介護保険サービス給付の縮小が介護提供者のウェルビーイングに与えた影響

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【要旨】

本研究では、公的介護保険給付の縮小が家族介護者の身体的精神的ウェルビーイングにどのような影響を与えるかを分析した。本研究では、2006年の介護保険制度改革において、公的介護保険給付の縮小の影響を受けた一部の受給者とその家族介護者への影響に焦点を当てた。国民生活基礎調査の個票データを用いて、改革後にどの程度の影響があったのか、また影響が時間の経過とともにどのように変化するかについて検証した。分析の結果、給付の縮小が家族介護者のウェルビーイングに悪影響を及ぼしたことが示された。この悪影響は特に女性の介護者に顕著であった。さらに、追加分析によりこの改革は介護サービス受給者のウェルビーイングにも悪影響を及ぼすことが示され、公的介護保険給付の削減は、家族介護者・要介護者の双方に良い影響を与える可能性が低いことが示された。本研究の結果は、公的介護保険給付縮小の費用対効果を評価する際に、介護者・要介護者の両方のウェルビーイングを考慮することの重要性を示唆している。

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The impact of contracting formal care benefits on caregivers' well-being: evidence from Japan[1]

Rong FU[2], Dung LE[3], Yoko IBUKA[4]

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Abstract

This study investigates how changes in formal care availability affect informal caregivers' well-being, adding to the heated discussion on what constitutes an appropriate level of formal care that is both sustainable and adequate. We leverage a reform of Japan's public long-term care insurance, which contracted formal care benefits among a group of recipients. Using a difference-in-difference approach with fixed effects to a nationally representative sample of informal caregivers, we examine the aggregated impacts of the reform and how they evolve over time. We find that the reform had a negative impact on caregivers' well-being, reflected in decreased mobility and stability, and increased stress from financial strains and domestic work. The negative impact was particularly pronounced among female caregivers, while male caregivers experienced an improvement in mental health, particularly those with higher income levels. The reform also led to an increased likelihood of regular caregiving, which may contribute to the well-being decline. Additionally, we find that the reform had negative effects on the well-being of care recipients, indicating that reducing formal care services is unlikely to have any positive impact on either the caregivers or the recipients. The study highlights the importance of considering the well-being of both caregivers and care recipients when evaluating the cost-effectiveness of reducing formal care availability and recommends policies that protect female caregivers against health and financial issues.

Keywords: formal long-term care, informal caregivers, well-being, difference-in-difference, event study

JEL codes: I14, I18, I31, I38

1. Introduction

The rapid demographic transition, accompanied by global growth in the older population, has intensified the need for long-term care (LTC) (Agree & Glaser, 2009). Research indicates that in developed and aging societies, such as Japan, family members constitute the primary caregivers for older people (Colombo et al., 2011; Ministry of Health Labour and Welfare, 2014).

However, informal care power has been decreasing for decades, and this trend is expected to continue due to smaller family sizes, lower fertility rates, increased mobility of younger generations, and a higher proportion of women in the labor force, who are typically primary family caregivers. To address this issue, many countries have established formal LTC systems. Japan was one of the early adopters of such a system, implementing a public insurance scheme for LTC in 2000, which was successful in supporting the elderly to lead independent lives with dignity and reducing the burden of care duties on family caregivers (Tamiya et al., 2011).

The growing demand for LTC, coupled with a decline in informal care, has placed significant pressure on the fiscal sustainability of public LTC systems, especially given the global economic stagnation. The annual growth rate of public LTC was 4.6% from 2005 to 2015 among OECD countries, more than double the contemporary GDP growth rate (OECD, 2017). According to projections, public resources devoted to LTC as a proportion of GDP may triple or more by 2060 (De La Maisonneuve & Martins, 2013). Therefore, balancing the provision of adequate formal care with ensuring the fiscal sustainability of such coverage is one of the most challenging tasks for governments.

In response, many governments have implemented reforms on LTC systems, which often involve lowering the level of welfare protection (Ranci & Pavolini, 2013). In this context, Japan implemented a significant reform in the insurance system in 2006, aiming to maintain the system's fiscal sustainability by contracting formal care availability for a group of care recipients with moderate care needs. However, contracting formal care raised public concern about potential decreases in both care recipients' and caregivers' well-being, as informal care is a substitute for formal care, especially among recipients with moderate care needs (Bonsang, 2009; Bremer et al., 2017). Thus, ongoing discussions revolve around what level of formal care is both sustainable and adequate. In particular, understanding how changes in formal care availability affect informal caregivers' well-being is critical from a policy perspective.

To obtain this objective, we analyze the impact of the 2006 reform of Japan's public LTC insurance on caregivers' well-being. Using a difference-in-difference approach with fixed effects, we examine the impact of the reform on caregivers' physical and mental health and how these effects change over time. Our analysis reveals that reducing formal care has a negative impact on caregivers' well-being, manifested in decreased mobility and stability, as well as increased stress from financial and domestic responsibilities. The reform led to an increased likelihood of regular caregiving, which may contribute to the well-being decline. However, the impact is not uniform across all caregivers. Female caregivers are particularly vulnerable to the negative effects of a lack of formal care, while male caregivers with higher incomes benefit from reduced stress levels. The results also show negative impacts of the reform on the well-being of care recipients, indicating that reducing formal care services is unlikely to have any positive impact on either the caregivers or the recipients, suggesting no welfare improvement in terms of well-being.

We suggest that future reforms on LTC systems should consider the diverse impact of informal caregiving on caregivers' well-being. A balanced approach that combines formal and informal care should be considered to ensure fiscal sustainability while also protecting the well-being of both those who may find informal caregiving challenging and those who may benefit from it.

2. Literature

2.1 Conceptual Frameworks

Several conceptual frameworks have been developed to understand the relationship between the load of informal care and caregivers' well-being. These frameworks serve to evaluate how the availability of formal care affects the welfare of caregivers. The caregiver stress model is a widely used framework that proposes two main stressors that stem from providing informal care: primary and secondary stressors (Pearlin et al., 1990). Primary stressors denote strains or problems that are directly related to the caregiving situation, such as lengthy care hours. Secondary stressors consist of challenges associated with executing multiple roles within the family or society in addition to the caregiving responsibility, such as being a spouse or holding a formal job. Primary stressors are deemed the sources of secondary stressors.

According to the stress model, formal care availability is considered a component of the caregiving setting that affects caregivers' well-being by modifying the two stressors. Formal care may serve as an external resource to cope with caregiving situations, reducing care intensity for caregivers and freeing up time for them to do other responsibilities. Therefore, the contraction of formal care options may negatively affect caregivers' well-being by amplifying care burden and the likelihood of conflicts with familial and occupational responsibilities, as well as financial strains. This escalation of stress can result in physical and mental issues for informal caregivers (Lazarus & Folkman, 1984; McEwen, 1998). Moreover, the literature finds that female caregivers are more susceptible to caregiving stressors (Pinquart & Sörensen, 2006), and that they tend to report higher care burdens and lower well-being than male caregivers owing to perceived and coping differences (Sharma et al., 2016).

However, the notion that caregiving is always detrimental to caregivers' well-being may overlook the potential benefits of providing informal care. An alternative perspective recognizes the advantages of caregiving. Caregivers who possess control over their caregiving situation and perceive it as a choice, rather than a burden, may encounter less stress and exhibit greater well-being (Roth et al., 2015). Additionally, psychological research suggests that individuals may experience less stress when they believe that they have controlled over an unfavorable event, as opposed to those who feel powerless (Rotter, 1966). Caregivers may also derive personal growth, altruism, and a sense of purpose from providing care (Brown & Brown, 2014; Marino et al., 2017).

Overall, providing informal care may have both positive and negative impacts on caregivers' well-being. The measurement of well-being outcomes typically involves a blend of these competing impacts, and the predominance of one over the other may hinge on the magnitudes of the costs and benefits associated with caregiving.

2.2 Empirical Evidence

Previous empirical research has found a positive association between formal care usage and informal caregivers' well-being (Ruppanner & Bostean, 2014).[5] Formal care availability has been shown to mitigate the negative impacts of informal caregiving by reducing feelings of unhappiness, loneliness, poor self-rated health, and high frailty indices. Moreover, the strength of the association between formal care usage and caregivers' well-being appears to be greater when formal care programs are more generous (Uccheddu et al., 2019; Verbakel, 2014; Wagner & Brandt, 2015). This positive association is thought to stem from the fact that professional care providers take on some of the caregiving responsibilities, thereby decreasing the burden on informal caregivers (Suanet et al., 2012; Verbakel et al., 2016). This shift in caregiving responsibilities can occur at different levels, ranging from the likelihood of providing care (i.e., extensive level) to the intensity of care provision (i.e., intensive level) and the types of care tasks undertaken by informal caregivers. For example, when professional caregivers are responsible for more complex care tasks, informal caregivers are often left with less demanding tasks such as administrative paperwork.

While these studies offer important insights into the relationship between formal care availability and the well-being of informal caregivers, they do not establish causality. A few studies have attempted to address this gap by using different methods. Gonçalves, von Hafe, and Filipe (2021) employed panel data to match couples who seek formal care with those who do not to investigate the impact of formal home care usage on spousal health. Their findings suggest that formal care has no significant impact on the physical or mental health of spouses. Dong et al. (2019) used the instrumental variable method to examine how a shift from nursing homes to formal home care affects the well-being of spouse caregivers.

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[5] Another rich body of empirical studies examines the relationship between informal caregiving and caregivers' wellbeing. For details, see the systematic review by Bom et al. (2019) and the studies by Kumagai (2017) and Niimi (2016) using Japanese data.

They found that the reduction worsened physical health but improved mental health, which is explained by increased care obligations and greater satisfaction, respectively.

Our study makes several contributions to the literature. Firstly, we establish a quasi-experimental setting that allows for causal inference by examining the exogenous reduction in formal care benefits among a group of care recipients. Secondly, our dataset captures a diverse range of well-being aspects, including specific physical health issues and factors contributing to depressive symptoms. This information contributes to a deeper understanding of the reasons underlying the impact of caregiving on well-being. Thirdly, our study goes beyond examining the overall effects of reducing formal care benefits, and instead explores the population average impacts over time and the heterogeneous effects across different groups. This provides a more nuanced and complete picture of the impacts of formal care benefits on informal caregivers' well-being. While a previous study in Japan has investigated the relationship between formal care and caregivers' well-being (Miyawaki et al., 2020), our study expands on this by analyzing the long-term impacts of the policy reform, exploring a broader range of well-being outcomes, and providing a more detailed breakdown of the impacts. Furthermore, we accounted for multiple sets of fixed effects and possible geographic linear trends that were not previously considered, and carefully selected our data period to exclude any confounding impacts from other policy reforms. This rigorous methodology enhances the accuracy and reliability of our findings. We also investigated how the reform has affected the well-being of care recipients, providing a more comprehensive picture of the consequences of the reform.

3. Background

3.1 The Long-Term Care Insurance

In 2000, Japan introduced a public long-term care insurance (LTCI) system with the aim of socializing care for dependent older people and easing the burden on family caregivers. Participation in the LTCI is mandatory for all citizens aged 40 and older, and the monthly premium is determined based on their age and income. Citizens aged 65 or older and those 40+ with specific types of disease are eligible for LTCI benefits (i.e., recipients) provided they receive a care-need certificate issued by local authorities after undergoing an assessment of their physical and mental status (Fu and Noguchi 2019).

Recipients of formal care are required bear 10% of the costs until they reach a monthly upper limit.[6] The upper limit is determined by the recipient's care-need level, which is divided into six categories ranging from the mildest support-required level (SL) to the most severe care-required level (CL5), with CL1, CL2, CL3, and CL4 in between.[7] The upper limit for monthly care costs is highest for CL5 and decreases as the care-need level decreases. Notably, neither the assessment of care needs nor the upper limit requires a means test.

The demand for formal care tends to increase with care-need level, particularly for recipients classified as CL3 or above, which poses a significant fiscal challenge for the government (Campbell et al., 2010). Public expenditures on LTCI double within the first five years of its introduction, rising from 0.7% of GDP in 2000 to 1.3% in 2005 (MHLW, 2019). To ensure fiscal sustainability, the government implemented a reform in April 2006, which aimed to reduce benefits for recipients with moderate care needs, namely those in the SL and CL1 categories. This change could potentially result in an increased reliance on informal caregiving.[8]

3.2 The 2006 Reform

The 2006 reform was a two-part process. First, it refined the care-need levels, renaming SL to SL1 and adding a new category called SL2. This increased the total number of care-need levels to seven, ranging from the mildest (SL1 and SL2) to the most severe (CL5). Recipients who were previously classified as SL were reassigned to SL1, while those previously classified as CL1 were reclassified as SL2 if their health was expected to remain stable for the next six months; otherwise, they remained in CL1.

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[6] Recipients have to pay 100% out-of-pocket if their monthly service use exceeds the upper limit.

[7] The assessment exam determines the care-need level.

[8] The reform encompassed adjustments to both institutional and home care. We did not delve into the impact of the institutional care reform on the well-being of informal caregivers. This was because changes in institutional care were less likely to affect those who provided care for recipients at home.

Second, the reform limited the *type* and *quantity* of formal care available to SL1 and SL2 recipients. The available services were narrowed down to focus on preventing recipients' health conditions from deteriorating, with popular services such as housekeeping and transportation assistance to hospitals no longer available for these groups. Prior to the reform, recipients in SL or CL1 categories used more than 60% of housekeeping services and over half of transportation assistance services (MHLW, 2004). The exclusion of these services may have had a significant impact on the well-being of both recipients and caregivers. In addition, the monthly upper limit for formal care benefits was reduced. The reduction was most significant for recipients in the SL1 category, who could use services worth up to 61,500 JPY per month (17.2% of the upper limit for CL5) before the reform, but only 50,030 JPY thereafter (13.9% as a percentage of the upper limit for CL5) (Fu et al. 2017). Notably, the reform did not alter the type or quantity of care provided to CL2–CL5 recipients; therefore, they may serve as the control group, as described in Section 4.2.

4. Methods

4.1 Data

We employed the Comprehensive Survey of Living Conditions (CSLC), a nationally representative and repeated cross-sectional survey in Japan that covers non-institutionalized populations, to conduct our study.[9] This survey, conducted every three years by the MHLW, consists of four questionnaires assessing household, health, income/savings, and LTC.

The household and health questionnaires, administered to over 600,000 respondents from more than 300,000 households in each wave, collect information on demographic, socioeconomic, and health status of each household member. The income/savings and LTC questionnaires involved approximately 100,000 and 6,000 respondents, respectively, supplementing the household and health questionnaires with information on individual income and LTC. The income/savings and LTC questionnaires are

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[9] The dataset is widely used in academic research (Tamiya et al. 2011; Shigeoka 2014; Fu et al. 2017).

separate samples and do not overlap, and therefore income information was not used in the estimations due to our focus on LTC.

We identified each pair of care recipient and his/her co-residing primary informal caregiver using the household and LTC questionnaires.[10] We then obtained demographic, socioeconomic, and health status information for each caregiver from the household and health questionnaires. Our sample included data from surveys conducted between 2001 and 2013, with the earliest available LTC questionnaire in 2001, one year after the introduction of LTCI, and excluding waves after 2013 to avoid potential confounding effects from the 2015 coinsurance rate reform.[11] The final sample included 18,603 caregivers who provided care to a recipient in the same household.[12]

4.2. Measurements

4.2.1 Treatment and control groups

We employed the exogenous variation in care-need levels, which arose from the 2006 reform, to examine the influence of formal care benefits on the well-being of caregivers. The treatment group consisted of informal caregivers of recipients classified as SL prior to the reform and as SL1 following it. These recipients, and therefore their caregivers, experienced a reduction in the variety and amount of formal care services available. The control group included caregivers of recipients classified as CL2 or CL3 before and after the reform, who were unaffected by the policy change.

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[10] The procedure we used to identify informal caregivers was as follows. We posed a question to each recipient, namely “Please report the household-member identification number of your main caregiver living with you,” and we then cross-referenced this number with the identification numbers of all household members of the recipient to identify the primary caregiver.

[11] The 2015 reform increased the coinsurance rate from 10% to 20% for recipients with incomes equivalent to the current labor force. This change may have a significant impact on the utilization of formal care services among recipients with relatively high levels of care needs, particularly those classified as CL3 and above.

[12] Since our study focuses on co-residing caregivers, we are unable to examine the effects of the reform on caregivers who reside separately from recipients. The overall effect, including non-co-residing caregivers, is ambiguous. On one hand, non-co-residing caregivers may be more vulnerable to reductions in formal care benefits due to the burden of commuting to provide care, potentially increasing the time constraint. On the other hand, co-residing caregivers may provide more time-elastic care than non-co-residing caregivers, making them more sensitive to the reduction in benefits. Depending on the magnitude of these competing impacts, our findings regarding co-residing informal caregivers may either underestimate or overestimate the overall impact of the reform on informal caregivers.

It is worth noting that we excluded caregivers of CL1 recipients throughout the research period and those of SL2 recipients after the reform, as we could not establish whether CL1 recipients were reassigned to SL2 (potentially “treatment”) or continued to be classified as CL1 (potentially “control”). Moreover, the control group did not include caregivers of CL4 and CL5 recipients. Although these caregivers were not affected by the reform, they might differ from those in the treatment group systematically because they cared for recipients with the most severe conditions. To test the robustness of the results, we incorporated these caregivers into the control group and compared the estimates with the primary findings in Section 5.6.

