The Effects of Providing Childcare on Grandmothers' Employment and Mental Health in Japan

By Yuko Ueno and Emiko Usui **

Abstract

In this paper, we examine the relationship between childcare given by a grandmother and her employment and mental health, using the 2005–2009 waves of the Longitudinal Survey of Middle-Aged and Older Adults, a large and nationally representative panel survey of those aged 50-59 in 2005. We find that when a grandmother provides childcare to grandchildren under the age of 6, the probability of her being employed is reduced by 3.8 percentage points, after we control for time-invariant individual heterogeneity. For those working grandmothers, caring for small grandchildren reduces hours worked per week by just 0.79, and days per week by just 0.069, reductions that are small in magnitude. We also observe that caregiving for small grandchildren is insignificantly related to any psychological distress of grandmothers.

JEL classification Codes: J22, J14

Keywords: Childcare, Grandmothers, Employment, Work hours, Labor supply, Mental health.

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日本で孫の育児が祖母の就業とメンタルヘルスに及ぼす影響

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＜要旨＞

本稿では、2005－2009 年の厚生労働省「中高年者縦断調査」結果を用いて、孫の育児と祖母の就業やメンタルヘルスとの関係を検証した。同調査は、2005 年時点で 50 代であった人々を対象とした全国を対象とする大規模調査である。時点間で不変の個人属性をコントロールした分析の結果、祖母が 6 歳未満の孫の育児を行うと、その就業確率は 3.8 パーセントポイント低下することが明らかになった。就業している祖母については、6 歳未満の孫の育児の週当たり就業時間への影響は 0.79 時間の減少、週当たり就業日数への影響は 0.069 日の減少にとどまり、ごくわずかであった。加えて、6 歳未満の孫の育児と精神的な負担との関係は有意にはみられなかった。

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1. Introduction

Informal caregiving is one of the key factors that affect the labor supply of prime working-age women. Women in their 50s can be informal caregivers not only for their elderly parents but also for their grandchildren. While the association of parental caregiving to employment has been examined in Japan (Oshio, 2014; Oshio and Usui, 2018; and many others), there are few studies that examine the impact of caregiving for a grandchild on grandmothers' employment. To gauge the use of prime-age women's labor in Japan, it is essential to investigate whether and how informal caregiving for grandchildren by grandmothers might affect their level of employment.

Recent studies have discussed this issue, mainly by using data from the United States and European countries (Rupert and Zanella, 2018; Lumsdaine and Vermeer, 2015; Frimmel et al., 2017). Researchers and policymakers in Japan also recognize the importance of informal family care of small children by grandparents, given the fact that the supply of public daycare facilities is often insufficient to meet the demand because of the growing number of working mothers. However, the relationship between the care of grandchildren and working-age grandmothers' employment in Japan has not yet been fully investigated.

We use the 2005–2009 waves of the Longitudinal Survey of Middle-Aged and Older Adults, a large and nationally representative panel survey of those aged 50-59 in 2005. We find a large negative association between a middle-aged grandmother's caring for a grandchild and her employment at both the extensive margin (i.e., employment) and the intensive margin (i.e., hours worked conditional on employment). However, after controlling for time-invariant individual heterogeneity by fixed effects, we observe that

caring for a grandchild reduces the probability of employment only modestly—by 3.8 percentage points (while the average employment rate of grandmothers in their 50s is 70.3 percent). Furthermore, working grandmothers of this age reduce their hours worked per week by only 0.79 hours, and days per week by 0.069, reductions which are small in magnitude.

We further investigate how caring for grandchildren is related to the grandmothers' mental health. It is well known that informal caregiving for elderly parents has an adverse impact on female caregivers' mental health in Japan (Oshio, 2014; Oshio and Usui, 2018). However, whether the same holds in the case of family care for grandchildren has not previously been studied in Japan. We have found that caring for grandchildren has no significantly negative associations with the level of working grandmothers' distress. Furthermore, we find that (i) caregiving for elderly parents itself is positively related with the psychological distress of middle-aged grandmothers; and (ii) caregiving provided for both elderly parents and grandchildren adds more to the psychological distress of these grandmothers. Therefore, "double care" (the simultaneous occurrence of grandchild care and eldercare) is indeed a source of psychological distress to grandmothers, but caring for elderly parents by itself is the major contributor to the psychological distress of grandmothers.

Overall, our results suggest that informal, family-based caregiving for grandchildren does not appear to be a significant deterrent to employment among grandmothers in their 50s in Japan. This may be because only 19.6 percent of Japanese grandmothers in their 50s work as regular workers.[1] As a result, grandmothers who care for grandchildren work

[1] Regular workers (*seiki no shokuin*) are those who are in employed companies, associations, government institutions, or private businesses and those whose employment is not limited in duration except for the mandatory retirement age. Among middle-aged grandmothers who are working for pay, 27.9 percent work as regular workers, 49.0 percent work as non-regular workers, and 22.5 percent are self-employed.

33.2 hours per week, while those who do not care for grandchildren work 34.73 hours per week; so there is little difference in working hours between those who care for grandchildren and those who do not. Even grandmothers who are *not* caring for any grandchildren are working fewer than 35 hours per week; as a result, grandmothers can participate in grandchild care without needing to significantly reduce their working hours. This situation may change in the future, if and when more women in Japan increase their attachment to the labor market as regular workers; that would make them unable to reduce their full-time working hours if and when asked to care for their grandchildren.

The paper proceeds as follows. Section 2 reviews the literature on how providing informal childcare by grandmothers affects their level of employment and their mental health. Section 3 provides details about the data and descriptive statistics of the sample. Section 4 presents the main estimation results, that is, the effect of informal caring for grandchildren on grandmothers' (1) employment, (2) hours and days of work conditional on working, and (3) mental health. Section 5 conducts robustness checks. Section 6 examines the effect of caring for both grandchildren *and* elderly parents on the labor supply and mental health of grandmothers. Section 7 concludes the paper.

2. Background

Grandmothers' provision of care for grandchildren is prevalent in many countries, particularly around the timing of retirement (Hank et al., 2018). Leopold and Skopek (2015) find that many midlife individuals in the US and European countries are likely to still be employed when they become grandparents, and this familial transition often precedes retirement by around 5-10 years. Ciani (2016) compares the time-use patterns

of grandparents before and after their retirement, and finds retired grandmothers spend more hours providing care for their grandchildren.

