



## Mental health effects of caregivers respite: Subsidies or Supports?

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### ABSTRACT

We study the causal effect of the introduction of caregiving respite in the form of hours of home help (caregiving supports) and financial subsidy (caregiving allowance) on the mental health of caregivers. We exploit evidence of a policy intervention that universalized previously means-tested caregiving subsidies and supports in Spain. Our estimates suggest evidence of an heterogeneous effect depending on the intensity of care provided. We find that caregiving supports reduce the probability of depressive symptoms among caregivers providing more than 50 hours of care. In contrast, caregiving subsidies give rise to a reduction in the probability of depressive symptoms among caregivers providing less than 50 hours of care. Consistently, we find evidence of an improvement in life satisfaction upon the receipt of subsidies and home supports. The latter effect is higher among part-time caregivers who spend between 20 and 50 caregiving hours/week which is explained by behavioural and preventive lifestyle changes. Finally, we estimate the 'hypothetical caregiving subsidy' amount that would have fully compensated caregivers' for their wellbeing losses. We find estimates ranging between 800 and 850 euros/month, a magnitude well above the actual subsidy in Spain.

### Introduction

Unpaid caregiving gives rise to both emotional and monetary welfare losses for those individuals providing care. The latter includes forgone employment and earnings, loss of independence, and impacts on health, employment and financial decisions of caregivers (Ettner et al., 1994; Carmichael and Charles, 2003; Heitmueller and Inglis 2007; Van den Berg and Ferrer-i Carbonell, 2007; Coe and Van Houtven, 2009; Hurd et al., 2013; van den Berg et al., 2014; Rattinger et al., 2015; Leggett et al., 2018). Consistently, some studies document evidence of an increased use of antidepressants, tranquilizers, painkillers and gastrointestinal agents among caregivers (Schmitz and Stroka, 2013; Stroka, 2014). However, the empirical literature has not yet reached a consensus on how various forms of financial and non-financial respite affect caregivers mental health.<sup>1</sup> One strategy to retrieve causal estimates lies in examining the effect of unanticipated policy interventions that exogenously change the financial and non-financial conditions under which caregivers provide care,<sup>2</sup> that is, the effect of caregiving

subsidies and supports.

Supports can provide caregivers with respite by easing time (time windfalls) that caregivers can allocate to leisure, sleep or employment. Similarly, caregiving subsidies ease the financial constraints (income windfalls) that either caregivers or care receivers face. Both interventions can improve caregivers' well-being, even when subsidies do not directly target caregivers, as they allow the purchase of care in the market.<sup>3</sup> However, it is unclear how should governments design such subsidies and/or supports. Cash subsidies (caregiving allowances) proponents argue that increasing care-recipients' ability to choose the caregiver results in higher quality of care (Linsk et al., 1992; Simon-Rusinowitz et al., 1998), and overall, improves the caregiver's time flexibility (Mahoney et al., 2002) even when they might not entirely be use to purchase care (Costa-Font and Vilaplana, 2017). Consistently, some studies have documented evidence of emotional, physical, and financial wellbeing improvements after the introduction of the Cash and Counseling Demonstration and Evaluation (CCDE) program, which entails flexible monthly allowances for Medicaid beneficiaries to hire

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<sup>1</sup> A metaanalysis of previous evidence finds both positive and negative effects of caregiving, yet the negative effects are more prominent among lower-income individuals (Pinquart and Sorensen, 2003).

<sup>2</sup> Alternative strategies use instrumental variables to estimate local average treatment effects, using within household variation in the presence of a single parent (Heger, 2017).

<sup>3</sup> Some evidence documents that they pass on part of the subsidies to their children (Costa-Font et al., 2016).

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informal caregivers as paid workers (Foster et al., 2003). Other studies report an effect of caregiving subsidies on care choices and household behaviours (Ettner, 1994; McKnight, 2006).<sup>4</sup> However, do subsidies exert a different effect on caregivers mental wellbeing than home care supports? Do subsidies compensate caregivers for the stress and employment and other losses related to caregiving?

This paper examines the effect of the introduction of both caregiving subsidies and supports on the mental health of *spousal caregivers*. We exploit evidence from the introduction of the Sistema de Autonomía y Ayuda a la Dependencia (SAAD) in Spain, a program that universalised and expanded the caregiving subsidies and supports from 2007. We specifically use two different datasets, a longitudinal panel survey (Survey of Health, Ageing and Retirement in Europe, SHARE) and a cross-sectional health survey (Spanish National Health Survey, NHS). Both datasets contain detailed information on a number of important covariates that serve as controls, and allow us to exploit the different regional rollout of SAAD across the period 2004–2011. To further test the robustness of our results, we both compare both OLS and instrumental variable (IV) estimates (to accommodate the potential endogeneity of reform implementation).<sup>5</sup>

We contribute to the literature as follows. First, we document causal evidence of the effects of subsidies and supports on partners/spouses caregivers' mental wellbeing. We find, consistently with previous studies, that although caregiving increases the probability of depressive symptoms (Bookwala, 2009; Hansen and Slagsvold, 2013; Do et al., 2015; Hiel et al., 2015; Heger, 2017; Zwart et al., 2017),<sup>6</sup> both *subsidies and supports* can ameliorate such effects. However, we find that caregiving subsidies give rise to a 14.2 pp. reduction in the probability of depressive symptoms, compared to a smaller 8.6 pp. decline among those receiving home supports. Consistently, we document an average 15% increase in the life satisfaction of caregivers receiving subsidies. However, the effect varies depending on the intensity of the care provided. Indeed, the reduction in the likelihood of depressive symptoms more than doubles among high-intensity caregivers (caregivers that spend between 50 h/week providing care) when they receive supports rather than subsidies (−33.4 pp. vs −15.6 pp. for more than 100 h; −27.3 pp. vs −10.3 pp. for between 50 and 100 h). However, the opposite is true among lower-intensity caregivers (spending less than 50 h/week). We find a more acute reduction in the probability of depressive symptoms among those receiving subsidies (−9pp.) compared to those that receive supports (−5.1 pp.).

We estimate that every 100 euros of 'investment' in long term care benefits, reduce the probability of depressive symptoms among caregivers in up to 5 pp, among individuals receiving subsidies, and up to 1.87 pp. among individuals receive supports. Our results are robust to the use of an instrumental variable strategy to account for the potential endogeneity of the type of benefit received (subsidies or supports). We also report difference-in-differences estimates using panel data, as well as restricting our analysis to caregivers available in all waves. Given that the results are similar, they suggest no evidence of selection bias.

The paper is organized as follows. Section 2 reviews the relevant literature on caregiving and mental health and Section 3 outlines the characteristics of the reform in Spain. Section 4 describes the data and the econometric model and section 5 reports the results. Finally, section 6 concludes.

<sup>4</sup> So far, the debate on the effect of subsidies on wellbeing is unsettled (Pinquart and Sörensen 2003; Andrén and Elmståhl, 2005; Fredman et al., 2008; Calvo-Perxás et al., 2018).

<sup>5</sup> We have tested the robustness of our estimates to other instruments used in the literature, such as the number of coresident daughters and number of coresident daughter who have not recently move to parents' household.

<sup>6</sup> When different European countries are compared, these effects happen to be especially larger in South-Europe (Brenna and Di Novi, 2016).

## Related literature

Caregivers are more likely to suffer from depression and to report a lower quality of life compared to non-caregivers (Papastavrou et al., 2007; Molyneux et al., 2008; Buyck et al., 2011). They are also more likely to consume prescribed medications and use health care (Schulz and Martire 2004, Serrano-Aguilar et al., 2006). Pearlin et al., (1990) argued that the so-called "captivity role" e.g., the feeling of being forced to care, is a prominent source of caregiver stress. Indeed, caregiver depression is directly related to the feeling of being trapped in a caregiving role, with no clear way out and the expectation that the current situation can only get worse (Ducharme et al., 2007). Informal caregiving is especially harmful to caregivers' well-being when they perceive a lack of agency (Schulz et al., 2012).

Caregivers experiencing a higher than average caregiving burden tend to be older (Rinaldi et al., 2005), female (Papastavrou et al., 2007, Campbell et al., 2008) and co-resident with care receivers (Conde-Sala et al., 2010). Indeed, several studies have reported that *spousal caregivers experience higher level of stress compared to other caregivers* (Rinaldi et al., 2005; Andrén and Elmståhl, 2005). Pinquart and Sörensen (2011) document that spousal caregivers are more likely to report depressive symptoms as well as a greater physical and financial burden than adult children caregivers. Similarly, caregivers of elderly spouses tend to be older, and may have themselves physical limitations that also add to the burden of caring for their spouse (AARP Public Policy Institute, 2013).<sup>7</sup> Similarly, social isolation is another common problem faced by caregivers (Aneshensel et al., 1993). Accordingly, the literature documents a positive and significant association between social isolation and caregiver burnout (Akkus, 2011).

Vulnerable caregivers are at greater risk when they do not benefit from any kind of external supports and subsidies (Sussman and Regehr 2009). If a caregiver's health deteriorates to the point that they can no longer provide care, the care-receiver may be at risk of being placed in a nursing home. Such a prospect adds to the caregiver's stress (Sanders and Power, 2009). Conversely, the caregiver's burden can be alleviated with the design of a network of supports, such as home care services. Studies of family caregivers have documented that when caregivers receive information related to physical care and disease progression, they experience a lower prevalence of depression and enjoy a higher quality of life (Emanuel et al., 2000; McDonagh, et al., 2004). Van den Berg (2007) analysed the effect of a cash benefit (mean value of which was €283) paid to a sample of caregivers, and establish that financial support reduced caregivers' stress and increases caregivers self-reported wellbeing.

