the household slightly increases the probability of taking up caregiving, but only for women and rural residents. Furthermore, living with a spouse has a marginal impact, increasing the probability of taking on caregiving and reducing the probability of exiting the labor force. Additionally, living with parents or in-laws has a slight impact on increasing the probability of becoming worker-caregivers. To summarize, living with family members of all kinds increases the risk of transitioning from sole workers to worker-caregivers, with the effect of cohabiting with young grandchildren being the most prominent.

Gender and rural-urban differences in the transitions of sole workers are also examined. The results indicate that compared to male workers, female workers in rural areas are more likely to exit the labor force and either become sole caregivers or enjoy a responsibility-free life. However, female workers are less likely to become worker-caregivers compared to male workers. Rural residents, regardless of gender, are less likely to exit the labor force than their urban counterparts but do not exhibit a preference for shouldering dual burdens. Additionally, older age groups are more likely to become responsibility-free or sole caregivers than those who have not reached retirement age. Those in their late 50s and early 60s are slightly more likely to take on caregiving, but not the youngest old population. Poorer health is associated with a higher probability of quitting the labor force but has no impact on transitioning into worker-caregiver roles.

Regarding socioeconomic factors, education, and household assets have little impact on the transitions of sole workers. In contrast, full-time employment is significantly associated with a lower probability of transitioning into caregiving categories, indicating that workers with long working hours tend to continue working. Interestingly, women with formal sector jobs are more likely to become sole caregivers, and women and urban residents with formal sector jobs are less likely to transition into worker-caregivers.

I give particular emphasis to individuals who make the transition from sole workers to worker-caregivers in comparison to those who remain as workers. To this end, in Table 2.5, I present the predicted probabilities of each worker-caregiver category at the follow-up wave, with respect to different living arrangements across gender-residency subgroups, among sole

workers at the baseline wave, while holding other covariates at their mean levels. When residing alone, over 60 percent of men, women, and rural residents persist as sole workers, and fewer than 20% of them switch to worker-caregivers. However, in the presence of care requirements, especially those pertaining to grandchild care, less than 30% of respondents maintain their status as sole workers across all gender and residence subgroups. Conversely, 56% of men, 48% of women, 49% of urban residents, and 54% of rural residents transition to the worker-caregiver category.

Baseline worker-caregivers' transitions

Table 2.4 presents the variables associated with the transition for baseline worker-caregivers, with the reference group of people staying in the dual role category. Results indicate that living with grandchildren is significantly associated with a lower probability of transitioning into the responsibility-free group or becoming sole workers for men and with a slightly lower probability of becoming a sole caregiver. Thus, worker-caregivers who live with their grandchildren may find it challenging to leave caregiving. Living with adult children slightly reduces the probability of transitioning into sole workers for men and rural residents, while increasing the probability of transitioning into a sole caregiver. Living with a spouse significantly reduces the likelihood of transitioning into the responsibility-free group and becoming a sole caregiver for urban residents. The spousal effect also decreases the probability of becoming a sole worker, except among women. However, living with parents or in-laws does not show any statistically significant impact.

Regarding gender differences, female worker-caregivers are more likely than their male counterparts to transition into the non-worker-or-caregiver group. Moreover, irrespective of residency, female worker-caregivers are more likely to become sole workers or sole caregivers. Rural residents are less likely than urban residents to become sole caregivers. As the respondents' age increases, they tend to transition from dual roles into groups with fewer responsibilities, except for those in their late 50s and early 60s, who are less likely to become sole workers. Poor health contributes to the transition of individuals into the non-worker-or-caregiver group but limits their chances of transitioning into sole workers. Regarding socioeconomic status, higher education increases the probability of men and urban worker-caregivers transitioning into sole workers. Formal sector jobs contribute to the probability of transition into other categories compared to remaining in the worker-caregiver group for women. Long working hours increase the likelihood of transitioning into sole workers but decrease the probability of transitioning into the non-worker-or-caregiver or sole caregiver.

Discussion and Conclusion

This study utilized data from the Chinese Aging and Retirement Longitudinal Study to examine the dynamics of working and caregiving categories among middle-to-older aged adults while controlling for sociodemographic and health-related variables. The findings indicate that the coresidence of family members is linked with a higher likelihood of transition to worker-caregiver for sole workers, as well as a lower likelihood of transition out

of the worker-caregiver category. It echoes the life course perspective that individuals' career trajectories are intertwined with family lives, and transitions are made in response to changes in social relationships. The most salient factor is living with young grandchildren, emphasizing the importance of care needs. Moreover, gender and residency appear to shape individuals' transitions between work and caregiving roles. Furthermore, individuals with long working hours are significantly constrained in their ability to balance multiple responsibilities.

The transitions from baseline sole workers and from baseline worker-caregivers are studied based on their prevalence. For workers and worker-caregivers, the decision to take on and maintain caregiving was found to be predominantly driven by care needs, as indicated by living arrangements. Specifically, the presence of young grandchildren, the spouse, and parents or in-laws all contributed to a higher likelihood of taking up caregiving compared to continuing as care-free workers. Additionally, living with grandchildren and the spouse was associated with a lower likelihood of exiting caregiving compared to continuing as worker-caregivers. Therefore, hypotheses 1-a and 1-c were supported in both scenarios, while 1-d was partially supported. Additionally, among sole workers, the presence of grandchildren increased the likelihood of turning to sole caregivers as well, while the presence of the spouse and parents/in-laws only increased the likelihood of becoming worker-caregivers. This may be attributed to the increasing prevalence of intensive grandparenting, which may pose challenges for grandparents to effectively multitask while providing care to young grandchildren (Di Gessa, Glaser, and Tinker 2016; Zamberletti, Cavrini, and Tomassini

2018). However, the presence of adult children increased the probability of becoming a worker-caregiver compared to continuing as a sole worker for women and for rural residents, contrary to the assumption of hypothesis 1-b. For worker-caregivers, those who lived with adult children were less likely to become sole workers but more likely to become sole caregivers. This finding may be interpreted in several ways, such as older adults moving in with adult children who require care due to illness (Lefley 1987), or the adult children financially contributing to the household's well-being rather than caregiving assistance (Ingersoll-Dayton, Neal, and Hammer 2001). Additionally, the marital status of the adult children could be important in determining the need for older adults' financial support and their assistance with domestic responsibilities, such as household chores and child-rearing (Tong et al. 2019).

In terms of demographic factors, hypothesis 2-a was supported, indicating that women workers have a higher likelihood of opting out of work and becoming non-worker-or-caregivers, while also being less likely to become worker-caregivers. Women who are worker-caregivers tend to transition into other categories rather than remaining in the worker-caregiver group. Conversely, rural workers exhibit a stronger commitment to work, as they are less likely to opt out and become sole caregivers and show no propensity to become worker-caregivers in comparison to continuing as sole workers. These findings contradict hypothesis 2-b, which suggested a weaker attachment to work among rural residents. The stronger attachment to the labor market observed among rural workers may be attributed to the lack of sufficient protection from the pension system. Without adequate pension income,

rural residents are compelled to continue working until very old age in order to sustain their livelihoods (Xu et al. 2021).

Regarding socioeconomic factors, the influence of socioeconomic status and education appears to be limited. However, having a job in the formal work sector increases the likelihood of transitioning from worker to caregiver, but only for women. Moreover, women with formal sector jobs are less likely to transition from sole worker to worker-caregiver, especially among urban residents. For women worker-caregivers in the formal sector, they tend to move into other categories such as responsibility-free, sole worker, or sole caregiver, rather than remaining in the double-burdened role as worker-caregivers. This finding supports the notion that formal sector jobs may limit one's flexibility to multitask and balance both employment and caregiving responsibilities (He and McHenry 2016). Due to societal expectations that women prioritize caregiving responsibilities over employment, they tend to exit the workforce and become sole caregivers when formal sector jobs exacerbate time scarcity and role conflict (Leopold and Skopek 2014). Interestingly, the impact of formal sector jobs remains significant even after controlling for long work hours. Workers with full-time or long work hours are less likely to leave their jobs and less likely to become worker-caregivers, especially among women. Among worker-caregivers, longer work hours are associated with a higher probability of transitioning to sole workers and a lower likelihood of becoming responsibility-free or sole caregivers. Thus, work hours may not necessarily constrain one's ability to balance employment and caregiving responsibilities, but rather indicate a strong attachment to the workforce (Berecki-Gisolf et al. 2008).

In general, older age and poorer health are associated with a higher likelihood of transitioning into responsibility-free categories or categories with reduced responsibilities. Additionally, these individuals are more likely to become caregivers rather than remain in the workforce.

This study is not without limitations. The current findings are based on self-reported data from the CHARLS survey, and the seven-year time frame may not be sufficient to capture the full extent of middle-to-older adults' transitions in terms of responsibilities and living arrangements. Future studies may wish to explore the intensity of work and caregiving, as well as additional factors related to work conditions, such as physical demands and shift schedules. It should also be noted that living arrangements are indicative of care needs rather than direct measures of care behaviors.

Policy implications include the need to provide facilities such as daycare centers and kindergartens to share caregiving responsibilities taken by working grandparents, given the significant impact of grandchildren on middle-to-older adults' transition into and maintaining the worker-caregiver role. The results also highlight the importance of making policies for flexible working arrangements and offering respite to support continued labor force participation for female worker-caregivers due to the impact of formal sector jobs and long work hours.

Tables

Table 2.1. Worker-caregiver Categories by Year, CHARLS 2011-2018

Year				
2011		Not worker	Worker	Total
	Not caregiver	20.29%	35.84%	7031
	Caregiver	13.70%	30.17%	5495
	Total	4258	8268	12526
2013		Not worker	Worker	
	Not caregiver	18.02%	37.28%	5831
	Caregiver	13.87%	30.83%	4714
	Total	3363	7182	10545
2015		Not worker	Worker	
	Not caregiver	16.05%	38.54%	6974
	Caregiver	15.45%	29.96%	5801
	Total	4024	8751	12775
2018		Not worker	Worker	
	Not caregiver	20.78%	35.64%	7170
	Caregiver	13.72%	29.86%	5538
	Total	4385	8323	12708
Pooled		Not worker	Worker	
	Not caregiver	17.00%	36.61%	26983
	Caregiver	15.08%	31.30%	23345
	Total	16147	34181	50328

Note: Percentages are cell percentages.

Table 2.2. Transitions of Worker-caregiver Category by Year

Baseline wave	2011	2011	2011	2013	2013	2015	Pooled
Follow-up wave	2013	2015	2018	2015	2018	2018	
Start as non-worker or caregiver							
to non-worker or caregiver (no transition)	9.61%	9.96%	6.67%	4.62%	9.67%	6.90%	8.25%
to sole worker	4.70%	5.26%	5.00%	3.74%	3.87%	3.00%	3.79%
to sole caregiver	3.72%	3.70%	10.00%	3.89%	5.80%	3.48%	3.68%
to worker-caregiver	2.17%	2.28%	1.11%	2.37%	1.10%	1.75%	2.03%
Start as sole worker							
to non-worker or caregiver	4.72%	4.27%	6.67%	3.27%	6.63%	4.13%	4.43%
to sole worker (no transition)	18.76%	22.76%	11.11%	21.89%	15.75%	21.26%	20.15%
to sole caregiver	2.24%	3.56%	3.89%	2.50%	3.59%	2.54%	2.42%
to worker-caregiver	9.79%	10.53%	15.00%	11.15%	9.67%	11.26%	10.53%
Start as sole caregiver							
to non-worker or caregiver	3.80%	2.99%	6.67%	2.40%	3.31%	3.09%	3.34%
to sole worker	1.98%	2.84%	2.78%	1.36%	2.21%	1.34%	1.59%
to sole caregiver (no transition)	5.02%	5.26%	5.00%	6.37%	7.46%	7.20%	6.07%
to worker-caregiver	2.86%	2.13%	3.89%	3.27%	2.49%	3.34%	3.07%
Start as worker-caregiver							
to non-worker or caregiver	2.53%	2.70%	2.22%	2.40%	3.04%	1.74%	2.19%
to sole worker	10.01%	8.96%	3.33%	9.88%	9.12%	7.75%	8.97%
to sole caregiver	3.40%	3.27%	5.56%	4.00%	5.52%	3.78%	3.67%
to worker-caregiver (no transition)	14.70%	9.53%	11.11%	16.90%	10.77%	17.45%	15.82%
Total	11643	703	180	9249	362	11751	34461

Note: Percentages are column percentages.