When economists discuss the role of caregiving for grandchildren, they have mainly focused on its impact on the mothers' labor supply as well as the mothers' fertility rate, both of which have been major policy issues. In considering the mothers' labor supply, most previous studies examine the impact of grandparents' informal caregiving on the labor supply of mothers; in contrast, those that have studied the impact on the labor supply of grandmothers themselves are still few in number (exceptions are Ho, 2015; Rupert and Zanella, 2018; Zanasi et al., 2020).

Within the former strand of empirical studies, several researchers have considered the experience of pension reform and the raising of the retirement age in Italy in the 1990s to examine the impact on the mothers' labor supply; their research has produced mixed results. Battistin et al. (2014) find the intergenerational effect did not influence the mothers' labor supply, while Arpino et al. (2014) and Garcia-Moran and Kuehn (2017) show a positive impact of grandparents' childcare on the mothers' labor supply. Bratti et al (2018) argue that whether or not a mother has her mother who has already retired and is receiving a pension affects the labor force participation of females with children under 15 years old. Bick (2016) uses data from Germany, and takes into account the impact of grandmothers' childcare on the mothers' labor supply as well.

Within the latter strand of empirical studies, Hank et al. (2018) stress the importance of studying the implications of grandparental childcare on the productive activities of the grandparents themselves (including participation in the labor market and engagement in social activities) as well as health. A few recent studies have examined the relationships between the provision of grandchildren's care and early retirement (De Preter et al., 2013;

Lumsdaine and Vermeer, 2015; Frimmel et al., 2017). Kim (2018) focused on the association between care intensity and grandparents' employment status in Korea. Rupert and Zanella (2018) structurally analyze the impact of the grandmothers' caregiving on the grandmothers' labor supply by using US data. They find that (i) caring for grandchildren reduces the grandmothers' labor supply by 30 percent on average (intensive margin), and (ii) this negative impact is more evident among grandmothers with shorter work hours.[2] Frimmel et al. (2017) explore heterogeneity across different institutional settings (e.g., availability of formal childcare) in Austria and identify a significantly negative effect of the first grandchild on a grandmother's employment (8 percent at the extensive margin). Their results indicate that the grandmothers' labor supply is reduced more in communities with formal childcare institutions than in those without such institutions. Using the English Longitudinal Study of Ageing, Zanasi et al. (2020) examine whether the birth of their first grandchild leads female workers to withdraw from the labor market. They argue that women with lower opportunity costs, including those who already had long employment interruptions, are more likely to withdraw from the labor market.

Several studies that have investigated the relationship between grandmothers' childcare and their health have yielded inconclusive results. Chen and Liu (2012) find a positive relation between care provision and (i) depressive symptoms, (ii) worse self-rated health, and (iii) physical health problems, especially for grandmothers who care for younger grandchildren intensively. Others, however, find beneficial effects on the grandmothers' health conditions, levels of happiness, or levels of cognition (Ku et al.,

[2] Rupert and Zanella (2018) use the gender of the grandparents' children (i.e., the gender of the grandchildren's parents) as an exogenous variable that affects the timing of grandparenthood. They find that parents of girls become grandparents around two years earlier than parents of boys. They argue that the gender of the child affects labor supply only through the grandparenthood but not through any of the unobserved attributes.

2012; Di Gessa et al., 2016a, 2016b; Ahn and Choi, 2019). Several other studies attempt to control for endogeneity in caregiving decisions. Ahn and Choi (2019) employ an FE-IV model to control for reverse causality and unobserved time-varying factors by the use of variation in family structures (e.g., having a married child). Ku et al. (2012) also use instrumental variable approach and discuss how the effects may be dependent on the intensity of childcare, co-residence or not, or other societal background factors.

Let us consider now the literature on the relationship between grandchildren's care and women's labor supply in Japan. Asai et al. (2015) examines the relationships between maternal employment and regional formal childcare availability as well as household structure. They find that formal childcare availability does not affect the employment rate of mothers from three-generation households; they conclude that this is because mothers do not enroll their children in formal childcare since the informal care of a grandmother is available.

In Japan, in contrast to the extensive research on caring for elderly parents on female labor supply, there are few prior studies that examine the relation between caring for their grandchildren and (i) grandmothers' decisions about their labor force participation, and (ii) their mental health. This is why we chose to study the possible impact of caring for grandchildren on the grandmothers' labor supply and mental health in Japan.

3. Data and descriptive statistics

3.1 Data

We use panel data from the Longitudinal Survey of Middle-Aged and Older Adults, conducted by the Japanese Ministry of Health, Labour and Welfare. The survey began in

early November 2005 with a sample of 34,240 individuals aged 50 to 59 years, and these individuals have been surveyed in November of every subsequent year. The initial response rate of the survey was 83.8 percent, with a subsequent attrition rate ranging from 1.2 percent to 9.8 percent. Because of the large sample size and relatively low attrition rate, as well as the availability of information on (i) the age of grandchildren if the respondent has any (whether or not they are co-resident), and (ii) how many hours the respondents spend time on caring for grandchildren,[3] this survey is one of the most effective ways to study the association between informal caregiving for grandchildren and the employment and mental health of middle-aged women in Japan. The survey also asks about informal caregiving for the respondents' parents, including questions on (i) parent(s) or parent(s)-in-law who are still living; and (ii) which of those elderly parents, if any, are being cared for by the respondent. Although our main interest of this study is the relationship between employment and caring for grandchildren, individuals in their 50s sometimes may be caring for not only their grandchildren but also their parents, which is indisputably another key factor that affects the labor supply. We thus take advantage of the fact that the survey covers both issues.

