

Informal caring-time and caregiver satisfaction

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Abstract This paper examines the role of care decision processes on informal caring-time choices. We focus on three care decisions: the caregiver's own decision, a family decision and a recipient request. Results show that informal caregivers, engaged in care activities as a result of a family decision, are more likely to devote more than 5 h to care activities, even after allowing for endogeneity. Our findings are robust to controlling for a large number of socio-demographic characteristics, including care recipient and caregiver characteristics. Supplemental analysis, developed to explore whether care arrangements are related to informal caregiver's satisfaction, indicates that the family decision heavily penalizes informal caregivers. Given the importance of informal care activities in reducing health care costs, our findings imply that care decision processes should be taken into consideration when formulating health care policies.

Keywords Informal care · Informal caregiver satisfaction · Care decision process

JEL Classification I10 · J10

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Introduction

In developed countries, the number of dependent individuals is expected to increase, on average, by 31% by 2040, with this increase being up to 20% in Europe and Japan, and 60% in North America and Australasia.¹ This process will increase the demand for informal and formal care for the disabled population, not only for the growth in the proportion of elderly people, but also for the changes in the health needs of the population, with non-communicable diseases, mental illness and injuries becoming leading causes of disability [51].

On the other hand, female labour force participation has increased and family patterns have changed as a result of lower marriage rates, higher divorce rates and declining fertility [43]. The growth in female labour force participation began in the Nordic countries and in the United States, reaching a level of 80% of women aged 25–54 in 2001, with this later extending to other countries, where the participation rates of women aged 25–54 are about 60% in Mexico, Turkey and the majority of Southern European countries (OECD Labour Market Statistics). These changes have given rise to concerns about the future viability of a care pattern which relies on informal care [1]. However, full-time workers have maintained or increased their efforts as caregivers [41], which raises questions about the motivations of the informal caregivers. In this paper, we present evidence suggesting that care decision processes, defined as the way in which individuals make agreements so that dependent people can receive informal care, plays an important role.

¹ In the year 2000, dependents comprised 4–5% of the global population, or 7–8% of the working-age population [19].

Most of the economic studies of informal care analyse the influence of such care responsibilities on the labour supply of informal caregivers, relative to non-caregivers, with the general conclusion being that informal caregivers are potentially more exposed to labour market disadvantages (see [5, 9, 10, 12, 13, 21, 22, 42]). There have been fewer studies of the determinants of informal caring time in the economics literature, although sociologists and researchers in the area of gerontology have extensively examined the effect of demographic and socio-economic factors on informal care (see, for instance, [15, 24, 29, 46, 50]). We add to this literature by presenting evidence of the relationship between care decision processes and informal caring time.

In our empirical analysis, we use the Spanish Survey of Informal Assistance for the Elderly, 2004 (Encuesta de Apoyo Informal a los Mayores). Existing research on this topic refers mainly to the US and the UK, but the issue is of relevance in other developed countries, as it is in Spain, where the number of people requiring care has grown at an unprecedented rate. According to the Institute for the Elderly and Social Services (Instituto de Mayores y Servicios Sociales), there were about 1 million informal caregivers in Spain in 2004, representing 6% of the population aged 18 or older, and the total number of elderly recipients of informal care is estimated at 1.3 million, representing 17% of the population aged 65 or older. In order to explore the relationship between care decision processes and informal caring time, the Spanish Survey specifically includes a question asking why informal caregivers engage in informal care activities.² We focus on three answers which are considered here as the care decision processes: the caregiver's own decision (the caregiver took the decision on his/her own), a family decision (the decision was the result of an agreement among several family members) and a recipient request (care recipient asked the respondent for care). We exclude those situations in which the caregiver is the only individual available to devote time to care activities, since here the informal caregiver is not capable of rejecting the request of any of the informal caring-time choices. Our results suggest that care decision processes are important in informal caring-time choices, even after controlling for the individual's demographic and socio-economic characteristics. We find that the family decision is highly correlated with spending more than 5 h per day in caring, rather than less than 2 h per day, but that the care recipient request, relative to the caregiver's own decision,

has no significant correlation, leading to the conclusion that there are no differences between the recipient request and the caregivers decision when determining the hours spent in informal care. Our results are maintained even after allowing for endogeneity in the care decision process, and in the employment status of the informal caregivers.