Table 2.3. Descriptive Statistics of the Pooled Sample and Subsamples by Gender and Residency, 2011

	Full sample		Men		Women		Urban		Rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Worker-caregiver category at the baseline wave										
Not worker or caregiver	0.20	0.40	0.16	0.37	0.24	0.43	0.26	0.44	0.17	0.37
Sole worker	0.36	0.48	0.40	0.49	0.32	0.47	0.28	0.45	0.40	0.49
Sole caregiver	0.14	0.34	0.10	0.30	0.17	0.37	0.20	0.40	0.10	0.30
Worker-caregiver	0.30	0.46	0.34	0.47	0.27	0.44	0.25	0.43	0.33	0.47
Worker-caregiver category at the follow-up wave										
Not worker or caregiver	0.21	0.40	0.17	0.38	0.24	0.43	0.26	0.44	0.17	0.38
Sole worker	0.36	0.48	0.39	0.49	0.32	0.47	0.29	0.45	0.40	0.49
Sole caregiver	0.15	0.35	0.11	0.31	0.18	0.39	0.21	0.41	0.11	0.31
Worker-caregiver	0.29	0.46	0.33	0.47	0.26	0.44	0.24	0.43	0.32	0.47
Living arrangements:										
Living with a grandchild aged below 16 during this period or at the follow-up wave	0.10	0.30	0.10	0.29	0.10	0.30	0.08	0.27	0.11	0.31
Living with an adult child during this period or at the follow-up wave	0.52	0.50	0.52	0.50	0.52	0.50	0.55	0.50	0.50	0.50
Living with a spouse during this period or at the follow-up wave	0.87	0.34	0.91	0.29	0.83	0.38	0.86	0.35	0.87	0.34
Living with a parent/in-law during this period or at the follow-up wave	0.02	0.13	0.02	0.14	0.02	0.13	0.02	0.14	0.02	0.12
Age group:										
45 to retirement age	0.41	0.49	0.61	0.49	0.23	0.42	0.42	0.49	0.41	0.49
retirement age to 64	0.39	0.49	0.19	0.39	0.58	0.49	0.39	0.49	0.39	0.49
65 to 74	0.20	0.40	0.21	0.41	0.19	0.39	0.19	0.40	0.20	0.40

Table 2.3. Descriptive Statistics of the Pooled Sample and Subsamples by Gender and Residency, 2011, continued.

	Full sample		Men		Women		Urban		Rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender (female=1)	0.52	0.50	0.00	0.00	1.00	0.00	0.53	0.50	0.51	0.50
Residency (rural=1)	0.63	0.48	0.64	0.48	0.62	0.48	0.00	0.00	1.00	0.00
Self-rated health (1=very good)	3.02	0.91	2.92	0.91	3.11	0.90	2.91	0.88	3.08	0.92
Sum of ADLs	0.26	0.79	0.20	0.71	0.31	0.85	0.19	0.68	0.30	0.84
Education attainment:										
Less than lower secondary	0.88	0.32	0.84	0.36	0.92	0.27	0.80	0.40	0.93	0.25
Upper secondary & vocational training	0.10	0.30	0.13	0.34	0.07	0.25	0.16	0.37	0.06	0.24
Tertiary	0.02	0.12	0.02	0.15	0.01	0.09	0.04	0.19	0.00	0.05
Household assets quantiles:										
1 (lowest quantile)	0.27	0.44	0.25	0.43	0.28	0.45	0.25	0.43	0.28	0.45
2	0.24	0.42	0.24	0.42	0.23	0.42	0.19	0.40	0.26	0.44
3	0.24	0.43	0.24	0.43	0.24	0.42	0.24	0.43	0.24	0.43
4 (highest quantile)	0.26	0.44	0.27	0.44	0.25	0.43	0.32	0.47	0.23	0.42
Work sector (formal=1)	0.17	0.38	0.25	0.43	0.10	0.30	0.24	0.43	0.13	0.34
Whether weekly hours of working ≥ 40 (yes=1)	0.45	0.50	0.53	0.50	0.37	0.48	0.38	0.48	0.49	0.50
N	12526		6027		6499		4614		7912	

Table 2.4. Relative Risk Ratios of Sole Workers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=12,309)

Non-worker or caregiver vs. Sole worker	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
Living with a grandchild aged below 16	0.825 (-1.00)	0.721 (-1.03)	0.887 (-0.49)	0.755 (-0.79)	0.855 (-0.68)
Living with an adult child	0.988 (-0.19)	0.942 (-0.65)	1.040 (0.46)	0.820 (-1.83)	1.075 (0.95)
Living with a spouse	0.638*** (-5.49)	0.566*** (-4.65)	0.680*** (-3.49)	0.726* (-2.03)	0.606*** (-5.18)
Living with a parent/in-law	0.963 (-0.17)	1.188 (0.55)	0.834 (-0.60)	1.404 (0.92)	0.799 (-0.80)
Female (yes=1)	1.160* (2.20)			1.073 (0.58)	1.199* (2.22)
Rural residency (yes=1)	0.630*** (-6.68)	0.572*** (-5.53)	0.686*** (-3.92)		
Age group (ref=pre-retirement retirement to 64)	1.790*** (7.10)	1.798*** (4.55)	1.727*** (4.90)	2.074*** (5.31)	1.669*** (5.00)
youngest-old (65-74)	3.079*** (13.02)	3.110*** (10.03)	3.025*** (8.25)	2.787*** (6.21)	3.146*** (11.17)
Self-rated health (1=very good)	1.149*** (3.84)	1.181** (3.08)	1.124* (2.39)	0.984 (-0.25)	1.238*** (4.74)
Sum of ADLs	1.149** (3.14)	1.187* (2.36)	1.127* (2.13)	1.281* (2.42)	1.105* (2.03)
Education attainment (ref= less than lower secondary)					
Upper secondary & vocational training	0.970 (-0.27)	0.825 (-1.22)	1.233 (1.26)	1.021 (0.14)	0.855 (-0.88)
Tertiary	1.110 (0.38)	1.147 (0.41)	1.118 (0.23)	1.037 (0.12)	1.229 (0.31)
Household assets quantiles (ref=lowest quantile)					
2	1.120 (1.31)	1.247 (1.73)	1.023 (0.19)	1.214 (1.15)	1.082 (0.78)
3	1.099 (1.05)	1.065 (0.48)	1.131 (1.00)	1.143 (0.78)	1.091 (0.81)
4	0.982 (-0.20)	0.932 (-0.52)	1.025 (0.20)	0.955 (-0.28)	1.010 (0.09)
Formal sector job (yes=1)	1.023 (0.28)	1.005 (0.05)	1.026 (0.22)	1.060 (0.47)	0.975 (-0.23)
Working full time or over (yes=1)	0.720*** (-5.15)	0.749** (-3.01)	0.695*** (-4.23)	0.748* (-2.47)	0.702*** (-4.62)

Table 2.4. Relative Risk Ratios of Sole Workers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=12,309), continued.

Sole caregiver vs. Sole worker	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
Living with a grandchild aged below 16	6.506*** (14.74)	5.777*** (8.48)	6.776*** (11.62)	5.270*** (7.22)	7.236*** (13.02)
Living with an adult child	1.154 (1.74)	1.013 (0.10)	1.273* (2.23)	0.912 (-0.66)	1.302** (2.60)
Living with a spouse	1.244 (1.72)	1.386 (1.54)	1.145 (0.84)	1.158 (0.65)	1.303 (1.70)
Living with a parent/in-law	0.924 (-0.36)	1.019 (0.06)	0.904 (-0.36)	1.475 (1.04)	0.728 (-1.18)
Female (yes=1)	1.169 (1.72)			0.984 (-0.10)	1.278* (2.14)
Rural residency (yes=1)	0.597*** (-5.97)	0.513*** (-5.15)	0.681** (-3.26)		
Age group (ref=pre-retirement retirement to 64	2.497*** (8.68)	3.128*** (7.46)	2.049*** (5.36)	3.054*** (6.53)	2.251*** (6.08)
youngest-old (65-74)	2.420*** (7.38)	2.603*** (6.13)	2.060*** (3.96)	2.559*** (4.22)	2.313*** (5.89)
Self-rated health (1=very good)	1.163** (3.27)	1.139 (1.82)	1.177** (2.70)	1.165* (1.96)	1.155* (2.51)
Sum of ADLs	0.976 (-0.35)	0.966 (-0.29)	0.980 (-0.24)	0.994 (-0.04)	0.975 (-0.32)
Education attainment (ref= less than lower secondary)					
Upper secondary & vocational training	1.077 (0.53)	1.237 (1.17)	0.991 (-0.04)	1.094 (0.48)	1.016 (0.08)
Tertiary	0.759 (-0.72)	0.855 (-0.35)	0.640 (-0.62)	0.609 (-1.08)	1.350 (0.41)
Household assets quantiles (ref=lowest quantile)					
2	1.010 (0.09)	0.926 (-0.45)	1.078 (0.50)	1.097 (0.43)	0.978 (-0.17)
3	0.993 (-0.06)	0.825 (-1.08)	1.145 (0.88)	1.119 (0.52)	0.946 (-0.40)
4	0.787* (-2.00)	0.705 (-1.94)	0.843 (-1.06)	0.914 (-0.42)	0.721* (-2.19)
Formal sector job (yes=1)	1.169 (1.58)	0.931 (-0.49)	1.419** (2.63)	1.263 (1.58)	1.109 (0.75)
Working full time or over (yes=1)	0.697*** (-4.40)	0.722* (-2.56)	0.669*** (-3.71)	0.652** (-3.01)	0.716*** (-3.30)

Table 2.4. Relative Risk Ratios of Sole Workers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=12,309), continued.

Worker-caregiver vs. Sole worker	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
Living with a grandchild aged below 16	6.781*** (22.26)	7.377*** (16.68)	6.058*** (14.48)	6.885*** (11.21)	6.798*** (19.17)
Living with an adult child	1.143** (2.97)	1.079 (1.28)	1.221** (2.90)	0.951 (-0.59)	1.226*** (3.86)
Living with a spouse	1.572*** (5.60)	2.026*** (5.65)	1.252* (2.06)	1.484* (2.49)	1.611*** (5.08)
Living with a parent/in-law	1.491** (2.96)	1.382 (1.71)	1.579* (2.39)	1.824* (2.35)	1.376* (2.00)
Female (yes=1)	0.776*** (-5.11)			0.771** (-2.78)	0.785*** (-4.12)
Rural residency (yes=1)	0.969 (-0.62)	1.014 (0.20)	0.908 (-1.20)		
Age group (ref=pre-retirement retirement to 64)	1.227*** (3.73)	1.184* (2.01)	1.284** (3.24)	1.338** (2.80)	1.191** (2.69)
youngest-old (65-74)	0.886 (-1.74)	0.876 (-1.51)	0.905 (-0.85)	0.860 (-1.00)	0.896 (-1.40)
Self-rated health (1=very good)	1.022 (0.87)	1.025 (0.75)	1.014 (0.37)	1.000 (-0.00)	1.030 (1.04)
Sum of ADLs	1.048 (1.20)	1.073 (1.22)	1.026 (0.47)	1.155 (1.66)	1.028 (0.64)
Education attainment (ref= less than lower secondary)					
Upper secondary & vocational training	0.957 (-0.59)	0.916 (-1.00)	1.038 (0.26)	0.854 (-1.36)	1.060 (0.59)
Tertiary	0.800 (-1.08)	0.623* (-1.96)	1.752 (1.43)	0.874 (-0.57)	0.627 (-1.05)
Household assets quantiles (ref=lowest quantile)					
2	1.063 (0.94)	1.072 (0.79)	1.055 (0.56)	0.924 (-0.58)	1.104 (1.34)
3	1.015 (0.23)	0.979 (-0.24)	1.076 (0.74)	0.922 (-0.60)	1.045 (0.58)
4	0.917 (-1.33)	0.919 (-0.95)	0.932 (-0.72)	0.843 (-1.35)	0.939 (-0.82)
Formal sector job (yes=1)	0.893* (-2.08)	1.002 (0.03)	0.681*** (-3.90)	0.835* (-1.98)	0.938 (-0.96)
Working full time or over (yes=1)	0.889* (-2.46)	0.930 (-1.10)	0.849* (-2.36)	0.861 (-1.60)	0.899 (-1.91)

Table 2.4. Relative Risk Ratios of Sole Workers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=12,309), continued.