4.2.2 Outcome variables

In order to evaluate the well-being of caregivers, we constructed five dummy variables with a health-related focus, namely “Any symptom,” “Outpatient visits,” “Limitations in activities of daily living (ADL limitations),” “Self-reported poor health,” and “Being stressed.” Each of these dummies took on a value of one if caregivers reported the corresponding condition and a value of zero if they did not, thereby signifying a less favorable health status.

Additionally, we formulated a collection of dummy variables for the subcategories of “Any symptom” and “Being stressed” to scrutinize the physical and mental health of informal caregivers at a more granular level. Each dummy variable obtained a value of one if caregivers reported the relevant condition, and a value of zero if they did not. Within the “Any symptom” category, we identified eleven subcategories associated with organ systems or physical components, including “systemic symptoms,” “respiratory,” “musculoskeletal system,” “limb,” “injury,” “eyes and ears,” “chest,” “digestive system,” “gum,” “skin,” and “urinary tract.”[13] In order to ensure consistency across survey waves, we partitioned

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[13] "Systemic symptoms" encompassed indications such as fever, dizziness, and headaches, among others. Symptoms related to the respiratory system, such as nasal congestion and coughing, were categorized under the "respiratory system." The musculoskeletal system included manifestations such as back pain and arthralgia, while "limb" symptoms were characterized by sensations of numbness or chills in the hands or feet. "Injury" encompassed traumatic occurrences such as bone fractures or lacerations. "Eye and ear" symptoms included vision impairment and tinnitus, while "chest" symptoms were marked by palpitations and chest pain. "Digestive system" symptoms comprised issues such as heartburn, diarrhea, and stomach aches, whereas dental issues and toothaches were subsumed under the "gum" condition. "Skin" issues encompassed symptoms such as rashes and itchy skin, while problems associated with the "urinary tract" were related to urinary complications.

the causes of “Being stressed” into nine groups: “family relationships,” “social networks,” “reason for living,” “having no free time,” “financial strain,” “own health and long-term care issues,” “family health and long-term care issues,” “childcare and domestic work,” and “marriage, love, and sexual life.” A detailed depiction of the outcomes is shown in Appendix Table A1.

4.2.3 Heterogeneity analyses

Existing literature suggests that male and female caregivers may exhibit divergent perspectives regarding the provision of informal care (Pinquart & Sörensen, 2006). A recent study in Japan has shown gender differences in the effects of informal caregiving on health and well-being (Le & Ibuka, 2023). These discrepancies may arise due to differences in their perceptions of the stress and rewards associated with caregiving and result in distinct responses to policy reforms. Hence, in addition to conducting a full-sample estimation, we performed heterogeneity analyses by gender to examine potential variations in the impact of the reform between male and female caregivers.

To gain a deeper insight into the underlying reasons for gender-based differences in the effects on well-being, we conducted estimations by the socioeconomic and demographic characteristics of female and male caregivers. These factors included income level, as approximated by per-capita monthly household expenditures (either Low HH-Exp or High HH-Exp, depending on whether the expenditure was below or above the sample median, respectively), and the caregiver-recipient relationship (spouse, parents, or parents-in-law).

4.2.4 Covariates

To mitigate potential confounding factors, we employed a series of control variables in our analysis, including caregivers’ age (in years), marital status (with married as reference, single, widowed, and divorced), working status (working and not working) health insurance status (with national health insurance as reference, employee health insurance, advance elderly health insurance, and other), pension status (seven types of pensions with basic pension as reference), gender and age (in years) of the care recipients, and number of family members.

4.3 Empirical Strategy

4.3.1 Event study

Drawing upon the definitions of the treatment and control groups, we conducted an event study using a difference-in-difference approach with fixed effects (DD-FE) to evaluate the population-level impact of the reform and how it varied over time[14] Given that all outcomes are binary, we employed a linear probability model,[15]

$$\mathrm{Y}_{it} = \sum_{t} \alpha_t \mathrm{Treat}_{it} \times \mathrm{Year}_t + \mathbf{X}_{it}\boldsymbol{\beta} + \boldsymbol{\lambda}_c + \boldsymbol{\lambda}_t + \boldsymbol{\lambda}_p + \boldsymbol{\Lambda}_p + \tau_{it},$$

$$\text{where} \quad t = 2001, 2007, 2010, 2013. \qquad (1)$$

Y_{it} denotes the outcomes of well-being for respondent i in year t, as previously defined. Treat_{it} represents the treatment status and Year_t is a set of year dummies with Year_{2004} being omitted as the reference year. Thus, α_t is the set of coefficients of interest. Given that 2004 is the reference year, we anticipate that the pre-reform coefficient α_{2001} is statistically insignificant, indicating no pre-trend across treatment status prior to the reform. The null α_{2001} also suggests that the reform did not have an anticipation effect. The coefficients of years post the reform—α_{2007}, α_{2010}, and α_{2013}—capture the average impacts of the reform on the population in each survey year that follows. Based on the theoretical framework, the sign of the post-reform coefficients may be positive, negative, or zero. They could be positive if the negative well-being impact induced by the formal care contraction outweighs the positive impact; they could be *negative* if the opposite is true; and they can be zero if the two impacts cancel one another out.

The post-reform coefficients also enable us to monitor the impact of the reform over time. If the magnitude and statistical significance of the coefficients remain constant or increase over time, we may

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[14] Given that our data are repeated cross-sectional, we refrained from utilizing propensity score matching (PSM) before conducting the DD estimation, as done by Miyawaki et al. (2020). While PSM can be useful in balancing observed differences between treatment and control groups in cross-sectional or panel data, it may not be effective when dealing with repeated cross-sectional data (Smith and Todd, 2005). Moreover, the unconfoundedness assumption of PSM is unlikely to hold in our study, given that treatment status was assigned based on care-need levels of the recipients.

[15] We opted for a linear probability model instead of logit or probit models for improved interpretability of interaction terms (Puhani, 2012).

infer that the reform had a long-term impact on caregivers' well-being. Alternatively, if the coefficients become statistically insignificant or their magnitudes regress to zero over time, we may infer that the impact of the reform was temporary. $\mathbf{X}_{it}$ represents the set of covariates, while $\boldsymbol{\lambda}_c$, $\boldsymbol{\lambda}_t$, and $\boldsymbol{\lambda}_p$ represent the FE at the care level, year level, and prefecture level, respectively. In addition, $\boldsymbol{\Lambda}_p$ includes either a prefectural linear trend by treatment status $c\boldsymbol{\lambda}_p$, a prefectural-year trend $t\boldsymbol{\lambda}_p$, or both. The linear trends control for geographical variations in the outcome variables over treatment status and time. As indicated in Table 1, we considered four models, which include all possible combinations of linear trends. Finally, τ_{it} is the error term.

[Table 1]

4.3.2 Difference-in-difference with fixed effects

We also employed a 2×2 DD-FE model to evaluate the overall effect of the reform. Specifically, we substituted the interaction terms in Equation (1) with a single interaction between the treatment indicator (Treat_{it}) and a dummy variable indicating the post-reform period (Post_t),

$$\mathrm{Y}_{it} = \gamma \mathrm{Treat}_{it} \times \mathrm{Post}_t + \mathbf{X}_{it}\boldsymbol{\delta} + \boldsymbol{\lambda}_c + \boldsymbol{\lambda}_t + \boldsymbol{\lambda}_p + \boldsymbol{\Lambda}_p + \tau_{it}. \quad (2)$$

The parameter γ represents the aggregate impact of the reform over the entire study period. The magnitude and statistical significance of γ are determined by the performance of each post-reform α_t in Equation (1). Compared to the event study approach, the DD-FE approach requires a smaller sample size and is advantageous for analyzing heterogeneity among subgroups of caregivers. We conducted heterogeneity analyses by caregiver gender and socioeconomic and demographic statuses for each gender, except for male in-law caregivers due to the insufficient sample (23 people). Furthermore, to test the robustness of the results, we applied an alternative specification of Equation (2) by replacing Treat_{it} with Robust_{it}, where caregivers of CL2–CL5 recipients served as the control group,

$$\mathrm{Y}_{it} = \rho \mathrm{Robust}_{it} \times \mathrm{Post}_t + \mathbf{X}_{it}\boldsymbol{\sigma} + \boldsymbol{\lambda}_c + \boldsymbol{\lambda}_t + \boldsymbol{\lambda}_p + \boldsymbol{\Lambda}_p + \tau_{it}. \quad (3)$$

We expected ρ in Equation (3) to be close to γ in terms of sign, magnitude, and statistical inference. We clustered standard errors at the levels of care level, year, and prefecture for all estimations.

One of the primary concerns when using the DD-FE approach is whether the common trend assumption holds. In addition to the α_{2001} from the event study as an indication of the pre-trend, we also conducted a placebo test based on Equation (2) by assuming a placebo reform in 2003,

$$\mathrm{Y}_{it} = \theta \mathrm{Treat}_{it} \times \mathrm{Placebo}_{t} + \mathbf{X}_{it}\boldsymbol{\pi} + \boldsymbol{\lambda}_{c} + \boldsymbol{\lambda}_{t} + \boldsymbol{\lambda}_{p} + \boldsymbol{\Lambda}_{p} + \tau_{it}. \tag{4}$$

$\mathrm{Placebo}_{t}$ takes the value of zero for the period before 2003 and one for the period between 2003 and 2006; thus, θ shall be non-significant if the common trend holds. The other variables are identically defined as in Equation (2).[16] We selected the primary model for Equation (1) and (2) based on their performance in the placebo estimation. In the primary model, the common trend should hold for both main and heterogeneity estimations.

Another major concern in our study was whether the composition of the treatment and control groups changed before and after the reform. Appendix Table A2 verifies that the proportions of recipients categorized as SL and SL1 (treatment) and CL2–CL3 (control) remained stable before and after the reform. Appendix Table A3 additionally demonstrates little before-and-after difference in caregiver and recipient characteristics across treatment status. Therefore, the confounding effect of changes in caregiver composition was minimal in our study. Lastly, we addressed the multiple-testing issue that could arise from examining the impacts of the reform on various outcomes. In addition to clustering standard errors, we adjusted standard errors according to the Simes (1986)'s method for multiple hypothesis testing.

5. Results

5.1 Basic Statistics

[Table 2]

Table 2 shows the basic statistics for outcomes, caregiver characteristics, and covariates adjusted in the estimations. The first two columns (1) and (2) provide information on the control group before

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[16] We also conducted a placebo test, in which caregivers of CL2 and CL3 recipients were given a placebo treatment. The control group consisted of caregivers of CL4 and CL5 recipients. Appendix Figure B2 summarizes the results. Except for intensive care, we found little difference in well-being between the placebo treatment and the control after the reform.

and after the policy reform, respectively, while columns (3) and (4) present the corresponding information for the treatment group. Columns (5) and (6) display the before-and-after differences for the control and treatment groups, respectively, along with the respective statistical significance. Finally, column (7) shows the simple DD estimate for each variable.

Upon examining column (7), we find that caregivers in the treatment group reported higher probabilities of having symptoms and outpatient visits after the reform than those in the control group, respectively. The treatment group was more likely to report specific symptoms, with musculoskeletal, systemic, and respiratory symptoms being the top three. After the reform, the treatment group experienced increased stress due to financial strain, domestic work, social networks, and health and LTC issues. However, they were less stressed concerning family health and LTC issues. The treatment group was also more likely to care for a spouse, not working, and living in smaller households after the reform. Additional statistics by the gender and socioeconomic status of caregivers are presented in Appendix Figures A1–A3 and Appendix Table A5. Generally, female caregivers reported more symptoms and stress. Caregivers with higher incomes and those caring for spouses were more likely to have poor health outcomes, regardless of gender.[17]

5.2 Placebo Test for Common Trend and Model Selection

The discrepancies in caregiver characteristics between the treatment and control groups highlighted the significance of assessing the assumption of a common trend, which denotes whether these differences were consistent over time. Accordingly, we conducted a thorough analysis of the placebo effects on the main outcomes based on Equation (4), before presenting the main findings.

[Figure 1]

As illustrated in Figure 1, all four models demonstrated a common trend between the treatment and control groups prior to the reform. Furthermore, Appendix Figure B1 displays the heterogeneous

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[17] The basic statistics for the robustness estimation, which include caregivers of CL2–CL5 recipients as the control, are shown in Appendix Table A4.

placebo effects based on caregiver gender, indicating that the four models varied in their capacity to satisfy the common trend assumption. Notably, Model 3 was the most effective in adhering to this assumption in both the main and heterogeneity estimations. Thus, we adopted Model 3 as the primary model, which controlled for year FE, care level FE, prefecture FE, and prefecture-year trends. For reference purposes, we presented the main results from all models in Appendix C, where we confirmed that the direction, magnitude, and statistical inferences of the impacts were consistent across the models.

5.3 Main Results

5.3.1 The population average impact of the reform over time

Figure 2 depicts the estimates from Model 3 of the DD-FE event study. Consistent with the results of the placebo tests, the coefficients prior to the reform in 2001 were statistically insignificant and close to zero in magnitude. This finding corroborated the conclusion that the treatment-control disparities were time-invariant and further indicated that the reform had no anticipatory effect.

[Figure 2]

Regarding the post-reform coefficients, we found that caregivers reported a significant increase in any symptoms (approximately 8 pp), with the impact appearing to attenuate over time. Moreover, although the reform did not have an immediate impact on the likelihood of regular outpatient visits, the extent of the impact increased over time, and caregivers visited hospitals significantly more often in the later stages of the study (approximately 7 pp). The reform did not appear to have any statistically significant impact on the other well-being outcomes.

[Figure 3]

Subsequently, we examined which specific symptoms were responsible for the significant increase in the likelihood of having symptoms. Figure 3 depicts the impacts on each symptom breakdown over time. Many of the symptoms increased immediately after the reform, with the top three being musculoskeletal system (10.3 pp), systemic symptoms (7.4 pp), and eye and ear conditions (7.2 pp). Caregivers seemed to have encountered more difficulties in functions related to mobility and stability.

The deterioration in these symptoms appeared to be somewhat attenuating, yet generally steady over time.

[Figure 4]

Moreover, we investigated the impacts of the reform on each specific reason for stress over time. Although caregivers' overall stress levels did not change substantially following the reform, Figure 4 reveals that they tended to be more concerned with financial strain (4.2 pp) and domestic work (3.3 pp), while being less concerned with reason for life (4.3 pp) and family relations (7.7 pp). The heightened concerns indicated that the objective reasons for stress, such as the opportunity costs of caregiving and the difficulties of allocating time between caregiving and other household tasks, have worsened since the reform. The reduced concerns suggested that the subjective causes of stress, such as low self-esteem and interpersonal tension, have improved after the reform. The changes in specific stresses were less persistent than changes in physical symptoms and faded with time, indicating that the mental health consequences of greater caregiving burden appeared to be transient.

5.3.2 The aggregated impact of the reform

We also evaluated the aggregated effects of the reform over the entire study period using the 2×2 DD-FE model. The results in Appendix Table D1 indicate that the aggregated effects were largely consistent with the time-varying effects in terms of their direction, size, and statistical significance. In addition, we conducted a multiple-hypothesis testing adjustment to examine the robustness of our findings. As shown in Appendix Table D2, the impacts on the main well-being outcomes and specific symptoms remained statistically significant after the adjustment, while the impacts on specific stressors were less resilient.

5.4 The Heterogeneous Impacts of the Reform

[Table 3]

5.4.1 Gender disparities

We also examined the gender disparities in the impact on caregivers' well-being. As shown in Panel A of Table 3, the gender-specific effects of the reform were evident. Female caregivers reported a significant decline in physical health, including symptoms, regular outpatient visits, and limitations in ADL. In contrast, male caregivers were less likely to experience stress. Panels B and C further revealed that female caregivers were more likely to experience musculoskeletal, systemic, chest, respiratory, and skin conditions, as well as stress related to financial strain and domestic work. Male caregivers, on the other hand, reported no decline in physical health and were less concerned about their own health and LTC needs, as well as their family's health.[18]

These gender-specific findings prompted the question of what factors drove men and women to respond differently to increased care burdens. To explore this question further, we examined the gender disparities in the impact of the reform based on their socioeconomic status (income level) and demographic status (caregiver-recipient relationship).

5.4.2 Gender disparities by caregivers' characteristics

[Figure 5]

[Figure 6]

Figures 5-6 present the gender-specific effects of the 2006 LTC reform on caregivers' well-being, across their income levels and caregiver-recipient relationship. The decline in well-being for female caregivers was concentrated among those with higher household income (High HH-Exp) who cared for their spouses or parents-in-law. Appendix Figures F1-F3 reveal that these female caregivers were more likely to report musculoskeletal, systemic, and chest conditions, as well as higher financial stress. Figure 6, on the other hand, shows that male caregivers with higher income levels who cared for their parents experienced significant improvements in mental health. Appendix Figures F1-F3 indicate that these male caregivers were less concerned about their own and their family's health and LTC issues.

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[18] Appendix Table E1 indicates that the statistical significance of the impacts on female caregivers' well-being outcomes and specific symptoms persisted even after adjusting for multiple-hypothesis testing, which lends credibility to these findings. In contrast, the statistical significance of the impacts on male caregivers did not survive the multiple-hypothesis testing, suggesting that caution is warranted when interpreting the findings for male caregivers.

5.5 Additional Impacts of the Reform

The primary findings reveal that the reform had unfavorable effects on the well-being of informal caregivers. We conducted two further investigations to ascertain any additional impacts of the reform, with the aim of obtaining a more comprehensive understanding of the reform's consequences.