We next explore whether care arrangements are related to informal caregiver's satisfaction. The informal caregiver's decisions about whether to spend time caring for the elderly or the sick are associated, in part, with the informal caregiver's expected subjective evaluation of their informal care status. Though we do not have information on their expected well-being, we consider the levels of satisfaction derived from the care activity as a proxy of that expected satisfaction. To our knowledge, this issue has not been analysed in the literature. We find that the family decision is negatively correlated with the probability of being more satisfied. Moreover, our findings provide evidence that lower satisfaction is associated with those informal caregivers who devote more than 5 h to care activities under the family decision.

Although the aforementioned dataset does not allow us to empirically test why informal caregivers accept a care arrangement which is correlated with a lower level of satisfaction, we present possible explanations. Previous literature on modelling the care decision-making process analyse parent-child relationships in which only one child is considered in the decision-making process [26] or by considering that several family members, such as all children, play a role in care decisions (see [13, 17, 35, 38]). More recent work has used game-theoretic bargaining models to examine family care arrangements, which involve separate utility functions for each family member. Pezzin and Schone [36, 37] assume that intrahousehold allocation is determined as the solution of a cooperative Nash bargaining game, in which the threat point is the Cournot-Nash equilibrium of a non-cooperative game. Hiedemann and Stern [23] and Engers and Stern [17] develop game theoretic models of family bargaining to analyse long-term care.

This paper proceeds as follows. 'Empirical specification' presents the empirical specification, and 'Data' describes the data. Results and robustness checks are in 'Results'. 'Informal caregiver's satisfaction: empirical model and results' explores the relationship between informal caregivers' satisfaction and care decision processes. 'Discussion' presents our discussion, and 'Conclusions' concludes.

Empirical specification

As stated, we are interested in empirically analysing the relationship between care arrangements and informal

² Other surveys, such as the Health and Retirement Study (HRS), do not include questions related to this issue. The Survey of Health, Ageing and Retirement in Europe (SHARE) does include some questions about the reasons, if any, why caregivers engage in such activities, but only accounts for the difference between the caregiver's own decision (to meet other people, to contribute something useful, for personal achievement,...) and the caregiver's sense of obligation.

caring time. The following equation forms the empirical framework of this analysis:

$$\ln \phi_{m|b} = \ln \frac{\Pr(y = m|\mathbf{x})}{\Pr(y = b|\mathbf{x})} = \mathbf{x}'\beta_{m|b} \quad \text{for } m = 1 \text{ to } J$$

We run a Multinomial Logit Model (MNL), estimating a separate binary logit for each pair of outcome categories [32], where b is the base category and \mathbf{x} is a vector which includes the care decision process variables and a set of socio-demographic characteristics of the informal caregiver, and also of the care recipient, which can affect the informal caring-time choice for reasons unrelated to care decision processes. Using methodologies very similar to ours, we find the work of Carmichael et al. [11], who examine the impact of employment status on readiness to take informal care responsibilities. Another example is the paper by Paraponaris et al. [34], who explore the factors correlated with several types of care (formal and informal care).

In our case, the dependent variable is the informal caring-time choice, including the following categories: less than 2 h of informal caring time, from 3 to 5 h of informal caring time or more than 5 h of informal caring time, on average per day.³ It can be argued that our outcome, informal caring time, is partially ordered, then we should use an Ordinal Model [52]. However, the parallel regression assumption, which is implicit in the Ordinal Model, is not satisfied. We computed the approximate likelihood-ratio test of proportionality of odds across response categories and found that the parallel regression assumption was violated at the 1% level of significance, ($\chi^2(35) = 70.93(0.000)$ including all controls). We have also compared the predictions from ordered logit and multinomial logit models, finding that probabilities predicted for one of the categories ended abruptly in the case of ordered logit