	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
N	12309	6562	5747	3605	8704

Note: * p<0.05, ** p<0.01, *** p<0.001

Table 2.5. Marginal Probability of Worker-Care Category in the Follow-up wave, by living arrangements

		Men	Women	Urban	Rural
Living alone	Not worker or caregiver	0.16	0.19	0.22	0.15
	Sole worker	0.61	0.62	0.57	0.64
	Sole caregiver	0.04	0.05	0.06	0.04
	Worker-caregiver	0.19	0.15	0.16	0.17
Living with grandchildren	Not worker or caregiver	0.06	0.07	0.08	0.06
	Sole worker	0.27	0.30	0.26	0.29
	Sole caregiver	0.11	0.14	0.17	0.11
	Worker-caregiver	0.56	0.48	0.49	0.54
Living with an adult child	Not worker or caregiver	0.15	0.18	0.21	0.15
	Sole worker	0.60	0.61	0.55	0.62
	Sole caregiver	0.04	0.05	0.06	0.04
	Worker-caregiver	0.21	0.16	0.18	0.19
Living with a spouse	Not worker or caregiver	0.10	0.12	0.14	0.09
	Sole worker	0.58	0.60	0.55	0.61
	Sole caregiver	0.05	0.06	0.07	0.04
	Worker-caregiver	0.28	0.23	0.24	0.26
Living with a parent/in-law	Not worker or caregiver	0.14	0.17	0.20	0.14
	Sole worker	0.57	0.58	0.53	0.59
	Sole caregiver	0.03	0.04	0.05	0.03
	Worker-caregiver	0.26	0.21	0.22	0.24

Table 2.6. Relative Risk Ratios of Worker-Caregivers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=10,241)

Non-worker or caregiver vs. Worker-caregiver	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
Living with a grandchild aged below 16	0.310*** (-8.19)	0.251*** (-6.10)	0.364*** (-5.47)	0.386*** (-3.47)	0.290*** (-7.37)
Living with an adult child	1.095 (1.09)	1.271 (1.95)	0.963 (-0.33)	0.827 (-1.25)	1.239* (2.13)
Living with a spouse	0.452*** (-6.62)	0.247*** (-7.20)	0.602*** (-3.41)	0.422*** (-3.49)	0.459*** (-5.63)
Living with a parent/in-law	0.758 (-1.21)	0.733 (-0.89)	0.777 (-0.83)	0.412 (-1.64)	0.879 (-0.50)
Female (yes=1)	1.342** (2.97)			1.380 (1.71)	1.284* (2.16)
Rural residency (yes=1)	0.824* (-2.09)	0.794 (-1.71)	0.852 (-1.24)		
Age group (ref=pre-retirement retirement to 64)	1.507*** (3.63)	1.778*** (3.64)	1.131 (0.78)	1.641* (2.48)	1.452** (2.72)
youngest-old (65-74)	4.044*** (11.39)	4.838*** (10.31)	2.823*** (5.13)	3.835*** (5.43)	4.000*** (9.65)
Self-rated health (1=very good)	1.136** (2.65)	1.163* (2.06)	1.113 (1.66)	1.424*** (3.66)	1.040 (0.72)
Sum of ADLs	1.016 (0.24)	1.052 (0.47)	1.013 (0.16)	1.129 (0.85)	0.993 (-0.10)
Education attainment (ref= less than lower secondary)					
Upper secondary & vocational training	1.068 (0.40)	1.275 (1.22)	0.795 (-0.76)	1.361 (1.30)	0.842 (-0.71)
Tertiary	1.191 (0.40)	1.168 (0.25)	0.913 (-0.15)	1.358 (0.65)	0.000*** (-32.43)
Household assets quantiles (ref=lowest quantile)					
2	1.058 (0.50)	1.225 (1.18)	0.936 (-0.42)	0.962 (-0.16)	1.082 (0.60)
3	0.993 (-0.06)	1.198 (1.02)	0.839 (-1.09)	0.894 (-0.48)	1.039 (0.28)
4	1.073 (0.57)	1.163 (0.81)	0.971 (-0.17)	1.277 (1.10)	0.950 (-0.34)
Formal sector job (yes=1)	1.372** (2.97)	1.127 (0.84)	2.048*** (4.38)	1.758** (3.28)	1.128 (0.83)
Working full time or over (yes=1)	0.760** (-5.15)	0.800 (-3.01)	0.731** (-4.23)	0.801 (-2.47)	0.742** (-4.62)

Table 2.6. Relative Risk Ratios of Worker-Caregivers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=10,241), continued.

Sole worker vs. Worker-caregiver	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
Living with a grandchild aged below 16	0.235*** (-17.67)	0.244*** (-12.82)	0.227*** (-12.02)	0.290*** (-8.10)	0.217*** (-15.64)
Living with an adult child	0.857** (-3.23)	0.848** (-2.58)	0.872 (-1.90)	0.924 (-0.88)	0.835** (-3.21)
Living with a spouse	0.706*** (-4.20)	0.473*** (-5.45)	0.901 (-0.98)	0.566*** (-3.44)	0.760** (-2.85)
Living with a parent/in-law	1.119 (0.93)	1.109 (0.63)	1.117 (0.61)	1.240 (0.99)	1.070 (0.47)
Female (yes=1)	1.249*** (3.94)			1.300* (2.44)	1.220** (2.98)
Rural residency (yes=1)	0.995 (-0.10)	0.981 (-0.26)	1.014 (0.17)		
Age group (ref=pre-retirement)					
retirement to 64	0.847** (-2.75)	0.939 (-0.75)	0.799* (-2.49)	0.826 (-1.70)	0.857* (-2.16)
youngest-old (65-74)	1.429*** (4.60)	1.314** (2.78)	1.598*** (3.53)	1.527** (2.59)	1.400*** (3.78)
Self-rated health (1=very good)	0.991 (-0.33)	0.990 (-0.29)	0.996 (-0.10)	0.955 (-0.89)	1.003 (0.10)
Sum of ADLs	0.910* (-2.18)	0.846* (-2.35)	0.949 (-0.94)	0.984 (-0.16)	0.893* (-2.35)
Education attainment (ref= less than lower secondary)					
Upper secondary & vocational training	1.088 (1.02)	1.111 (1.10)	0.998 (-0.01)	1.423** (2.77)	0.910 (-0.86)
Tertiary	1.521 (1.67)	1.859* (2.09)	0.740 (-0.66)	1.907* (2.27)	0.830 (-0.32)
Household assets quantiles (ref=lowest quantile)					
2	0.944 (-0.85)	0.925 (-0.84)	0.983 (-0.17)	0.898 (-0.77)	0.956 (-0.58)
3	1.043 (0.62)	1.045 (0.48)	1.049 (0.47)	0.968 (-0.25)	1.063 (0.76)
4	1.043 (0.61)	1.095 (0.96)	0.978 (-0.21)	0.989 (-0.08)	1.069 (0.80)
Formal sector job (yes=1)	1.063 (1.01)	0.903 (-1.39)	1.586*** (4.08)	1.009 (0.09)	1.079 (1.01)
Working full time or over (yes=1)	1.163** (2.95)	1.187* (2.37)	1.156* (1.98)	1.244* (2.17)	1.135* (2.12)

Table 2.6. Relative Risk Ratios of Worker-Caregivers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=10,241), continued.

Sole caregiver vs. Worker-caregiver	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
Living with a grandchild aged below 16	0.797* (-2.57)	0.743* (-2.09)	0.827 (-1.66)	0.794	0.814
Living with an adult child	1.252** (3.29)	1.252* (2.12)	1.242* (2.39)	(-1.44) 1.183	(-1.93) 1.285**
Living with a spouse	0.752** (-2.69)	0.656 (-1.89)	0.810 (-1.75)	(1.43) 0.590**	(2.96) 0.823
Living with a parent/in-law	0.927 (-0.55)	0.870 (-0.63)	0.958 (-0.24)	(-2.78) 0.610	(-1.50) 1.077
Female (yes=1)	1.673*** (6.56)			(-1.82) 1.548**	(0.47) 1.741***
Rural residency (yes=1)	0.613*** (-6.68)	0.599*** (-4.63)	0.618*** (-4.88)	(3.29)	(5.68)
Age group (ref=pre-retirement)					
retirement to 64	1.562*** (5.14)	1.600*** (3.67)	1.431** (2.90)	2.019***	1.345**
youngest-old (65-74)	2.372*** (7.93)	2.617*** (6.90)	1.994*** (3.93)	(4.89) 2.552***	(2.75) 2.218***
Self-rated health (1=very good)	1.125** (3.02)	1.227*** (3.43)	1.060 (1.12)	(4.67) 1.114	(6.13) 1.133**
Sum of ADLs	1.067 (1.29)	1.149 (1.57)	1.047 (0.77)	(1.60) 1.079	(2.60) 1.076
Education attainment (ref= less than lower secondary)					
Upper secondary & vocational training	1.261 (1.87)	1.456* (2.44)	0.944 (-0.26)	1.424*	1.168
Tertiary	1.391 (0.85)	2.146 (1.76)	0.380 (-1.23)	(2.00) 1.197	(0.88) 2.460
Household assets quantiles (ref=lowest quantile)					
2	0.942 (-0.63)	0.836 (-1.20)	1.022 (0.18)	0.928	0.948
3	0.910 (-0.98)	0.763 (-1.77)	1.018 (0.14)	(-0.44) 0.621**	(-0.46) 1.108
4	1.144 (1.40)	1.287 (1.76)	1.020 (0.15)	(-2.75) 1.016	(0.89) 1.199
Formal sector job (yes=1)	1.069 (0.75)	0.971 (-0.25)	1.431* (2.55)	(0.10) 1.244	(1.50) 0.926

Working full time or over (yes=1)	0.742*** (-4.41)	0.666*** (-3.88)	0.809* (-2.42)	(1.67) 0.760*	(-0.61) 0.738***
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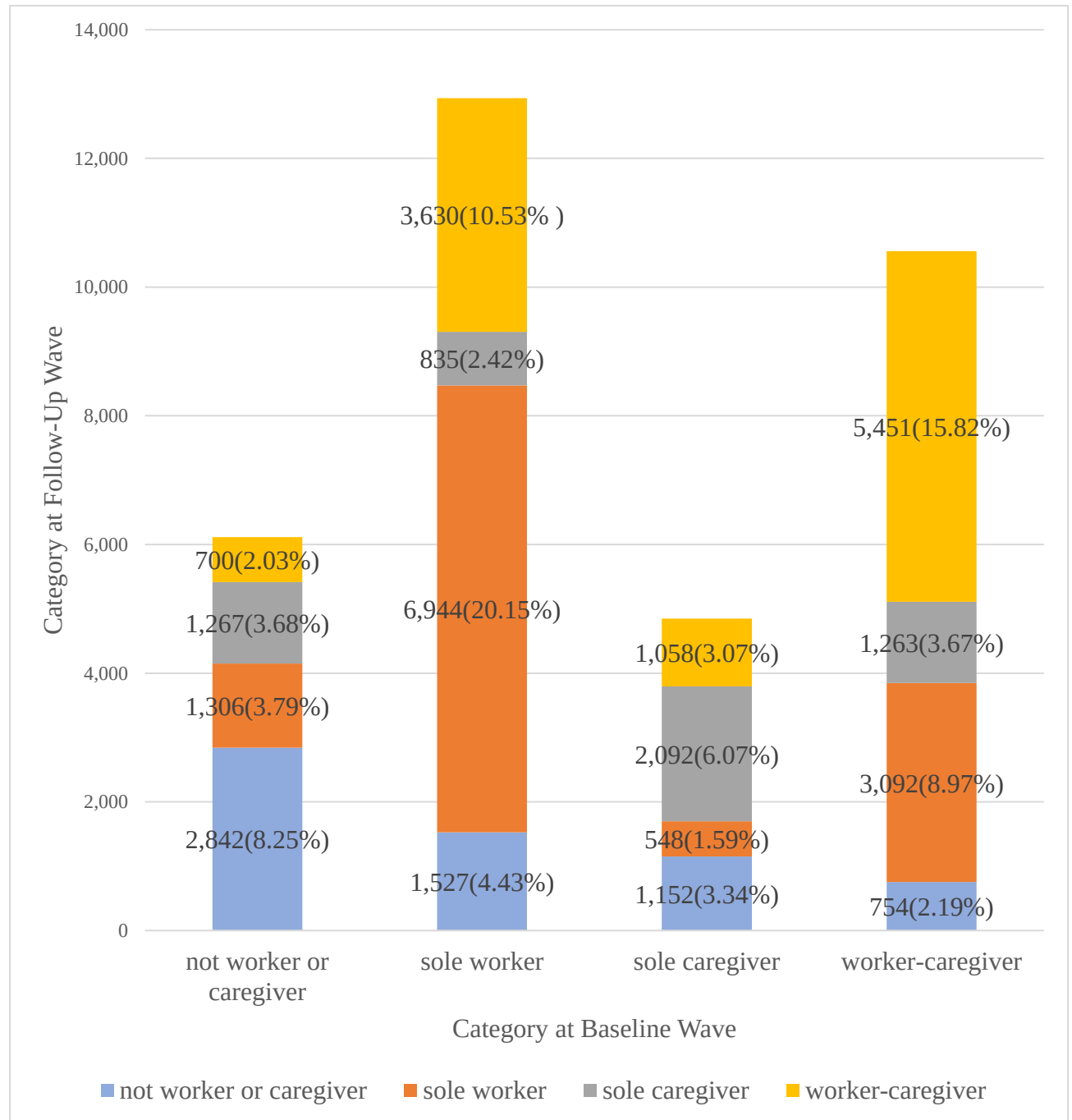
Table 2.6. Relative Risk Ratios of Worker-Caregivers Transfer into Other Categories from Multinomial Logistic Regression Models with Robust Standard Error (N=10,241), continued.