We restricted our sample to female respondents between the ages of 50 and 59 who have at least one grandchild below the age of 6 (preschool-age children). We excluded women over age 60 from our sample, because their work decisions are likely to be affected by pension and retirement policies: workers in Japan can claim pensions starting

[3] The survey does not ask about the gender of the grandchildren. The survey asks about respondents' childcare activity for an individual below the age of 6: specifically, for (i) their own children, (ii) their grandchildren, (iii) another relative, and (iv) other. The survey does not ask which grandchild is being cared for by the respondent. The survey also asks the total hours spent on the childcare activity. We utilize the total hours spent on childcare activity for grandmothers whose childcare activity is solely grandchild care, which is 99.1 percent of grandmothers who are involved in any kind of childcare activity.

at age 60, and the mandatory retirement age is often between the ages of 60 and 65. We also limited our sample to the years 2005–2009 because the data from the later waves—after 2010— do not include information on whether the respondents provided care for their grandchildren. We were left with a total of 4,931 grandmothers in 2005.

In regard to employment, the respondents are asked whether they have a paid job. The indicator variable for employment is defined as 1 if the respondent has a paid job and 0 otherwise. Those who have a paid job are then asked about (i) their average hours worked per week, and (ii) their average days worked per week during October— the most recent month because the survey is conducted in early November—of the survey year. In regard to informal caregiving, the survey asks whether the respondents provide care to someone in their immediate family (including grandchildren), and if they do, which family member(s) receive care. We consider a respondent an informal caregiver for her grandchildren if she cares for at least one of her grandchildren.

We evaluate the respondents' mental health status because the Longitudinal Survey included questions from the Kessler Screening Scale for Psychological Distress (K6). The K6 score is a standardized and validated measure of nonspecific psychological distress (Kessler et al., 2002, 2010). The K6 contains six questions that ask whether the following feelings have been experienced in the past 30 days: (a) nervousness, (b) hopelessness, (c) restlessness or fidgeting, (d) depression, (e) feeling that everything was an effort, and (f) worthlessness. These items are rated on a five-point scale, ranging from 0 (none of the time) to 4 (all of the time). The items are summed to provide a score that ranges from 0 to 24. The reliability and validity of this tool have been demonstrated for a Japanese sample (Furukawa et al., 2008; Sakurai et al., 2011). Higher K6 scores indicate higher

levels of psychological distress in the respondent.

3.2 Descriptive Statistics

Table 1 provides summary statistics of the key variables by caregiving status using the 2005 wave. Among women who have at least one grandchild below the age of 6 in 2005, 16.6 percent (= 817/4,931) provide informal care to at least one grandchild. Those who care for at least one grandchild spend on average 19.8 hours per week on grandchild care; of those, 62.3 percent spend more than 10 hours per week on grandchild care. When caregivers and noncaregivers are compared, caregivers tend to have slightly more limitation in their physical functioning.

We then compare whether the employment and mental health variables differ by the caregiving status shown in Table 1. The proportion of caregivers who have paid jobs is 57.8 percent, which is 13.8 percentage points lower than that among noncaregivers. Caregivers who have paid jobs work an average of 33.2 hours per week and 4.9 days per week—both values being slightly less than those among noncaregivers (34.7 hours and 5.0 days), although the difference is limited. Meanwhile, the average K6 score was slightly greater among caregivers (9.28) than noncaregivers (8.91).

Table 1. Summary statistics

Sample: Women who have at least one grandchild less than 6 years old, 2005

	Grandmother			
	Noncaregiver		Caregiver	
	Mean	SD	Mean	SD
Work	0.716	0.451	0.578	0.494
Hours of work	34.73	14.82	33.23	16.95
Days of work	5.039	1.163	4.918	1.336
Hours caring for grandchildren			19.80	22.02
Caring for grandchildren $\geq$ 30			0.226	0.418
Age	55.61	2.472	55.56	2.524
Married	0.871	0.335	0.854	0.353
Separated	0.017	0.128	0.011	0.104
Divorced or Widowed	0.106	0.308	0.133	0.340
Never Married	0.003	0.056	0.000	0.000
Less than High School	0.230	0.421	0.237	0.426
High School	0.561	0.496	0.507	0.500
Some College	0.177	0.381	0.222	0.416
University	0.028	0.164	0.028	0.166
Education: Other	0.004	0.062	0.006	0.078
Self-assessed health: exellent	0.082	0.274	0.086	0.280
Self-assessed health: very gooc	0.321	0.467	0.288	0.453
Self-assessed health: good	0.424	0.494	0.424	0.494
Self-assessed health: fair	0.135	0.342	0.169	0.375
Self-assessed health: poor	0.033	0.178	0.024	0.155
Self-assessed health: very poor	0.006	0.075	0.010	0.099
Physical functional limitation: 1	0.046	0.209	0.056	0.231
Physical functional limitation: 2+	0.042	0.201	0.060	0.238
Number of Living Children	2.455	0.832	2.556	0.864
Children less than 18	0.022	0.148	0.020	0.139
Own house	0.879	0.326	0.909	0.287
Apartment	0.095	0.293	0.075	0.263
Company housing	0.009	0.096	0.006	0.078
Housing: Other	0.017	0.128	0.010	0.099
Home loan	0.312	0.463	0.327	0.469
K6	8.905	3.914	9.280	4.012
N	4,114		817	

4. Estimation Results

4.1 Caregiving and work on the extensive margin: employment probability

We estimate a linear probability model in which the dependent variable is the indicator of having a paid job. The independent variables include an indicator of providing care to at least one grandchild below the age of 6, in addition to a set of control variables. In line with the literature, the control variables consist of the woman's age and its square, self-assessed health, physical functional limitations, education, marital status, the number of children, whether the respondent is living with children younger than 18 years old, whether the household has a home mortgage, and survey year.

First, we estimate the linear probability model by ordinary least squares, and then we estimate by fixed effects to control for time-invariant individual heterogeneity. Table 2 displays the estimation results. As seen in Table 2, the ordinary least square estimates of the coefficient on caregiving is –0.099, which is negative and significant, a result consistent with the finding that the proportion of workers among caregivers is 13.8 percentage points lower than that among noncaregivers (see Table 1). When we control for time-invariant individual heterogeneity, the estimate of the coefficient on caregiving is –0.038; this is about 40 percent smaller in magnitude than the ordinary least square estimates. However, since the average employment rate of the sample is 70.3 percent, the reduction in employment probability is not negligible in magnitude.