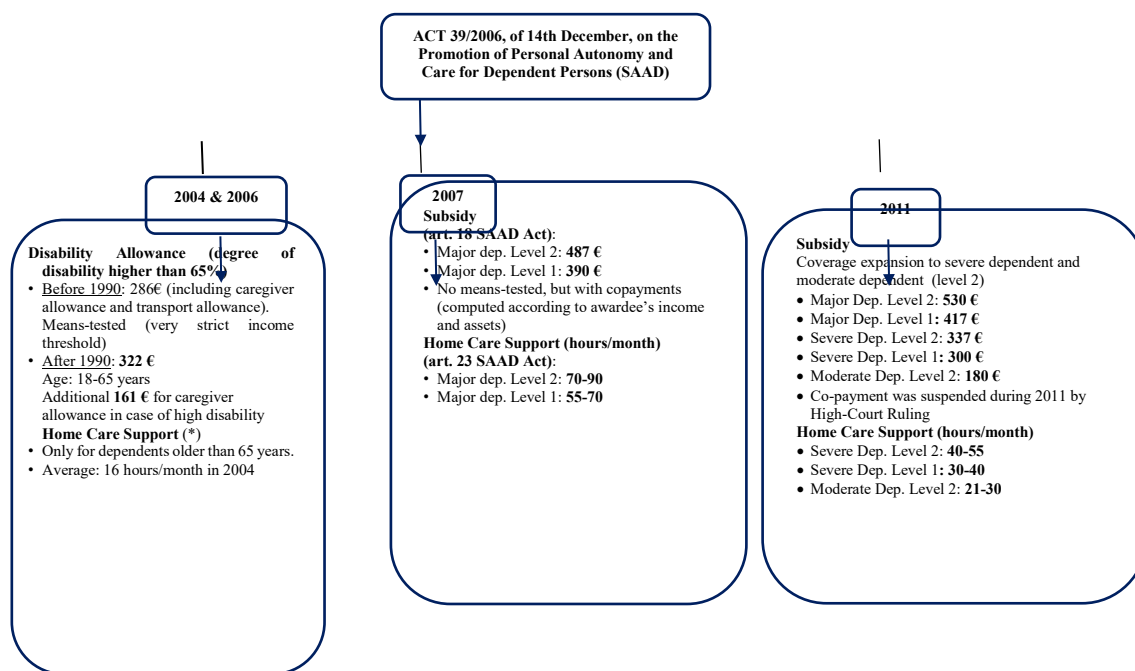
## The Spanish SAAD

### *Institutional background*

We draw on evidence from a reform from in Spain, namely the introduction of a universal expansion of publicly funded supports and subsidies. That is, we examine the effect of the Act 39/2006, of 14 December, on the Promotion of Personal Autonomy and Care for Dependent Persons (SAAD),<sup>8</sup> which was effectively a public funding expansion of subsidised long-term care services and supports for all Spaniards (see Fig. 1 for a calendar of events). Before the introduction of SAAD, subsidies were means tested and funded by limited local

<sup>7</sup> The specific tasks required, alongside the level of support and the ability to cope with caregiver concerns have also been related with perceived caregiver's burden (Pearlin et al., 1990; Snyder, 2000).

<sup>8</sup> Available at: ACT 39/2006, of 14th December, on the Promotion of Personal Autonomy and Care for Dependent Persons – SID (usal.es).



**Fig. 1. Implementation of the System of Autonomy and Care for Dependent Persons** Wave field time overview: Wave 1: April-December 2004; Wave 2: October-December 2006 and January-October 2007; Wave 4: January-November 2011. For a better understanding of the amount of caregiver allowance and disability allowance, they can be compared with minimum wage: 460.50 €/month (2004), 540.90 €/month (2006), 570.60 €/month (2007), 641.40 €/month (2011). (\*) Las personas mayores en España IMSERSO (2004).

authority budgets.<sup>9</sup> Disability allowances were only granted in case of disability to a degree higher than 65 %<sup>10</sup> and under very strict income thresholds.

The reform was largely unexpected, as it resulted from the unexpected and election of a new socialist government (after the 2004 Madrid bombings only three days before parliamentary elections) that delivered no overall majority in parliament and, hence had to negotiate the reform until the very last month it was implemented. Although initially the system was designed around a network of caregiving supports (home help), a caregiving subsidy was introduced to compensate informal caregivers for their opportunity costs of providing care. Furthermore, another important characteristic of the SAAD is that it was implemented by Spanish regions (autonomous communities) rather than by the central government. Such development was regionally heterogeneous, and specifically, it was faster in some regions (run by the incumbent party in the central government) than others (Costa-Font, 2010).<sup>11</sup>

Unlike in the pre-reform period, where publicly subsidised care was means-tested, the introduction of SAAD universalised the access to care, regardless of age or other demographic characteristics. After a needs test, each applicant received an ‘individual care plan’ which specified the supports that best matched their needs (after consulting the family). Individuals were classified into four scales ‘not dependent’, ‘moderate’,

‘severe’ or ‘major dependent’ following the official ranking scale defined by SAAD.<sup>12</sup>

The range of services available included in-kind services (such as home care supports,<sup>13</sup> day and night centres and residential care), as well as subsidies<sup>14</sup> to compensate for the opportunity costs of informal caregiving. The final responsibility for the ‘individual care plan’ lied

<sup>12</sup> The Ranking Scale evaluates 47 tasks grouped into ten activities (eating and drinking, control of physical needs, bathing and basic personal care, other personal care, dressing and undressing, maintaining one’s health, mobility, moving outside home and housework). Each task is assigned a different weight, and there exists a different scale for individuals with mental illness or cognitive disability. Additionally, the evaluation considers the degree of supervision required to perform each task. The final score is the sum of the weights of the tasks for which the individual has difficulty times the degree of supervision required. The degree of dependency is determined as the result of the sum: no eligible (less than 25 points), moderate dependent (25 to 49 points), severe dependent (50 to 74 points) and major dependent (above 74 points). Royal Decree 504/2007, of 20 April, that approves the dependency rating scale established by the Act 39/2006, of 14 December of *Promoción de la autonomía personal y atención a las personas en situación de dependencia*.

<sup>13</sup> Home care supports are provided by professional caregivers and include services related to household work and personal care. Quality standards were defined and professional services to become formal caregivers were accredited by regional authorities.

<sup>14</sup> The informal caregiver selected by the care-receiver or the family must satisfy the following conditions: (i) older than 18 years of age and legal resident in Spain; (ii) he/she has been co-resident of the care recipient for at least one year before the application, or in the event of no co-residence, the caregiver must be registered in either the same or a neighbouring municipality for at least one year before application. In addition, other criteria refer to minimum housing conditions deemed to be suitable to the needs specified in the individual care plan.

<sup>9</sup> Access to different social services (home care supports, day centres and nursing homes) was conditioned on the score obtained in a rating scale that considered various characteristics (age, disability status, economic resources, and family situation).

<sup>10</sup> Order 8 March 1984, of the Ministry of Labour and Social Security that establishes the ranking scales for the determination of the disability degree and valuation of different situations to be entitled to benefits and subsidies recognized in the Royal Decree 383/84.

<sup>11</sup> Figure A1 displays a negative relationship between the percentage of socialist vote and the percentage of subsidies (with respect to total benefits).

with the regional department of social services.<sup>15</sup> Since its implementation in 2007, the receipt of the subsidy expanded the social security entitlements of the informal caregivers beyond retirement age<sup>16</sup>.

The receipt of the caregiving allowance was unconditional, that is, the cash subsidy was paid directly into the care recipient's bank account<sup>17</sup> and was incompatible with other benefits (in particular, home care supports) except for telecare. Fig. 1 describes the evolution of subsidies and supports. Subsidies ranged between €390/month and €487/month in 2007 (nominal euros) for 'major dependants' and increased to a range between 417€ and €530 in 2011.<sup>18</sup> The spirit of the law has been to bestow power on the care-receiver to monitor their caregiver's activity. Fig. 2 displays the evolution of subsidies both in absolute and relative terms (as percentage of total benefits) since 2008, revealing that the uptake of subsidies drastically expands over time.<sup>19</sup>

Regarding the provision of supports, the amount awarded to individuals classified as 'major dependants' or level 1 (70–90 h/month) was four times the average provision before the reform (16 h/month), and three times the average provision for the case of 'major dependants' of level 2 (55–70 h/month). Between 2007 and 2011 the system extended to 'severe dependants' (level 1 and 2) and 'moderate dependants' (level 2).<sup>20</sup>

### The identification strategy

In this section we examine whether the caregiver's mental health and, more specifically, the probability of exhibiting depressive symptoms was modified with the implementation of SAAD's subsidies and supports. The uniqueness of the Spanish reform lies in that the exposure to

the reform can be clearly identified on the basis of the following factors: the severity of their disability and the needs assessment, the region of residence as it affects the implementation of the reform,<sup>21</sup> and the time when the need emerged<sup>22</sup>.

We rely on data from four waves of the SHARE data for Spain, and more specifically 2004, 2006, 2007 and 2011's waves. In wave 2 it is possible to distinguish between those interviewed in 2006 and in 2007, which allows us to increase the pre-reform sample (2004 and 2006) and assess more accurately the effects of SAAD.

Our estimates are retrieved from a difference-in-differences (DiD) strategy identifying at the individual level the rollout of SAAD which universalised previously means tested benefits (Winkelmann, 2004; Chou et al., 2010), controlling for care needs using the Katz index from available information in the dataset. However, rather than the canonical DiD model, the assignment to treatment is made based on the information available in the survey<sup>23</sup> which identifies both treated and untreated individuals (caregivers whose dependent partner/spouse does not receive any type of benefit), before and after the introduction of SAAD in 2007.<sup>24</sup>

Our dependent variable refers to mental health scales ( $EUROD_{ict}$  and  $CESD_{ict}$ ), depressive symptoms ( $EURO - 3_{ict}$  and  $CES - 3_{ict}$ ) and life satisfaction ( $SAT_{ict}$ ) of caregiver  $i$  in region  $r$  and time  $t$ , before the implementation of SAAD (or pre-SAAD regime, when the dependent partner/spouse received a disability allowance ( $DA_{irt}$ ) or homecare support ( $HCB_{irt}$ )), and after the implementation of SAAD when they received allowance ( $SU_{irt}$ ) or homecare support ( $HCA_{irt}$ ). The counterfactual being the available benefits in the absence of the reform. Using the terminology proposed by Callaway and Sant'Anna (2002), in our model there is *staggered adoption* because once units have been treated, they remain so in the following periods (units do not "forget" the treatment). Our model specification is defined as follows:

<sup>15</sup> The current financing system for all regions (except the Basque Country and Navarre) has four basic elements. The first is a distribution of resources and tax competences between administrations that determines the gross fiscal capacity of the autonomous communities and their margin to raise or lower the taxes that have been allocated to them. The second is a formula of spending needs that describes how the available resources are regionally distributed so that all of them can finance similar service which results from an unadjusted capitation formula. In addition, a system of interregional transfer is in place to equalise the resources with different income levels. In contrast, the Basque Country and Navarre enjoys the right to collect all their tax revenues (with the exception of social security contributions) and negotiate their contribution to the general central government revenues (*cupo*).