	Full sample	Men	Women	Urban	Rural
	Model 1	Model 2	Model 3	Model 4	Model 5
N	10241	5509	4732	2995	7246

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

Figure

Figure 2.1. Transitions in Worker-Caregiver Type between Baseline Wave and Follow-Up Wave, Frequency and Percentage of the Total Sample



3 Satisfied or Depressed? The Joint Effects of Work and Informal Caregiving on Mental Well-being among Chinese Middle-to-Older Aged Adults

Abstract

Although the health implications of employment and caregiving are well-documented, less is known about the joint impact of work and caregiving on the well-being of older adults. This study contributes to filling this research gap by focusing on the well-being implications of combining work and informal caregiving for older Chinese men and women. The study draws on two theoretical perspectives: role strain theory and role enhancement theory. While the role strain theory assumes lower life satisfaction and higher depressive symptoms due to the double burden of paid work and caregiving, the role enhancement theory predicts an increase in well-being through the accumulation of resources and role fulfillment. Using data from the China Health and Retirement Longitudinal Study (CHARLS 2011-2018), I investigate whether and how middle-to-older age working caregivers experience different life satisfaction and depressive symptoms. Furthermore, I examine how the combined effects of work and caregiving differ by the intensity of work and caregiving, gender, residence, socioeconomic status, and social isolation level. Analyses from the random-effects model show that compared to those who do not work or provide informal care, low-intensity worker-caregivers report higher life satisfaction. Only female worker-caregivers experience higher depressive symptoms, particularly with long hours of work and caregiving. These

results support both role enhancement and role strain theories and suggest the need for increased investment in formal care facilities to alleviate the care burdens among older adults.

Introduction

Older populations are usually considered retirees who hardly participate in productive activities, and occasionally as care recipients or caregivers in the family domain. However, increasing literature on productive aging provides evidence of older adults' role as active contributors to the well-being of the household and society, through participating in paid work, taking care of others, and doing household chores (Kim 2019; Li et al. 2014; Lum 2013). Balancing multiple responsibilities could be challenging, and the term double burden or second shift was created to characterize the phenomenon of work-life conflict that many middle-aged women face (Bratberg, Dahl, and Risa 2002; Hochschild and Machung 2012). Researchers have explored the potential harm associated with the double burden of work and caregiving responsibilities (Floderus et al. 2009; Hewitt, Western, and Baxter 2006). Little is known, however, about the adverse health outcomes of the dual duties in the middle-to-older population, who have complex demands from various life domains and potential early onset of chronic illness and disease (Lachman 2004). Most studies discussing the health consequences of the double burden group focused on working-aged women, leaving older adults underexplored (Chen et al. 2020). The aging literature, however, estimates the association between either work or caregiving and health, without considering the joint impact of work and care responsibilities (Freedman et al. 2019).

While engagement in multiple roles could enhance psychological well-being through role fulfillment, excessive demands from work and caregiving could also become a source of elevated stress, especially when such role overload has endured and accumulated over the life course. Existing research has suggested an association between demands or stress from paid or domestic work at older ages and changes in mental health outcomes, which are then associated with mortality, morbidity, and quality of life (Baker and Silverstein 2008; Freedman et al. 2019; Gao et al. 2018; Liu et al. 2019; Liu and Lou 2017; Wang et al. 2019). However, mixed empirical evidence is found, depending on the level of intensity and the national setting (Di Gessa, Bordone, and Arpino 2019; Nakagawa, Cho, and Yeung 2021).

This study is set in China, a developing society featuring a high labor force participation rate in all age groups and intergenerational solidarity where older adults play a vital role in households and actively participate in family affairs. Facing the challenge of accelerated population aging, the Chinese government has begun adjusting retirement policies for an older legal retirement age, which could intensify the work-life conflict for the older population. As the filial piety and reproductive obligation of Confucianism still prescribe substantial caregiving responsibilities and strong intergenerational bonds (Chen and Liu 2009), the normative expectation of care for family members may translate into emotional rewards for middle-aged and older adults. In this paper, I investigate an underexplored area of health research, the double demands from work and family in a later life stage.

Theoretical Approaches and Literature Review

Role theories

Previous studies on work-caregiving conflict and its health consequences built their frameworks upon role theories. Role enhancement and role strain perspectives are two major components of role theory. Both describe the situation that a person plays multiple roles simultaneously, but with different demand or intensity that leads to various health outcome (Rozario et al. 2004). On the one hand, the role enhancement perspective argues that taking multiple roles could enhance subjective well-being by promoting self-esteem and life satisfaction (Mirowsky and Ross 1986). The beneficial effect could also be because of the exchange and augmentation of an individual's power, prestige, resources, and emotional gratification (Goode 1960; Moen et al. 1995). On the other hand, the role strain perspective indicates that role strain results from the many inconsistent and often contradictory demands placed on individuals, whose time and resources are constrained (Marks 1977; Moen et al. 1995; Sieber 1974). The detrimental effects are therefore led by job and family dissatisfaction, tension, and life stress (Davis et al. 2008). Role theories are not competing theories but can work simultaneously on individuals.

Health outcomes: mixed results

In recent years, as most caregivers seek a balance between care responsibilities and work, scholars have started to examine empirically the effect of the dual pressure of care and work

on individuals' well-being; nevertheless, the findings have been inconsistent, just as the role theories suggested.

Supporting the role enhancement perspective, positive consequences of taking on the dual roles of worker and caregiver simultaneously were found in health studies. Using the Norwegian Life Course, Ageing and Generation study, researchers showed that female caregivers with full-time employment have better mental health compared to their counterparts with limited employment. Their explanation was that full-time employment provided greater opportunities to achieve the full benefits that a worker's role has to offer (Hansen and Slagsvold 2015).

As evidence to support the role strain perspective, devastating effects of the double burden of informal care and work are also found. Using the Disability and Use of Time supplement to the Panel Study of Income Dynamics and focusing on the time use of couples aged 60 years or older, Freedman and colleagues (2019) indicated that caregivers who worked for pay on the prior day reported a lower level of well-being, measured by the intensity of feeling five emotions – calm, happy, sad, frustrated, and worried than caregivers who did not. Focusing on depressive symptoms among older adults in urban China, Liu and Lou (2017) conducted latent class analysis and stated that worker-caregivers reported higher levels of depressive symptoms than that of helpers and caregivers without work responsibilities. In a similar vein, Schmitz and Stroka (2013) utilized administrative data from the second-biggest German sickness fund and showed that caregivers who were

employed full-time had a significantly higher consumption of antidepressant drugs and tranquilizers than those who only worked. Using the 2000–2015 China Health and Nutrition Survey, Chen and colleagues (2020) found that for full-time employed women, the double burden of work and care led to a decline in life satisfaction, through channels of reduced exercise and increased psychological stress. It was consistent with findings from time-use studies suggesting that worker-caregivers' leisure time was crowded out because of time constraints and extra time devoted to care and work to relieve the increased expenditure and income pressures associated with informal care (Juratovac et al. 2012; Kan et al. 2021).

The role theories provided scholars guidance to understand the heterogeneous health consequences of the double burden of work and care responsibilities, with an increase in attention paid to intensity and duration. Since most studies discussed mental health outcomes, this study estimates the implication on subjective well-being as well. Despite these current efforts, most of the literature discussed the health implications of paid work and family responsibilities separately, without considering their joint effect on worker-caregivers. Besides, a limited number of studies expanded the discussion on work-life conflict to the later stages of life, or in non-Western societies. Additionally, how the intensity of work-caregiving influences the direction and magnitude of the effects remained underexplored.

Moderating effects: intensity, socioeconomic status, and social isolation

The double burden of work and caregiving could affect individuals' well-being; furthermore, the magnitude of the health implications could be moderated by the intensity of

workload and amount of caregiving tasks, the individuals' social class, and the level of social isolation. In time-use studies, scholars have found that excessive time demands from work and family may indirectly lead to poor health by restraining the time available to sleep, prepare and consume healthy food, and physical activities, which then translates into detrimental well-being (Flood and Moen 2015; Strazdins et al. 2016; Venn and Strazdins 2017). Due to time inadequacy, people may choose multitasking and have feelings of rushing, which could lead to poor well-being (Barnett and Hyde 2001; Offer 2014; Offer and Schneider 2011). Time scarcity, as an inevitable result of the double burden of work and care responsibilities, offers explanations for well-being disadvantages caused by role overload. In their work focusing on working-aged women in China, Chen and colleagues (2020) pointed out that the detrimental effect of double-burden on health is exacerbated as the care and work hours increase, as the group with the heaviest double burden experienced the most severe health decline.

The socioeconomic status could be a moderator that changes the direction and magnitude of the health implications of worker-caregiver status as well. Productive engagement is expected to benefit health by boosting psychological resources and establishing supportive social ties, which makes sense for worker-caregivers who enjoy maintaining their social relationships or feeling a sense of meaning and control (Musick and Wilson 2003). However, if the worker-caregiver takes multiple roles not voluntarily, but obligatorily because the household can hardly afford the expense of formal caregiving or needs extra financial support from older generations, the positive effect of productive engagement on health may be

weaker or no longer exist, which is suggested to be true for Taiwanese older workers (Wang et al. 2019).

The adverse effect of social isolation on health has been widely discussed by studies focused on older adults, considering social withdrawal as the result of retirement (Musick and Wilson 2003; Steptoe et al. 2013; Yu et al. 2021). Maintaining social relationships could be especially beneficial for older worker-caregivers who are exposed to stressors from both the employment and family arena as they constantly face the risk of losing social connections, and therefore moderate the negative health consequences (Pohl et al. 2022).

The Chinese context

As the most populous country in the world, China has also officially entered the “aging society” stage, based on the UN standard when its population aged 60 and above exceeded 10% of the total population in 1999. It is aging at a skyrocketing speed, with the largest number of older adults in the world: the population of people aged 65 and above was estimated to be 190 million in 2020, accounting for 13.5% of the total population, increasing from 7.0% in 2000 (National Bureau of Statistics of China 2021). The labor force participation rate is comparatively high in China, especially for women: the female labor force participation rate is 68.8% for working-aged women in 2017, higher than that of OECD countries and the US, and remains high across all age groups (Xiao and Asadullah 2020). In 2010, among individuals aged 50 to 74, 58.9% of rural women and 20.7% of urban women remained in the labor force (Connelly et al. 2014). The accelerated population aging may lead

to a shrinking labor force and slow economic growth in the long term. Faced with such challenges, the Chinese Government has begun revising the current retirement age, 60 for men and 50 or 55 for women, to older retirement age. However, China lacks a mature social infrastructure, such as a social security system and health care program, to meet the care demands of its aging residents. Influenced by traditional filial piety and Confucian culture, care responsibilities primarily rely on families. With a prolonged work life and a scarcity of formal care, middle-to-older aged adults have to deal with the dual pressure of informal care and work, potentially harming their health. An urgent need has arisen for the government to recognize the disadvantaged worker-caregiver group and develop relevant support and public services to protect them from hazardous health consequences.

According to traditional gender role norms, women are expected to bear the responsibilities of caregiving for family members while men are socialized to participate in paid employment outside the family (Sánchez-López, Cuellar-Flores, and Dresch 2012). The patrilineal and patriarchal family structure in China still endorses a highly gendered labor division ideal within households today, with males providing financial support and females caring for family members (Qian and Sayer 2016). Therefore, existing literature finds double-burdened women more vulnerable in health given their more intense caregiving loads (Penning and Wu 2016). The pace of development toward egalitarian gender ideologies has been uneven in China, as women made great gains in labor force opportunities, yet men did not move comparably into housework and caregiving (Luo 2021). Since caregiving remains “women’s work”, it is possible for female worker-caregivers to acquire a higher sense of role

fulfillment as it is consistent with gender roles and expectations (Li et al. 2014). In contrast, men may experience gender role conflict between the internalized masculine role and the feminine caregiving practice, would make them reluctant to disclose feelings of distress (Baker, Robertson, and Connelly 2010; Sanders 2007) and ambivalent to seek outside help (Berger et al. 2005), eventually translating to higher depression level (Zhao et al. 2022).

Another critical factor that could influence the joint impact of work and caregiving on well-being is the prominent urban-rural divide. Urban residents have been holding significant socioeconomic advantages due to the state's policy inclination toward cities since the establishment of the People's Republic of China (Lu and Chen 2006). Huge urban-rural inequality is shown in social and financial resources: According to the Statistical Bulletin of Social Service Development released by the Ministry of Civil Affairs of China, the coverage rate of community service centers in urban areas was much higher than that in rural areas (78.6% vs. 15.3%) by the end of 2017 (Zhao et al. 2022). Over the years 1997–2015, urban households had per capita disposable income three times that of rural households (Wang, Shao, and Li 2019). Socioeconomic disadvantages then translate into higher depression levels among rural older adults (Li et al. 2016). However, working could be regarded as financially contributing to the well-being of households, and caregiving as an expression of intergenerational support, both would be especially valued in rural areas where resources are limited. Following conventional social norms, worker-caregivers could enhance role fulfillment and improve life satisfaction (Dingemans and Henkens 2019; Liu and Chen 2022).

In this study, I use the 2011-2018 waves of the China Health and Retirement Longitudinal Study (CHARLS) to analyze the impact of the double burden of informal care and paid work on subjective well-being among middle-to-older adults. This work expands our understanding of work-life conflict and health in several ways. First, it addresses the gaps in international literature by examining the role theories in a developing society where the boundary between work and caregiving is not as clear-cut as in developed countries. Second, based on national representative panel data, this study uses random effects models to estimate the impacts of time-invariant factors while maintaining observations refer to the same individual. Finally, this study discusses if and how the joint effect of work and caregiving varies by intensity of workload, and further estimates the potential differences caused by gender, rural-urban residence, socioeconomic status, and social isolation.