5.5.1 The impact on caregiving behaviors

Our first investigation aimed to determine whether the reform had any impact on caregiving behaviors. To accomplish this, we established a binary outcome variable "Regular caregiving" that distinguishes between providing informal care on a scheduled basis versus as-needed basis.[19] Using Equation (2), we examined whether the reform augmented the probability of providing care regularly. Appendix Table G1 demonstrates that the reform resulted in a 17.2-pp increase in the likelihood of regular caregiving. The elevation was particularly conspicuous among female caregivers with low income (20.3 pp) or those caring for their spouses and parents-in-law (23.8 pp). It is plausible that the intensified frequency of caregiving contributed to the negative effects on the well-being of informal caregivers.

5.5.2 The impact of the reform on care recipients

Furthermore, we examined whether the reform had any effect on the well-being of care recipients. On the one hand, formal care by professionals may improve the well-being of care recipients. On the other hand, informal care by family members and close relatives could have strengths in terms of tailor-made care based on long-term relationships. If the latter is true, the overall impact of the reform on the welfare is ambiguous as it decreased the wellbeing of the caregivers but increased that of care recipients. Thus, we assessed this by replicating the set of outcome variables described in section 4.2.2 for all care recipients in the LTC questionnaires. We then analyzed the impacts using Equation (1). Appendix Figure

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[19] The query utilized to ascertain care intensity from the primary family caregiver was "What is the duration for which your primary family caregiver provides care on a daily basis?" The possible responses consisted of five options, namely "full day," "half day," "2 to 3 hours," "only when needed," or "other." Subsequently, if respondents selected any of the first three choices, we ascribed a value of one to the outcome variable. If they chose the fourth option, we designated a value of zero. The variable indicated the presence or absence of regular informal caregiving.

G2 displays that care recipients were 6.6-pp and 5.7-pp more likely to have outpatient visits and limitations in ADL immediately following the reform. These increases persisted throughout the study period. The reform appeared to lead to the deterioration of well-being for both caregivers and recipients.

5.6 Robustness Checks

The robustness of the main results, based on Equation (3), is demonstrated in Appendix Figures H1-H3. The estimates obtained from the robustness checks were found to be similar to those of the main results in terms of their direction, magnitude, and statistical inference.

VI. Discussion and Conclusion

This study delved into the repercussions of formal care benefits contracting on informal care provision and the well-being of informal caregivers. The analysis leveraged the 2006 reform of LTCI in Japan and employed a difference-in-difference methodology to isolate the impact of the reform. The estimations were carried out using not only the full sample of the CSLC, but also subsamples stratified by caregivers' gender and socioeconomic statuses. In addition, the study scrutinized the impact of the reform on each of the sub-components of two well-being outcomes, namely self-reported symptoms and stress.

We affirm that the reform had adverse effects on the physical health of informal caregivers, particularly in terms of self-reported symptoms and outpatient visits. Musculoskeletal, systemic, and chest conditions were identified as the primary reasons for symptom increases. While there was minimal change in overall mental health, caregivers expressed more concern about their financial situation and ability to manage domestic tasks, while experiencing less stress regarding family relationships. The reform had a lasting impact on physical conditions, while its impact on mental health was temporary. Female caregivers experienced a substantial decline in both physical and mental well-being, while male caregivers experienced an improvement in mental health, particularly those with higher income levels. We further confirm that the reform led to an increase in the likelihood of regular caregiving, indicating that the reduction in formal care benefits led to a greater care burden on informal caregivers. Moreover, the reform also had negative effects on the well-being of care recipients, indicating a ripple effect on the well-being of both informal caregivers and care recipients.

Consistent with the existing literature, our findings suggest that the benefits of informal caregiving are generally outweighed by primary and secondary stressors, making contracting formal care a risky proposition for informal caregivers' well-being (Bauer & Sousa-Poza, 2015). Caregivers experience physical strain due to increased care burden, primarily affecting their musculoskeletal systems, leading to mobility and stability difficulties (primary stressors). Additionally, without adequate formal care support, caregivers lose a vital external resource to cope with caregiving situations, making it challenging to balance their roles as caregivers and their other familial and societal roles (secondary stressors). Our study also found that informal caregivers are increasingly concerned about their financial status, which reflects the opportunity cost associated with providing more informal care (Heitmueller & Inglis, 2007). Furthermore, the findings add to the literature by revealing that physical deterioration caused by increased care load is greater and lasting more than mental deterioration. Although the psychological benefits of providing care may reduce (and in some cases outweigh) the secondary stressors, the physical load of caregiving is not thereby alleviated. This suggests that the consequences of the primary stressors may be particularly pronounced, necessitating a comprehensive solution to relieve them.

The gender-specific variations in the trajectory of well-being are also a novel contribution to the extant literature. These gender-specific effects suggest that the impact of the reform on caregivers' well-being was highly dependent on their individual characteristics and circumstances. The provision of informal care was predominantly a female role. However, contemporary trends indicate that women increasingly demonstrate a greater inclination to participate in paid employment and become significant contributors to their families' economic welfare. Consequently, women caregivers face a higher opportunity cost in terms of lost income due to providing informal care (Carmichael & Charles, 2003; Schmitz & Westphal, 2015). Our sample of female caregivers is characterized by a younger age group and a higher likelihood of being married when compared to their male counterparts (refer to Appendix Table A5). Balancing their professional, social, and marital obligations while providing more care poses a significant challenge for these caregivers (Fu et al. 2017; Schmitz and Stroka 2013; Van Houtven, Coe, and Skira 2013). Conversely, it is plausible that male caregivers with higher income have greater flexibility in terms of time and resources to allocate towards caregiving, which may contribute to the enhancement of their mental well-being. Moreover, our sample of male caregivers primarily attends to the needs of their wives or parents (refer to Appendix Table A5), which may provide them with greater satisfaction as they engage in more intimate relationships while providing care. The informal care provision entails minimal opportunity cost and substantial psychological rewards for male caregivers, thereby conferring considerable benefits (Collins & Feeney, 2000; Penning & Wu, 2016).

Disparities in the nature of care provided by male and female caregivers may also contribute to the gender-specific impacts of the reform. According to existing literature, informal caregiving is often a demanding and challenging task, and caregivers may have little choice in assuming this role (Pearlin 2010). This situation is especially pronounced for female caregivers in Japan, where societal gender norms tend to dictate their primary responsibility in providing informal care (Kumagai, 2017; Sharma et al., 2016). Furthermore, research suggests that caregivers experience heightened emotional stress and physical health issues when compelled to provide care (Schulz et al., 2012), particularly when formal care options are limited (Wagner & Brandt, 2018). Hence, female caregivers may be more vulnerable to reductions in formal care benefits than their male counterparts. Although this hypothesis is suggestive, the gender disparity in caregivers with similar income levels or caring for spouses supports this argument. Even when male and female caregivers have comparable opportunity costs or psychological rewards associated with caregiving, female caregivers remain more susceptible to formal care benefit reductions than male caregivers.

The adverse impact of the reform on the well-being of care recipients, as evidenced by our findings, stands in contrast to the literature that suggests potential benefits of informal care over formal care for recipients. For example, Cohen et al. (2002) posit that informal caregivers, who are often family members or close acquaintances, possess a profound understanding of the care recipient's requirements, inclinations, and values. This knowledge enables them to offer more individualized care that is better tailored to the recipient's needs. However, our results underscore the fact that even for recipients with moderate care needs, formal care services provide specialized and professional care that may prove challenging for informal caregivers to deliver. As such, reducing formal care services is unlikely to have any positive impact on either the caregivers or the recipients.

This study has some limitations owing to the lack of data. First, while we confirmed that the composition of caregivers changed little in observable characteristics following the reform, it may have changed regarding unobservable characteristics. Second, we could not assess the care burden using a broader range of measurements. Providing care regularly may reflect a portion of the care burden, but not all of it. This is especially true for female caregivers with high income or caring for spouses. Their great decline in well-being is likely because of care burdens that were not quantified by care frequency. Further studies using longitudinal datasets with comprehensive information to track an individual over time are necessary to clarify our results.

Our study highlights the importance of considering the well-being of caregivers when evaluating the cost-effectiveness of contracting formal care availability based on care needs. Although the advantage of providing formal care to recipients with moderate care needs may appear to be smaller than the cost, it does help the caregivers of those recipients. Therefore, any loss in caregivers' well-being should be considered when evaluating the impact of contracting formal care benefits. Our findings also suggest that the well-being loss observed in our study may be a lower bound of the potential impacts of a reform targeting a wider range of recipients, including those with more severe conditions. Contracting formal care benefits may have more negative consequences if future reforms are aimed at a broader range of recipients. Therefore, policymakers should consider alternatives to the need-based method, such as affordability-based methods, to contain public spending on LTC. In fact, the government has already launched an affordability-based reform in 2018, raising the co-insurance rate for affluent recipients. Future research is needed to assess the impact of this reform. Furthermore, policymakers should consider the heterogeneity of caregivers when designing policies to support them. Female caregivers are particularly susceptible to an increased care burden, and thus policies should be implemented to protect them against financial and health issues. These policies could include respite care, counseling services, and financial assistance.

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Table 1. Model specifications per Λ_p

	Model 1	**Model 2**	**Model 3**	**Model 4**
Prefecture-treatment trend $c\boldsymbol{\lambda}_p$	No	Yes	No	Yes
Prefecture-year trend $t\boldsymbol{\lambda}_p$,	No	No	Yes	Yes

Table 2. Basic statistics

	Control		Treatment		Diff		Diff		DD	
	Before	After	Before	After	(2)-(1)		(4)-(3)		(6)-(5)	
	(1)	(2)	(3)	(4)	(5)		(6)		(7)	
Outcomes										
Any symptom (%)	50.67	49.65	44.31	49.29	-1.02		4.98	**	6.00	**
Outpatient visits (%)	56.54	59.75	48.75	60.13	3.21	***	11.38	***	8.17	***
ADLs (%)	22.61	23.43	17.98	21.69	0.82		3.71	**	2.89	
Self-rated poor health (%)	28.18	31.97	23.32	30.32	3.79	***	7.00	***	3.21	
Stress (%)	75.12	73.95	65.63	64.48	-1.17		-1.15		0.02	
Specific symptoms (%)										
Musculoskeletal system	36.80	36.03	29.02	35.63	-0.77		6.61	***	7.38	***
Systemic symptoms	25.99	23.70	20.31	24.41	-2.29	**	4.10	**	6.39	***
Chest	9.71	7.14	5.25	7.63	-2.57	***	2.38	**	4.95	***
Limb	18.54	18.56	14.62	18.57	0.02		3.95	**	3.93	*
Respiratory	10.18	9.71	6.70	11.88	-0.47		5.18	***	5.65	***
Eye and ear	22.50	20.51	17.30	19.79	-1.99	*	2.49	*	4.48	**
Digestive system	16.19	15.47	12.83	15.74	-0.72		2.91	*	3.63	*
Gum	11.27	9.93	7.37	9.05	-1.34	*	1.68	*	3.02	*
Skin	9.50	7.56	8.59	8.01	-1.94	**	-0.58		1.36	
Urinary tract	7.78	8.71	7.14	9.99	0.93		2.85	**	1.92	
Injury	2.94	2.10	2.79	2.26	-0.84	*	-0.53		0.31	
Reasons of stress (%)										
Financial strain	11.81	13.74	10.50	15.52	1.93	**	5.02	***	3.09	*
Childcare and domestic work	6.62	5.74	4.06	6.07	-0.88	*	2.01	**	2.89	**
Social networks	5.73	5.24	5.01	8.16	-0.49		3.15	***	3.64	***
Having no free time	14.32	14.13	7.28	8.26	-0.19		0.98		1.17	
Marriage, love and sexual life	1.79	1.19	1.67	1.39	-0.60	*	-0.28		0.32	
Reason for living	5.41	6.09	4.77	6.47	0.68		1.70	*	1.02	
Own health and long-term care issues	35.12	19.48	31.03	19.20	-15.64	***	-11.83	***	3.81	*
Family relationships	13.78	13.74	16.59	15.42	-0.04		-1.17		-1.13	
Family health and long-term care issues	59.02	57.99	41.53	34.43	-1.03		-7.10	***	-6.07	**
Caregiver's demographic status										
Female (%)	77.70	72.82	71.41	67.05	-4.88	***	-4.36	**	0.52	
Recipient-caregiver relationship										
Spouse	39.90	40.12	31.69	37.06	0.22		5.37	***	5.15	**

Parent	23.91	30.73	27.41	33.84	6.82	***	6.43	***	-0.39	
Parent-in-law	32.17	25.22	37.69	25.51	-6.95	***	-12.18	***	-5.23	**
Caregiver's socio-economic status										
Household Per-capita Expenditure < median (%)	48.37	48.02	47.57	47.03	-0.35		-0.54		-0.19	
Covariates										
Age (year)	62.93	64.43	60.11	63.41	1.50	**	3.30	***	1.80	
	(29.24)	(18.93)	(12.75)	(13.37)	(0.59)		(0.58)			
Marital Status (%)										
Married	85.10	81.43	82.76	79.05	-3.67	***	-3.71	**	-0.04	
Single	7.17	10.15	9.21	11.19	2.98	***	1.98	*	-1.00	
Widowed	4.67	4.37	3.85	3.94	-0.30		0.09		0.39	
Divorced	3.06	3.91	4.18	5.73	0.85	*	1.55	*	0.70	
Working (%)	38.41	40.26	52.04	44.65	1.85	*	-7.39	***	-9.24	***
Health Insurance (%)										
National health insurance	62.80	48.19	58.56	43.51	-14.61	***	-15.05	***	-0.44	
Health insurance	35.66	32.53	40.37	35.68	-3.13	***	-4.69	***	-1.56	
Advance elderly health insurance	0.00	17.71	0.00	19.55	17.71	***	19.55	***	1.84	
Others	1.53	1.57	1.08	1.26	0.04		0.18		0.14	
Pension (%)										
Basic pension	17.83	22.30	13.49	19.44	4.47	***	5.95	***	1.48	
Basic pension and employee pension	10.43	17.88	8.35	14.07	7.45	***	5.72		-1.73	
Basic pension and mutual aid pension	1.81	2.67	1.18	2.33	0.86	**	1.15	*	0.29	
National pension	9.30	3.77	6.85	3.76	-5.53	***	-3.09	***	2.44	*
Employee pension	11.03	11.36	9.74	10.57	0.33		0.83		0.50	
Mutual aid pension	2.82	2.43	3.21	3.67	-0.39		0.46		0.85	
Governmental pension	0.68	0.24	0.75	0.36	-0.44		0.75		1.19	
Male Care recipients	0.41	0.41	0.29	0.35	0.00		0.29	**	0.29	***
Care recipients' age (year)	80.96	82.04	80.35	82.57	1.08	**	2.22	**	1.14	
	(20.67)	(9.26)	(8.53)	(28.60)	(0.37)		(0.97)		(0.85)	
Household size (person)	3.74	3.52	3.77	3.33	-0.22	***	-0.45	***	-0.23	***
	(1.69)	(1.57)	(1.68)	(1.50)	(0.04)		(0.07)		(0.08)	
N	2,325	4,008	838	1,060						

Notes: Standard deviations are in parentheses for continuous variables. The t-statistic for testing the treatment-control difference in the proportion of advance elderly health insurance prior to the reform is not available because of the zero proportions. *Inference: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 3. Gender disparities in the impact of 2006 reform

	Female (N=6,339)				Male (N=3,362)			
	Coef.		S.E.	p-value	Coef.		S.E.	p-value
Panel A: Main outcomes								
Any symptom	0.061	*	(0.037)	0.099	0.050		(0.057)	0.381
Outpatient visits	0.079	**	(0.035)	0.026	-0.016		(0.053)	0.760
ADL limitations	0.062	**	(0.031)	0.049	-0.058		(0.050)	0.247
Self-rated health	0.036		(0.033)	0.288	-0.009		(0.050)	0.865
Being stressed	0.033		(0.032)	0.315	-0.128	**	(0.063)	0.043
Panel B: Specific symptoms								
Musculoskeletal system	0.100	**	(0.034)	0.004	0.081		(0.053)	0.127
Systemic symptoms	0.069	**	(0.031)	0.025	0.054		(0.048)	0.261
Chest	0.065	***	(0.017)	0.000	0.003		(0.032)	0.917
Limb	0.043		(0.028)	0.119	0.031		(0.042)	0.466
Respiratory	0.074	***	(0.020)	0.000	-0.034		(0.033)	0.311
Eye and ear	0.045		(0.028)	0.105	-0.006		(0.043)	0.890
Digestive system	0.041		(0.027)	0.122	-0.012		(0.039)	0.770
Gum	0.034		(0.021)	0.110	-0.009		(0.036)	0.794
Skin	0.044	**	(0.020)	0.028	-0.085	**	(0.033)	0.009
Urinary tract	0.031	*	(0.018)	0.088	-0.056		(0.035)	0.112
Injury	-0.009		(0.011)	0.434	0.002		(0.017)	0.914
Panel C: Reasons for being stressed								
Financial strain	0.059	**	(0.025)	0.016	-0.017		(0.038)	0.646
Domestic work	0.040	**	(0.017)	0.018	-0.006		(0.024)	0.791
Social networks	0.029		(0.018)	0.119	0.019		(0.025)	0.451
Having no free time	0.016		(0.026)	0.544	0.013		(0.033)	0.690
Marriage, love and sexual life	0.014	*	(0.008)	0.066	-0.022		(0.021)	0.290
Reason for living	0.007		(0.016)	0.655	-0.020		(0.026)	0.443
Own health and LTC issues	0.022		(0.032)	0.495	-0.097	*	(0.052)	0.063
Family relations	-0.021		(0.027)	0.443	-0.030		(0.038)	0.418
Family health and LTC issues	-0.017		(0.035)	0.631	-0.106	*	(0.062)	0.087