<sup>16</sup> More specifically, the following characteristics were considered, namely: (i) whether the caregiver was already receiving a retirement or unemployment benefit, then he/she could receive the subsidy, but the payment of Social Security contributions was not made; (ii) whether the caregiver was not working and under retirement age, then Social Security paid the minimum contribution; (iii) whether the caregiver was working, but had reduced working hours, then Social Security would supplement its contribution base to match the level it had before reducing the working day.

<sup>17</sup> The holder of the bank account must be the care receiver.

<sup>18</sup> For a better understanding of the significance of the magnitude of the subsidy, they can be compared with minimum wage, which was €570.60/month (2007) and €641.40/month (2011).

<sup>19</sup> The sharp jump in the percentage of subsidies with respect to total benefits observed between September and October 2009 is due to the fact that official statistics available in September recognized 209,559 unclassified benefits, which appeared classified in the corresponding categories in October 2009.

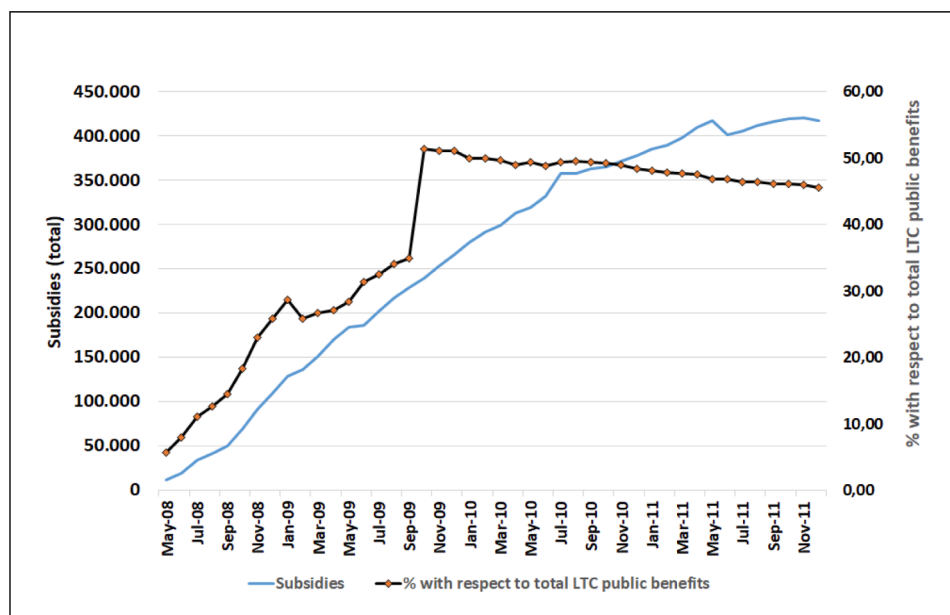
<sup>20</sup> Observatorio de la Asociación Estatal de Directores y Gerentes de Servicios Sociales. July 2015.

<sup>21</sup> There was a wide variation in the percentage of beneficiaries (e.g. 3.19 per cent in Andalusia versus 1.17 per cent in the Canaries, using data for 2010). Similarly, the reliance on subsidies differs across regions, representing a high dispersion rate in the cost per dependent (e.g. €5,093 in Murcia vs €12,715 in Madrid, while the percentage of informal caregivers' benefits with respect to total benefits awarded is 68.7 and 18.6 per cent, respectively. (Barriga Martí et al., 2015).

<sup>22</sup> In addition to the above-mentioned probabilities, we have not considered the simultaneous choice between informal and formal care because the Spanish SAAD is not a self-directed long-term care system (as is the and CCDE). It is rather a consumer-advisory long-term care system because the care-receiver and his/her family manifest their preferences, but the final decision is taken by the regional department of social services (and the fraction receiving subsidies varies widely by region).

<sup>23</sup> Similar approaches have been used before to assess the impact of long-term care programmes that were uniformly introduced across the country and whose coverage was universal in Korea, Japan and Germany (Shimizutani et al., 2008; Tamiya et al., 2011; Hyun et al., 2014; Fukahori et al., 2015; Fu et al., 2017; Geyer and Korfhage, 2015). Treatment and control groups in these studies are not defined based on exogenous group-level exposure to the introduction of the new long-term care system, as implied by a standard DiD framework.

<sup>24</sup> A similar definition of treatment and control groups is provided by Hyun et al. (2014) who analyse the introduction of a new long-term care system in Korea, primarily targeting the over-65s in the context of an ageing population. They define the treatment group as those aged 65 and over who use the benefits offered by the long-term care system, and the control group as those aged 65 and over who do not use these benefits.



**Fig. 2. Evolution of total number of subsidies and percentage of subsidies with respect to total long-term care benefits. 2008–2011**  
 Source: Own work using data from the Ministry of Health, Social Issues and Equality. Imsero. Instituto de Mayores y Servicios Sociales:: Estadística mensual Straight line shows the number of subsidies awarded since the onset of the SAAD. Dotted line shows the percentage of subsidies with respect to total benefits awarded by the SAAD (telecare, home care supports, day centres, residential homes and subsidies).

$$Y_{irt} = X'_{irt}\alpha_0 + \alpha_1 E_{rt} + B\_Pre_t \cdot (\alpha_2 DA_{irt} + \alpha_3 HCB_{irt}) + B\_Post_t \cdot (\alpha_4 SU_{irt} + \alpha_5 HCA_{irt}) + E_{ct} + C_c + T_t + \varepsilon_{ict} \tag{1}$$

$$Y_{ict} = \{EUROD_{ict}, EURO - 3_{ict}, CESD_{ict}, CES - 3_{ict}, SAT_{ict}\}$$

The main outcomes of interest are three ordered variables and two binary variables:  $EUROD_{ict}$  corresponds to the score for the EURO-D scale (from 0 to 12);  $CESD_{ict}$  which denotes the score at CES-D scale (from 0 to 8). The EURO-D<sup>25</sup> and the CES-D 8<sup>26</sup> are validated scales to measure depressive symptoms across populations. According to [Courtin et al. \(2015\)](#), both scales measure the same underlying concept and can be used in comparative studies of the determinants of depression.

Next, we use  $SAT_{ict}$  which measures caregiver’s satisfaction with life (from 0 to 10).  $EURO - 3_{ict}$  is a binary variable that takes the value 1 if there are depressive symptoms according to the EURO-D scale, frequently used to define depression caseness ( $EUROD_{ict} \geq 3$ ), 0 otherwise;  $CES - 3_{ict}$  is a binary variable that takes the value 1 if there are depressive symptoms according to the CES-D scale ( $CESD_{ict} \geq 3$ ), 0 otherwise.

The key covariates in our specification are the following: (i)  $DA_{irt}$  is a binary variable equal to 1 if the dependent partner/spouse received a disability allowance in region  $r$  before the SAAD, and 0 otherwise; (ii)  $SU_{irt}$  is a binary variable equal to 1 if the care recipient received an allowance from the SAAD after 2006 in region  $r$ , and 0 otherwise; (iii) homecare support  $HCB_{irt}$ , is a binary variable equal to 1 if the care recipient received publicly funded homecare before the SAAD in region  $r$ , and 0 otherwise; and (iv)  $HCA_{irt}$  is a binary variable equal to 1 if the care recipient received publicly funded homecare support after the SAAD in region  $r$ , and 0 otherwise. These covariates are interacted with either  $B\_Pre$  or  $B\_Post$  which are defined as follows:  $B\_Pre_t$  takes the value 1 if the care-receiver receives a benefit in a year before the 2007 reform and in all the periods the individual is in sample with the same type of benefit, and zero in all other cases.  $B\_Post_t$  takes the value 1 if the care-

receiver  $i$  is entitled to a benefit in a year after the introduction of the SAAD reform in 2007 and in all the periods the individual is in sample with benefits, and 0 in all other cases.

The treatment group refers to caregivers whose dependent partner/spouse received the benefit before the SAAD (either  $DA_{irt}$  or  $HCB_{irt}$ ), and after the reform (either  $SU_{irt}$  or  $HCA_{irt}$ ) which differs by care-receivers need alongside the regional implementation of SAAD. The control group consists of caregivers whose dependent partner/spouse did not receive any benefit either before or after the reform. Hence, comparing the treatment and control groups, it is possible to estimate analogous coefficients to the canonical DiDs model. Consequently, the coefficients  $\alpha_4$  and  $\alpha_5$  refer to the average treatment effect of subsidies and home care supports respectively after SAAD.

$X_{ict}$  refers to a vector of control variables: care-receiver’s characteristics (age, sex, chronic illness, dependency degree approximated by Katz’s Index), caregiver’s characteristics (age, sex, level of education), household characteristics (income and wealth in real terms, municipality size). Health-related variables recorded in SHARE do not allow us to disentangle between the three dependency degrees because the Ranking Scale used by SAAD involves a higher number of daily living activities. In view of these constraints, care-receiver’s dependency degree will be approximated using the Katz’s Index.<sup>27</sup>

<sup>27</sup> The dependency degree is approximated using Katz’s Index ([Katz, 1983](#)). The Katz Index determines functional status as a measurement of the ability to perform six daily living activities independently. We have computed this index using the information on daily living activities provided by SHARE. Respondents have been classified in 4 categories: Katz\_0 indicates that the individual performs all activities independently; Katz\_1 indicates that the individual performs 4 or 5 activities independently; Katz\_2 indicates that the individual only performs independently 2 or 3 activities; Katz\_3 indicates that the individual needs help for all activities (or all but one).

<sup>25</sup> [Portellano-Ortiz et al. \(2018\)](#), [Belvederi Murri et al. \(2020\)](#), [Marqués et al. \(2020\)](#) [Santini et al. \(2020\)](#), [Richardson et al. \(2020\)](#).

<sup>26</sup> [Van de Velde et al. \(2010\)](#), [Huijts et al. \(2011\)](#), [Levecque et al. \(2011\)](#), [von dem Knesebeck et al. \(2011\)](#) and [Missinne and Bracke, 2012](#).