³ The Spanish Survey of Informal Assistance, in 2004, asked informal caregivers the hours they spent caring for the dependent person, in five categories: less than 1 h, from 1 to 2 h, from 3 to 5 h, from 5 to 8 h and a continuous variable for those cases with more than 8 caregiving hours. In our work, we combine categories *less than 1 h* and *from 1 to 2 h* in a new category *less than 2 h* since we have observed that those categories are indistinguishable by testing whether none of the independent variables significantly affect the odds of alternative m versus alternative n [2]. Formally, we test:

$$H_0 : \beta_{1,m|n} = \dots = \beta_{i,m|n} = \dots = \beta_{I,m|n} = 0$$

with β_i being the coefficient associated with the explanatory variable x_i . Results show that we cannot reject the hypothesis those categories are indistinguishable when using Wald tests and LR tests. We also group the outcome categories *from 5 to 8 h* and *more than 8 h* in a new category *more than 5 h of caring time*, as those two categories are also statistically indistinguishable. This also allows us to compare our results with those obtained by repeating the analysis with the Spanish Survey of Informal Assistance of 1994, since it only uses the categories considered in our work.

predictions. This abrupt truncation of the distribution for the ordered logit model is substantively unrealistic (see [27]). Thus, it is unclear whether our multinomial-choice-dependent variable is inherently ordered.

A potential explanation for these results is that the outcome categories represent different *occupational choices*, depending on the care needs of dependent individuals [18, 31]. Those informal caregivers who chose more than 5 h of caring time may be considered as *blue-collar* caregivers, since we would expect that they perform more Personal Activities of Daily Living (ADL) such as bathing or showering, grooming, dressing, feeding, etc, which are more time consuming [49]. Those caregivers devoting from 3 to 5 h of caring time can be classified as *housewife* caregivers, since we would expect that they engage more in Instrumental Activities of Daily Living (IADL), such as cleaning, ironing and making lunch. Finally, those involved in less than 2 h of caring time may be defined as *white-collar* caregivers, since we expect that they spend time in administrative tasks such as shopping and visits to the doctor or the bank. The choice set *blue collar*, *housewife* and *white-collar* is clearly unordered, as in the case of the *occupational choice* among workers [40], and it is thus arguable that the models for nominal outcomes, and in particular the MNL model, are suitable.⁴

Our variables of interest are the care decision processes. We consider three types of processes: the caregiver's own decision, the family decision and the care recipient request. In all three processes, the informal caregiver is able to reject the final agreement on informal care. We exclude those situations where the caregiver has no choice—the caregiver is the only individual available to spend time caring for since there are few observations which makes the analysis of this situation less reliable and because in this case, the informal caregiver is not capable of rejecting the request of any of the informal caring-time choices.⁵ To capture the effect of the care decision processes, we incorporate two dummy variables, one of these variable sets being equal to one when the informal caregiver reports

⁴ Note that we checked for the validity of the MNL model in this setting by testing the property of the independence of irrelevant alternatives (IIA). This property is convenient as regards estimation in MNL models, since if alternatives are not truly independent, then the parameter estimates will be inconsistent [20]. Results suggest that the MNL model is appropriate since we find evidence that the odds are independent of other alternatives by using two of the most common tests: Hausman's specification test [20] and the Small-Hsiao test [39].

⁵ To provide additional evidence that our results are not driven by the dropping of those individuals, we repeated the analysis without eliminating them from the sample and considered another care decision process called 'No Choice'. Results are quite consistent. Note that informal caregivers also report other reasons. However, those are difficult to classify and the sample is quite small so we have excluded those individuals from the analysis.

being involved in care activities because of the family decisions, and the other dummy variable being equal to one if the informal caregiver devotes time to dependent care as a result of a recipient request. The caregiver's own decision is the variable of reference.