Research Questions and Hypotheses

This paper contains three research questions. First, how does the joint effect of work and caregiving affect middle-to-older adults' life satisfaction and depression levels? On the one hand, the role enhancement perspective claims that occupying multiple roles benefits health through the exchange of resources and boosts self-esteem. On the other hand, the role strain perspective believes that the inconsistent demands of dual roles lead to higher stress levels and reduced time available for health-promoting behaviors. Therefore, I have two competing hypotheses: compared with non-worker or caregivers, worker-caregivers could (H1a) report

higher levels of life satisfaction and lower levels of depression, or (H1b) report lower levels of life satisfaction and higher levels of depression.

The second research question asks how the joint impact of work and caregiving differs by intensity. Since the categorization by dichotomized employment status and caregiving status may omit critical details, low and high intensity are used to classify worker-caregivers. Worker-caregivers are therefore divided into four intensity groups: those with low-intensity work and caregiving tasks, those with low-intensity work and high-intensity caregiving tasks, those with high-intensity work and low-intensity caregiving responsibilities, and those with high-intensity work and caregiving burden. Longer time allocated to employment and caregiving usually indicates exposure to more stressors and crowds out time for leisure activities and self-care. Therefore, I assume that (H2a) while low-intensity worker-caregiver may enjoy higher life satisfaction and lower depression level, (H2b) high-intensity worker-caregiver could report lower life satisfaction and higher depression level, compared to non-worker or caregivers.

Thirdly, I ask how the link between dual responsibilities and well-being are moderated by sociodemographic factors. I examine how the perceived association varies by gender, rural/urban residence, socioeconomic status, and social isolation level. As the gendered division of labor is still embedded in Chinese society, women may acquire a higher sense of role fulfillment from caregiving duties, while men taking the caregiver role may experience

gender role conflict. Therefore, I hypothesize that (H3a) women worker-caregivers may have higher life satisfaction and lower depression level than their men counterparts.

With limited social security system coverage, low accessibility to public care services, and lack of availability of health resources, rural residents may have to continue working and providing care to family members to support themselves and the household. In contrast, urban residents are more likely to become worker-caregivers out of choice. However, in rural areas where social resources and assistance are scarce and much needed, those who provide them may be particularly respected and valued. Furthermore, conventional social norms are more influential in rural areas, worker-caregivers could achieve a higher level of role fulfillment. Hence, I infer that (H3b) rural residents may benefit less from working and caregiving in terms of life satisfaction but suffer from higher depression levels compared to urban residents.

People of higher socioeconomic status may have more adequate resources when coping with stressors brought on by demanding roles than their lower social class counterparts. Similar to the rural-urban disparity, people of higher social class may choose to continue working and providing care, while their disadvantaged counterparts have no alternative choice. Therefore, I assume that (H3c) the beneficial effect of working and caregiving simultaneously on life satisfaction and depression is more pronounced among higher social classes than in lower socioeconomic groups.

Social isolation could be another factor that moderates the joint impact of work and caregiving. Bearing the responsibilities of both work and caregiving, having access to assistance or simply having someone to confide in could serve as a protective buffer against stressors. Conversely, the absence of social connections may intensify negative emotions and further worsen the detrimental health consequences. Therefore, I hypothesize that (H3d) worker-caregivers with high levels of social isolation tend to have lower levels of life satisfaction and higher levels of depressive symptoms compared with their counterparts with low levels of social isolation.

Methods

Data and sample

This study uses data from the 2011-2018 China Health and Retirement Longitudinal Study (CHARLS). It is a nationally representative study that has tracked respondents aged 45 and over and their spouses biennially since 2011, with information on respondents' work, retirement, demographic characteristics, health, and care responsibilities. The analytical sample includes individual-year observations of respondents aged 45 to 75 who were interviewed at least two times in the four waves of the study. The study sample consisted of 10,525 non-missing individual-year observations in 2011, 10,272 in 2013, 12,550 in 2015, and 13,705 in 2018.

Measures

Dependent variables: life satisfaction and depressive symptoms

The major outcome variables of this study are life satisfaction and depressive symptoms. Life satisfaction is used to represent individuals' well-being, which is asked with the question "Please think about your life as a whole. How satisfied are you with it?". The responses are coded with 1 representing not at all satisfied to 5 representing completely satisfied. Depressive symptoms are measured using the Center of Epidemiologic Studies Depression Scale 10-item version (CES-D-10), which asks how often the respondent felt depressed during the past week. Depression level is the sum of the ten variables from the scale, which ranges from 0 to 30 with a higher score indicating a higher level of depression.

Independent variable: worker-caregiver categories

Older adults are categorized into worker-caregiver groups based on their average hours of working in the prior week and the average weekly hours taking care of household members. Hours of working measure the total amount of time allocated to agricultural work, non-agricultural employment, non-agricultural self-employment, and household business. Household caregiving is measured by the sum of hours allocated to caring for grandchildren, spouses, and parents/in-laws. Individuals are defined as workers or caregivers if they reported more than 1 hour of working or caregiving in the last week. Therefore, the worker-caregiver category includes four categories: non-worker or caregiver, sole worker, sole caregiver, and worker-caregiver.

Since individuals' responses to employment and caregiving may differ by the workload, I further differentiate the worker-caregiver category based on the intensity of productive

activities¹. For work, high intensity is defined as 40 or more working hours per week, consistent with the distinction of full-time work. Regarding caregiving, the cutoff point is defined as 20 or more informal care hours per week, following a previous study estimating the impact of a double burden on health in the Chinese context (Chen et al. 2020). Therefore, the worker-caregiver categorization with intensity consists of nine groups: non-worker or caregiver, low-intensity sole workers, high-intensity sole workers, low-intensity sole caregivers, high-intensity sole caregivers, and low-intensity worker-caregiver, low-intensity worker-high-intensity caregiver, high-intensity worker-low-intensity caregiver, high-intensity worker-caregiver, emerged from worker-caregivers. Because this study focuses on the joint impact of working and caregiving at different intensities, I collapse sole workers as well as sole caregivers and keep the four worker-caregiver categories with intensity, yielding seven groups.

Moderators: gender, residence, socioeconomic status, and social isolation

Gender is a dichotomized variable identifying men and women. Residence differentiates rural and urban residents based on the place they are currently living².

The measurement of socioeconomic status includes three variables: household assets, education attainment, and work type. Household assets are measured by the quartile of annual household assets at the time of the interview, including cash, checking, and savings accounts.

¹ The duration of staying in the worker-caregiver group is also tested. Results show that the longer duration, the higher life satisfaction. No evidence was found regarding depression.

² Hukou registration types are used as an alternative to address rural-urban differences. The results are similar, so I stick with the residence.

Educational attainment level is a categorical variable including less than lower secondary, upper secondary and vocational training, and tertiary education attainment. Work type is measured based on the work sector of the major job (nonagricultural employed as the formal sector, others as the informal sector). To highlight the potential buffering effect of higher socioeconomic class on individuals' well-being, I identify formal sector workers who have higher than secondary education and the top 50% of household assets as the most advantageous group and distinguish them from others.

Previous literature has used several components to measure social isolation level, including marital status, contact with children, contact with other family members, contact with friends, participation in religious activities, and participation in social activities (Glei et al. 2012; Steptoe et al. 2013; Yu et al. 2021). This study uses the three variables that have been utilized in all cited studies to measure social isolation level: marital status, contact with children, and social activity participation. Those who are not married or partnered, have less than weekly contact (by phone, in person, or by e-mail) with children, or not participating in any social activities over the last month (e.g. interacted with friends; played chess or cards; went to the community club; went to a sport, social, or other clubs; took part in a community-related organization; did voluntary or charity work) are considered as more socially isolated. Individuals who fit two or more descriptions are categorized as having a higher level of social isolation, following Steptoe and colleagues' categorization (Steptoe et al. 2013).

Control variables

Since both productive activity participation and subjective health are influenced by age, I control for the age group. Since previous cohorts assign higher importance to work than recent cohorts (Kwon and Schafer 2012), while recent cohorts are more likely to provide informal caregiving, I control for the birth cohort (Luo and Chui 2019). Individuals' objective physical health, measured by whether having any chronic disease and the number of activities with at least some difficulties are also taken into consideration. I also control for observed non-random attrition by identifying those who no longer respond because of failure to track or mortality in the follow-up waves.

Analytical strategies

Random-effects models are used to model the subjective health outcomes. Although life satisfaction is an ordinal variable derived from a five-point Likert scale, it is treated as a continuous one to make the statistical analysis more interpretable while largely preserving information in the ordering. To examine the validity of this approach, ordered logit models are performed in preliminary analysis and found similar effects for the key predictors. To cope with the potential reverse causation and examine the validity of this approach, I add the health outcome at the prior wave of interviews as a control and find similar effects for the key independent variables. The model is written as follows:

$$Y_{it} = \alpha_{00} + \beta_{10}Group_{it} + \beta_{20}X_{it} + \beta_{01}Z_{i0} + \mu_{i0} + \varepsilon_{it} \quad (1)$$

Here, Y_{it} refers to the continuous health status variables (life satisfaction and depressive symptoms level) of individual i at time t . $Group_{it}$ refers to the worker-caregiver group of

individual i at time t , and coefficient β_{20} denotes the unit change of subjective health with worker-caregiver status. X_{it} are the time-varying covariates. Z_{i0} represents the time-invariant covariates that denote the inter-individual variance, in this study only gender and education attainment. μ_{i0} stand for a series of time-constant random variables and assume it to be uncorrelated with the independent variable and follow a normal distribution. An important advantage of random-effect models is that it takes the potentially unobservable variables μ_{i0} into analysis and therefore better control for the potential heterogeneity caused by unobservable factors. In a similar vein, the time-variant error term ε_{it} is also assumed to be independent of the predictors and normally distributed. I first estimated the effects of worker-caregiver categories on subjective health outcomes by running the model for the pooled sample. I further differentiate worker and caregivers' workloads in terms of time and estimate the effects of various combinations of work intensity and caregiving intensity. Then, I divide respondents into subgroups to test if the worker-caregiver effect differs by gender, residence, socioeconomic status, and social isolation.

Results and Discussion

Descriptive statistics of the baseline study (2011) are shown in Table 3.1. The average life satisfaction level is 3.05, representing a fair level. The average depression scale score is 8.44, lower than the cut-off point of depression (Fu, Si, and Guo 2022; Zhang et al. 2012).

For the worker-caregiver type, the two largest categories were sole worker (36%) and worker-caregiver (30%). Taking intensity into consideration, high-intensity worker-caregiver (14%) is the most populated subgroup of worker-caregiver, followed by high-intensity worker-low-intensity caregiver and low-intensity worker-high-intensity caregiver, each accounting for 7%.

Respondents who have not yet reached retirement age were slightly more populated (41%). The mass majority (88%) had less than lower secondary education. Most respondents have close connections to family members: only 9% were unmarried or not partnered, and 7% didn't have weekly contact with children.

-----Table 3.1 about here -----

Tables 3.2 and 3.3 show the random-effects regression results of life satisfaction and depression respectively, with worker-caregiver categories as the key independent variable. For both tables, Model 1 uses 4-categories differentiation of worker-caregivers and Model 2 uses 9-categories categorization taking intensity into consideration, both apply to the full sample. Model 3-10 replicate Model 2 for the men and female, urban and rural, low socioeconomic status and high economic status, and low social isolation and high social isolation subsamples, respectively.

Life satisfaction

The results from Model 1 of Table 3.2 support Hypothesis 1 that worker-caregiver is associated with higher life satisfaction compared to non-worker or caregivers. This finding

could enrich the evidence that assuming participation in productive activities leads to enhanced life satisfaction (Hossain, Asadullah, and Kambhampati 2019; Xie and Han 2023). Further estimating the effects of worker-caregiver by intensity, results from Model 2 of Table 3.2 show that as care and work intensities strengthened, the life satisfaction of low-intensity worker-high-intensity caregiver improves. However, no evidence suggests that similar advantage of high-intensity worker-caregivers. While it is easier to achieve work-life balance when the burdens are light, balancing commitments from both work and caregiving would be harder when the load increases, leading to work-life conflict and therefore a lower level of life satisfaction (Haar et al. 2014).

Models 3 and 4 from Table 3.2 test the gender difference of the worker-caregiver effect, showing the results from men and women subgroups respectively. Men benefit from low-intensity working and caregiving, while their women counterparts don't report similar gains. Both men and women benefit from low-intensity work with high-intensity caregiving, and the difference is not statistically significant. Figure 3.1 shows the predicted life satisfaction by worker-caregiver group, for men and women separately. The gender disparity could be interpreted by gender differences in the types of activities in caregiving. Compared to men, women engage more in physical labor, follow a more rigid timetable, and take more overall responsibility in caregiving, which makes caregiving more like an obligatory task for women, thus the burden and stress it brings may overshadow its benefits, especially for those juggling paid work and informal care (Arpino and Bellani 2022; Craig 2006). For instance, grandparenting, a vital part of Chinese middle-to-older aged adults' caregiving, is found to

benefit grandfathers more since they take on tasks that are flexible and fun such as grocery shopping, cooking, and picking up kids from school (Zhang et al. 2015).