Notes: All estimates were derived based on subsample estimation using Model 3 of Equation (2), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. N stands for number of observations, S.E. for standard errors that were clustered at the level of care level, year, and prefecture. *Inference: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

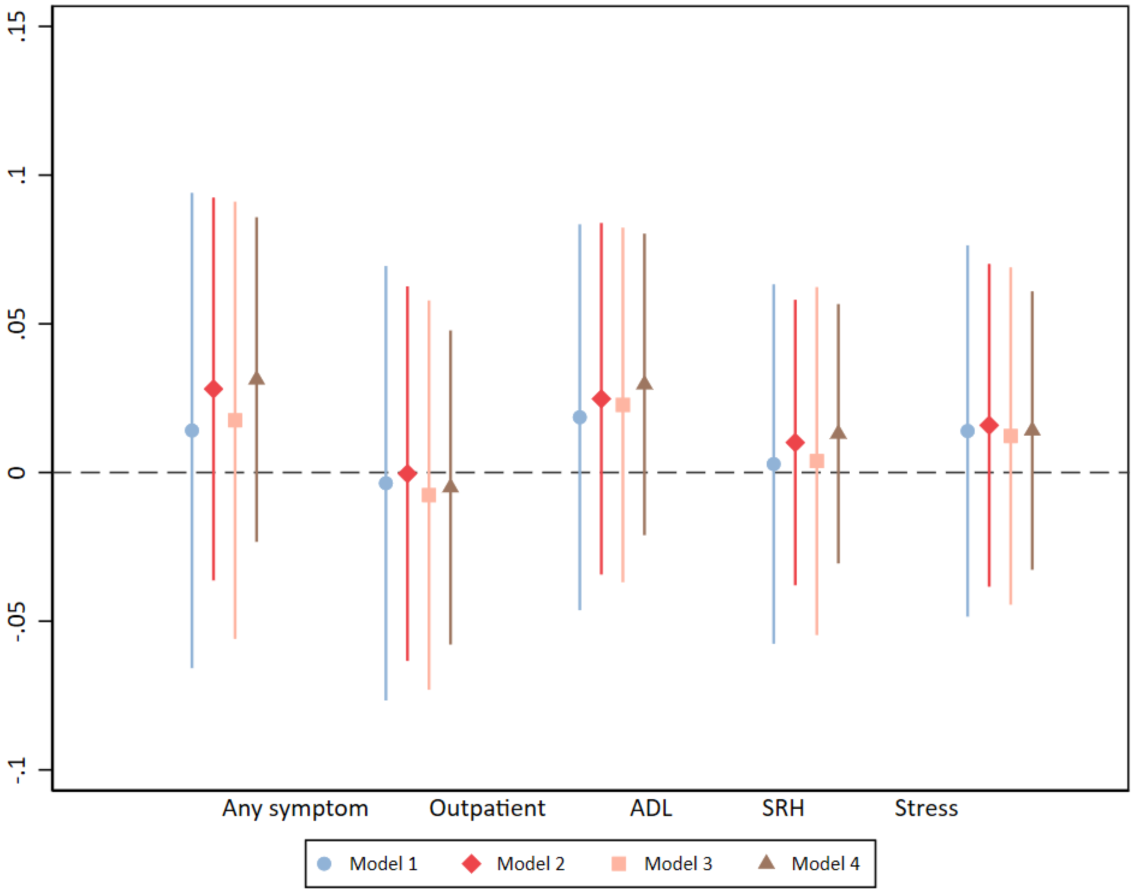


Figure 1. Placebo impacts on informal care provision and caregivers' well-being across models

Notes: The markers with 95% confidence intervals represent the estimates of θ from Equation (4). Model 1 controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, and prefecture FE. Based on Model 1, Model 2 further controlled for prefecture-treatment trend, Model 3 further controlled for prefecture-year trend, and Model 4 further controlled for both trends. Standard errors are clustered at the municipal level. Standard errors are clustered at the municipal level. "Outpatient" for outpatient visits, "ADL" for limitations in ADLs, "SRH" for self-report poor health. Standard errors were clustered at the level of care level, year, and prefecture.

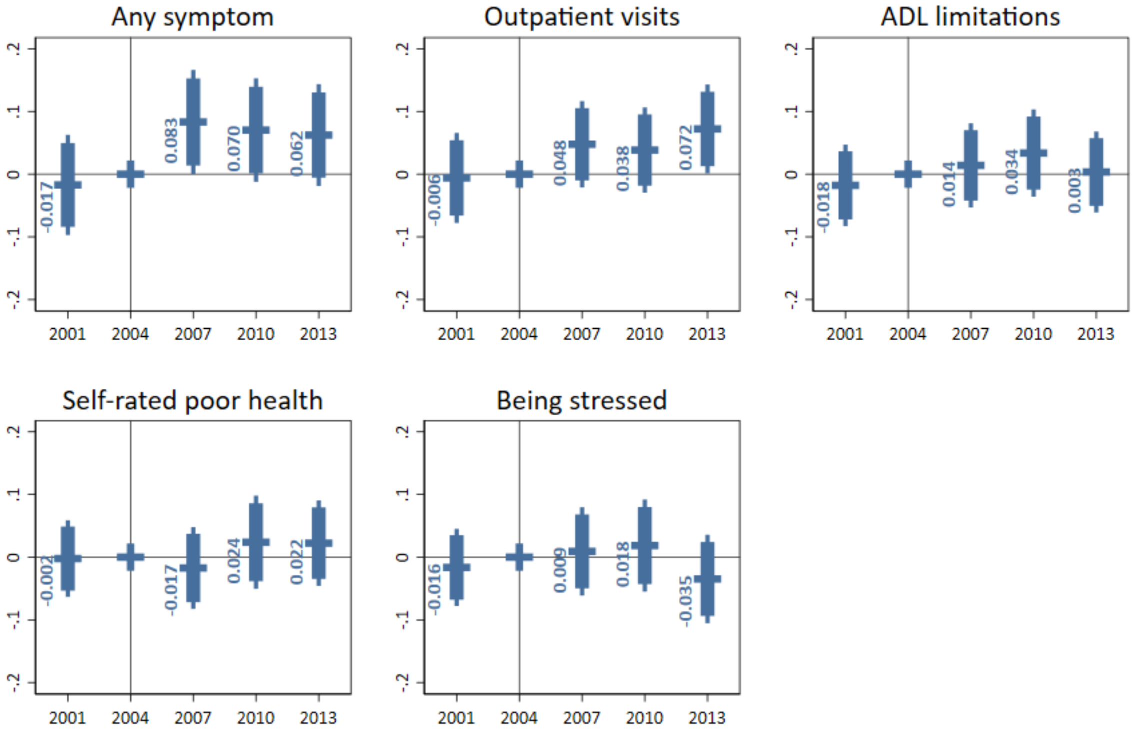


Figure 2. The impacts of the 2006 reform on well-being of caregivers over time

Notes: All estimates were derived based on Model 3 of Equation (1), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. The y-axes share a uniform scale for visual comparability. The markers stand for the estimates of α_t in Equation (1). The thicker and thinner bars represent confidence intervals at the 90% and 95% levels, respectively. Standard errors were clustered at the level of care level, year, and prefecture.

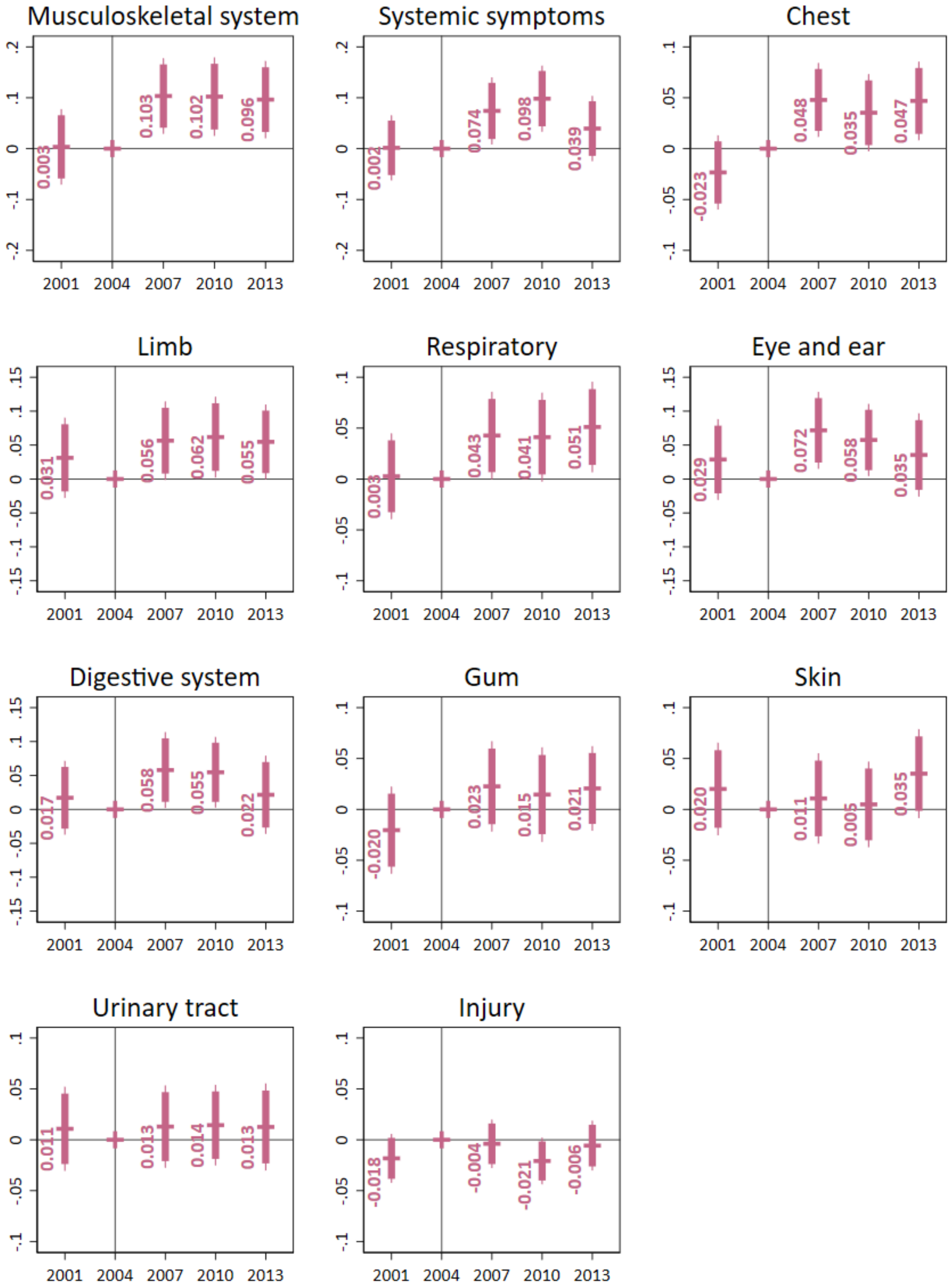


Figure 3. The impacts of the 2006 reform on specific symptoms over time

Notes: All estimates were derived based on Model 3 of Equation (1), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. The y-axes share a uniform scale for visual comparability. The markers stand for the estimates of α_t in Equation (1). The thicker and thinner bars represent confidence intervals at the 90% and 95% levels, respectively. Standard errors were clustered at the level of care level, year, and prefecture.

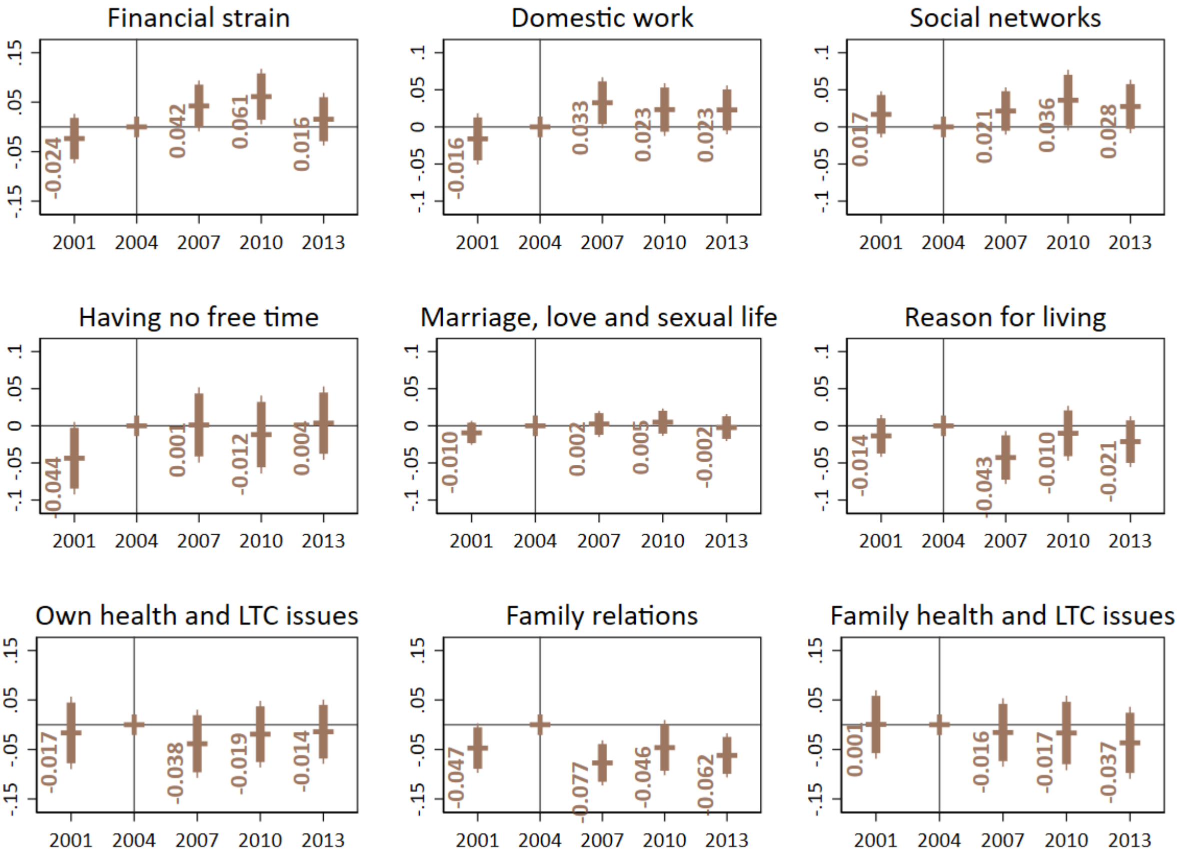


Figure 4. The impacts of the 2006 reform on specific reasons of stress over time

Notes: All estimates were derived based on Model 3 of Equation (1), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. The y-axes share a uniform scale for visual comparability. The markers stand for the estimates of α_t in Equation (1). The thicker and thinner bars represent confidence intervals at the 90% and 95% levels, respectively. Standard errors were clustered at the level of care level, year, and prefecture.

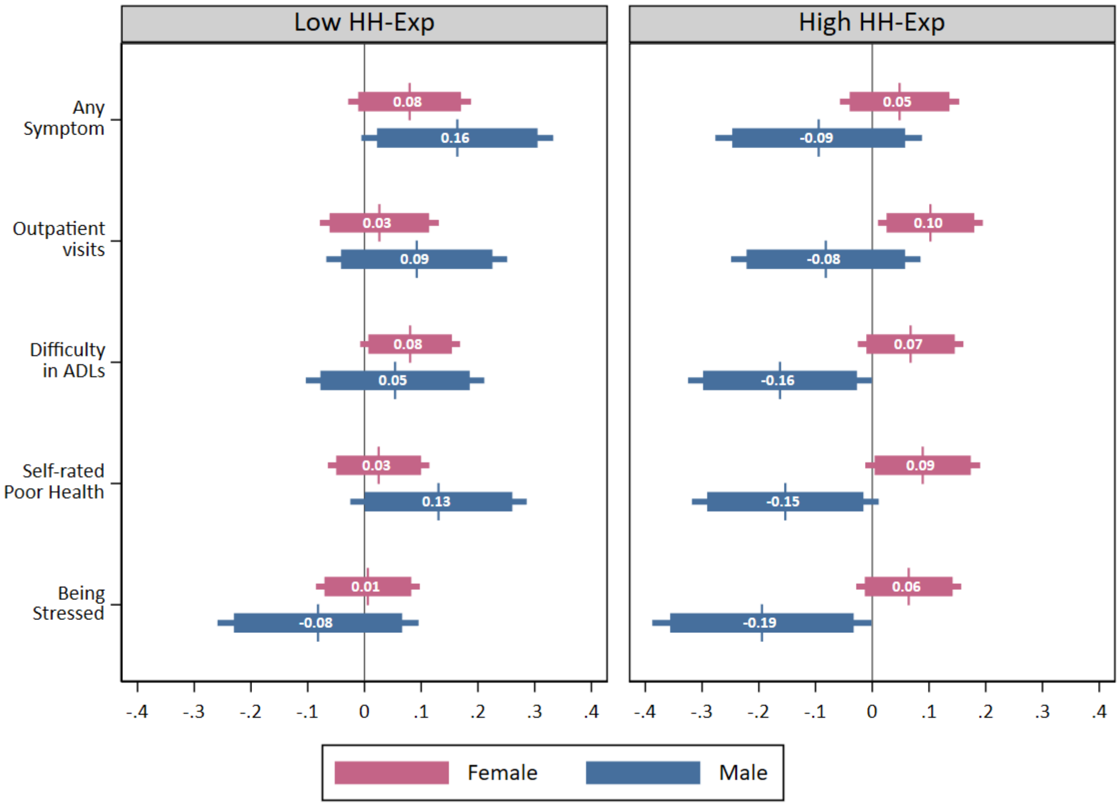


Figure 5. Heterogeneous impact of the 2006 reform by gender: caregivers' income level

Notes: All estimates were derived based on Model 3 of Equation (2), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. The vertical bars stand for the estimates of γ in Equation (2). The thicker and thinner horizontal bars represent confidence intervals at the 90% and 95% levels, respectively. Standard errors were clustered at the level of care level, year, and prefecture.