Table 2. The estimated effect of grandchild care on employment

Dependent variable = employment

	OLS			FE		
Independent Variable	**Coef.**	**SE**		**Coef.**	**SE**	
Grandchild care	-0.099	0.011	***	-0.038	0.008	***
Age	0.196	0.074	***	0.206	0.057	***
Age^2	-0.019	0.007	***	-0.020	0.005	***
Separated	0.036	0.032		0.003	0.022	
Divorced or Widowed	0.130	0.015	***	-0.053	0.049	
Never Married	0.158	0.069	**	0.134	0.124	
Less than High School	0.010	0.013				
Some College	-0.017	0.014				
University	-0.050	0.032				
Education: Other	-0.056	0.086				
Self-assessed health: exellent	0.042	0.016	***	-0.016	0.011	
Self-assessed health: very good	0.017	0.009	*	-0.001	0.006	
Self-assessed health: good	-0.059	0.013	***	-0.016	0.008	*
Self-assessed health: poor	-0.168	0.026	***	-0.047	0.019	**
Self-assessed health: very poor	-0.289	0.052	***	-0.104	0.045	**
Physical functional limitation: 1	-0.014	0.020		-0.025	0.014	*
Physical functional limitation: 2+	-0.095	0.023	***	-0.020	0.015	
Number of Living Children	0.018	0.006	***	0.001	0.008	
Children less than 18	-0.029	0.040		-0.031	0.033	
Apartment	0.043	0.018	**	0.008	0.040	
Company housing	-0.108	0.061	*	-0.023	0.069	
Housing: Other	0.006	0.034		0.032	0.029	
Home loan	0.063	0.011	***	-0.002	0.012	
R^2	0.046			0.014		
N	19,593			19,593		
Mean of employment	0.703			0.703		

Robust standard errors clustered at the individual level are shown in parentheses.

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

The results from Table 2 are summarized as follows. First, consistent with the findings in previous studies in the United States (e.g., Frimmel et al., 2017; Rupert and Zanella, 2018), we observe a negative relationship between caregiving for grandchildren and participation in the labor force. Second, due to the association between the time-invariant individual heterogeneity and the regressors, this negative relationship is reduced but still significant when we account for the individual heterogeneity.

In addition to these results for caregiving, we obtain noteworthy findings about the relationship between employment and other variables, as shown in Table 2. Although in the ordinary least square estimates, physical function limitations are negatively related with employment and having a home mortgage is positively related with employment, these relationships become insignificant once time-invariant individual heterogeneity is controlled for; this suggests that the cross-sectional correlation between employment and these variables is confounded by common time-invariant characteristics.

4.2 Caregiving and work on the intensive margin: hours and days worked conditional on employment

We next examine how grandchild care is associated with the labor supply on the intensive margin. Specifically, for individuals who have paid jobs, we regress grandchild care separately on hours worked per week and days worked per week, along with a set of covariates described in Section 4.1. Table 3 reports the results. Grandchild care reduces hours worked per week by 2.22 hours in the OLS model. This is consistent with the results from Table 1, which show that caregivers work 1.5 hours fewer per week than noncaregivers. In contrast, the impact of caregiving on hours worked per week is –0.79 in the fixed-effect model, which is significant but smaller in its absolute level.

Table 3. The estimated effect of grandchild care on hours worked per day

Dependent variable = hours of work per week

	OLS			FE		
Independent Variable	Coef.	SE		Coef.	SE	
Grandchild care	-2.221	0.446	***	-0.791	0.298	***
Age	-0.351	2.848		2.917	2.404	
Age^2	0.014	0.255		-0.288	0.215	
Separated	0.817	1.386		0.657	0.917	
Divorced or Widowed	4.191	0.628	***	1.607	2.328	
Never Married	1.864	2.267		-0.859	1.314	
Less than High School	1.142	0.514	**			
Some College	1.462	0.544	***			
University	1.462	1.655				
Education: Other	5.011	2.517	**			
Self-assessed health: exellent	0.414	0.717		-0.371	0.494	
Self-assessed health: very good	-0.058	0.338		0.018	0.240	
Self-assessed health: good	0.066	0.564		0.041	0.407	
Self-assessed health: poor	0.114	1.177		-0.690	0.834	
Self-assessed health: very poor	1.229	3.632		0.034	3.033	
Physical functional limitation: 1	-0.046	0.851		0.110	0.555	
Physical functional limitation: 2+	0.304	1.223		0.797	0.629	
Number of Living Children	0.536	0.241	**	-0.392	0.388	
Children less than 18	-1.976	1.304		-0.889	0.901	
Apartment	-0.346	0.697		2.199	1.435	
Company housing	2.465	3.021		0.609	2.295	
Housing: Other	-1.729	1.361		-0.151	1.299	
Home loan	1.257	0.430	***	-0.305	0.533	
R^2	0.017			0.003		
N	13,227			13,227		
Mean of hours worked per wekk	34.129			34.129		

Robust standard errors clustered at the individual level are shown in parentheses.

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

We obtain similar results for the relationship between grandchild care and days worked per week, as shown in Table 4. Caregiving reduces the work week by 0.145 days in the OLS model; this is in line with the result in Table 1 which shows that the work week of caregivers is 0.12 days shorter than that of noncaregivers. The fixed-effect estimate is –0.07, which reveals little relationship between grandchild care and days worked per week.

Table 4. The estimated effect of grandchild care on days worked per week

Dependent variable = days of work per week

	OLS		FE	
Independent Variable	**Coef.**	**SE**	**Coef.**	**SE**
Grandchild care	-0.145	0.037 ***	-0.069	0.027 **
Age	0.102	0.225	0.298	0.188
Age^2	-0.011	0.020	-0.030	0.017 *
Separated	0.064	0.114	-0.021	0.070
Divorced or Widowed	0.172	0.047 ***	0.068	0.121
Never Married	-0.061	0.249	-0.645	0.510
Less than High School	0.137	0.040 ***		
Some College	0.019	0.042		
University	-0.332	0.102 ***		
Education: Other	0.292	0.170 *		
Self-assessed health: exellent	-0.036	0.057	-0.035	0.044
Self-assessed health: very good	0.004	0.027	0.020	0.019
Self-assessed health: good	-0.018	0.042	-0.053	0.034
Self-assessed health: poor	-0.042	0.106	-0.137	0.073 *
Self-assessed health: very poor	-0.231	0.297	-0.153	0.323
Physical functional limitation: 1	-0.071	0.067	-0.056	0.056
Physical functional limitation: 2+	0.014	0.088	0.010	0.064
Number of Living Children	0.028	0.019	-0.022	0.029
Children less than 18	-0.008	0.087	-0.185	0.086 **
Apartment	0.059	0.056	0.149	0.136
Company housing	-0.006	0.188	0.024	0.229
Housing: Other	0.039	0.105	-0.084	0.114
Home loan	0.033	0.033	0.066	0.042
R^2	0.014		0.004	
N	13,241		13,241	
Mean of days of work	4.982		4.982	

Robust standard errors clustered at the individual level are shown in parentheses.