$E_{ct}$  is a vector of economic characteristics according to the respondent's place of residence (real per capita GDP and unemployment rate by province<sup>28</sup>), which helps to control for the effect of relevant macroeconomic conditions. Finally,  $C_c$  and  $T_t$  denote regional fixed effects and year fixed effects respectively, and  $\varepsilon_{ict}$  is an individual-specific error term.<sup>29</sup>

We use the two-step procedure proposed by Donald and Lang (2007) to retrieve the standard errors that do not affect the validity of our results.<sup>30</sup> We report baseline results and a number of robustness checks to make sure that the effect of the reform is robust and does not pick up other potential confounding effects.

The main coefficients of interest are  $\alpha_3$  and  $\alpha_5$  measure the effect of subsidies and home care supports after the SAAD on five outcomes of interest. A core assumption of the model is that the time trend is common to both groups, after controlling for observables (Lechner, 2011). Although the common time trend assumption is not directly testable, we believe that there are solid reasons for it to hold. First, Fig. A1 in the Appendix reports suggestive evidence of common parallel trends of the dependent variables, especially before 2007. We find that among those receiving a subsidy, their CES-D and EURO-D scales reveal an improvement in mental wellbeing in the post reform period. In contrast when examine those receiving home supports, we find that the density function in the post-reform period for high levels of CES-D is considerably behind that of the pre-reform period. Similarly, when we turn to examining the effect of SAAD on life satisfaction, we find a rise in the percentage of caregivers receiving a subsidy in the post-reform period. Finally, when we focus on the group of caregivers receiving supports, we find analogous effects in the post-reform period. Therefore, mental wellbeing and general satisfaction of caregivers receiving subsidies or home supports seems to have improved in the post-reform period.

This graphical analysis has been completed with a test of differences in linear trends between treated vs non-treated individuals during the pre-reform period. When we focus on the pre-reform period (2004–2006), we regress each outcome variable on the treatment variable, a binary variable corresponding to the year 2004, the interaction between the two and regional fixed effects. If the parallel trends assumption holds, we expect the coefficient of the interaction to be statistically insignificant. The coefficient and standard deviation for each pre-trend regression is displayed in Figure A1. None of the estimated coefficients are significant.

Second, the difference-in-difference model requires a stable composition of the treatment and control groups before and after the SAAD reform. Given that the receipt of SAAD benefits is linked to the disability status (following the application of the Ranking Scale), it does not seem plausible that: (i) a 'healthy' individual intentionally deteriorates his or disability to be entitled to a benefit (subsidy or home support) from the SAAD, (ii) a person intentionally deteriorates their health or disability of his/her partner/spouse, so as to receive a subsidy from the SAAD.

The third assumption refers to the absence of anticipation, insofar as the behaviour of individuals could be modified with the announcement of an imminent reform. We do not expect the latter to have happened as the Act 39/2006 was the result of a last minute political compromise that required ample majorities. The reform was heavily amended in Parliament making it practically impossible to anticipate a specific

outcome. During the months in which the draft legislation was being negotiated, regions not run by the socialist party (PSOE) raised serious doubts about the economic viability of the reform. Although the legislation was publicised in the mainstream media outlets, negotiations were stalled for a long time. Indeed, three months before the reform (in September 2006), a cross-party agreement had still not been reached about neither the inclusion of children under the age of three in the SAAD nor the criteria should to distribute regional funds.<sup>31</sup>

The canonical difference-in-difference model presumes the existence of two groups, the treated and the comparison group, and two time periods. Provided a common trend assumption is satisfied, the two-way fixed effects estimator is a linear combination of treatment effects across treated units. When the treatment of interest varies across space and times, a two-way fixed effects specification allows to control for location- and period-specific shocks, estimating an average treatment effect across locations and time periods. However, such estimates can be biased when treatment effects change over time within treated units (Goodman-Bacon, 2021). The presence of treatment effect heterogeneity required a series of alternative estimators (Callaway and Sant'Anna, 2020, Sun and Abraham, 2020). However, these estimators may have less statistical power than the pooled estimator, and at this point Marcu and Sant'Anna, 2021 find that when facing a limited number of groups and time periods (as in our case), it may be reasonable to favour 'weaker' version of the parallel trend assumption.<sup>32</sup>

As for model estimation, it is worth noting that although OLS models are not designed to handle ordinal outcome variables, their use of a linear probability model in a DiD setting is justified for several reasons. First, in a non-linear DiD model, the estimated coefficients are not a proper representation of the magnitude of the treatment effect and therefore should not be used when interpreting the results. Instead, Ai and Norton (2003) and Puhani (2012) recommend focusing only on the interaction term. Second, non-linear models violate the common trend assumption of the DiD model (Lechner, 2011). For this reason, scholars often suggest estimating a linear latent index of the ordinal outcome variable (Puhani 2012).

Third, it is possible to show that the intervals between each pair of values of the latent variables are quite similar, e.g., that they are uniformly distributed across the true (unobserved) latent variable.<sup>33</sup> All model specifications return similar differences between threshold parameters (results available upon request).

We have performed a robustness check following Rambachan and Roth (2019), who propose robust inference methods that do not require the assumption of parallel trends to hold exactly. Alternatively, they impose that prior trends are informative about what would have happened under the counterfactual, that is, a sensitivity analysis is conducted in which confidence sets are reported under different restrictions on the set of possible violations of the parallel trends assumption (Rambachan and Roth, 2019). Rambachan and Roth (2019) propose a model to estimate the year-by-year coefficients and the variance-covariance matrix by excluding

<sup>28</sup> In Spain there are 17 Autonomous Communities (or regions) divided into 50 provinces. Additionally, there are two autonomous cities in North Africa (Ceuta and Melilla).

<sup>29</sup> Bertrand et al., (2004) shows that difference-in-difference estimations may underestimate the standard errors of the estimated coefficients. To overcome this problem, we follow their solution and apply block bootstrap (Efron and Tibshirani, 1994) because it maintains the autocorrelation structure, holding together all observations that belong to the same region.

<sup>30</sup> Donald and Lang (2007) argue that, when the number of regions (clusters) is small in a DiD setting, applying standard asymptotics implies that the significance of the  $t$ -statistics is overstated. In order to address this issue, we use the two-step procedure proposed by them which effectively treats the number of region-years as the number of observations.

<sup>31</sup> The sequence of the parliamentary process was the following one: (i) Deadlines for amendments, until 20th June. (ii) The Parliament passed the draft bill on 5th October 2006. (iii) The draft bill was referred to the Senate on 18th October 2006. (iv) Deadline for amendments finished on 6th November 2006. Parliamentary groups registered 3 amendments to reject the bill and 260 amendments to modify specific aspects of the bill. (v) Parliament passed the Act on 30th November 2006. (vi) Publication in the Official State Bulletin on 14th December 2006.

<sup>32</sup> We have checked that the residuals from a regression of the outcome variable on region and year fixed effects are linearly related to the residuals from a regression of treatment on region and year fixed effects, finding that the slope of this linear relationship does not differ between the treatment group and the control group (results available upon request).

<sup>33</sup> To demonstrate this, two ordered logit models are used for each of the three ordinal variables: one model that only includes a constant and one that includes all explanatory variables, with the purpose of analysing whether these models capture the latent variable in a linear fashion.

the effect of the pre-treatment trend, and then extrapolating to the post-treatment period. We estimate the year-by-year coefficient and confidence intervals at different values of the Rambachan and Roth parameter, which measures the degree of deviation from the previous trend. The estimated coefficient is positive with a 95 % confidence interval for all exposure years, even under the assumption of non-linear trends. Our estimates suggest that although the pre-treatment trend might be different, the effect of subsidies or supports on caregivers' wellbeing is significant after the treatment (results available upon request).

### Endogeneity of reform implementation

In a robustness check, we provide the estimates of an instrumental variable strategy that exploits the electoral incentives of the regional incumbent party to speed the reform (e.g., regional run by the socialist party). More specifically, we test whether regional level socialist party support gave rise to differences in other policy issues or on preferences with regards to caregiving before the reform. To address this point, we examine the evidence for the 2004 'Informal Support Survey', a representative survey of Spanish informal caregivers containing records of 1,504 respondents (75.80 % partners/spouses of care receivers) and collects information on the care policy priorities, alongside the preferred source of care received by current informal caregivers in the future. [Table A1](#) displays the percentage of informal caregivers across Spanish regions, and [Table A2](#) displays evidence suggesting that we cannot reject the hypotheses of equality of preferences between regions run by the socialist or other parties. Additionally, we find evidence of a non significant relationship between socialist run regions and healthcare expenditure.<sup>34</sup> We will come back to this point in section 3.3.

One of the potential threats to the specification strategy lies in that we do not account for the potential endogeneity in the implementation of the reform, that is, unobserved circumstances affecting both our dependent and independent variables, leading to biased estimated coefficients of equation (1). Appendix B provides a detailed description of the instrumental variable estimation.

### Data and description

We use data from SHARE (Survey of Health, Ageing and Retirement in Europe) for Wave 1 (2004), Wave 2 (2006/2007) and Wave 4 (2011).<sup>35</sup> SHARE is the European equivalent of the Health and Retirement Survey, a panel dataset of interviewees born in 1960 or earlier and their partners.<sup>36</sup>

<sup>34</sup> [Bacigalupe et al., \(2016\)](#) finds no evidence of an association between socialist support in a region and a higher investment in public healthcare services, or vice versa, a positive relationship between conservative regions and privatizations of public hospitals. Andalusia and Extremadura which had socialist governments have experienced a high decrease in health care resources between 2008 and 2013 and a moderate increase (Andalusia) or high increase (Extremadura) of privatizations. In contrast, Murcia which has a right-wing government has experienced a moderate reduction in public health care resources and a decrease in privatized facilities.

<sup>35</sup> Unfortunately, wave 3 could not be included as it is not comparable with the other waves.

<sup>36</sup> The SHARE data collection has been funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812), FP7 (SHARE-PREP: GA N°211909, SHARE-LEAP: GA N°227822, SHARE M4: GA N°261982, DASISH: GA N°283646) and Horizon 2020 (SHARE-DEV3: GA N°676536, SHARE-COHESION: GA N°870628, SERISS: GA N°654221, SSHOC: GA N°823782) and by DG Employment, Social Affairs & Inclusion. Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01\_AG09740-13S2, P01\_AG005842, P01\_AG08291, P30\_AG12815, R21\_AG025169, Y1-AG-4553-01, IAG\_BSR06-11, OGHA\_04-064, HHSN271201300071C) and from various national funding sources is gratefully acknowledged (see <https://www.share-project.org>).