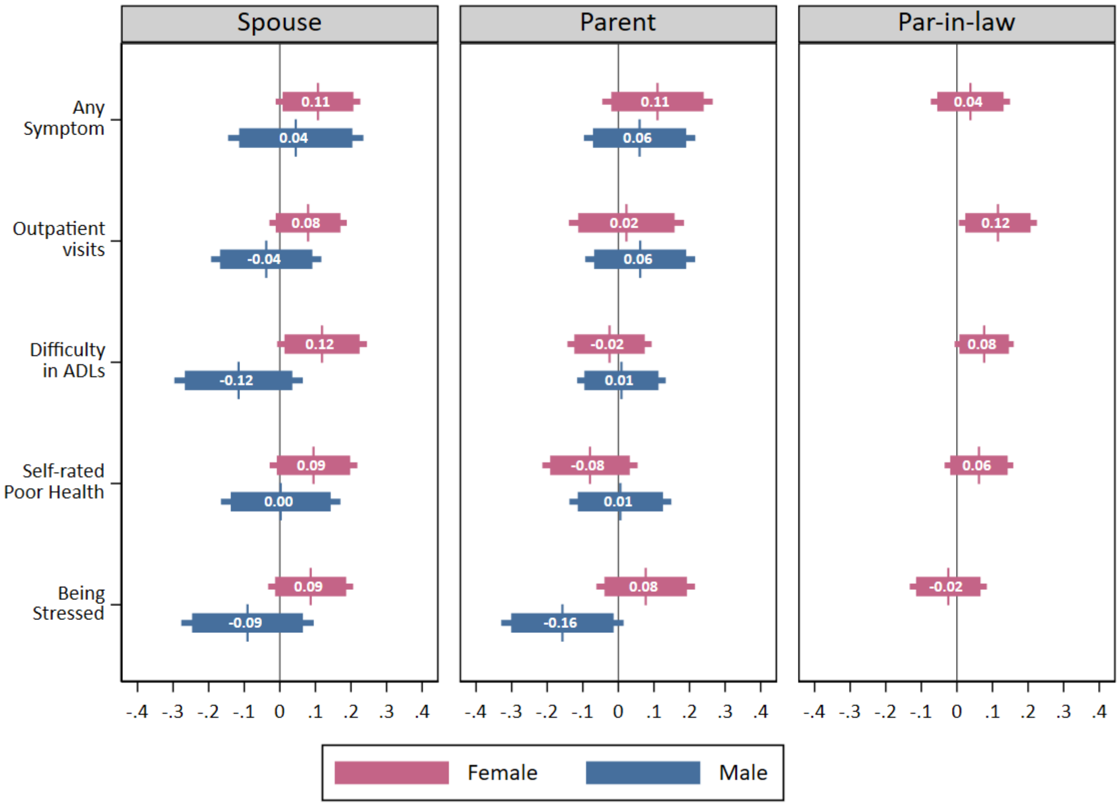


Figure 6. Heterogeneous impact of the 2006 reform by gender: caregiver-recipient relationships

Notes: All estimates were derived based on Model 3 of Equation (2), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. The vertical bars stand for the estimates of γ in Equation (2). The thicker and thinner horizontal bars represent confidence intervals at the 90% and 95% levels, respectively. Standard errors were clustered at the level of care level, year, and prefecture.

Appendices

A. Outcome Structure and Basic Statistics

Table A1. The structure of the outcomes

	Main outcomes	**Breakdowns**
Physical health	1. Any symptom	1) Musculoskeletal system 2) Systemic symptoms 3) Chest 4) Limb 5) Respiratory 6) Eye and ear 7) Digestive system 8) Gum 9) Skin 10) Urinary tract 11) Injury
	2. Outpatient visits	
	3. ADL limitations	
	4. Self-rated poor health	
Mental health	5. Being stressed	1) Financial strain 2) Childcare and domestic work 3) Social networks 4) Having no free time 5) Marriage, love and sexual life 6) Reason for living 7) Own health and long-term care issues 8) Family relationships 9) Family health and long-term care issues

Note: All outcomes are binary. Each takes a value of one if the caregivers reported the corresponding condition and a value of zero if they did not.

Table A2. Trends in proportions of care recipients in each care-required

	2001	2004	2007	2010	2013	Total
SL	0.11	0.13				0.12
SL1			0.11	0.10	0.09	0.10
SL2			0.13	0.14	0.14	0.14
CL1	0.25	0.32	0.20	0.19	0.21	0.23
CL2	0.23	0.20	0.21	0.21	0.22	0.21
CL3	0.16	0.14	0.16	0.16	0.15	0.15
CL4	0.12	0.11	0.12	0.11	0.10	0.11
CL5	0.13	0.09	0.08	0.08	0.08	0.09
N	3,148	3,893	3,259	3,874	4,000	18,174

Source: LTC questionnaires of CSLC from 2001 to 2013.

Table A3. Changes in the characteristics of caregivers after the reform

	Male Caregivers			Female Caregivers		
	Treat_Post	**S.E.**	**N**	**Treat_Post**	**S.E.**	**N**
Caregiver-recipient relationship						
Spouse	0.0634	(0.0620)	2,320	0.0898**	(0.0353)	6,376
Parent	-0.0715	(0.0616)	2,320	0.0316	(0.0306)	6,376
Par-in-law	0.0234	(0.0155)	2,320	-0.129***	(0.0365)	6,376
Income						
Low-HH Exp	-0.0169	(0.0594)	2,320	-0.00995	(0.0373)	6,376
High-HH Exp	-0.00849	(0.0599)	2,320	-0.00113	(0.0370)	6,376
Marital status						
Married	0.0368	(0.0543)	2,320	-0.0297	(0.0272)	6,376
Single	-0.0403	(0.0466)	2,320	0.0221	(0.0197)	6,376
Widowed	-0.0119	(0.0203)	2,320	0.000919	(0.0156)	6,376
Divorced	0.0154	(0.0314)	2,320	0.00660	(0.0139)	6,376
Insurance						
Other health insurance	0.00361	(0.0180)	2,311	-0.00329	(0.00646)	6,348
National health insurance	0.0119	(0.0585)	2,311	0.0297	(0.0372)	6,348
Employee health insurance	-0.0821	(0.0562)	2,311	-0.0451	(0.0370)	6,348
Advance elderly health insurance	0.0666*	(0.0368)	2,311	0.0187	(0.0228)	6,348
Pension						
Basic pension	0.0598	(0.0411)	2,320	0.0555*	(0.0303)	6,376
Basic pension and employee pension	-0.0137	(0.0458)	2,320	-0.00931	(0.0226)	6,376
Basic pension and mutual aid pension	0.0218	(0.0210)	2,320	-0.00232	(0.00941)	6,376
National pension	0.0294	(0.0334)	2,320	0.0205	(0.0152)	6,376
Noncontributory pension	0.0314	(0.0453)	2,320	-0.0225	(0.0207)	6,376
Recipients Characteristics						
Female	0.0088	(0.0397)	2,320	-0.1434***	(0.0374)	6,376
Age	7.8888	(5.7086)	2,320	0.4279	(0.6273)	6,376
Cerebrovascular	0.1599*	(0.0730)	2,320	0.0671*	(0.0320)	6,376
Debilitation	0.0674	(0.0543)	2,320	-0.0170	(0.0358)	6,376
Dementia	-0.0254	(0.0440)	2,320	-0.0015	(0.0259)	6,376
Broken born	0.0419	(0.0448)	2,320	-0.0089	(0.0278)	6,376
Joint disorder	-0.0745	(0.0531)	2,320	-0.0183	(0.0286)	6,376
Heart disease	-0.0666*	(0.0353)	2,320	-0.0333	(0.0243)	6,376
Cancer	0.0057	(0.0228)	2,320	0.0044	(0.0144)	6,376

Respiratory	-0.0420*	(0.0219)	2,320	0.0129	(0.0176)	6,376
Parkinson	-0.0218	(0.0195)	2,320	0.0179	(0.0119)	6,376
Diabetes	-0.0141	(0.0336)	2,320	-0.0231	(0.0201)	6,376
Eye and ear	-0.0252	(0.0316)	2,320	-0.0086	(0.0220)	6,376
Spinal cord	0.0021	(0.0235)	2,320	-0.0072	(0.0125)	6,376

Notes: Estimates are derived from estimating equation (2) without controlling for covariates. Outcomes are replaced by the covariates to test the changes in the characteristics of caregivers before and after the reform. Treat_Post indicates γ in equation (2).

Table A4. Basic statistics for treatment group, control group, and control group including caregivers of CL4-CL5 recipients

	Treatment N=2,050 (1)	Control (caregivers of CL2-CL3) N=6,646 (2)	Robust (caregivers of CL2-CL5) N=10,777 (3)	T-test (3)-(2)
Caregiver's demographic status				
Female (%)	69.07	74.63	74.70	0.08
Recipient-caregiver relationship				
Spouse	34.63	40.03	40.35	0.42
Parent	30.88	28.19	28.96	1.10
Parent-in-law	31.60	27.81	26.65	-1.68
Caregiver's socio-economic status				
Working (%)	48.03	39.56	38.36	-1.58
Household Per-capita Expenditure < median (%)	52.73	49.56	49.60	0.05
Recipient's conditions				
Cerebrovascular	13.95	36.00	39.32	4.39
Debilitation	22.88	26.56	24.88	-2.48
Dementia	5.80	26.89	26.96	0.09
Broken bone	12.83	17.81	17.67	-0.25
Joint disorder	24.88	14.49	12.57	-3.62
Covariates				
Age (year)	61.91	63.87	64.17	0.72
	(13.19)	(23.33)	(28.22)	
Marital Status (%)				
Married	80.78	82.80	82.12	-1.15
Single	10.29	9.03	9.66	1.37
Widowed	3.90	4.48	4.55	0.21
Divorced	5.02	3.59	3.67	0.25
Health Insurance (%)				
National health insurance	50.37	53.66	55.40	2.24
Employee health insurance	37.81	33.70	32.57	-1.54
Advance elderly health insurance	10.64	11.09	10.59	-1.03
Others	1.18	1.56	1.44	-0.59
Pension (%)				
Basic pension	16.73	20.63	21.04	0.64
Basic pension and employee pension	11.46	15.09	15.01	-0.15
Basic pension and mutual aid pension	1.80	2.35	2.36	0.04
National pension	5.17	5.84	5.86	0.07
Noncontributory pension	0.00	0.02	0.01	-0.35
Employee pension	10.20	11.24	11.00	-0.50
Mutual aid pension	3.46	2.57	2.39	-0.74
Governmental pension	0.54	0.41	0.43	0.20
Household size (person)	3.53	3.60	3.62	1.05
	(1.60)	(1.62)	(1.63)	