Evidence supporting Hypotheses 3b is found in Models 5 and 6, which present results from urban and rural subsamples respectively. While rural worker-caregivers enjoy higher life satisfaction, there is no evidence that their urban counterparts hold similar improvements. Conventional social norms are deeply embedded in rural areas, therefore rural residents could achieve higher role fulfillment by practicing dual roles (Liu and Chen 2022). While rural grandparents who take care of grandchildren get financial support from migrant adult children as a form of reciprocity, the extra financial gain could be less meaningful for urban residents, given urban their advantageous economic conditions (Cong and Silverstein 2008). Besides, urban dual role takers are more likely to suffer from work-family conflicts compared to rural residents who are mostly agricultural (self-)employed and have much more flexible schedules.

Worker-caregiver is associated with higher life satisfaction for people from both lower and higher socioeconomic classes, as suggested by Models 7 and 8, but the subgroup differentials are statistically significant.

Findings from Models 9 and 10 supported Hypothesis 3d that the worker-caregiver role is beneficial to life satisfaction, but only among people with low a level of social isolation. It echoes the literature suggesting that higher social isolation generates and exacerbates stress,

lowers the probability of help-seeking, and eventually leads to lower life satisfaction (Lai et al. 2020), which could overshadow the benefits brought by multiple roles.

-----Table 3.2 about here -----

Depression

The results from Model 1 of Table 3.3 supports Hypothesis 1 that worker-caregivers have higher depression level compared to non-worker or caregivers, enriching the literature that assumes the double burden of both informal care provision and full-time work is linked with detrimental mental health condition (Chen et al. 2020; Schmitz and Stroka 2013). Furthermore, Model 2 shows that the level of depressive symptoms rises as the intensity of working and caregiving increases, and the high-intensity double burden group reports the most severe depression symptom, supporting Hypothesis 2b and consistent with the previous study on female worker-caregivers in China (Chen et al. 2020). The findings highlight the importance of intensity, since low-intensity double burden shows no harm compared with non-worker or caregiver individuals, while high-intensity worker-low-intensity caregivers report higher depression levels, and the detrimental effect of double burden is most experienced by the high-intensity worker-caregiver group.

Results from Models 3 and 4 indicate that women who experience the dual responsibilities of work and caregiving endure elevated levels of depression, whereas men may not necessarily face the same disadvantage. Figure 3.2 shows the predicted depression level by worker-caregiver categories for men and women. This gender difference is

consistent with previous studies stating that women are more vulnerable to depressive symptoms due to chronic strain caused by work overload of employment and household responsibilities, which then contribute to the sense of burnout and distress, including depressive symptoms (Nolen-Hoeksema, Grayson, and Larson 1999).

Models 5 and 6 show that rural residents tend to suffer more from high-intensity work combined with caregiving, but the subgroup differentials are not statistically significant.

Hypothesis 3c is supported by results from Models 7 and 8, suggesting that a high-intensity double burden is associated with higher levels of depression, but only for lower socioeconomic status individuals. The difference in the nature of work could be a reason behind the health disparity. Middle-to-older adults with lower socioeconomic status mainly engage in agricultural work and informal sectors, which require more intensive manual labor but provide a low level of income. In contrast, higher socioeconomic status workers are usually employed in government organizations or as professionals, which have lower requirements of labor intensity and better income (Moortel, Dragano, and Wahrendorf 2020; Xie and Han 2023). Therefore, the double burden of work and caregiving transfers into depression for lower socioeconomic groups.

Findings from Models 9 and 10 show that worker-caregivers who are more socially isolated tend to have higher levels of depression, supporting Hypothesis 3d. It is consistent with literature stating that social integration buffers individuals from stressors by expanding

the chances of finding resources and helpful social contacts, therefore diminishing the harmful impact of role overload on subjective well-being (Lee, Jang, and Lockhart 2018).

-----Table 3.3 about here -----

Conclusion

The double burden effect of work and caregiving is commonly discussed among the middle-aged women population in Western societies, and many studies found it to associate with adverse health outcomes (Arpino and Bellani 2022; Chen et al. 2019, 2020). In this study, I expand the discussion to middle-to-older aged adults in China, where the boundary between employment and caregiving is less clear-cut, conventional social norms expect intergenerational support, and the practice of working and providing informal care to household members simultaneously being prevalent. This study uses data from the 2011-2018 CHARLS to assess the joint effect of work and caregiving on Chinese middle-to-older adults' subjective well-being. Using random effects models with robust standard errors, it is found that the dual roles of worker and caregiver are associated with higher life satisfaction, but higher depression levels as well. The improvement in life satisfaction indicates that in a society that values intergenerational solidarity, providing financial and instrumental support to contribute to the household is highly emotionally rewarding, especially if the individual practice both. However, the higher level of depression associated with dual roles suggests

that the rising number of middle-and-older adults caught between work and caregiving obligations still face potential increases in emotional and health risks.

Further estimating the role taken by care and work intensities, I emphasize the vital role of intensity as a low to moderate level of work and caregiving could enhance life satisfaction and not necessarily lead to a higher level of depression. However, the beneficial impact of holding dual roles no longer exists when the workload becomes more extreme, and the hazardous impact on depression becomes more severe.

These results provide evidence in favor of both role enhancement and role strain theories. The positive effect of holding the role of worker and caregiver simultaneously on life satisfaction indicates that fulfilling multiple roles could enhance one's subjective well-being, supporting the prediction of role enhancement theories. However, the findings also demonstrate that when work and care responsibilities require a considerably high time investment, the positive effect brought by dual roles diminishes and the detrimental effect exacerbates, which is particularly evident for depressive symptoms. This finding provides evidence to the prediction of role strain theories that the combination of different roles may become too stressful and burdensome and therefore become harmful to one's well-being.

Shouldering the responsibilities of work and caregiving is suggested to benefit men more than women. Women low-intensity worker-caregivers do not show promotion in life satisfaction, and their depression level rises as the workload increases. Though women have long been actively participating in the labor force, caregiving is still regarded as women's

responsibility. Men's involvement in informal caregiving is comparatively limited and with different, usually less stressful activities. Given that institutionalized care is still inadequate and culturally stereotyped, it becomes middle-to-older aged women's obligation to juggle paid work and take care of family members, which could easily lead to work-life conflict and translate to stressors that devastate their health and well-being.

A high level of social isolation is tested to be an important moderator that diminishes the positive impact of worker-caregiver on life satisfaction and exacerbates the negative effect of depression. Losing social ties remains to be a prevalent challenge for middle-to-older adults, as they may experience exiting the labor force and the passing away of friends and family members. Social disconnectedness may be especially harmful among Chinese populations, who could be deeply influenced by collectivist and interdependent social norms (Lai et al. 2020).

Rural/urban residence and socioeconomic status are hypothesized to moderate the worker-caregiver effect as well. However, the socioeconomic status disparity is not statistically significant for life satisfaction, and the rural-urban difference is not statistically significant for depression.

This study is not without limitations. First, the intensity of work and caregiving is measured by time burden, without specifying the job's characteristics including physical demand, schedule, and hazardous work environment due to data limitation. Besides, the intensity of caregiving could be further measured by the relationship with the care recipient,

whether living with the recipient, and the recipient's health condition. Secondly, the time window of 7 years may not capture the full extent of worker-caregiver's responsibilities and well-being consequences across individuals' life courses. Thirdly, this study does not explore the mechanisms through which dual roles influence subjective well-being. Future studies could explore the potential channels such as self-care time, leisure time, as well as emotional closeness with family members.

Tables

Table 3.1. Descriptive Statistics of Dependent Variables and Covariates, 2011, N=12526

	Mean/proportion	SD
Life satisfaction (5=completely satisfied)	3.05	0.71
Depression Syndrome (0-30, higher score=higher level of depression)	8.44	6.33
Worker-caregiver categories		
Non-worker or caregiver	0.20	0.40
Sole worker	0.36	0.48
Sole caregiver	0.14	0.34
Worker-caregiver	0.30	0.46
Low work intensity, low care intensity	0.03	0.17
Low work intensity, high care intensity	0.07	0.25
High work intensity, low care intensity	0.07	0.25
High work intensity, high care intensity	0.14	0.35
Gender (female=1)	0.52	0.50
Residence (rural=1)	0.63	0.48
Have chronic disease (yes=1)	0.25	0.43
Sum of difficulties in activities of daily livings	0.26	0.79
Age group		
54 and below	0.41	0.49
55 to 64	0.39	0.49
65 to 74	0.20	0.40
Birth cohort		
1930-1939	0.04	0.21
1940-1949	0.26	0.44
1950-1959	0.42	0.49
1960-1969	0.27	0.45
1970-1979	0.00	0.00
Work sector (formal=1)	0.17	0.38
Education attainment		
Less than lower secondary	0.88	0.32
Upper secondary & vocational training	0.10	0.30
Tertiary	0.02	0.12
Household assets quantiles:		
the lowest quartile	0.27	0.44
the 2nd lowest quartile	0.24	0.42
the 3rd lowest quartile	0.24	0.43
the highest quartile	0.26	0.44

Table 3.1. Descriptive Statistics of Dependent Variables and Covariates, 2011, N=12526, continued.

	Mean/proportion	SD
Not married or partnered (yes=1)	0.09	0.29
Less than weekly contact with children (yes=1)	0.07	0.26
Not participate in social activities last week (yes=1)	0.53	0.50
N	12526	

Note: In 2011 wave, those who were born in the 1970s have not entered the sample yet due to the 45-75 age restriction.

Table 3.2. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Life Satisfaction, Reference=non-worker or caregiver

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Worker-caregiver group (ref=non-worker or caregiver)										
Sole worker	0.01 (0.01)	0.00 (0.01)	0.01 (0.02)	0.01 (0.02)	-0.00 (0.02)	0.02 (0.02)	0.02 (0.01)	0.14 (0.10)	0.01 (0.01)	0.00 (0.04)
Sole caregiver	0.02 (0.01)	0.02 (0.01)	0.01 (0.02)	0.03 (0.02)	0.01 (0.02)	0.02 (0.02)	0.02 (0.01)	0.38 (0.25)	0.02 (0.01)	0.06 (0.05)
Worker-caregiver	0.03* (0.01)									
Low intensity worker-caregiver		0.04 (0.02)	0.06* (0.03)	0.03 (0.03)	0.05 (0.04)	0.04 (0.03)	0.05* (0.02)	0.10 (0.16)	0.05* (0.02)	0.01 (0.07)
Low intensity work, high-intensity caregiving		0.06*** (0.01)	0.05* (0.02)	0.07*** (0.02)	0.03 (0.02)	0.08*** (0.02)	0.06*** (0.01)	0.22 (0.12)	0.06*** (0.02)	0.09 (0.05)
High intensity work, low-intensity caregiving		-0.03 (0.02)	-0.03 (0.02)	-0.03 (0.03)	-0.04 (0.03)	-0.02 (0.02)	-0.02 (0.02)	0.16 (0.11)	-0.02 (0.02)	-0.10 (0.06)
High intensity worker-caregiver		0.02 (0.01)	0.03 (0.02)	0.00 (0.02)	-0.00 (0.02)	0.04 (0.02)	0.03 (0.01)	0.22* (0.10)	0.03 (0.01)	-0.04 (0.05)
Female (yes=1)	-0.07*** (0.01)	-0.07*** (0.01)			-0.07*** (0.02)	-0.08*** (0.01)	-0.08*** (0.01)	-0.05 (0.06)	-0.08*** (0.01)	-0.04 (0.03)
Rural resident (yes=1)	-0.02* (0.01)	-0.02* (0.01)	-0.01 (0.01)	-0.03* (0.01)			-0.04*** (0.01)	-0.05 (0.05)	-0.02** (0.01)	-0.00 (0.03)
Have chronic disease (yes=1)	-0.03*** (0.01)	-0.03*** (0.01)	-0.05*** (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	0.03 (0.05)	-0.03*** (0.01)	-0.08** (0.03)

Table 3.2. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Life Satisfaction, Reference=non-worker or caregiver, continued.