The use of individual survey data is especially important given that common administrative data lacks important controls for detailed socio-economic and demographic characteristics available in survey data.

The initial sample is made up Spanish informal caregivers in each wave: 1,722 for wave 1(W1), 1,858 for wave 2(W2) and 2,884 for wave 4(W4), that is, respondents who report providing help with personal or instrumental daily living activities to partner/spouse, mother, father, mother in law, father in law, stepmother, stepfather, brother, sister, child, son in law, daughter in law, grandchild, grandparent, aunt, uncle, niece, nephew, other relative or friend. Next, we focus on caregivers who are partners or spouses of the care-receiver, because this is the only situation for which we know: (i) if the care-receiver receives any long-term care benefit, (ii) mental health and life satisfaction of the caregiver. The final sample contains observations 909 observations: 281 observations for the pre-reform period and 628 for the post-reform period. 266 care-receivers receive disability allowance (pre-reform) or subsidy (post-reform), 200 received home support and 443 did not receive any of them. Although this is a relatively small sample, it is comparatively larger than the sample used by previous studies, for instance [van den Berg \(2007\)](#) considers 522 caregivers.

Our sample is consistent with the overall picture of informal caregivers who are partners/spouses of the care-receivers, which represents 61 % of all informal caregivers in Spain. We take advantage of the fact that some interviews of wave 2 were carried out in 2006 and hence, they allow us to further identify the initial effects of the exposure to the public insurance expansion. Next, we have concentrated on the comparison in the pre-reform (2004 and 2006) and post-reform (2007 and 2011) periods.

In addition, we have also constructed a longitudinal sample considering only those individuals who can be identified in all waves (N = 694). This longitudinal sample (rigorously tested for attrition) is used to control for selection into caregiving, as health-related selection criteria may not be monotonic. A healthier family member is more likely to take on the role of caregiver due to the burdensome nature of caregiving. However, a less healthy or less productive family member may choose to provide informal care rather than engage in paid employment ([Coe and van Houtven, 2009](#))<sup>37</sup>.

Descriptive statistics ([Table A3](#)) confirm that there have not been significant changes in the observable characteristics of individuals providing care before and after the reform, neither for the group receiving a subsidy or support, nor for the group receiving any type of benefit (subsidy or home support). Recipients of subsidies are more likely to be male, to have suffered a stroke or heart attack, higher values of Katz's index, exhibit lower wealth (in real terms) and are likely to reside in large city (especially in the post-reform period). The percentage of female caregivers is close to 80 % among those who receive subsidies or home supports compared to about 60 % among those who receive no benefits at all. More than 65 % of caregivers receiving subsidy are retired, compared to 40 % among those receiving home supports or less than 30 % among those receiving no benefits.

Finally, we have enriched the list of controls with data from aggregate sources, including macroeconomic controls (regional unemployment and per capita GDP) that account for the effect of the economic downturn, which was largely regional specific.

### Wellbeing measures

Our main dependent variable refers to a measure of mental

<sup>37</sup> The data contains information on a long list of controls including care-receiver's characteristics (age, gender, chronic illness, dependency degree approximated by the Katz's Index), caregiver characteristics (age, gender, level of education, relation with economic activity, receiving any source of income) and household characteristics (size of municipality, household income and wealth, ability to make ends meet).

wellbeing, and more specifically, we employ two different screening instruments to measure depressive symptoms. The first one is the 8-item version of the CES-D scale which measures whether respondents have experienced the following feelings in the previous week: 'feeling depressed', 'feeling that everything was an effort', 'feeling that sleep was restless', 'feeling happy', 'feeling lonely', 'enjoying life', 'feeling sad' and 'feeling unable to get going'.<sup>38</sup> A score higher than 3 out of 8 is generally used to define depression caseness (Turvey et al., 1999).

This measure is employed alongside the EURO-D scale which has been applied to identify depressive symptoms in European countries (Prince et al., 1999). The EURO-D scale is a 12-item scale that asks the respondent whether in the last month he/she has experienced any of the following symptoms: 'depressed mood', 'pessimism', 'suicidality', 'guilty feelings', 'sleep problems', 'loss of interest', 'irritability', 'less appetite', 'fatigue', 'lower levels of concentration', 'less enjoyment in life' and 'tearfulness'. A score greater than 3 out of 12 signals a depressive disorder, for which therapeutic intervention would be recommended (Dewey and Prince, 2005)<sup>39</sup>.

An additional measure of mental wellbeing available is life satisfaction which is measured only among individuals who have completed the drop-off questionnaire (N = 781 observations). The drop-off questionnaire<sup>40</sup> contains a question concerning satisfaction with life: 'On a scale from 0 to 10 where 0 means completely dissatisfied and 10 means completely satisfied, how satisfied are you with your life?'. We define an ordinal variable which records the answer to this question.

#### Imputation of public home care for wave 4

Spanish data contains records of individuals benefiting from subsidies, as well as supports in waves 1 and 2. However, wave 4 only contains data on subsidies, but does not capture the use of home care supports. Given that we identify the information at the individual level from previous waves, a multiple imputation procedure has been used to tackle missing data (Rubin, 1987). This technique allows predicting what the random missing values would have been using information from the whole dataset. It requires two main assumptions: (i) the data must be missing at random, which is clearly the case because observations for public home care are missing for all the individuals in wave 4, and (ii) the reasons for the missing data must be captured by other variables that do not have missing values.

Given that the missing variable is binary, a logistic imputation method has been chosen, and the following explanatory variables have been introduced: age, gender, having co-resident children, pathologies (stroke, mental illness, Parkinsonism, hip fracture), and a socialist regional government. To test the sensitivity of our results, we have selected five different random seed values, and added five different imputations to our main dataset. The results in these alternative cases were very similar to the original estimates.

To assess the reliability of our imputations we have drawn upon

<sup>38</sup> The original CES-D scale (Center for Epidemiologic Studies Depression Scale) was developed by Radloff (1977) in the US and comprised 20 items, but a shorter version with only 8 items was developed and validated for European countries (Fuhrer and Rouillon, 1989; Van de Velde et al., 2009).

<sup>39</sup> Some differences between such scales typically emerge, because CES-D tends to exhibit a higher share of identified depressive symptoms (Courtin et al., 2015). We define two ordinal variables for each measure as well as two binary variables, taking the value one if the respective ordinal scale is higher than 3 (EURO-3 if EURO-D score is higher than 3; CES-3 if CES-D score is higher than 3), and 0 otherwise.

<sup>40</sup> SHARE Main questionnaire which is completed using CAPI (computer-assisted personal interviewing) is supplemented with a pen and pencil questionnaire. This so-called drop-off questionnaire is not completed neither by all countries nor by all respondents of the same countries.

official data published by the Ministry of Health, Social Services and Equality.<sup>41</sup> Table A4 shows that the number of home care benefits awarded in June 2011 amounted to 110,586.<sup>42</sup> This represents a difference of 6,584 individuals less with respect to the official data. In view of the above limitations, we consider our imputations to be reliable.

#### Descriptive statistics

Table 1 reports wellbeing statistics for the Spanish sample. In the pre-reform period, the average score for CES-D (EURO-D) was 0.4 points (12 %) and 0.8 points (21 %) higher for those receiving subsidies or supports respectively, compared to those not receiving any type of benefit. The percentage with CES-D (EURO-D) score higher than 3 in the pre-reform period was 58 % (57 %) among those receiving subsidies (supports), but did not reach 50 % among those not receiving any benefit.

In the post-reform period, the CES-D and EURO-D scores decrease by 10 % and 9 %, respectively and the percentage with CES-D (EURO-D) higher than 3 decreased by approximately 9 pp. (7 pp.) among those receiving a subsidy (support), but only by 5 pp. among those not receiving any benefit. A more detailed breakdown suggests a significant reduction in the fraction reporting sleep troubles among those, as well as a reduction in irritability and less appetite.

Importantly, we find an improvement in life satisfaction reported among partners receiving a long-term care benefit (0.77 points for subsidies and 0.68 points for supports or an increase by 13 %), as compared to those who do not receive it (0.37 points or 6 %). Similar conclusions are obtained for caregivers who receive any type of benefit, suggesting that long-term care benefits affect caregiver's wellbeing.

## Results

#### Baseline estimates

Table 2 reports the estimates of the effect of SAAD on two measures of mental health (CES-D and EURO-D), as well as life satisfaction. It is important to note that receiving a disability benefit or support in the pre-reform period has no impact on mental health or life satisfaction. The opposite is true for SAAD benefits. The receipt of a subsidy gives rise to a reduction of 0.46 points in the CES-D scale, or an average 13 % reduction, and more specifically, a 14 pp. decrease in the caregivers probability of presenting depressive symptoms. In contrast, the reception of home care supports gives rise to a 0.255 points reduction in the CES-D (7 % reduction with respect to the mean value), namely a decline by 8.6 pp in the likelihood of depressive symptoms in caregivers.

Similar results are retrieved when we focus on the EURO-D and EURO-3. The scores decrease by 10 % (after the subsidy) and 5 % (after the receipt of home care supports) with respect to the mean value. Likewise, we estimate a reduction in the probability of depressive symptoms by 18.5 pp. (after receiving a caregiving subsidy) and by 11.2 pp. (after receiving home care supports). Looking at the level of life satisfaction, we find an increase by almost one percentage point (15 % with respect to mean value) after a subsidy and 0.65 pp. (10.5 % with

<sup>41</sup> [https://www.dependencia.imserso.gob.es/dependencia\\_01/documentacion/estadisticas/est\\_inf/inf\\_gp/index.htm](https://www.dependencia.imserso.gob.es/dependencia_01/documentacion/estadisticas/est_inf/inf_gp/index.htm).

<sup>42</sup> Two important caveats should be mentioned before comparing these figures with our imputations. First, official data disaggregated by age and type of benefit are not available. We only know that there are 85.78% beneficiaries aged 46 years and older, but ignore the number of beneficiaries aged 50 years and older receiving public home care. Second, official data published by the Ministry comes from the reports referred by the Departments of Social Services of each region. This fact might explain why some regions seem to have not awarded any home care benefit. The imputation procedure assigns 180 home care benefits in 2011 for the entire sample. Using the weights provided by SHARE, 103,732 individuals were receiving home care benefit at the population level.