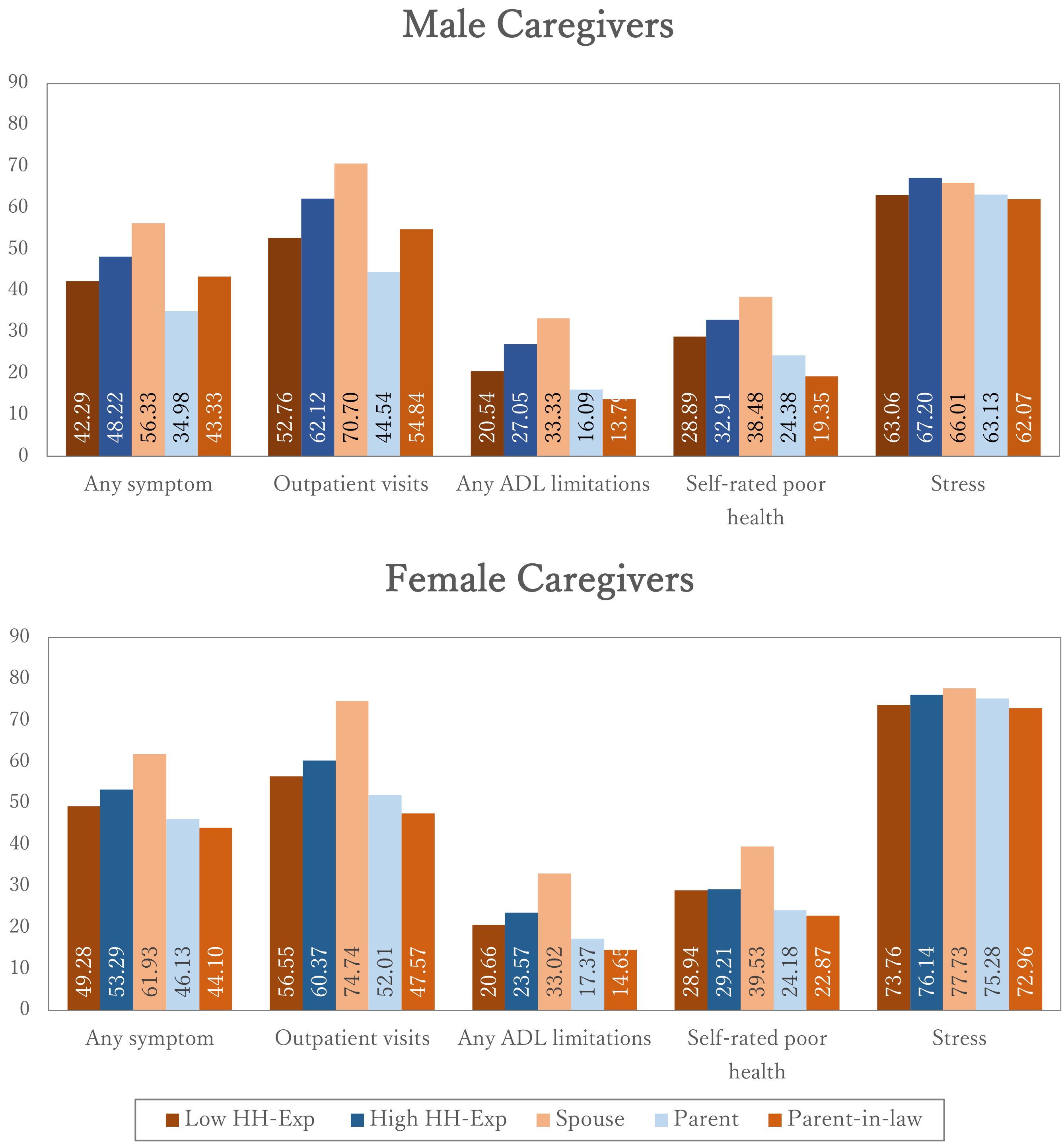


Figure A1.The statistics of main outcomes by gender and SES

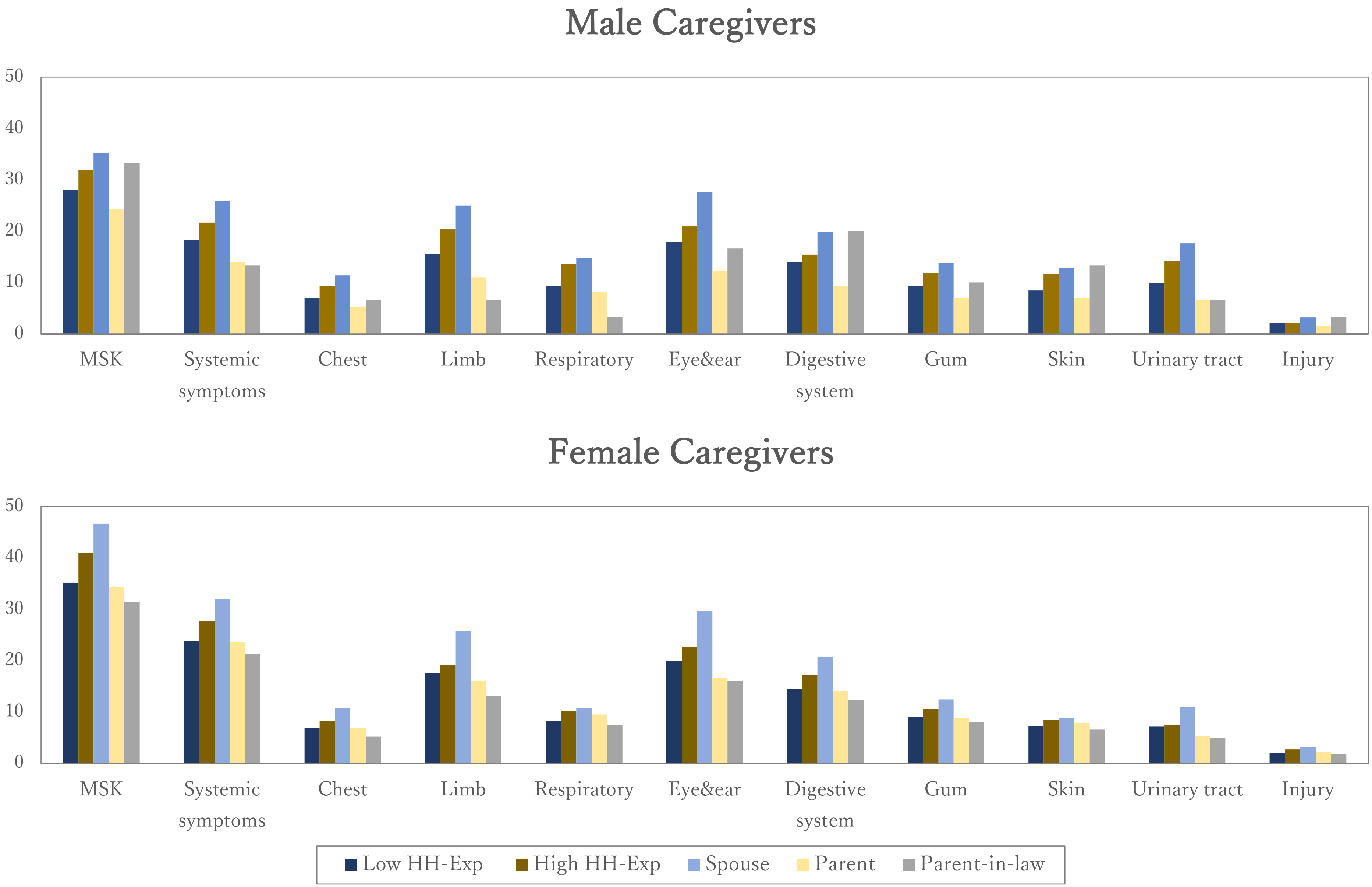


Figure A2. The statistics of specific symptoms by gender and SES

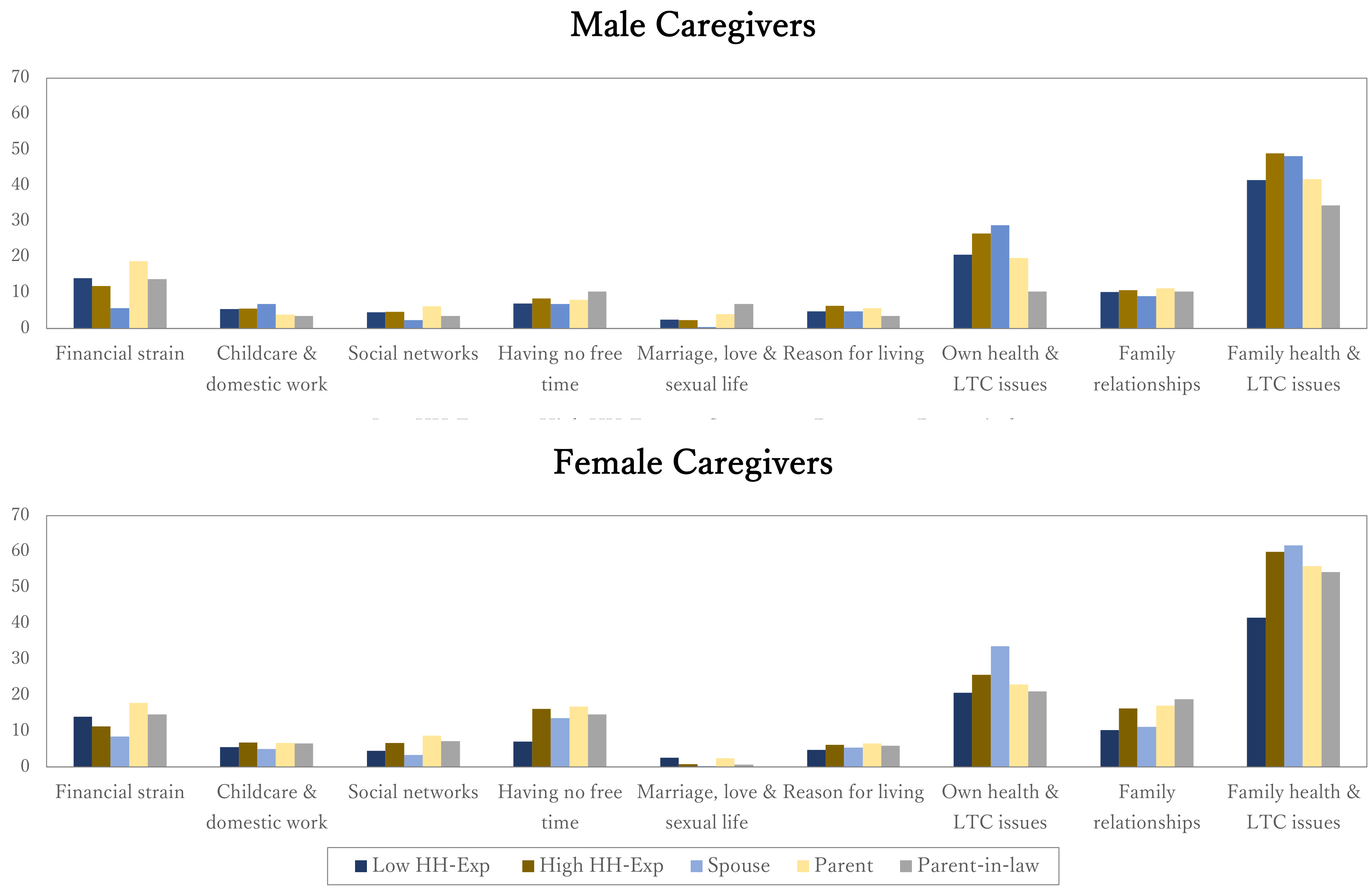


Figure A3. The statistics of specific reasons of being stressed by gender and SES

Table A5. Basic statistics by gender and SES

	Low HH-Exp		High HH-Exp		Spouse		Parent		Parent-in-law	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
	N=1136	N=3006	N=974	N=2840	N=1056	N=2317	N=1164	N=1345	N=31	N=2456
Caregiver's demographic and SES statuses										
Recipient-caregiver relationship										
Spouse	43.31	39.12	48.46	33.84						
Parent	52.82	20.23	47.02	21.90						
Parent-in-law	0.70	35.76	2.16	40.99						
Working (%)	46.95	40.13	48.74	37.90	27.01	15.29	65.76	51.13	83.33	54.87
Household Per-capita Expenditure < median (%)					51.04	55.03	56.71	49.43	27.59	48.01
Covariates										
Age (year)	65.04	62.75	66.19	62.03	78.03	73.21	56.76	55.94	59.19	56.32
	(13.95)	(12.38)	(12.63)	(11.42)	(41.00)	(20.83)	(8.74)	(9.04)	(8.19)	(7.79)
Marital Status (%)										
Married	69.19	83.97	79.16	87.57	100.00	100.00	51.80	49.00	83.87	95.85
Single	20.86	6.49	12.83	6.34	0.00	0.00	31.36	25.50	0.00	0.04
Widowed	3.26	5.46	3.39	3.91	0.00	0.00	5.50	11.30	16.13	4.07
Divorced	6.69	4.09	4.62	2.18	0.00	0.00	11.17	13.90	0.00	0.00
Health Insurance (%)										
National health insurance	55.15	56.44	49.95	48.02	52.37	60.86	54.67	52.75	61.29	44.96
Health insurance	26.87	31.75	31.17	41.98	13.85	13.78	41.78	45.37	32.26	53.86
Advance elderly health insurance	15.07	10.34	16.82	9.29	31.69	23.97	0.87	0.53	0.00	0.41
Others	2.91	1.47	2.06	0.71	2.09	1.39	2.68	1.36	6.45	0.78
Pension (%)										
Basic pension	14.17	25.35	9.24	19.68	17.42	40.61	8.43	11.78	9.68	11.24
Basic pension & employee pension	17.61	11.88	24.23	13.03	26.99	18.60	13.77	9.32	12.90	8.11
Basic pension & mutual aid pension	1.67	1.26	6.06	2.57	4.92	2.46	2.24	1.86	3.23	1.10
National pension	9.51	5.76	5.24	4.23	16.19	12.73	0.09	0.30	0.00	0.04
Employee pension	16.29	9.25	16.53	9.12	24.81	11.87	8.86	7.01	6.45	7.41
Mutual aid pension	4.14	1.06	7.49	2.64	8.24	2.42	3.18	1.42	9.68	1.55
Governmental pension	1.32	0.20	1.03	0.04	2.84	0.04	0.00	0.15	0.00	0.00
Household size (person)	3.20	3.79	3.08	3.65	2.91	3.14	3.31	3.46	3.58	4.44
	(1.55)	(1.72)	(1.41)	(1.51)	(1.48)	(1.60)	(1.42)	(1.36)	(1.26)	(1.47)

B. Placebo tests and model specifications

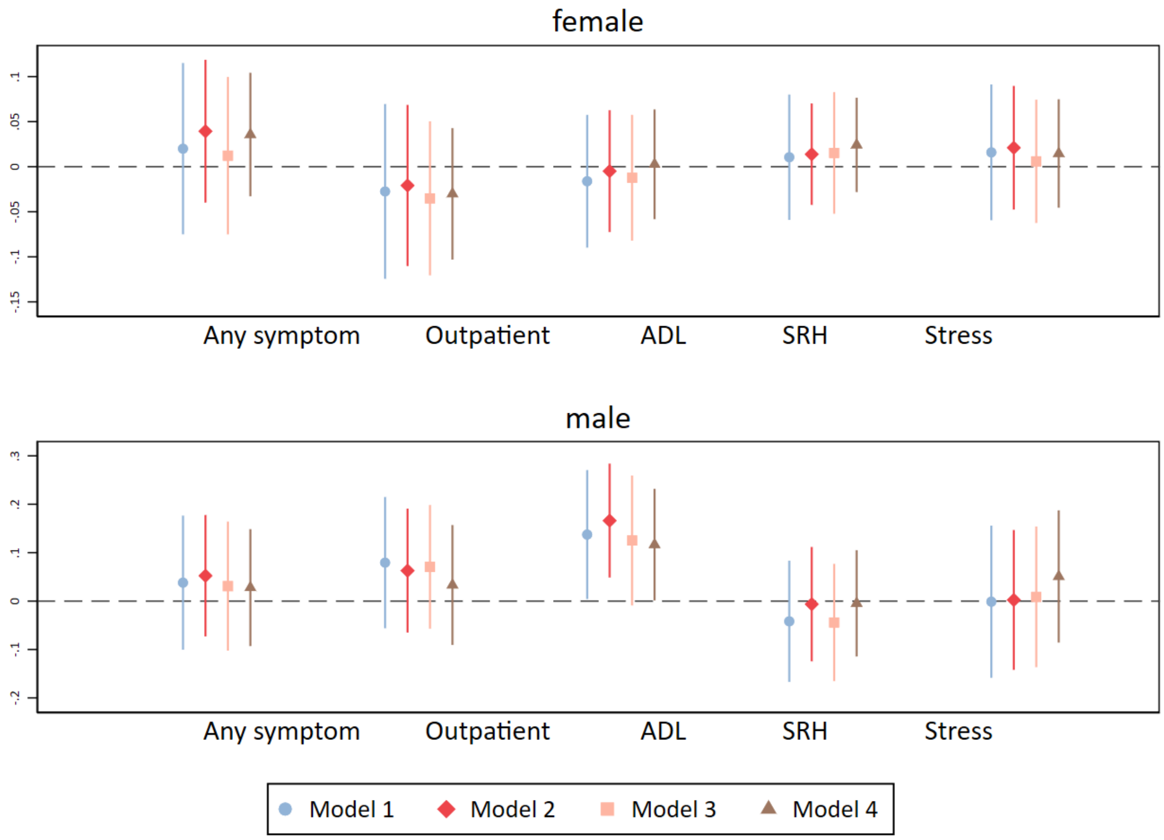
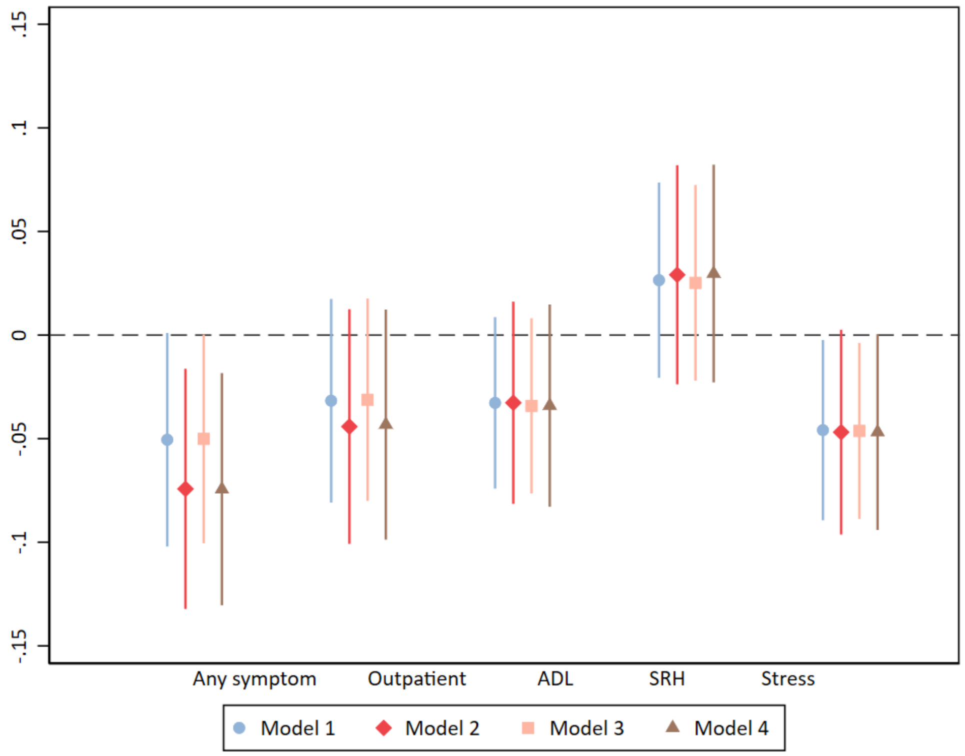


Figure B1. Placebo test: a placebo post period by gender

Panel A



Panel B

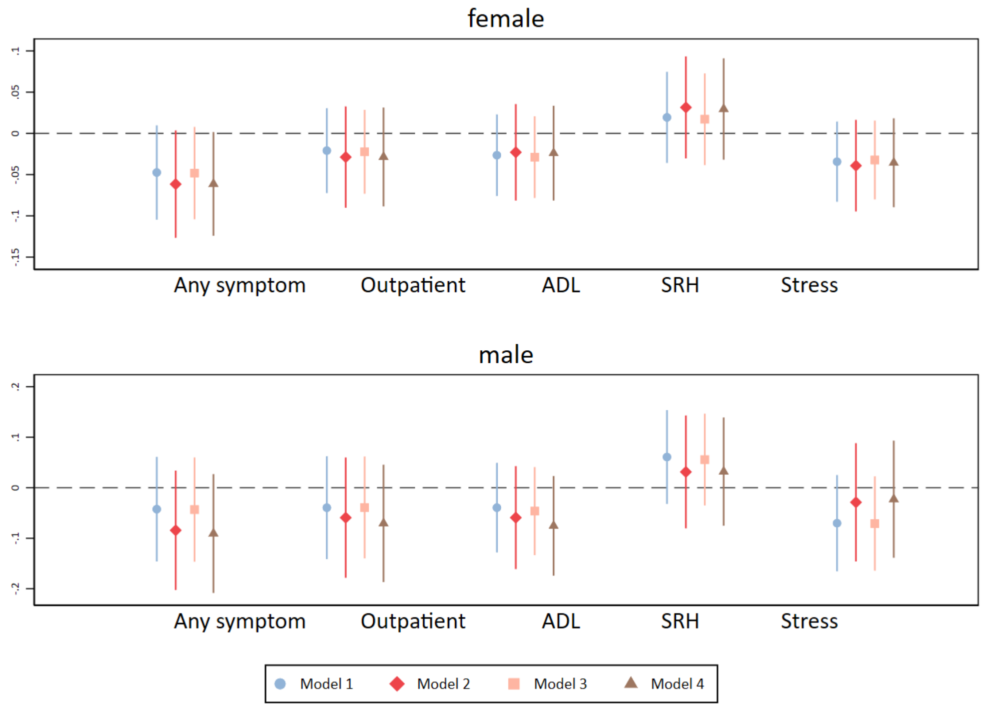


Figure B2. Placebo test: a placebo treatment status

C. Main results across models

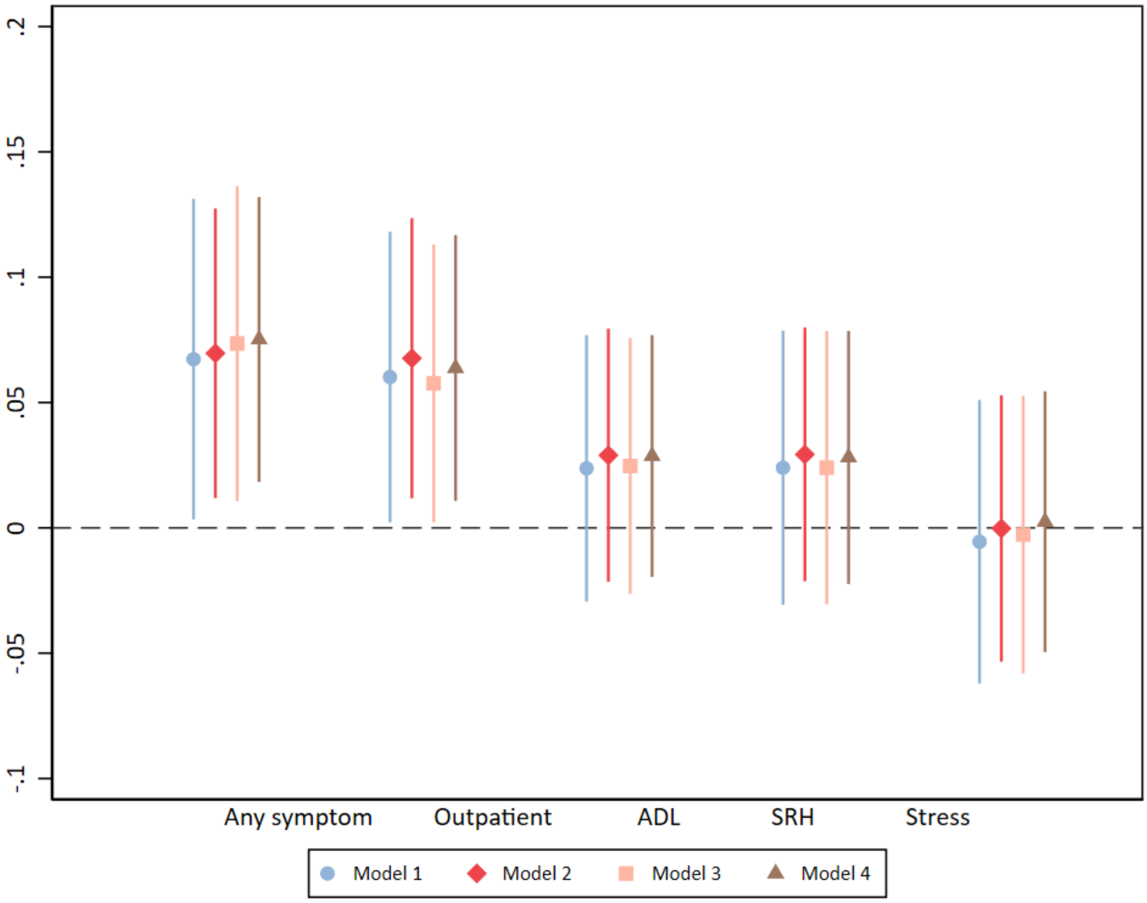


Figure C1. Impact on informal care provision and caregiver well-being across models