$^{***}\ p < 0.001$, $^{**}\ p < 0.01$, $^{*}\ p < 0.05$.

The limited association between grandchild care and working hours or work days among working individuals suggests that caregivers who remain in the labor force reduce their working hours only slightly, compared to their previous schedule. It is probably not surprising, however, to see such a limited relationship between caregiving and working hours or days, when we consider that only 27.9 percent of grandmothers who are working work as regular workers. This limited relationship therefore suggests that female non-

regular workers are often able to adjust their working schedule in accordance with their need to take care of their grandchildren.[4]

4.3 Impact of caregiving on mental health

Last, we investigate how caregiving for grandchildren is related with grandmothers' mental health. We regress psychological distress, measured by the K6 scores, on caregiving for grandchildren, along with a set of control variables described in Section 4.1. We exclude self-assessed health, which is based on the respondent's subjective assessment and tends to overlap with psychological distress measured by K6 scores. Table 5 presents the estimation results. We find that the level of the grandmother's psychological distress is related negatively with caregiving for grandchildren in the OLS model, but not related with it in the fixed-effect model. This result is in accordance with previous studies that find that caring for grandchildren can be associated with beneficial outcomes, including a lower level of loneliness (Hank et al., 2018) and/or better cognition (Arpino and Bordone, 2014), which in turn might help reduce depressive symptoms.

[4] Working grandmothers who care for at least one grandchild spend on average 17.3 hours per week on grandchild care, while nonworking grandmothers who care for at least one grandchild spend 23.2 hours per week. Although working grandmothers spend 5.9 fewer hours per week on grandchild care compared to nonworking grandmothers, it is important to note that working grandmothers nevertheless spend a significant amount of their time on grandchild care.

Table 5. The estimated effect of grandchild care on psychological distress

Dependent variable = K6 score (0–24)

	OLS			FE		
Independent Variable	Coef.	SE		Coef.	SE	
Grandchild care	0.279	0.090	***	0.117	0.079	
Age	0.574	0.697		1.232	0.578	**
Age^2	-0.061	0.062		-0.103	0.052	**
Separated	-0.036	0.277		0.034	0.279	
Divorced or Widowed	0.007	0.146		0.042	0.531	
Never Married	0.447	0.933		0.904	1.704	
Less than High School	0.097	0.115				
Some College	0.055	0.112				
University	-0.470	0.177	***			
Education: Other	-0.152	0.573				
Physical functional limitation: 1	2.184	0.201	***	0.721	0.157	***
Physical functional limitation: 2+	3.488	0.211	***	1.422	0.183	***
Number of Living Children	-0.091	0.049	*	-0.102	0.087	
Children less than 18	0.075	0.357		0.253	0.313	
Apartment	0.005	0.166		0.319	0.458	
Company housing	-0.856	0.336	**	0.377	0.353	
Housing: Other	0.784	0.418	*	0.110	0.301	
Home loan	0.048	0.091		0.001	0.113	
R^2	0.054			0.026		
N	18,732			18,732		
Mean of K6	3.186			3.186		

Robust standard errors clustered at the individual level are shown in parentheses.

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

5. Robustness check

In the previous section, we showed that grandchild care negatively impacts grandmothers' labor supply but its impact is relatively small. In this section, we examine whether this negative effect varies by (1) the intensity of the grandchild care, where *intensity* reflects the hours spent on grandchild care and (2) the age of the grandchildren.

5.1 Impact of hours of grandchild care on grandmothers' labor supply

We first examine whether grandmothers who care for their grandchildren for long hours are more likely to reduce their labor supply because of the time constraints they face. To do this, we repeat the same estimation as in Tables 2, 3, and 4; however, instead of estimating the effect of grandchild care on the grandmothers' labor supply as in those tables, we estimate the effects of grandchild care on the grandmothers' labor supply separately for (1) grandmothers who care for grandchildren for less than 10 hours per week, and (2) grandmothers who care for grandchildren for 10 or more hours per week.[5] Table 6 summarizes the estimation results.

With regard to the labor supply on the extensive margin, the negative impact on employment is much larger among grandmothers with longer care hours than those with shorter hours. Specifically, grandmothers who care for their grandchildren for 10 or more hours per week are less likely to work by 5.4 percentage points (compared to those who do not care for grandchildren at all), while grandmothers who care for their grandchildren for less than 10 hours per week are less likely to work by only 1.8 percentage points (compared to those who do not care for their grandchildren at all). Regarding the effect on the labor supply on the intensive margin, grandmothers who care for their grandchildren for 10 or more hours per week work 1.1 hours per week / 0.09 days per week less than those who do not care for grandchildren. In contrast, the corresponding numbers for grandmothers whose caregiving hours are fewer than 10 per week show that they reduce their labor supply by only 0.59 hours, or 0.04 days, per week.

Finally, the length of grandchild-care hours does not lead to any differences in terms

[5] Note that 43.5 percent of grandmothers who care for their grandchildren do so for fewer than 10 hours per week.

of grandmothers' psychological distress, as shown in Table 7. Therefore, intensive grandchild care impacts negatively the labor supply of grandmothers, but does not affect their psychological distress.