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Sum of difficulties in activities of daily livings	-0.08*** (0.01)	-0.08*** (0.01)	-0.08*** (0.01)	-0.09*** (0.01)	-0.08*** (0.01)	-0.08*** (0.01)	-0.09*** (0.01)	0.08 (0.13)	-0.08*** (0.01)	-0.11*** (0.02)
Age group (ref=pre-retirement)										
55 to 64	0.13*** (0.01)	0.13*** (0.01)	0.14*** (0.02)	0.15*** (0.02)	0.13*** (0.02)	0.12*** (0.01)	0.13*** (0.01)	0.01 (0.06)	0.13*** (0.01)	0.08 (0.04)
65 to 74	0.27*** (0.02)	0.27*** (0.02)	0.27*** (0.02)	0.31*** (0.02)	0.23*** (0.02)	0.28*** (0.02)	0.27*** (0.02)	0.05 (0.17)	0.27*** (0.02)	0.24*** (0.05)
Birth cohort (ref=1930-1939)										
1940-1949	0.11*** (0.03)	0.11*** (0.03)	0.12** (0.04)	0.09* (0.04)	0.10* (0.04)	0.12** (0.04)	0.11*** (0.03)	0.24 (0.23)	0.12*** (0.03)	0.10 (0.07)
1950-1959	0.16*** (0.03)	0.16*** (0.03)	0.19*** (0.04)	0.10* (0.04)	0.12* (0.05)	0.18*** (0.04)	0.17*** (0.03)	-0.03 (0.10)	0.16*** (0.03)	0.14 (0.07)
1960-1969	0.20*** (0.03)	0.20*** (0.03)	0.26*** (0.04)	0.14** (0.05)	0.17*** (0.05)	0.21*** (0.04)	0.22*** (0.03)	-0.04 (0.09)	0.21*** (0.04)	0.10 (0.08)
1970-1970	0.23*** (0.04)	0.23*** (0.04)	0.24*** (0.06)	0.23*** (0.06)	0.17** (0.06)	0.26*** (0.05)	0.26*** (0.04)	0.00 (.)	0.25*** (0.04)	-0.04 (0.15)
Lost at the follow-up wave (yes=1)	0.13*** (0.03)	0.13*** (0.03)	0.17*** (0.03)	0.08* (0.04)	0.11*** (0.03)	0.15*** (0.04)	0.14*** (0.03)	0.04 (0.11)	0.13*** (0.03)	0.03 (0.09)
Work sector (formal=1)	0.04*** (0.01)	0.05*** (0.01)	0.06*** (0.01)	0.01 (0.02)	0.02 (0.02)	0.07*** (0.01)			0.05*** (0.01)	0.02 (0.04)

Table 3.2. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Life Satisfaction, Reference=non-worker or caregiver, continued.

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Education attainment (ref=less than lower secondary)										
Upper secondary & vocational training	0.00	0.00	0.01	-0.01	0.01	-0.01			-0.01	0.08
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)			(0.01)	(0.06)
Tertiary	-0.00	-0.00	0.01	0.00	-0.00	0.09			0.01	-0.22*
	(0.03)	(0.03)	(0.04)	(0.06)	(0.04)	(0.08)			(0.03)	(0.10)
Household assets quantiles (ref=the lowest quantile)										
the 2nd lowest quartile	0.07***	0.07***	0.06***	0.07***	0.08***	0.06***			0.07***	0.08**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)			(0.01)	(0.03)
the 3rd lowest quartile	0.11***	0.11***	0.11***	0.11***	0.09***	0.12***			0.11***	0.13***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)			(0.01)	(0.03)
the highest quartile	0.16***	0.16***	0.14***	0.18***	0.13***	0.18***			0.17***	0.13***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)			(0.01)	(0.04)
Not married or partnered (yes=1)	-0.04*	-0.04*	-0.08**	-0.02	-0.05*	-0.03	-0.07***	-0.31*		
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	(0.13)		
Less than weekly contact with children (yes=1)	-0.07***	-0.07***	-0.07***	-0.07***	-0.08**	-0.07***	-0.07***	-0.12		
	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)	(0.01)	(0.08)		
Not participate in social activities last week (yes=1)	-0.02**	-0.02**	-0.01	-0.03**	-0.03**	-0.01	-0.03***	-0.05		
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)		

Table 3.2. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Life Satisfaction, Reference=non-worker or caregiver, continued.

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Constant	2.92***	2.92***	2.87***	2.87***	2.98***	2.86***	3.02***	3.25***	2.90***	2.89***
R-squared within	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01
R-squared between	0.04	0.04	0.04	0.05	0.03	0.05	0.03	0.03	0.04	0.04
R-squared overall	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.02	0.03	0.04
	(0.03)	(0.03)	(0.05)	(0.05)	(0.05)	(0.04)	(0.03)	(0.13)	(0.04)	(0.09)
N	46059	46059	22016	24043	17061	28998	44690	1369	41726	4698

Note: * p<0.05, ** p<0.01, *** p<0.001

Table 3.3. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Depressive Symptoms, Reference=non-worker or caregiver

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Worker-caregiver group (ref=non-worker or caregiver)										
Sole worker	-0.02 (0.08)	-0.01 (0.08)	-0.28* (0.12)	0.14 (0.12)	0.16 (0.13)	-0.11 (0.11)	-0.15 (0.08)	-0.95 (1.96)	-0.03 (0.09)	0.08 (0.26)
Sole caregiver	0.20* (0.09)	0.20* (0.09)	0.07 (0.14)	0.27* (0.12)	0.04 (0.12)	0.38** (0.14)	0.19* (0.09)	-1.62 (2.25)	0.12 (0.10)	0.64 (0.34)
Worker-caregiver	0.26** (0.09)									
Low intensity worker-caregiver		0.20 (0.14)	-0.12 (0.20)	0.40 (0.21)	0.10 (0.23)	0.20 (0.18)	0.14 (0.15)	-0.57 (2.02)	0.14 (0.15)	0.17 (0.52)
Low intensity work, high intensity caregiving		0.15 (0.10)	-0.13 (0.15)	0.30* (0.14)	0.33 (0.18)	0.04 (0.13)	0.10 (0.11)	-0.92 (1.99)	0.09 (0.11)	0.22 (0.36)
High intensity work, low intensity caregiving		0.30* (0.13)	0.02 (0.17)	0.47* (0.20)	0.13 (0.20)	0.35* (0.16)	0.22 (0.13)	-1.35 (1.98)	0.18 (0.13)	1.34** (0.50)
High intensity worker-caregiver		0.37*** (0.10)	-0.05 (0.14)	0.73*** (0.15)	0.39* (0.17)	0.35** (0.13)	0.25* (0.10)	-0.68 (1.99)	0.31** (0.11)	0.82* (0.38)
Female (yes=1)	1.58*** (0.08)	1.58*** (0.08)			1.34*** (0.12)	1.73*** (0.10)	1.78*** (0.08)	0.52 (0.36)	1.64*** (0.08)	1.62*** (0.23)
Rural resident (yes=1)	1.18*** (0.07)	1.18*** (0.07)	0.95*** (0.10)	1.36*** (0.11)			1.52*** (0.07)	0.77** (0.29)	1.22*** (0.07)	0.98*** (0.24)
Have chronic disease (yes=1)	1.27*** (0.07)	1.27*** (0.07)	1.03*** (0.09)	1.47*** (0.10)	1.06*** (0.10)	1.40*** (0.09)	1.30*** (0.07)	0.49 (0.29)	1.26*** (0.07)	1.61*** (0.21)

Table 3.3. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Depressive Symptoms, Reference=non-worker or caregiver, continued

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Sum of difficulties in activities of daily livings	1.57*** (0.04)	1.57*** (0.04)	1.63*** (0.07)	1.52*** (0.05)	1.59*** (0.08)	1.54*** (0.05)	1.62*** (0.04)	1.91** (0.74)	1.63*** (0.04)	1.60*** (0.10)
Age group (ref=pre-retirement)										
55 to 64	0.06 (0.08)	0.07 (0.08)	-0.17 (0.11)	0.32** (0.12)	-0.02 (0.12)	0.13 (0.10)	0.11 (0.08)	0.21 (0.39)	0.08 (0.08)	-0.13 (0.31)
65 to 74	-0.26* (0.11)	-0.24* (0.11)	-0.40** (0.15)	-0.03 (0.18)	-0.19 (0.18)	-0.26 (0.15)	-0.18 (0.12)	0.08 (1.09)	-0.13 (0.12)	-0.78 (0.41)
Birth cohort (ref=1930-1939)										
1940-1949	0.35 (0.24)	0.35 (0.24)	-0.01 (0.32)	0.82* (0.38)	0.34 (0.35)	0.36 (0.33)	0.29 (0.25)	0.00 (.)	0.21 (0.27)	0.59 (0.53)
1950-1959	0.37 (0.25)	0.37 (0.25)	-0.02 (0.33)	0.81* (0.39)	0.44 (0.36)	0.37 (0.34)	0.23 (0.26)	0.36 (1.60)	0.23 (0.28)	0.58 (0.58)
1960-1969	0.48 (0.26)	0.49 (0.26)	0.05 (0.35)	0.97* (0.40)	0.81* (0.38)	0.30 (0.36)	0.21 (0.27)	0.51 (1.62)	0.30 (0.29)	0.82 (0.65)
1970-1970	0.92** (0.31)	0.93** (0.31)	0.33 (0.42)	1.64*** (0.47)	1.08* (0.46)	0.83* (0.42)	0.54 (0.32)	1.37 (1.70)	0.70* (0.34)	1.89 (1.05)
Lost at the follow-up wave (yes=1)	0.04 (0.18)	0.04 (0.18)	0.11 (0.25)	-0.03 (0.27)	-0.15 (0.24)	0.33 (0.29)	-0.08 (0.19)	0.78 (0.68)	0.04 (0.19)	0.27 (0.71)
Work sector (formal=1)	-0.67*** (0.07)	-0.68*** (0.07)	-0.69*** (0.09)	-0.61*** (0.13)	-0.73*** (0.11)	-0.72*** (0.10)			-0.65*** (0.07)	-0.79** (0.29)

Table 3.3. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Depressive Symptoms, Reference=non-worker or caregiver, continued

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Education attainment (ref=less than lower secondary)										
Upper secondary & vocational training	-1.23*** (0.10)	-1.23*** (0.10)	-1.00*** (0.13)	-1.63*** (0.18)	-1.18*** (0.13)	-1.31*** (0.16)			-1.21*** (0.10)	-2.28*** (0.43)
Tertiary	-1.55*** (0.21)	-1.55*** (0.21)	-1.46*** (0.25)	-1.89*** (0.41)	-1.62*** (0.22)	-1.41* (0.68)			-1.61*** (0.21)	-1.17 (1.24)
Household assets quantiles (ref=the lowest quantile)										
the 2nd lowest quartile	-0.53*** (0.08)	-0.53*** (0.08)	-0.37*** (0.11)	-0.65*** (0.11)	-0.49*** (0.13)	-0.53*** (0.09)			-0.59*** (0.08)	-0.72** (0.23)
the 3rd lowest quartile	-0.87*** (0.08)	-0.87*** (0.08)	-0.77*** (0.11)	-0.93*** (0.11)	-0.69*** (0.13)	-0.94*** (0.10)			-0.93*** (0.08)	-1.28*** (0.25)
the highest quartile	-1.45*** (0.08)	-1.45*** (0.08)	-1.32*** (0.11)	-1.54*** (0.12)	-1.29*** (0.13)	-1.48*** (0.10)			-1.54*** (0.08)	-1.88*** (0.29)
Not married or partnered (yes=1)	1.31*** (0.12)	1.31*** (0.12)	1.33*** (0.19)	1.29*** (0.16)	1.07*** (0.19)	1.48*** (0.16)	1.61*** (0.12)	1.77* (0.71)		
Less than weekly contact with children (yes=1)	0.66*** (0.10)	0.65*** (0.10)	0.83*** (0.13)	0.49*** (0.14)	0.73*** (0.19)	0.61*** (0.11)	0.69*** (0.10)	0.71 (0.54)		
Not participate in social activities last week (yes=1)	0.51*** (0.05)	0.51*** (0.05)	0.56*** (0.07)	0.48*** (0.08)	0.71*** (0.08)	0.39*** (0.07)	0.59*** (0.05)	0.65** (0.24)		

Table 3.3. Random-Effects Models Estimating the Effects of Worker-Caregiver Categories on Depressive Symptoms, Reference=non-worker or caregiver, continued

	Model 1	Model 2	Male	Female	Urban	Rural	Low SES	High SES	Low isolation	High isolation
	coef	coef	coef	coef	coef	coef	coef	coef	coef	coef
Variables	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)
Constant	5.89*** (0.27)	5.87*** (0.27)	6.63*** (0.35)	6.64*** (0.41)	5.77*** (0.39)	7.11*** (0.36)	4.71*** (0.27)	4.40 (2.34)	6.35*** (0.29)	7.81*** (0.68)
R-squared within	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.02
R-squared between	0.23	0.23	0.19	0.21	0.19	0.23	0.20	0.04	0.21	0.17
R-squared overall	0.17	0.17	0.14	0.15	0.15	0.17	0.15	0.04	0.16	0.15
N	47078.00	47078.00	22422.00	24656.00	17354.00	29724.00	45697.00	1381.00	42609.00	4839.00