**Table 1**  
Wellbeing indicators.

	Receive subsidy		Receive home support		Do not receive neither subsidy nor home support	
	2004–2006	2007–2011	2004–2006	2007–2011	2004–2006	2007–2011
CES-D (scale 1–8)	3.791 (2.022)	3.410 (1.721)	3.790 (2.047)	3.417 (1.751)	3.386 (1.853)	2.999 (1.942)
CES-D score higher than 3 (%)	58.06	49.01	57.38	50.56	49.09	44.23
Items used in the CES-D Scale						
1. Feels depressed	0.583	0.582	0.582	0.598	0.591	0.497
2. Feels everything is an effort	0.675	0.607	0.629	0.612	0.650	0.558
3. Sleep restless	0.445	0.499	0.460	0.498	0.464	0.460
4. Enjoy life	0.333	0.311	0.398	0.302	0.249	0.203
5. Feels happy	0.341	0.285	0.376	0.289	0.222	0.257
6. Feel lonely	0.469	0.452	0.468	0.461	0.412	0.336
7. Feel sad	0.290	0.206	0.279	0.200	0.117	0.103
8. Unable to get going	0.554	0.569	0.513	0.556	0.681	0.584
EURO-D (scale 1–12)	4.860 (3.024)	4.435 (2.851)	4.831 (3.102)	4.401 (2.888)	4.001 (2.864)	3.669 (2.765)
EURO-D score higher than 3 (%)	60.98	50.92	60.49	50.34	50.67	45.42
Items used in the Euro-D Scale						
1. Feels sad or depressed	0.583	0.582	0.598	0.582	0.591	0.497
2. No hopes for the future	0.389	0.379	0.411	0.390	0.308	0.320
3. Feel would rather be dead	0.290	0.206	0.279	0.200	0.117	0.103
4. Feels guilty	0.136	0.074	0.121	0.076	0.009	0.052
5. Sleep problems	0.499	0.445	0.498	0.460	0.464	0.460
5. Loss of interest	0.327	0.255	0.366	0.262	0.222	0.231
7. Irritability	0.469	0.395	0.499	0.408	0.294	0.294
8. Less appetite	0.251	0.134	0.255	0.153	0.222	0.206
8. Fatigue	0.675	0.607	0.629	0.612	0.650	0.558
10. Difficulties for concentration	0.420	0.414	0.464	0.438	0.463	0.408
11. Finds no enjoyable activity	0.333	0.311	0.398	0.302	0.249	0.203
12. Tearfulness	0.469	0.452	0.468	0.461	0.412	0.336
Satisfaction with life (scale 0–10)	5.801 (1.525)	6.577 (2.573)	5.818 (1.511)	6.591 (2.613)	6.494 (1.798)	6.864 (2.108)
N	115	151	94	106	72	371

Note: This table reports the descriptive statistics and number of observations of the variables included in our estimates. We specifically separate the effect before (2004–2006) and after the reform (2007–2011).

respect to mean value) after the receipt of home care supports. These results suggest that the effect of the extensive margin of subsidies is stronger than that of home supports. We will examine the intensive margin on section 5.4.

The Appendix B provides the details of the estimation by IV. The test statistics display evidence pointing out that the hypothesis of exogeneity is rejected at the 5 % significance level. The second panel of Table 2 shows, that the IV estimates which are consistent with the OLS estimation. The sign and significance of all coefficients are preserved though the magnitude is slightly higher in the IV estimation. Therefore, the OLS estimates are reliable and, lower-bound compared to IV estimates.

*Panel data estimates with SHARE*

The sample size for the longitudinal (panel data sample) is significantly smaller (N = 694). Given the significant reduction in the number of observations, doubts arise about the existence of attrition bias. To investigate this issue more thoroughly, we have estimated a series of attrition probit specifications (Fitzgerald et al., 1998) and performed pooling tests for the equality of coefficients between the initial sample with and without attriters, using the Beckett-Gould-Lillard-Welch test (Beckett et al., 1988). To compute this test, first we regress the outcome variables from the first wave on variables measuring individual characteristics, an attrition dummy, and the same attrition dummy interacted with the other explanatory variables. Next, we test the joint significance of the interaction variables and the attrition dummy to determine whether the coefficients from the explanatory variables differ between individuals that disappear or remain in the panel. Results do not reject the hypothesis that attrition takes place at random. Additionally, the small pseudo-R-squared from the attrition probits, which

typically is interpreted as the proportion of the attrition that is not random, reinforces our previous results (Outes-Leon and Dercon, 2008).

Consistently, when panel data estimates (shown on third panel of Table 2) are compared to those retrieved using pooled data, we find no major qualitative change in coefficients. For all regressions, the Hausman test indicates that the fixed effects estimations are significantly different than the random effect estimation, confirming that individual effects are correlated with some of the explanatory variables, and that the instrumental variables model with fixed effects is preferred over the model with random effects. The consistency between pooled and panel data estimates, which retains respondents who have participated in all waves, reinforces that there is no selection problem into caregiving.

*Economic valuation of SAAD benefits*

As an extension we have estimated the amount of subsidy that would (ceteris paribus) render carers’ mental well-being equivalent to that of non-caregivers. This provides us with relevant information to understand the extent to which the subsidy compensated for caregivers’ welfare losses. In addition, we estimate the effect of SAAD benefits in the reduction in the probability of depression (estimated for every 100 euros spent on subsidies or supports). The estimates has been retrieved as follows:

First, we have estimated the average cash subsidy in the period 2007–2011 taking into account the distribution of beneficiaries by dependency degrees in 2007 and 2011, the amount of the corresponding cash subsidy for each dependency degree in each year and the total number of cash subsidy beneficiaries in each year. The average cash subsidy amounts to 369.82 euros/month (see Tabla A5). Secondly, we take as a reference a SHARE sample of spouses/partners who are neither

**Table 2**  
Estimation of the difference-in-difference model.

OLS	CES-D	CES-3	EURO-D	EURO-3	Life satisfaction
DA-B_Pre	0.280 (0.199)	0.087 (0.136)	0.325 (0.199)	0.092 (0.146)	-0.398 (0.233)
SU-B_Post	-0.466** (0.210)	-0.142** (0.056)	-0.485** (0.207)	-0.185** (0.076)	0.939*** (0.272)
HCB-B_Pre	0.294 (0.203)	0.106 (0.088)	0.368 (0.202)	0.103 (0.078)	-0.520 (0.342)
HCA-B_Post	-0.255*** (0.083)	-0.086*** (0.021)	-0.228*** (0.072)	-0.112*** (0.030)	0.656*** (0.141)
N	909	909	909	909	781
R <sup>2</sup> adjusted	0.233	0.298	0.225	0.300	0.245
F	96.638	7.548	84.402	7.781	2.716
p	0.000	0.000	0.000	0.000	0.003
<b>IV</b>	<b>CES-D</b>	<b>CES-3</b>	<b>EURO-D</b>	<b>EURO-3</b>	<b>Life satisfaction</b>
DA-B_Pre	0.316 (0.205)	0.096 (0.140)	0.368 (0.210)	0.102 (0.151)	-0.422 (0.248)
SU-B_Post	-0.591** (0.235)	-0.154** (0.062)	-0.510** (0.232)	-0.200** (0.084)	1.121*** (0.307)
HCB-B_Pre	0.332 (0.214)	0.118 (0.092)	0.418 (0.213)	0.114 (0.082)	-0.545 (0.372)
HCA-B_Post	-0.274** (0.092)	-0.094*** (0.023)	-0.246*** (0.080)	-0.122*** (0.033)	0.765*** (0.157)
N	909	909	909	909	781
R <sup>2</sup> adjusted	0.238	0.212	0.231	0.330	0.255
F	111.173	5.122	104.655	6.052	1.941
p	0.000	0.000	0.000	0.000	0.013
<b>Panel estimates</b>	<b>CES-D</b>	<b>CES-3</b>	<b>EURO-D</b>	<b>EURO-3</b>	<b>Life satisfaction</b>
DA-B_Pre	0.349 (0.226)	0.106 (0.154)	0.406 (0.231)	0.112 (0.166)	-0.462 (0.273)
SU-B_Post	-0.647** (0.259)	-0.169** (0.068)	-0.558** (0.256)	-0.220** (0.092)	1.246*** (0.339)
HCB-B_Pre	0.366 (0.236)	0.130 (0.101)	0.462 (0.235)	0.126 (0.090)	-0.597 (0.411)
HCA-B_Post	-0.301** (0.101)	-0.103*** (0.025)	-0.270*** (0.088)	-0.134*** (0.036)	0.847*** (0.173)
N	694	694	694	694	601
Test individual fixed effects = 0	3.744	3.702	3.779	3.553	3.442
p-value	0.000	0.000	0.000	0.000	0.027
Hausman test: $\chi^2$	45.394	54.304	24.569	50.309	40.646
p-value	0.000	0.000	0.003	0.000	0.000

Note: All regressions include dependent’s characteristics (age, sex, chronic pathologies, Katz’s index), caregiver’s characteristics (age, sex, level of education), household characteristics (size of municipality, household income and wealth (in real terms)), GDP per capita and unemployment rate by province, regional fixed effects and time fixed effects. Standard errors between parenthesis. Clustered estimates at regional level and block bootstrap with 1,000 replications. IV regressions employ support to socialist party, home care characteristics in 2004 (coverage index, hours per month, cost per hour) as instruments. First-stage estimations are reported in [Table A8](#).

carers nor cared for. [Table 3](#) displays the average CES-D score, EURO-D score and satisfaction with life for the comparison sample and our initial sample of caregivers. Using the estimated coefficient for subsidies and supports in the post-reform period, and the amount of the average cash subsidy, we have computed the average cash subsidy that would that yield caregivers the same mental wellbeing than non-caregivers. This amount lies between 800 and 850 euros/month, about 216 %-229 % higher than the actual subsidy.

To estimate a measure of the economic performance of SAAD benefits, we have estimated the reduction in the probability of depressive symptoms (using the CES-3 and EURO-3 indicators) for every 100 euros of expenditure on subsidies and supports. As mentioned above, the average subsidy has been estimated to be 369.82 euros/month. To derive the average cost of support, we first estimate the average number of hours received and we consider the public price of one hour of support (12.70 €/month in 2007 and 13.66 €/hour in 2011). [Table A9](#) shows that the average cost in the period 2007–2011 amounts to 599.66 €/month.