Table 6. The estimated effect of care hours on labor supply

Sample: Women who have at least one grandchild ≤ 5

Dependent variable = Employment, Hours of work, Days of work

	Employment		Hours of work		Days of work	
Independent Variable	OLS	FE	OLS	FE	OLS	FE
Hours of grandchild care < 10	-0.037 ***	-0.018 ***	-1.660 ***	-0.593 *	-0.090 **	-0.044
	(0.014)	(0.009)	(0.561)	(0.353)	(0.045)	(0.031)
Hours of grandchild care ≥ 10	-0.147 ***	-0.054 **	-2.864 ***	-1.091 ***	-0.213 ***	-0.089 **
	(0.015)	(0.010)	(0.596)	(0.398)	(0.052)	(0.037)
R^2	0.049	0.017	0.017	0.004	0.015	0.004
N	19,447	19,447	13,151	13,151	13,166	13,166

Note: We control for the same set of variables as in Tables 2, 3, and 4. Robust standard errors clustered at the individual level are shown in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 7. The estimated effect of care hours on grandmothers' mental health

Sample: Women who have at least one grandchild ≤ 5

Dependent variable = K6 score (0–24)

Independent Variable	OLS	FE
Hours of grandchild care < 10	0.318 ***	0.149
	(0.117)	(0.101)
Hours of grandchild care ≥ 10	0.237 **	0.105
	(0.113)	(0.096)
R^2	0.053	0.025
N	18,602	18,602

Note: We control for the same set of variables as in Table 5. Robust standard errors clustered at the individual level are shown in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

5.2 Impact of grandchild care on grandmothers' labor supply by grandchildren's age

We now examine whether grandchild care has a differential impact on the grandmothers' labor supply by the age of the grandchildren that the grandmothers have. We examine this because in Japan, working mothers can take parental leave until the child reaches the age of one, and also because the availability of childcare facilities tends to be limited for children between the ages of 0 and 2 years. We therefore conjecture that the need for grandmothers to care for grandchildren is likely to be greater when the grandchild is between the ages of 1 and 2, but less so when the grandchild is between the age of 0 and 1 (when mothers can take parental leave) and between the ages of 3 to 5 (when children enroll in kindergarten, which almost all children in Japan do).

We estimate the effects of grandchild care on the grandmothers' labor supply at different ages of grandchildren (specifically, 0, 1, 2, 3, 4, and 5 years old, separately).[6] To do this, we interact grandchild care with the age of the grandchildren that the grandmothers have. Note that our data does not include information on which specific grandchildren the grandmothers care for, but only information on the age of the grandchildren the grandmothers have.

We report the estimation results in Table 8. We find that grandchild care reduces grandmothers' employment probability significantly by 4.8 percentage points when the grandmothers have a 1-year-old grandchild, and significantly by 2.7 percentage points when the grandmothers have a 2-year-old grandchild; the employment effects are small

[6] Here, as before, we continue to restrict out sample to those who have at least one grandchild below the age of 6. Note that the employment rate of women with first-born 0-year-old grandchild and that of those one year before having the first-born 0-year-old grandchild are almost identical (70.7 percent and 69.3 percent, respectively).

and insignificant at other ages of grandchildren (e.g., a reduction of 1.3 percentage points for babies under 1 year old, and of 1.2 percentage points for a 3-year-old; and an increase of 0.2 percentage points for a 4-year-old and 0.3 percentage points for a 5-year-old). Therefore, (1) having grandchildren who are 0, 3, 4, or 5 years old does not affect the employment probability of grandmothers who take care of grandchildren, but (2) having grandchildren who are 1 or 2 years old negatively affects the employment probability of grandmothers who take care of grandchildren. These results are consistent with our conjecture that grandchild care is needed more for grandchildren between the ages of 1 and 2 years, and thus negatively affects the employment of caregiving grandmothers. In order to directly examine whether mothers who return to work when the child is 1 year old need caregiving support from grandmothers, we need information on mothers' employment status. Unfortunately, however, this information is not available in our data; although we do have information on the mothers' employment status, we do not have information on which grandchildren the grandmother is caring for.

Next, we look at the effect of grandchild care on the grandmothers' labor supply on the intensive margin. When grandmothers have grandchildren under 1 year old (i.e., the age when parental leave is available), grandchild care reduces grandmothers' working hours by 0.752 hours per week; this effect is insignificant and smaller for grandchildren at the other ages. When grandmothers have 1-year-old grandchildren, grandchild care reduces grandmothers' working days by 0.066 days per week; this effect is insignificant and much smaller for grandchildren at the other ages. We do not have a definite explanation as to why grandmothers who care for grandchildren reduce their hours worked per week when they have newborn grandchildren and reduce their days worked per week when they have 1-year-old grandchildren.

Table 8. The estimated effect of care hours on labor supply

Sample: Women who have at least one grandchild ≤ 5

Dependent variable = Employment, Hours of work, Days of work

	Employment				Hours of work				Days of work			
	OLS		FE		OLS		FE		OLS		FE	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Grandchild care × 0-year-old	-0.020	0.015	-0.013	0.010	-1.311	0.595 **	-0.752	0.389 *	-0.058	0.054	-0.044	0.038
Grandchild care × 1-year-old	-0.065	0.014 ***	-0.048	0.009 ***	-1.393	0.589 **	-0.532	0.376	-0.095	0.053 *	-0.066	0.035 *
Grandchild care × 2-year-old	-0.041	0.014 ***	-0.027	0.009 ***	-0.462	0.549	-0.315	0.394	-0.088	0.049 *	-0.048	0.035
Grandchild care × 3-year-old	-0.053	0.014 ***	-0.012	0.010	-0.654	0.594	-0.630	0.392	-0.030	0.052	0.015	0.035
Grandchild care × 4-year-old	-0.030	0.015 *	0.002	0.011	-1.184	0.678 *	-0.346	0.443	-0.023	0.054	0.020	0.040
Grandchild care × 5-year-old	-0.022	0.016	0.003	0.012	-0.932	0.700	0.353	0.458	-0.043	0.058	0.012	0.036
R^2	0.044		0.013		0.016		0.003		0.014		0.004	
N	19,593		19,593		13,227		13,227		13,241		13,241	

Note: We control for the same set of variables as in Tables 2, 3, and 4. “X-year-old” is a dummy for whether the grandmother has grandchildren who is X years old. Robust standard errors clustered at the individual level are shown in parentheses.