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

Figures

Figure 3.1. Predicted Life Satisfaction by Work-Caregiving Categories and Gender

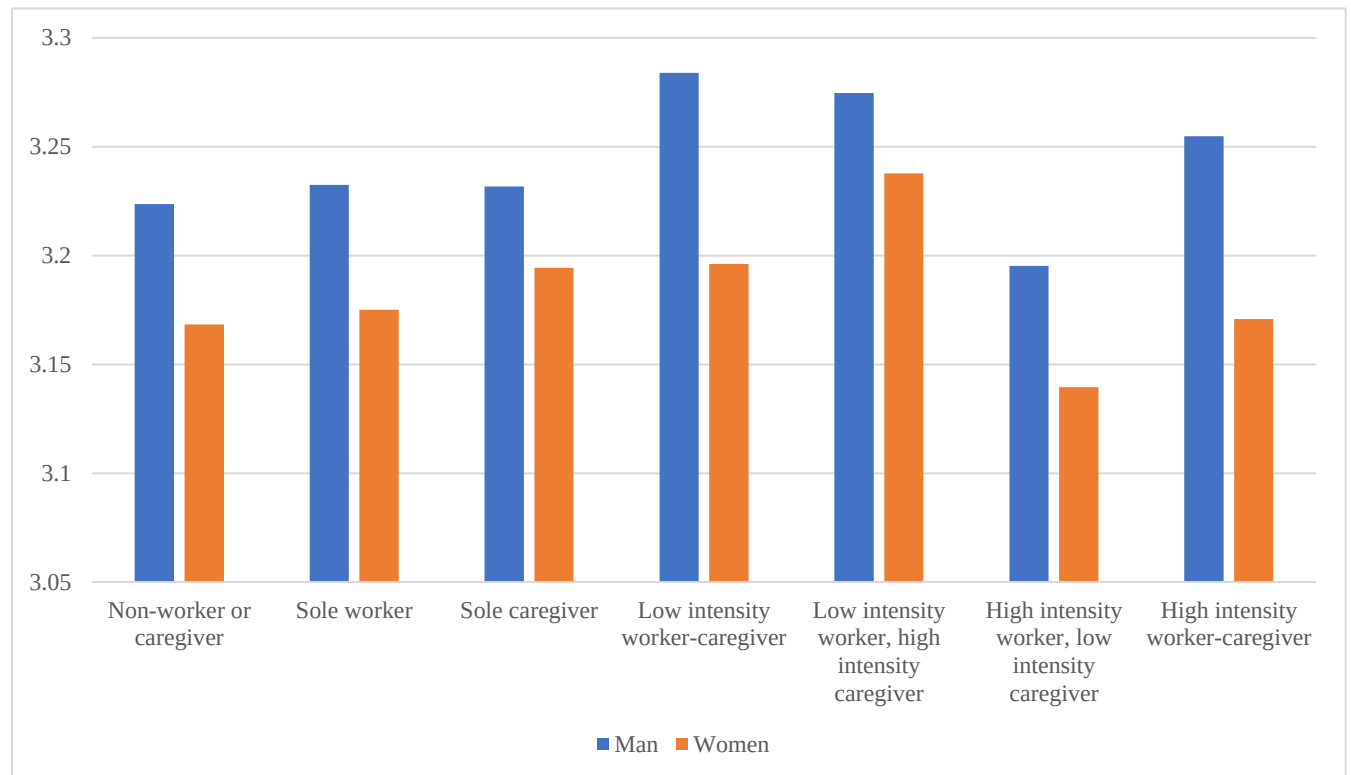
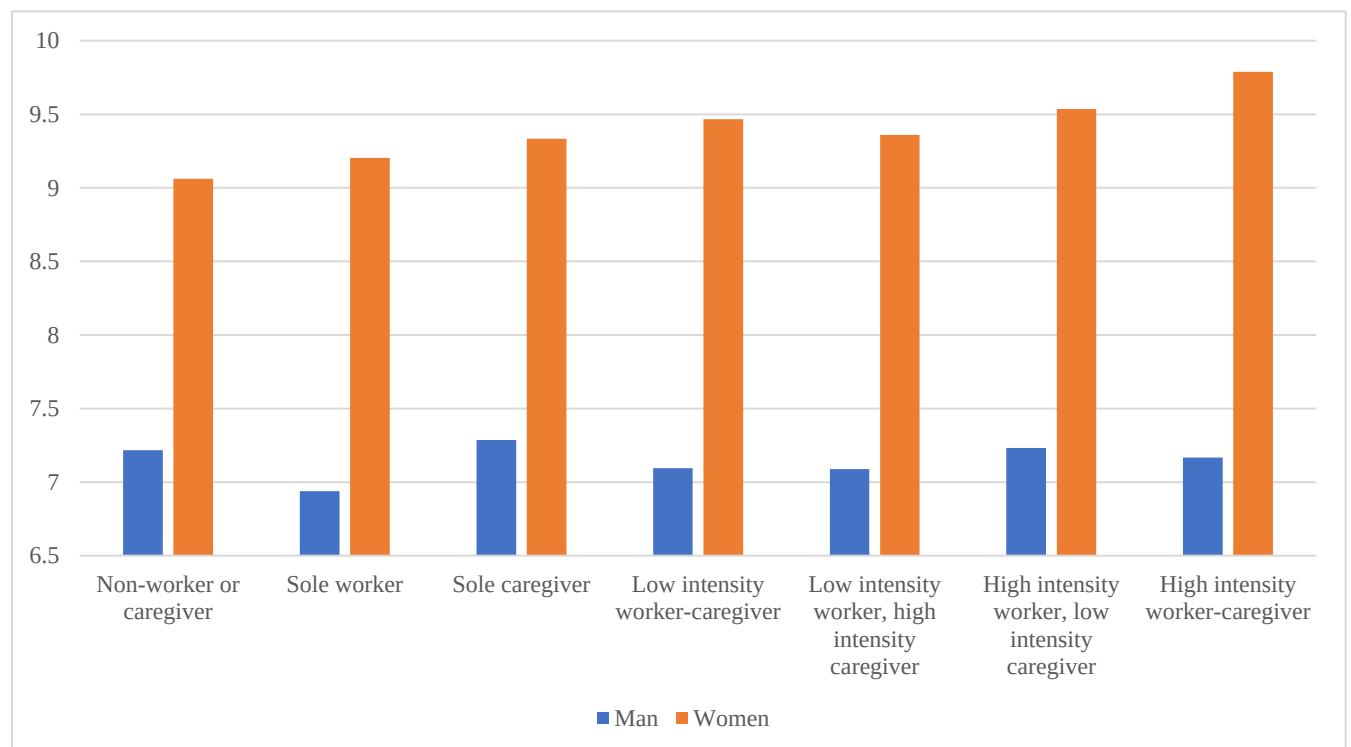


Figure 3.2. Predicted Depression Syndrome by Work-Caregiving Categories and Gender



Conclusion

Based on the life course perspective, the three papers comprising this dissertation focus on a distinct group of middle-to-older aged Chinese adults who are engaged in both paid work and informal caregiving. The papers examine the formation, transition, and consequences of their subjective well-being. Previous studies have typically approached middle-to-older adults either as workers, assessing the additional impact of caregiving, or as caregivers, examining the additional influence of participating in the labor force. However, given the context of rapid population aging, increased life expectancy, and deeply ingrained intergenerational solidarity, adults who are at risk of becoming grandparents are more likely to assume multiple roles and face the challenge of balancing work and family responsibilities. Consequently, their motivations and trajectories may differ from those of individuals with a singular role. Balancing these two roles can be particularly demanding, as role expectations may conflict with each other, and individuals have limited resources at their disposal. To examine how the interrelationship between work and family persists during later stages of life, the initial investigation explores the impact of living with grandchildren on grandparents' work prospects (chapter one). Subsequently, the scope expands to include other living arrangements and investigates their associations with role transitions, with specific attention given to those who become or exit worker-caregiver roles (chapter two). Finally, the study explores the subjective well-being outcomes of worker-caregivers at varying intensities (chapter three). Findings drawn from four waves of longitudinal data derived from the China

Health and Retirement Study (CHARLS, 2011-2018) indicate that worker-caregivers are prevalent in the Chinese context, primarily driven by the care needs of family members. Those individuals who shoulder dual responsibilities exhibit higher levels of depression syndrome but also report greater life satisfaction.

Summaries for each three chapter

The first study contributes to the existing knowledge regarding the role of grandparents within households, particularly as workers who adapt their employment plans in response to changes in living arrangements. When grandparents reside with their adult children, both men and women experience reduced labor force participation and work hours. However, the impact of living with a grandchild varies according to gender and the sector of employment. For grandfathers, having a grandchild living with them is associated with a higher rate of labor force participation. In contrast, grandmothers employed in the formal sector tend to leave the workforce upon the arrival of grandchildren, while those in the informal sector extend their working hours. This gendered effect of grandchild presence highlights women's caregiving responsibilities in contrast to men's income-earning roles. Consequently, the labor supply is reduced due to the caregiving needs of grandchildren, aligning with previous findings that women are more likely to exit the labor market or take time off due to informal caregiving obligations (Smith et al. 2020). Additionally, the disparity observed between formal and informal sector workers suggests that the inflexible schedules in formal employment pose challenges for female employees in achieving work-life balance, whereas

the flexible nature of informal sector work enables better multitasking. This distinction holds particular significance in developing countries, where the informal economy represents a substantial portion of the overall economy, and the boundaries between work and caregiving are more blurred compared to developed societies. Furthermore, the study highlights the significant contributions made by grandmothers, who are commonly presumed to serve as caregivers for grandchildren, in meeting the additional financial needs generated by younger generations within the household.

Building upon the findings of the first chapter, which highlighted the influence of caregiving needs on the career choices of middle-to-older aged adults, the second chapter delves deeper by categorizing individuals into four distinct groups: non-worker or caregiver, sole worker, sole caregiver, and worker-caregiver. This categorization allows for a comprehensive exploration of role transitions and the estimation of the impacts of living arrangements. Given the added burden of balancing multiple roles, the worker-caregiver group emerges as a unique focus of analysis. At each wave of the study, respondents are classified into one of these categories. Transitions between categories are constructed based on two waves of observations, with the most prevalent trajectories being persistent sole workers, persistent worker-caregivers, workers transitioning into worker-caregivers, and worker-caregivers transitioning into workers. This finding underscores the prevalence of middle-to-older aged individuals who assume the dual responsibilities of work and caregiving, thus expanding the discussion on the challenges posed by the double burden to a later stage in life. The results derived from multinomial logistic regressions reveal that living

arrangements, particularly living with grandchildren, are associated with a higher likelihood of becoming worker-caregivers and a lower likelihood of exiting the worker-caregiver category.

Expanding upon the worker-caregiver typology established in the second chapter, the third chapter delves into the well-being implications associated with each type of worker-caregiver in the Chinese context. In comparison to non-worker or caregivers, only worker-caregivers exhibit higher levels of life satisfaction. However, both caregivers and worker-caregivers experience higher levels of depressive symptoms. It is worth noting that while moderate levels of employment and informal caregiving are linked to higher life satisfaction, high intensity in both areas is only associated with increased depressive symptoms. Furthermore, compared to men, women who are worker-caregivers report lower life satisfaction and higher levels of depressive symptoms. The presence of lower levels of social isolation acts as a protective factor, buffering worker-caregivers from the negative well-being consequences of juggling multiple roles. Taken together, these findings suggest that simultaneous engagement in work and caregiving can bring about both positive and negative implications, thus providing evidence for both the role strain and role enhancement perspectives. Moreover, the results indicate that the subjective well-being implications of being a worker-caregiver are moderated by gender and the level of social isolation: women and highly isolated worker-caregivers are more vulnerable to the negative effects compared to their male counterparts and those who have a lower level of social isolation.

Contributions and implications for future research

This dissertation makes several valuable contributions to the existing literature.

Firstly, it emphasizes the unique group of worker-caregiver and provides estimations of the combined impact of paid work and informal caregiving on middle-to-older aged adults. By adopting a life course perspective, this study extends our understanding of the double burden of employment and caregiving responsibilities, including men and older age groups.

Secondly, the results derived from multinomial logistic regressions reveal that the transition into and persistence within the worker-caregiver group among middle-to-older adults are primarily driven by caregiving needs, particularly the care of grandchildren. This finding further enhances our comprehension of intergenerational solidarity and mutual support within Chinese society.

Thirdly, the well-being implications of being a worker-caregiver support both the role enhancement and role strain hypotheses, suggesting that these two hypotheses can operate simultaneously. The health consequences vary significantly, indicating that the implications differ not only by gender but also by the intensity of work demands and the level of social isolation.

This study aims to explore the intertwined trajectories of work and caregiving for middle-to-older aged adults, with a specific focus on those who simultaneously engage in both work and family roles. However, it is important to acknowledge that the seven-year time window may provide only a partial view of individuals' later stages of life. For future

research, it would be valuable to examine adults' life courses from middle to older ages and investigate how their decision-making and health implications change as the potential care recipients transition from children to grandchildren.

Policy implications

This dissertation research offers valuable insights that can inform the development and design of social welfare systems and long-term care services in rapidly aging developing societies.

In the context of China, where many individuals do not receive sufficient benefits from the social security system, a significant portion of the population is compelled to continue working even in older age. The response to caregiving responsibilities varies depending on the nature of employment: the inflexible schedules associated with formal sector jobs often result in workers exiting the labor force, whereas informal sector employment offers some degree of flexibility, enabling individuals to balance multiple responsibilities. As the government encourages individuals to delay retirement within the formal sector, it becomes crucial to introduce more flexible work arrangements. In the case of the large population of informal sector workers, it is essential to enhance their income, benefits, and social security coverage to enable them to effectively manage the demands of fulfilling dual roles.

While caregiving responsibilities traditionally rely on family members, the availability of family care networks is declining due to factors such as lower childbirth rates and significant rural-to-urban migration. Therefore, it is necessary to invest in more affordable home-based

and community-based care facilities, particularly in rural areas. This investment will help meet the increasing demand for care services and provide viable options for individuals balancing work and caregiving responsibilities.

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