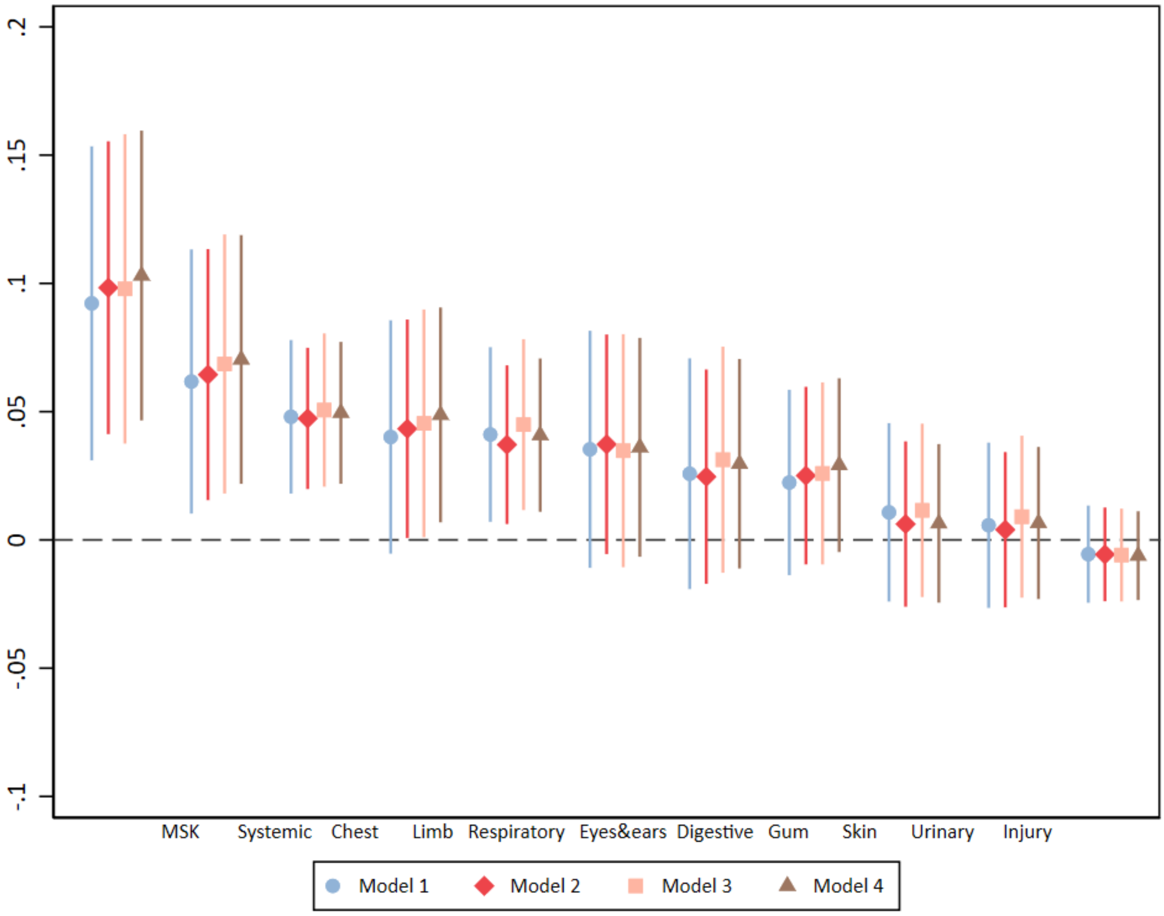


Figure C2. Impact on caregiver well-being across models: specific symptoms

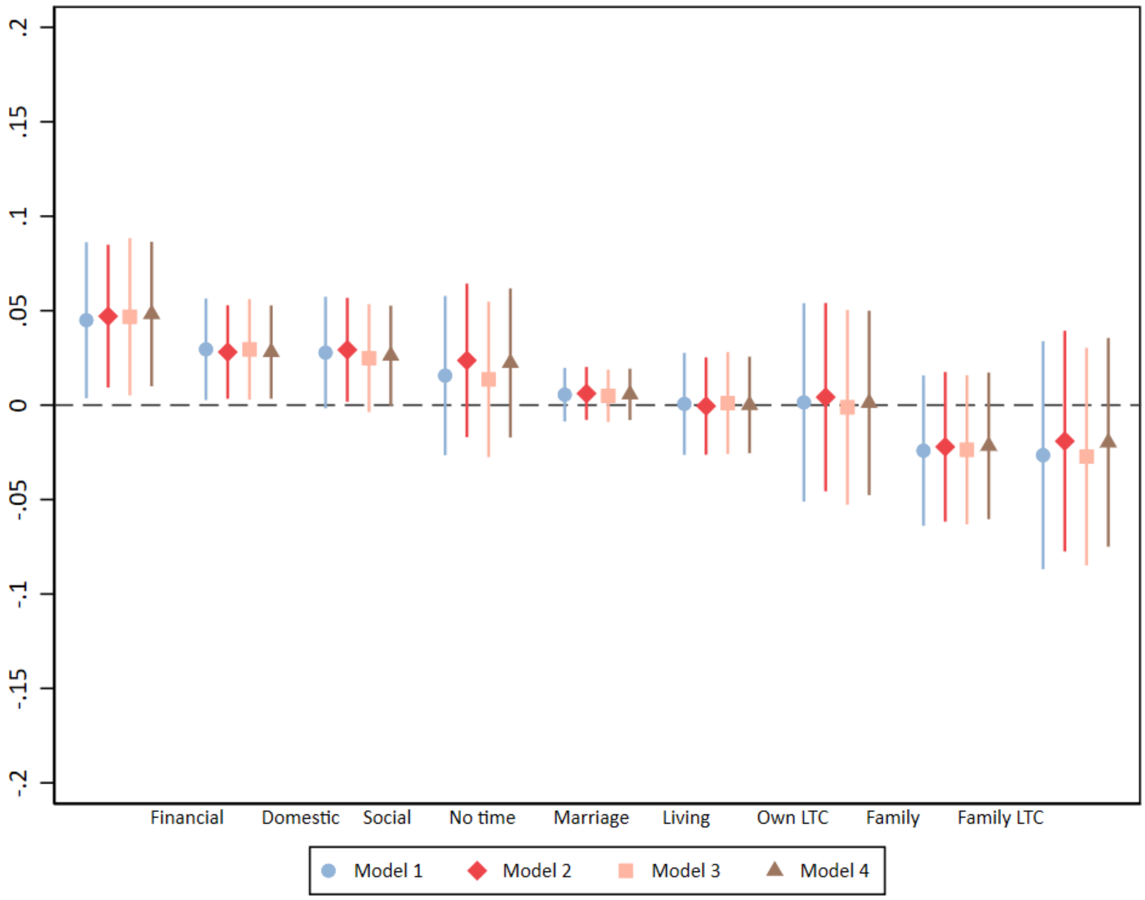


Figure C3. Impact on caregiver well-being across models: reasons for being stressed

D. Results from the aggregated DD-FE Model

Table D1. Overall impacts of the 2006 reform well-being of caregivers

	N	Impact of the Reform	S.E.	95% C.I.			
Panel A: Main results							
Any symptom	8,307	0.074	(0.032)	[	0.011	0.136	]
Outpatient visits	8,211	0.058	(0.028)	[	0.002	0.113	]
ADL limitations	7,571	0.025	(0.026)	[	-0.026	0.076	]
Self-rated poor health	7,823	-0.003	(0.028)	[	-0.057	0.052	]
Being stressed	8,406	0.024	(0.028)	[	-0.031	0.079	]
Panel B: Specific symptoms							
Musculoskeletal system	8,307	0.098	(0.031)	[	0.038	0.158	]
Systemic symptoms	8,307	0.069	(0.026)	[	0.018	0.119	]
Chest	8,307	0.051	(0.015)	[	0.021	0.080	]
Limb	8,307	0.045	(0.023)	[	0.001	0.090	]
Respiratory	8,307	0.045	(0.017)	[	0.012	0.078	]
Eyes and ears	8,307	0.035	(0.023)	[	-0.011	0.080	]
Digestive system	8,307	0.031	(0.022)	[	-0.013	0.075	]
Gum	8,307	0.026	(0.018)	[	-0.009	0.061	]
Skin	8,307	0.012	(0.017)	[	-0.022	0.045	]
Urinary tract	8,307	0.009	(0.016)	[	-0.022	0.041	]
Injury	8,307	-0.006	(0.009)	[	-0.024	0.012	]
Panel C: Reasons for being stressed							
Financial strain	7,823	0.047	(0.021)	[	0.005	0.088	]
Domestic work	7,823	0.030	(0.014)	[	0.003	0.056	]
Social networks	7,823	0.025	(0.015)	[	-0.004	0.053	]
Having no free time	7,823	0.014	(0.021)	[	-0.027	0.055	]
Marriage, love, and sexual life	7,823	0.005	(0.007)	[	-0.009	0.019	]
Reason for living	7,823	0.001	(0.014)	[	-0.026	0.028	]
Own health and LTC issues	7,823	-0.001	(0.026)	[	-0.053	0.050	]
Family relations	7,823	-0.024	(0.020)	[	-0.063	0.016	]
Family health and LTC issues	7,823	-0.027	(0.029)	[	-0.085	0.030	]

Notes: All estimates were derived based on Model 3 of Equation (2), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. N stands for number of observations, S.E. for standard errors that were clustered at the level of care level, year, and prefecture, and 95% C.I. for confidence intervals at the 95% level.

Table D2. Multiple testing for the aggregated main results: p-values of the estimates

	Full	
	Origin	**Simes**
Panel A: Main results		
Any symptom	0.0218	0.0945
Outpatient visits	0.0417	0.1165
ADL limitations	0.3425	0.5398
Self-rated poor health	0.3880	0.5604
Being stressed	0.9238	0.9647
Panel B: Specific symptoms		
Musculoskeletal system	0.0015	0.0130
Systemic symptoms	0.0078	0.0430
Chest	0.0009	0.0120
Limb	0.0448	0.1165
Respiratory	0.0083	0.0430
Eyes and ears	0.1332	0.2887
Digestive system	0.1639	0.3043
Gum	0.1517	0.3034
Skin	0.5032	0.6180
Urinary tract	0.5740	0.6489
Injury	0.5229	0.6180
Panel C: Reasons for being stressed		
Financial strain	0.0277	0.0970
Domestic work	0.0299	0.0970
Social networks	0.0881	0.2082
Having no free time	0.5163	0.6180
Marriage, love, and sexual life	0.4872	0.6180
Reason for living	0.9360	0.9647
Own health and LTC issues	0.9647	0.9647
Family relations	0.2400	0.4159
Family health and LTC issues	0.3530	0.5398

Notes: The multiple testing is conducted based on Model 3 of Equation (2), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. "Origin" stands for the p-values based on clustered standard errors; "Simes" standards for the p-values further adjusted for multiple-hypotheses testing.

E. Gender disparities in the impacts of the reform

Table E1. Multiple Testing for the aggregated DD results by gender: p-values of the estimates

	Female		Male	
	Origin	**Simes**	**Origin**	**Simes**
Panel A: Main results				
Any symptom	0.0993	0.1757	0.3814	0.7576
Outpatient visits	0.0262	0.0814	0.7604	0.9169
Any ADL limitations	0.0488	0.1268	0.2467	0.7348
Self-rated poor health	0.2879	0.3940	0.8650	0.9169
Being stressed	0.3149	0.4094	0.0426	0.3689
Panel B: Specific symptoms				
Musculoskeletal system	0.0037	0.0238	0.1266	0.4700
Systemic symptoms	0.0247	0.0814	0.2614	0.7348
Chest	0.0002	0.0027	0.9169	0.9169
Limb	0.1193	0.1757	0.4662	0.7576
Respiratory	0.0003	0.0027	0.3109	0.7348
Eyes and ears	0.1049	0.1757	0.8903	0.9169
Digestive system	0.1217	0.1757	0.7702	0.9169
Gum	0.1101	0.1757	0.7944	0.9169
Skin	0.0282	0.0814	0.0093	0.1213
Urinary tract	0.0879	0.1757	0.1119	0.4700
Injury	0.4338	0.5235	0.9136	0.9169
Panel C: Reasons for being stressed				
Financial strain	0.0164	0.0775	0.6458	0.9169
Domestic work	0.0179	0.0775	0.7915	0.9169
Social networks	0.1189	0.1757	0.4510	0.7576
Having no free time	0.5440	0.5893	0.6895	0.9169
Marriage, love, and sexual life	0.0661	0.1562	0.2905	0.7348
Reason for living	0.6554	0.6554	0.4427	0.7576
Own health and LTC issues	0.4951	0.5597	0.0633	0.4115
Family relations	0.4429	0.5235	0.4184	0.7576
Family health and LTC issues	0.6308	0.6554	0.0870	0.4525

Notes: The multiple testing is conducted based on Model 3 of Equation (2), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. "Origin" stands for the p-values based on clustered standard errors; "Simes" standards for the p-values further adjusted for multiple-hypotheses testing.