Using the estimated coefficients in [Table 2](#), it is noticeable that for every 100 euros of expenditure on subsidies, the probability of depression decreases by 3.84 pp. (CES-3) or 5 pp. (EURO-3) while for every 100 euros of expenditure on supports, these same probabilities decrease by 1.43 pp. and 1.87 pp, respectively, e.g., the reduction in the probability of depression is 2.7 times higher for subsidies than for supports.

#### Caregiving intensity using the National Health Survey

Given that SHARE data does not include information on caregiving intensity, we have retrieved data form an alternative survey, namely the Spanish National Health Survey (NHS). The advantage of SHARE is that we have information for 4 years (2 pre-reform and 2 post-reform) compared to only 2 years (1 pre-reform and 1 post-reform) in the NHS. The downside is that SHARE does not provide disaggregated information on hours of care (see Appendix C for a detailed description of NHS).

**Table 3**

Estimation of the subsidy that would make caregivers equally well-off as not being caregivers.

	Comparison sample (1)	Receive cash subsidy (2)	Difference (3)=(1)-(2)	(4) = Coefficient "Subsidy" (Table 2. OLS)	369.82· (4)/(3)
Euro-D score	3.372	3.575	-0.203	-0.466	848.76€/month
CES-D score	4.401	4.619	-0.217	-0.485	825.62 €/month
Satisfaction with life	6.674	6.242	0.432	0.939	803.69 €/month

Note: (1) EURO-D, CES-D and satisfaction with life score for the comparison sample composed by SHARE respondents who are married or cohabiting, neither informal caregivers of his/her partner, nor receive informal care.

(2) EURO-D, CES-D and satisfaction with life score for caregivers who receive a subsidy.

(3) Difference (1)-(2).

(4) Coefficient of the interaction term for the OLS regression.

(5) Average cash subsidy (€/month) · (4) / (3).

Table A5 explains how the average cash subsidy has been obtained.

Estimates using caregiving hours are shown in Table 4. First, considering weekly hours of care compared to the omitted category (less than 20 h/week), we find that the CES-D score increases by 1.66 points if caregivers provide more than 100 h/week and by 0.67 points if they provide 50–100 h/week (which represents an increase by 55 % and 22 % with respect to mean). This entails an increase by 25.2 pp. and a 16.6 pp., respectively, in the probability of suffering from depressive symptoms.

Second, the interaction between the number of hours of care and pre-reform benefits is not significant, but, as expected, the interactions with post-reform benefits are indeed significant. Focusing on post-reform benefits, and distinguishing between caregivers who devote between 50 and 100 h/week or more than 100 h/week to provide care, we find that the reduction of depressive symptoms more than doubles when individuals receive home care supports compared to caregiving subsidies (-33.4 pp. vs -15.6 pp. for more than 100 h; -27.3 pp. vs -10.3 pp. for between 50 and 100 h). In contrast, though caregivers providing less than 20 h per week or between 20 and 50 h per week of care exhibit a reduction in the probability of depression for both (post-reform) benefits, the effect is larger among those receiving subsidies (-9pp.) compared to those receiving supports (-5.1 pp.).

The IV estimation results are in line with the OLS estimations. Therefore, we conclude that the implementation of the SAAD has led to a clear improvement in mental health (CES-D score and CES-3) for caregivers providing more than 20 h per week. However, whilst the receipt of subsidised home care supports has benefited more intensive caregivers (caring more than 50 h/week), caregiving subsidies have benefited mainly caregivers who spend between 20 and 50 h/week.

**Mechanisms**

Once we have established the effect of the introduction of the SAAD on caregivers mental and subjective wellbeing, we then examine five potentially relevant dimensions of wellbeing that can be affected including financial strain alleviation, feeling of control, change in lifestyles, social contacts and extra time. We find that subsidies improve mental wellbeing if they alleviate caregivers financial hardship (Costa-Font and Vilaplana-Prieto, 2017; Amegbor et al., 2021), or their perceived financial burden (Rajapakshe et al., 2018). Similarly, subsidies can improve caregivers esteem as their work is often-invisible to society, and a result, alleviate social fragility (Ma et al., 2018). Furthermore, subsidies can increase an individuals sense of control over their own life (Bjørkløf et al., 2016), participation in leisure activities (Jeong

**Table 4**

Difference-in-difference model using the Spanish National Health Survey.

	OLS		IV	
	CES-D	CES-3	CES-D	CES-3
<b>Caregiving hours</b> (omitted: Less than 20 h/week)				
Between 20 and 50 h/week	0.282** (0.097)	0.061** (0.021)	0.325** (0.112)	0.070** (0.024)
Between 50 and 100 h/week	0.676** (0.248)	0.166*** (0.042)	0.782** (0.286)	0.191*** (0.048)
More than 100 h/week	1.663*** (0.244)	0.252*** (0.044)	1.940*** (0.281)	0.290*** (0.051)
<b>DA· B_Pre · Caregiving hours</b>				
Less than 20 h/week	-0.047 (0.072)	-0.062 (0.173)	-0.054 (0.083)	-0.071 (0.199)
Between 20 and 50 h/week	-0.083 (0.084)	-0.190 (0.471)	-0.095 (0.097)	-0.218 (0.544)
Between 50 and 100 h/week	-0.111 (0.157)	-0.085 (0.174)	-0.128 (0.181)	-0.098 (0.200)
More than 100 h/week	-0.251 (0.172)	-0.182 (0.477)	-0.288 (0.198)	-0.209 (0.551)
<b>SU· B_Post · Caregiving hours</b>				
Less than 20 h/week	-0.340 (0.552)	-0.102 (0.223)	-0.390 (0.638)	-0.117 (0.257)
Between 20 and 50 h/week	-0.094** (0.039)	-0.090*** (0.042)	-0.105** (0.047)	-0.098** (0.048)
Between 50 and 100 h/week	-0.132*** (0.038)	-0.103*** (0.027)	-0.152*** (0.044)	-0.118*** (0.031)
More than 100 h/week	-0.242*** (0.050)	-0.156** (0.052)	-0.278*** (0.058)	-0.179** (0.060)
<b>HCB· B_Pre · Caregiving hours</b>				
Less than 20 h/week	-0.049 (0.396)	-0.075 (0.057)	-0.056 (0.457)	-0.086 (0.066)
Between 20 and 50 h/week	-0.616 (0.503)	-0.115 (0.142)	-0.705 (0.581)	-0.132 (0.164)
Between 50 and 100 h/week	-0.715 (0.507)	-0.212 (0.468)	-0.817 (0.586)	-0.243 (0.540)
More than 100 h/week	-0.979 (0.572)	-0.232 (0.126)	-1.116 (0.661)	-0.266 (0.145)
<b>HCA· B_Post · Caregiving hours</b>				
Less than 20 h/week	-0.107 (0.720)	-0.091 (0.303)	-0.580 (0.833)	-0.105 (0.349)
Between 20 and 50 h/week	-0.045*** (0.021)	-0.051** (0.024)	-0.051** (0.023)	-0.058** (0.027)
Between 50 and 100 h/week	-0.525*** (0.064)	-0.273*** (0.038)	-0.601*** (0.074)	-0.313*** (0.044)
More than 100 h/week	-0.801*** (0.134)	-0.334*** (0.080)	-0.915*** (0.154)	-0.383*** (0.092)
N	964	964	964	964
R2	0.363	0.254	0.419	0.293
F	1.778	1.706	2.432	2.332
P	0.009	0.019	0.000	0.000

Note: All regression include dependent's characteristics (age, gender, chronic illnesses, Katz's Index), caregiver's characteristics (age, gender, level of education), size of municipality, household income, GDP per capita (by province) and unemployment rate (by province), time fixed effects and regional fixed effects.

Standard errors between parenthesis. Clustered estimates at regional level and block bootstrap with 1,000 replications (Cameron et al., 2008). IV regressions employ support to socialist party, home care characteristics in 2004 (coverage index, hours per month, cost per hour) as instruments. First-stage estimations are reported in Table A8.

and Park, 2020), as well as social contact and can ameliorate loneliness (Wang et al., 2017).

The SHARE data provides information about household ability of making ends meet. Four binary variables have been defined for the possible answers 'with great difficulty', 'with some difficulty', 'fairly easily' and 'easily'. We have also examined three binary variables measuring caregiver's income: (i) 'no income' takes the value 1 if the caregiver has no source of income (neither from work nor from a retirement or unemployment pension); (ii) 'earnings below minimum wage': 1 if the caregiver is working at the time of the survey, but his/her earnings are below the minimum wage<sup>43</sup>; (iii) 'retirement benefit below average', 1 if caregiver is already retired and the retirement pension is below average.<sup>44</sup>

A linear probability model has been estimated for each of these responses using as regressors long-term care benefits before and after SAAD and the same socio-demographic characteristics used for the DiD model, as well as regional and year fixed effects. Results are shown in Table 5. We document that the probability of making ends meet 'with great difficulty' decreases by 11.4 pp. among individuals receiving subsidies and by 6.4 pp. among those receiving home care supports.

We find that a caregiving subsidy provides a greater relief to pensioners whose income is lower than average. Indeed, a caregiving subsidy decreases the probability of individuals reporting 'great difficulty' or 'some difficulty' in making ends meet by 48.1 pp. and 21.1 pp, respectively. Secondly, receiving a subsidy relieves carers who have no other source of income (-32.6 pp. for 'with great difficulty') and, thirdly, those who are working, but whose income is below the minimum wage (-17.6 pp. for 'with great difficulty'). Receiving supports after the SAAD also reduces the financial frailty of pensioners with below-average pensions (-29.6 pp. for 'with great difficulty').

This result can be explained by the fact that before the reform, some carers faced some difficulty to hire a household employee. To test this, we estimate a linear probability model for the probability of having hired a household employee. While pre-reform benefits are not significant, we find a 10.7 pp. increase in the probability of hiring a household employee after receiving a subsidy, but a 12.7 pp. decrease when receiving supports (last column in lowest panel of Table 4).

Next, we examine the effect of SAAD on 'feeling that things are out of control'. Four binary variables have been defined for each of the responses: 'often', 'sometimes', 'rarely' and 'never'. Comparing pre- and post-reform benefits, the probability of feeling that things are out of control 'often' decreases by 121 % among individuals receiving a subsidy compared to a disability allowance (-16.8 pp. vs -7.6 pp) and by 133 % for post-reform supports with respect to the pre-reform period (-17.3 pp. vs -7.3 pp). On the other hand, the probability of feeling that things are 'never' out of control increases by 122 % for subsidies relative to disability allowance (14 pp. vs 6.3 pp) and by 107 % for post-reform supports compared to the pre-reform period (11.4 pp. vs 5.5 pp). Therefore, post-reform benefits have boosted the psychological benefits for the caregiver.