$^{***}\ p < 0.001$, $^{**}\ p < 0.01$, $^{*}\ p < 0.05$.

Finally, we find that grandchild care has a small, negative, and insignificant effect on grandmothers' psychological distress when the grandmothers have grandchildren between the ages of 0 and 3 years old. This effect becomes positive when the grandmothers have 4-year-old grandchildren, and it becomes larger and significantly positive (0.346 points) when the grandmothers have 5-year-old grandchildren (see Table 9). We leave for future research the question as to why grandmothers who care for grandchildren experience greater psychological distress when they are caring for these older grandchildren.

Table 9. The estimated effect of care hours on grandmothers' mental health

Sample: Women who have at least one grandchild ≤ 5

Dependent variable = K6 score (0–24)

	OLS		FE	
	Coef.	**SE**	**Coef.**	**SE**
Grandchild care × 0-year-old	-0.036	0.119	-0.103	0.095
Grandchild care × 1-year-old	0.098	0.120	-0.003	0.100
Grandchild care × 2-year-old	0.110	0.118	-0.025	0.094
Grandchild care × 3-year-old	0.053	0.116	-0.019	0.092
Grandchild care × 4-year-old	0.121	0.137	0.110	0.123
Grandchild care × 5-year-old	0.346	0.144 **	0.265	0.119 **
R^2	0.054		0.027	
N	18,732		18,732	

Note: We control for the same set of variables as in table 5. "X-year-old" is a dummy for whether the grandmother has a grandchild who is X years old. Robust standard errors clustered at the individual level are shown in parentheses.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

6. Impact of "double care" on employment and mental health

According to Soma and Yamashita (2015, 2017), one result of delays in both marriage and childbirth, as well as the declining birth rate and aging population in Japan, is that an increasing number of women in their 30s and 40s must provide "double care" (the simultaneous provision of childcare and eldercare). The results of a survey by Sony Life Insurance show that, among mothers between the ages of 30 to 55 with children younger than college age, 12.3 percent reported that they are currently facing double-care responsibilities. Those who are engaged in double care are under pressure as they need to decide how to allocate their limited resources between childcare and eldercare. They always feel they are providing insufficient eldercare and/or childcare and tend to be mentally stressed. Among those facing "double care," three-quarters feel that public services are inadequate.

Using our data, we examine the double care offered for elderly parents and *grandchildren under the age of 6*.[1] Specifically, we examine the impact on the labor supply and psychological distress of women when they care for both the elderly parents and grandchildren. To do this, we restrict the sample to grandmothers who have at least one grandchild below the age of 6 *and* who have at least one living parent or parent-in-law. Among these grandmothers, 15.9 percent care for grandchildren only, 9.0 percent care for elderly parents only, and 4.9 percent care for both grandchildren and elderly parents. Grandmothers in their 50s are more likely to be involved in grandchild care than in eldercare.

We report the estimated effect of three types of caregiving (i.e., caring only for

[1] Note that a grandmother's caretaking responsibilities are likely to differ from a mother's caretaking responsibilities. We nevertheless focus on caring for grandchildren in this paper, because among women in their 50s, only 0.02 percent (in our sample) are caring for their own children under the age of 6.

grandchildren, caring only for elderly parents, and caring for both grandchildren and elderly parents) on the employment, work hours, and workdays in Table 10, Columns 1, 2, and 3, respectively. In the fixed-effect model, we find that grandmothers who care for both grandchildren and elderly parents are less likely to work by 5.4 percentage points. In contrast, grandmothers who care only for grandchildren are less likely to work by 3.0 percentage points, and grandmothers who care only for elderly parents are just about as likely to work as grandmothers who have neither kind of caretaking responsibility.

We next look at the intensive margin (hours worked per week and days worked per week). Grandmothers who care for both elderly parents and grandchildren reduce their days of work per week significantly by 0.147, while the reduction in hours per week is 0.966, which is insignificant. The working situations of grandmothers who care only for elderly parents have a much smaller effect on the intensive margin.

These results suggest that grandmothers who care only for grandchildren, as well as those who care for both grandchildren and elderly parents, experience a relatively large impact on their employment probability. However, the impact on working hours for those who continue to work while caregiving is small.

Table 10. The estimated effect of three types of informal caregiving on labor supply
Sample: Women who have at least one grandchild ≤ 5 and at least one living parent or parent-in-law
Dependent variable = Employment, Hours of work, Days of work