F. Gender Disparities in the impact of the reform across SES

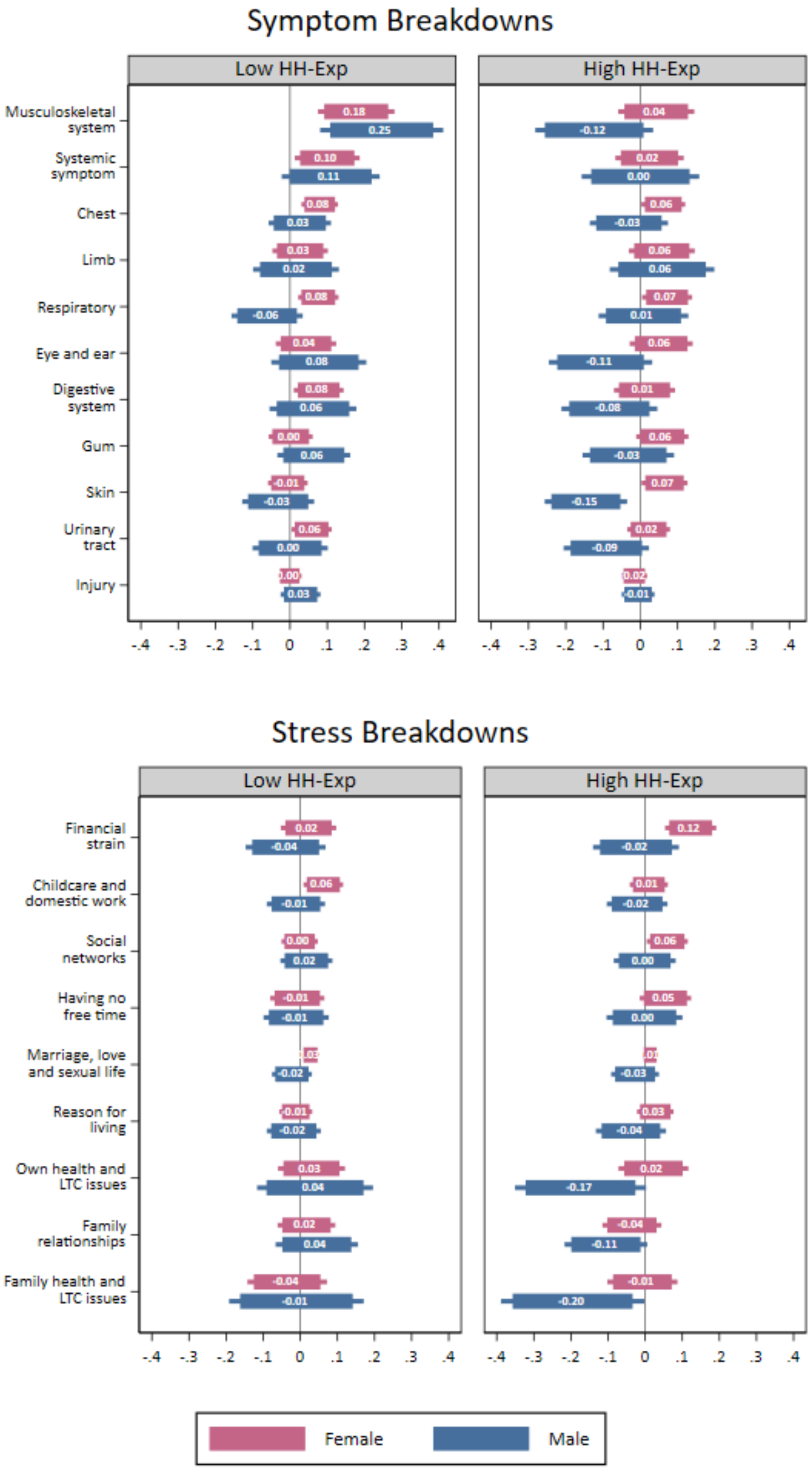


Figure F2. Heterogenous impact on specific symptoms by gender: income level

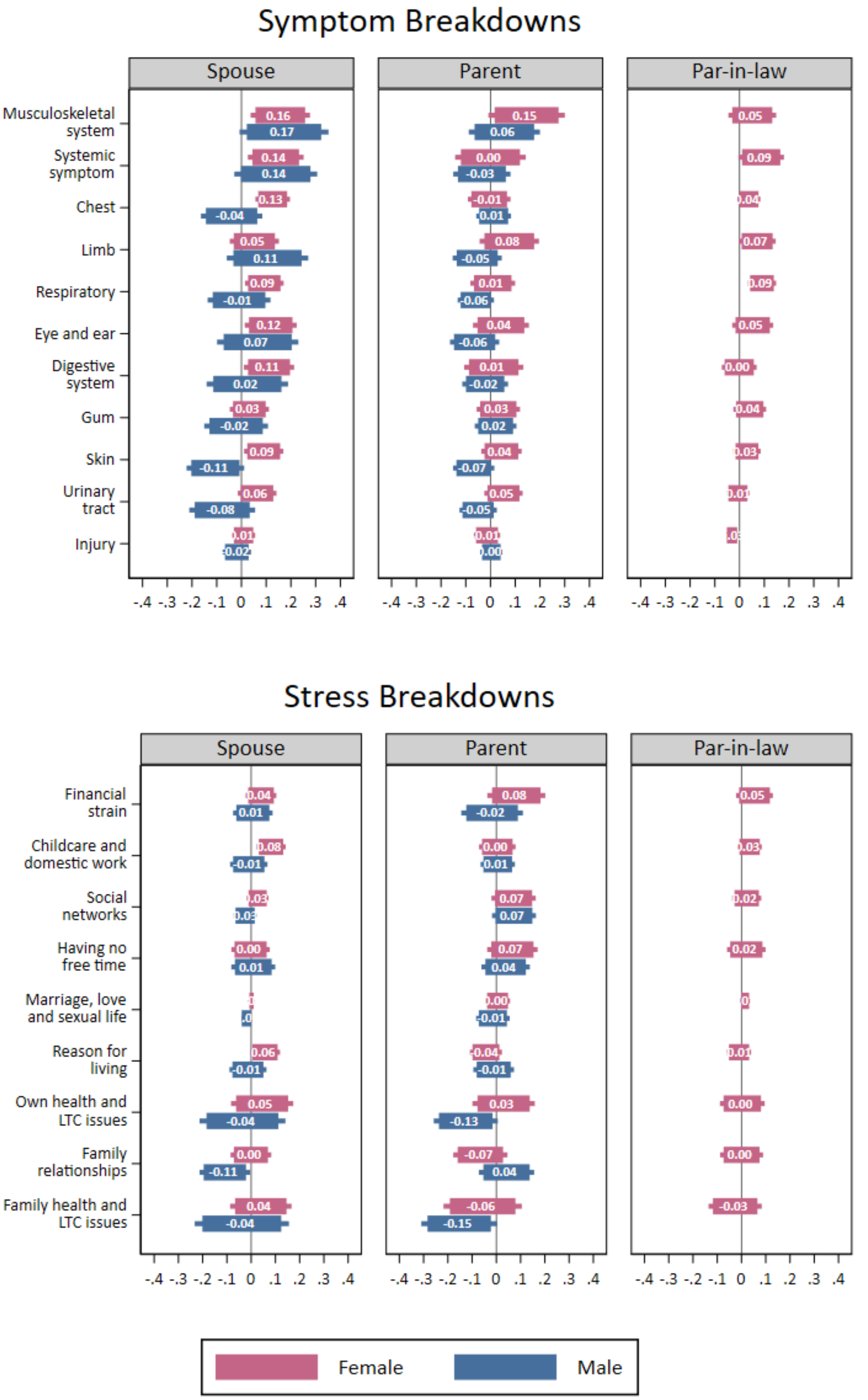


Figure F3. Heterogenous impact on specific symptoms by gender: caregiver-recipient relationship

G. Additional Impacts of the Reform

Table G1. Overall impacts of the 2006 reform on informal care provision

	Impact of the Reform	S.E.	95% C.I.			
Full sample	0.172	(0.024)	[	0.219	0.125	]
Female sample	0.183	(0.028)	[	0.237	0.128	]
Low HH-Exp	0.203	(0.043)	[	0.287	0.119	]
High HH-Exp	0.162	(0.043)	[	0.247	0.077	]
Spouse	0.238	(0.054)	[	0.344	0.133	]
Parent	0.086	(0.068)	[	0.220	-0.047	]
Parent-in-law	0.238	(0.045)	[	0.326	0.151	]
Male sample	0.143	(0.051)	[	0.242	0.043	]
Low HH-Exp	0.107	(0.081)	[	0.265	-0.051	]
High HH-Exp	0.101	(0.081)	[	0.260	-0.057	]
Spouse	0.108	(0.080)	[	0.266	-0.050	]
Parent	0.173	(0.075)	[	0.320	0.026	]
Parent-in-law	-	-	[	-	-	]

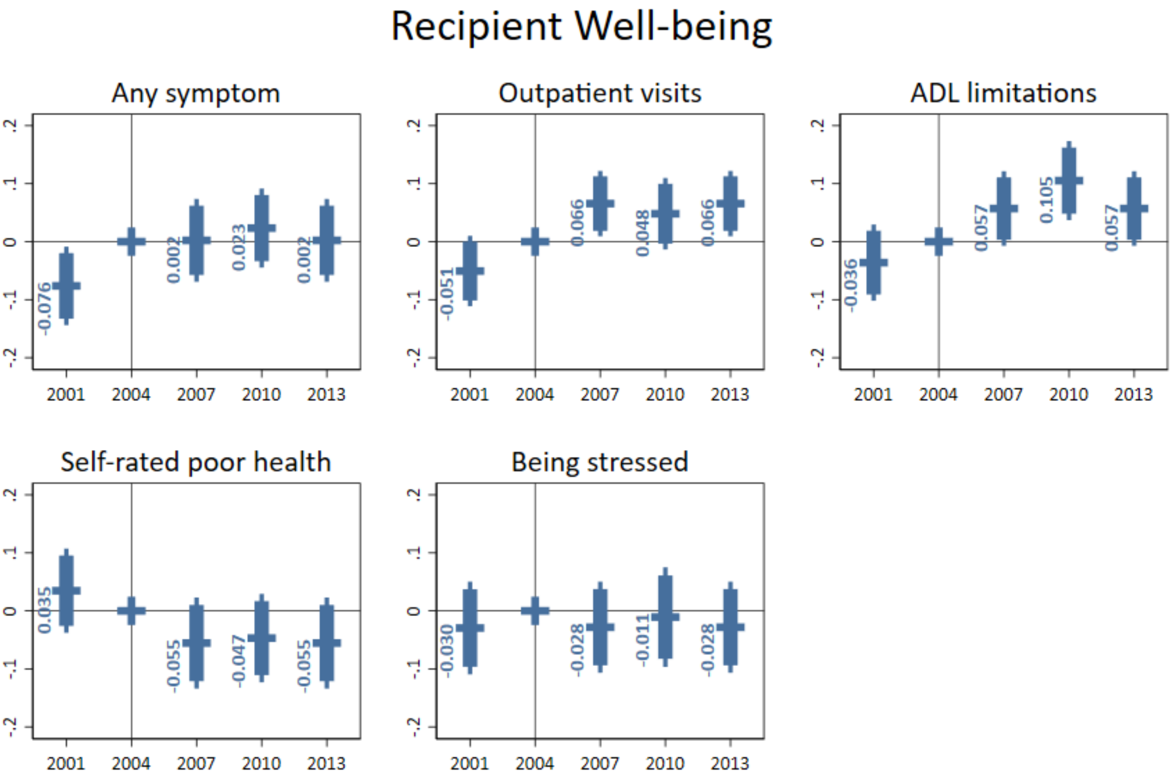


Figure G2. The impacts of the 2006 reform on well-being of care recipients over time

Notes: All estimates were derived based on Model 3 of Equation (1), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. The y-axes share a uniform scale for visual comparability. The markers stand for the estimates of α_t in Equation (1). The thicker and thinner bars represent confidence intervals at the 90% and 95% levels, respectively. Standard errors were clustered at the level of care level, year, and prefecture.

H. Robustness Checks

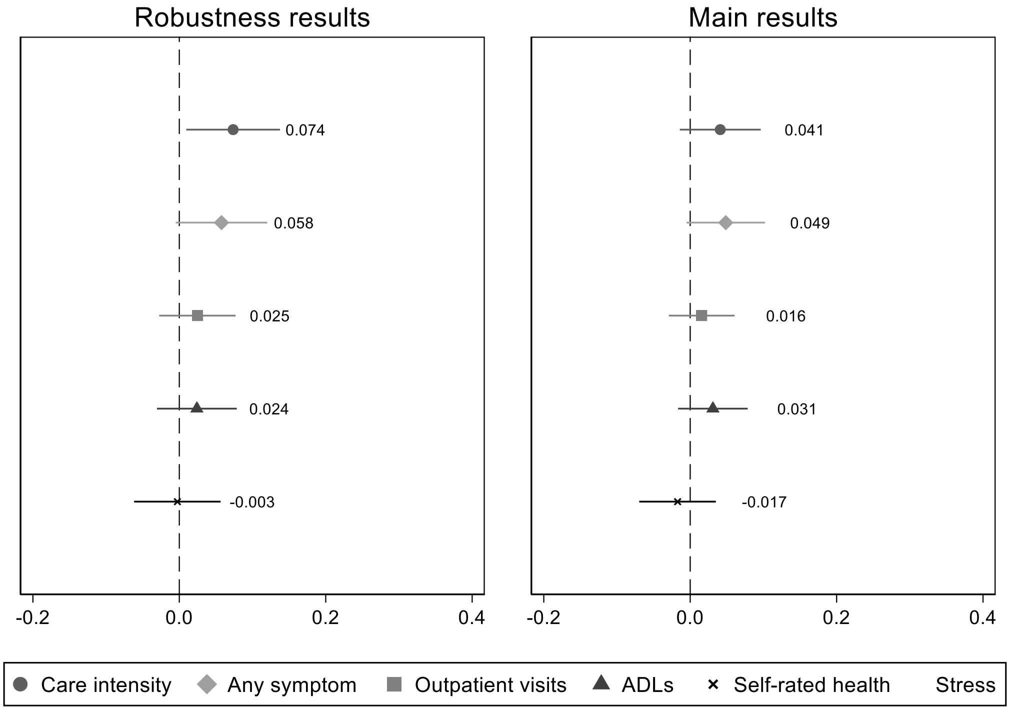


Figure G1. Robustness checks

Notes: For the robustness results, the markers with 95% confidence intervals represent the estimates of γ_1 from Model 3 of Equation (3), which controlled for the full set of caregiver characteristics and recipients' gender and age, as well as year FE, care level FE, prefecture FE, and prefecture-year trend. For the main results, the markers with 95% confidence intervals correspond to the estimates presented in Panel A of Table 3. Standard errors are clustered at the level of care level, year, and prefecture.

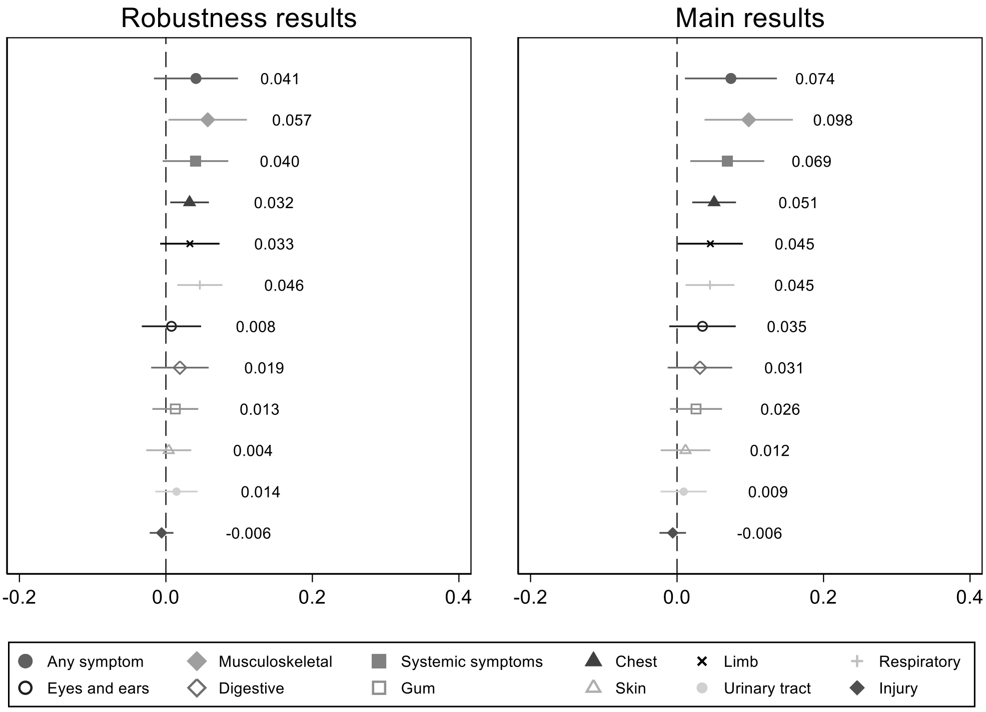


Figure G2. Robustness check: specific symptom

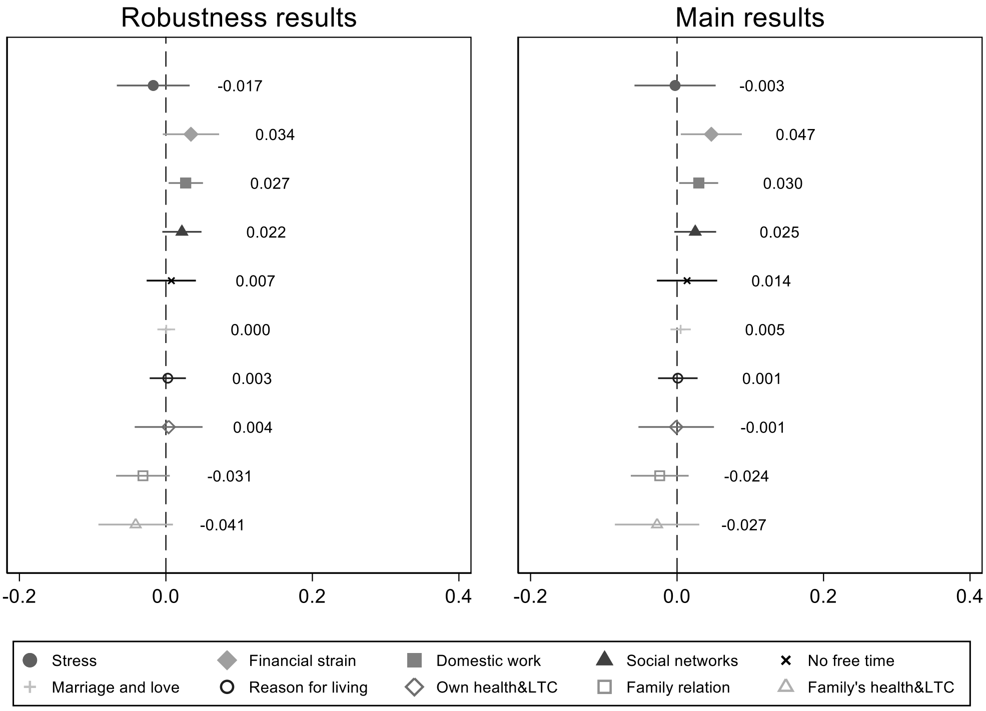


Figure G3. Robustness check: reasons for being stressed