Furthermore, some studies have reported that stress gives rise to an increase in smoking and drinking (Salgado-García et al., 2015) alongside sedentary lifestyles (Snyder and Vitaliano, 2020) among caregivers. With this in mind, we have defined four binary variable, namely

whether the caregiver follows a 'sedentary lifestyle' (physical activity less than three times per month), whether the caregiver 'currently smokes', 'drinks alcohol' (drinking more than 2 glasses of alcohol almost every day) and 'eats outside home'. The probability of an individual reporting a 'sedentary lifestyle' decreases by 19.2 pp. among households receiving subsidies and by 25.6 pp. among those receiving home care supports. In contrast, the reduction in the probability of reporting being a 'current smoker' is stronger when receiving a subsidy (-24.4 pp) than post-reform home care supports (-13.5 pp). The effect on current drinking is significant, negative and quite similar for both benefits (-9.3 pp. for subsidies and -8.6 pp. for supports). Finally, the probability of eating out increases twofold when receiving subsidies compared to those receiving home care supports (8.5 pp. vs 4 pp).

In terms of social contacts, we find that the probability of frequent contact with non-corresident children daily or several times a week increases more after the reception of post-reform supports (16.7 pp. and 13.9 pp) vs subsidies (7 pp. and 11.4 pp), respectively. Finally, we examine the time spent caring for grandchildren. Our estimates suggest a very sharp increase when post-reform supports are received (11.2 pp) which may reveal a substitution between time spent caring for the dependent person (now assumed by public home care workers) and time spent on grandchildren's care.

## Conclusion

This paper has studied the effect of the inception of a system of subsidies and supports on caregivers' mental wellbeing. We document that receiving a caregiving subsidy (home care support) gives rise to an average reduction of depressive symptoms by 13 % (7 %). Consistently, we document an average increase in life satisfaction of about 15 % among those receiving subsidies or 10.5% among those receiving home supports respectively.

Receiving home supports may help to reduce the feeling of being 'trapped in a caregiving role' (Ducharme et al., 2007), as it frees up some time for the caregiver to spend on other activities, including rest or leisure. If this extra time is used to socialise with other people (children, grandchildren among other), the correlation between informal care and isolation is lessened (Akkus, 2011). However, subsidies may fulfil a triple role of (i) acknowledging the caregiving status of caregivers (Ma et al., 2018), (ii) easing potential financial strains (Amegbor et al., 2021), and finally, (iii) providing the caregiver with the resources and time that can be used to improve their limited leisure time. We find that subsidies reduce the probability of caregivers sedentary lifestyles, smoking and alcohol consumption, which can impact on the caregiver's mental health (Sawatzky and Fowler-Kerry, 2003).

Our results reinforce the notion put forward by Foster et al., (2003) that paying family members gives rise to a reduction in the probability of depression (between -3.84 pp. and -5pp. per €100/month).

Policy makers can interpret these results as evidence of the positive effect of subsidies and supports on the mental well-being of caregivers. Such caregiving subsidies and home care supports can exert further spillover effects by enabling caregivers to continue providing care, delaying the use of other types of formal care. The reduction of depressive symptoms is about twice as large when care receivers benefit from subsidies compared to home supports. Our estimates suggest that the effect of 100 euros of public expenditure on long-term care improves caregivers mental wellbeing. However, the effect is 2.7 times higher among those receiving caregiving subsidies than those that received home care supports. These results suggest that, the use of subsidies can be justified by its improvements on the mental wellbeing of caregivers (Fig. 2). Subsidies might improve mental health by acknowledging caregivers social contribution (Ma et al., 2018), and more generally, can make their work visible. That said, if a caregivers subsidy was designed to compensate their mental wellbeing losses, the subsidy should have been 219-226 % higher.

<sup>43</sup> The minimum wage in 14 payments is 460€/month (2004), 540€/month (2006), 570€/month (2007) and 644€/month (2011).

<sup>44</sup> The retirement pension in 14 payments is: 648€/month (2004), 722€/month (2006), 768€/month(2007) and 915€/month (2011).

**Table 5**  
Mechanisms.

	Self-perceived view that the household is able to make ends meet			
	With great difficulty	With some difficulty	Fairly easily	Easily
DA-B_Pre	-0.012 (0.029)	-0.033* (0.019)	0.014 (0.027)	0.029 (0.018)
SU-B_Post	-0.114*** (0.032)	-0.095** (0.036)	0.031 (0.047)	0.048 (0.030)
HCB-B_Pre	-0.020 (0.026)	-0.035 (0.035)	0.009 (0.024)	0.040 (0.032)
HCA-B_Post	-0.064*** (0.025)	-0.015 (0.033)	0.022 (0.028)	0.016 (0.018)
DA-B_Pre · Retirement benefit below average	-0.882 (0.573)	-0.047 (0.734)	0.275 (0.613)	0.414 (0.341)
SU-B_Post · Retirement benefit below average	-0.481** (0.157)	-0.211** (0.088)	0.238** (0.098)	0.148 (0.198)
HCB-B_Pre · Retirement benefit below average	-0.045 (0.142)	-0.237 (0.183)	0.023 (0.153)	0.075 (0.350)
HCA-B_Post · Retirement benefit below average	-0.296*** (0.096)	-0.163 (0.355)	0.197 (0.382)	0.174 (0.212)
DA-B_Pre · Earnings before minimum wage	-0.024 (0.323)	-0.780* (0.414)	0.149 (0.346)	0.173 (0.192)
SU-B_Post · Earnings before minimum wage	-0.176** (0.085)	-0.215 (0.362)	0.163 (0.388)	0.029 (0.216)
HCB-B_Pre · Earnings before minimum wage	-0.011 (0.343)	-0.014 (0.440)	0.169 (0.367)	0.003 (0.204)
HCA-B_Post · Earnings before minimum wage	-0.224 (0.484)	-0.007 (0.620)	0.142 (0.518)	0.133 (0.288)
DA-B_Pre · No income	-0.070 (0.565)	-0.188 (0.724)	0.294 (0.605)	0.185 (0.336)
SU-B_Post · No income	-0.326*** (0.119)	-0.179 (0.256)	0.113 (0.214)	0.039 (0.200)
HCB-B_Pre · No income	-0.212 (0.486)	-0.127 (0.623)	0.023 (0.520)	0.018 (0.290)
HCA-B_Post · No income	0.049 (0.467)	-0.770 (0.599)	0.276 (0.500)	0.165 (0.278)
N	909	909	909	909
R <sup>2</sup>	0.337	0.324	0.325	0.319
F	2.622	4.681	4.789	9.270
p	0.000	0.000	0.000	0.000
	<b>Caregiver feels that things are out of control</b>			
	<b>Often</b>	<b>Sometimes</b>	<b>Rarely</b>	<b>Never</b>
DA-B_Pre	-0.076** (0.035)	-0.011 (0.039)	-0.009 (0.033)	0.063** (0.031)
SU-B_Post	-0.168** (0.029)	-0.060** (0.010)	-0.056** (0.013)	0.140*** (0.026)
HCB-B_Pre	-0.074** (0.032)	-0.036 (0.036)	-0.048 (0.030)	-0.055* (0.031)
HCA-B_Post	-0.173*** (0.036)	-0.088*** (0.027)	-0.067*** (0.020)	0.114*** (0.013)
N	909	909	909	909
R <sup>2</sup>	0.295	0.313	0.269	0.399
F	4.260	5.162	3.030	4.480
p	0.000	0.000	0.000	0.000
	<b>Caregiver's lifestyle</b>			
	<b>Sedentary lifestyle</b>	<b>Current smoker</b>	<b>Drinking alcohol</b>	<b>Eating outside home</b>
DA-B_Pre	0.022 (0.090)	0.012 (0.091)	0.025 (0.091)	0.015 (0.091)
SU-B_Post	-0.042*** (0.038)	-0.244*** (0.072)	-0.093** (0.038)	0.085*** (0.22)
HCB-B_Pre	-0.030 (0.068)	-0.029 (0.068)	-0.042 (0.071)	-0.039 (0.072)
HCA-B_Post	-0.256*** (0.072)	-0.135*** (0.030)	-0.086** (0.036)	0.040*** (0.012)
N	909	909	909	909

(continued on next page)

Table 5 (continued)

	Self-perceived view that the household is able to make ends meet			
	With great difficulty	With some difficulty	Fairly easily	Easily
R <sup>2</sup>	0.446	0.349	0.409	0.351
F	3.371	3.276	2.208	2.199
p	0.000	0.000	0.004	0.004
<b>Family relations and domestic worker's employment</b>				
	<b>Contact with non co-resident children: daily (Subsample with children)</b>	<b>Contact with non co-resident children: several times per week (Subsample with children)</b>	<b>Looks after grandchildren (Subsample with grandchildren)</b>	<b>Has household employee</b>
DA-B_Pre	0.022 (0.113)	0.057 (0.111)	0.015 (0.114)	0.053 (0.113)
SU-B_Post	0.070*** (0.024)	0.114*** (0.024)	0.012*** (0.005)	0.107*** (0.023)
HCB-B_Pre	-0.042 (0.096)	-0.079 (0.095)	-0.043 (0.097)	-0.081 (0.096)
HCA-B_Post	0.167** (0.069)	0.139** (0.071)	0.112*** (0.028)	-0.127** (0.061)
N	495	495	467	909
R <sup>2</sup>	0.380	0.409	0.391	0.386
F	5.619	6.131	3.070	2.951
p	0.000	0.000	0.001	0.001

Note: All regressions include dependent's characteristics (age, gender, chronic illnesses), caregiver's characteristics (age, gender, level of education), household characteristics (real income, real wealth, size of municipality), real GDP per capita, unemployment rate, region fixed effects, time fixed effects. Omitted category: Katz's index equal to zero. Standard errors between parenthesis. Clustered estimates at regional level and block bootstrap with 1,000 replications (Cameron et al., 2008).

**Declaration of Competing Interest**

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**Data availability**

Data is publicly available and codes will be made available on request.

**Appendix A. Supplementary data**

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jeoa.2022.100398>.

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