	OLS		FE		OLS		FE		OLS		FE	
Independent Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Grandchild care only	-0.099	0.014 ***	-0.030	0.010 ***	-2.437	0.570 ***	-0.426	0.330	-0.182	0.046 ***	-0.002	0.032
Parental care only	-0.085	0.018 ***	-0.008	0.012	-1.100	0.697	0.184	0.626	-0.100	0.057 *	-0.072	0.048
Both grandchild and parental care	-0.134	0.025 ***	-0.054	0.015 ***	-2.678	0.962 ***	-0.966	0.717	-0.165	0.094 *	-0.147	0.066 **
Age	0.191	0.085 **	0.171	0.065 ***	-1.636	3.230	2.229	2.765	0.027	0.255	0.129	0.211
Age^2	-0.019	0.008 **	-0.017	0.006 ***	0.124	0.290	-0.228	0.248	-0.005	0.023	-0.015	0.019
Separated	0.019	0.039	-0.009	0.025	-0.074	1.707	0.560	1.242	-0.006	0.146	0.023	0.061
Divorced or Widowed	0.130	0.019 ***	-0.049	0.062	3.957	0.741 ***	0.885	2.565	0.158	0.058 ***	-0.054	0.133
Never Married	0.270	0.034 ***	0.165	0.142	2.953	2.534	-2.015	0.841 **	0.027	0.282	-1.134	0.889
Less than High School	0.017	0.017			1.454	0.625 **			0.164	0.049 ***		
Some College	-0.012	0.016			1.911	0.622 ***			0.061	0.047		
University	-0.034	0.034			1.701	1.655			-0.322	0.104 ***		
Education: Other	-0.158	0.107			4.992	3.628			0.463	0.183 **		
Self-assessed health: exellent	0.034	0.019 *	-0.018	0.013	-0.127	0.834	-0.175	0.567	-0.049	0.068	0.002	0.050
Self-assessed health: very good	0.006	0.010	-0.006	0.007	-0.138	0.394	0.123	0.279	-0.002	0.032	0.030	0.022
Self-assessed health: good	-0.059	0.016 ***	-0.013	0.010	0.143	0.665	0.101	0.473	-0.047	0.049	-0.055	0.040
Self-assessed health: poor	-0.124	0.030 ***	-0.030	0.021	0.148	1.354	-1.159	0.942	-0.077	0.128	-0.150	0.089 *
Self-assessed health: very poor	-0.257	0.061 ***	-0.067	0.046	1.055	4.112	0.141	3.503	-0.243	0.325	-0.162	0.378
Physical functional limitation: 1	-0.014	0.023	-0.021	0.015	0.486	1.048	0.062	0.633	-0.029	0.075	-0.069	0.063
Physical functional limitation: 2+	-0.097	0.027 ***	-0.020	0.018	1.306	1.512	0.595	0.671	0.037	0.112	-0.033	0.074
Number of Living Children	0.017	0.007 **	0.001	0.009	0.414	0.279	-0.466	0.432	0.028	0.022	-0.016	0.033
Children less than 18	-0.046	0.045	-0.039	0.037	-2.335	1.452	-0.983	0.997	-0.043	0.103	-0.203	0.094 **
Apartment	0.040	0.023 *	0.025	0.049	-1.427	0.847 *	2.297	1.908	-0.024	0.070	0.121	0.182
Company housing	-0.171	0.079 **	-0.049	0.069	-0.230	3.142	2.355	2.608	-0.117	0.230	0.291	0.202
Housing: Other	-0.011	0.042	0.030	0.030	-2.230	1.588	-0.488	1.656	0.030	0.120	-0.096	0.140
Home loan	0.045	0.013 ***	0.007	0.013	0.908	0.501 *	-0.383	0.640	0.022	0.038	0.066	0.050
R^2	0.044		0.015		0.017		0.017		0.017		0.002	
N	14,637		14,637		9,918		9,918		9,928		9,928	
Mean of independent variable	0.703		0.703		34.095		34.095		4.972		4.972	

Robust standard errors clustered at the individual level are shown in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 11. The estimated effect of three types of informal caregiving on psychological distress

Sample: Women who have at least one grandchild ≤ 5 and at least one living parent or parent-in-law

Dependent variable = K6 score (0–24)

	OLS			FE		
Independent Variable	Coef.	SE		Coef.	SE	
Grandchild care only	0.071	0.105		0.029	0.096	
Parental care only	1.114	0.151	***	0.427	0.142	***
Both grandchild and parental care	1.380	0.213	***	0.615	0.169	***
Age	0.554	0.783		0.725	0.647	
Age^2	-0.060	0.070		-0.058	0.058	
Separated	-0.269	0.300		-0.052	0.364	
Divorced or Widowed	0.084	0.177		0.333	0.613	
Never Married	0.858	1.021		1.086	2.024	
Less than High School	0.233	0.139	*			
Some College	0.116	0.125				
University	-0.475	0.189	**			
Education: Other	0.161	0.771				
Physical functional limitation: 1	2.060	0.234	***	0.698	0.180	***
Physical functional limitation: 2+	3.249	0.226	***	1.295	0.221	***
Number of Living Children	-0.153	0.053	***	-0.063	0.091	
Children less than 18	0.308	0.399		0.161	0.343	
Apartment	-0.005	0.190		0.738	0.527	
Company housing	-0.558	0.414		0.700	0.430	
Housing: Other	1.140	0.522	**	0.182	0.360	
Home loan	0.065	0.104		0.074	0.133	
R^2	0.059			0.025		
N	14,052			14,052		
Mean of K6	3.222			3.222		

Robust standard errors clustered at the individual level are shown in parentheses.

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

Finally, in Table 11 we report the estimated effect of the three types of caregiving on the caretaker's psychological distress. In the fixed-effect model, we find that caregiving for grandchildren is not related with the caregiver's psychological distress. However, caregiving for only elderly parents and caregiving for both elderly parents and grandchildren are each significantly and positively related with the level of the caregiver's psychological distress. Specifically, caregiving only for elderly parents positively affects

the caregiver's psychological distress by 0.427 points, and caregiving for elderly parents in addition to grandchildren positively affects the caretaker's psychological distress by 0.615 points; these differences are significant at the 1 percent level. For grandmothers, caregiving for elderly parents itself is positively related with the former's psychological distress, and caregiving for elderly parents in addition to grandchild care adds more to the grandmother's psychological distress.

In conclusion, grandchild care negatively impacts the employment of grandmothers, but its impact on psychological distress arises only when it is combined with elderly care.

7. Conclusions

Based on the data from a large and nationally representative panel survey of middle-aged Japanese, we have obtained three noteworthy findings. First, a grandmother's caregiving for her grandchildren reduces the probability of her being employed by 3.8 percentage points (while the average employment rate of middle-aged grandmothers is 70.3 percent), after we control for time-invariant individual heterogeneity. Second, a grandmother's caring for her grandchildren is negatively related to either the hours or the days worked per week by the working caregiver, but the difference is small in magnitude. Third, grandchild care itself does not positively impact the psychological distress of caregivers; however, it positively impacts the psychological distress of caregivers when caregiving for grandchildren is combined with caring for elderly parents.

These results suggest that informal caregiving for grandchildren does not seriously harm employment and mental health for middle-aged women. These findings may reflect the features of female employment in Japan. Women with paid jobs tend to work fewer hours than men and often in non-regular jobs that tend to be jobs with limited

responsibility, regardless of their caregiving status. Our results present an interesting contrast to those of Rupert and Zanella (2018), who argue that the labor supply adjustment resulting from caring for grandchildren in the United States takes place mainly at the lower quantiles of the hour distribution. Since we expect that Japanese middle-aged women will become more attached to the labor market in the near future, caregiving by these women could have a larger impact on their employment. In such circumstances, the development of childcare facilities and eldercare facilities well beyond the country's present capacity would seem to be a prerequisite for enabling *all* working middle-aged women who take care of small grandchildren and/or elderly parents to better reconcile work and caregiving.

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