The relationship between the care decision processes and the informal caring-time choices is unclear. We would not expect to observe differences between the informal caring-time choices of those caregivers who devote time to care activities as a result of the care recipient request, and as a result of the caregiver's own decision when the care recipient does not want to burden the caregiver [7]. However, if the care recipient prefers that one of his children provides care, we would observe differences in the informal caring time, since it is likely that the caregiver and the care recipient's preferences will differ. Under the family decision, the informal caring-time choice will not change from the choice made under the caregiver's own decision, when family members decide to devote time to their preferred care activities. On the other hand, we would expect to observe differences if the caregiver receives a compensation to devote time to care activities that he/she would rather not be doing. Thus, the study of the relationship between informal caring-time choices and care decision processes is an empirical question that has received little attention in the literature.

Results are shown in two ways. First, we present the average of the J discrete changes (or of the one standard deviation centred on the base values for those variables that are not binary) across all outcome categories, for each explanatory variable, $\bar{\Delta} = \frac{1}{J} \sum_{j=1}^J \left| \frac{\Delta \Pr(y=j|\bar{\mathbf{x}})}{\Delta x_i} \right|$ where the absolute value is taken because the sum of the changes, without taking the absolute value, is necessarily zero (see [27]). This measure of the impact of the explanatory variables should be interpreted as follows: when the average of the absolute values of the discrete changes obtained for x_i is greater than that estimated for x_j , the greater is the impact of x_i on informal caring-time choices.

We then explore the dynamics among the outcomes by utilizing the odds ratios (also known as factor change coefficients). Odds ratios are used extensively in the health-related literature, since they are a more intuitive method of interpreting the results obtained [27]. Formally, holding other variables constant, the changed factor in the odds of outcome m (e.g. white-collar caregiver) versus outcome n (e.g. blue-collar caregiver), as increased by δ equals:

$$\frac{\phi_{m|n}(\mathbf{x}, x_i + \delta)}{\phi_{m|n}(\mathbf{x}, x_i)} = e^{\beta_{i,m|n}\delta}$$

If the amount of change is $\delta = 1$, the odds ratio can be interpreted as follows: for a unit change in x_i , the odds of m

versus n are expected to change by a factor of $\exp(\beta_{i,m|n})$ holding all other variables constant. In contrast, when $\delta = s_{x_i}$, then the odds ratio can be understood in the following way: for a standard deviation change in x_i , the odds of m versus n are expected to change by a factor of $\exp(\beta_{i,m|n} \times s_{x_i})$, holding all other variables constant. To simplify the odds analysis, we have developed odds-ratio plots ('Result'). These plots reveal a great deal of information (for more details, see [27]). If a category is to the right of another category, it indicates that increases in the independent variable make the outcome to the right more likely. Also, the distance between each pair of categories indicates the magnitude of the effect, and when a line connects a pair of categories, this means a lack of statistical significance for this particular coefficient.

Data

In our main analysis, we use data from the Spanish Survey of Informal Assistance for the Elderly (Encuesta de Apoyo Informal a los Mayores), conducted in 2004 by the Institute for the Elderly and Social Services (Instituto de Mayores y Servicios Sociales) of the Spanish Ministry of Employment and Social Services.⁶ Our sample consists of individuals 18 years and older, residing in Spain, and devoting time to any kind of assistance with activities that the care recipient can no longer do alone, excluding those tasks that were done by others prior to the current need for care.⁷ Given that we are interested in the role of care decision processes, we restrict our sample to those individuals who report devoting time to care activities as a result of a caregiver's own decision, a family decision or a care recipient request. Our final sample consists of 1,107 informal caregivers: 16% report spending time on care of less than 2 h per day, 25.1 % devote from 3 to 5 h per day and the rest, 58.9%, engage in care of more than 5 h per day.

Table 1 presents summary statistics of all the variables. Column 1 reports values for the whole sample, and columns 3, 5 and 7 include the means of the care decision processes and all controls by informal caring-time choice. The average informal caregiver is a middle-aged woman. These characteristics vary slightly across informal caregiver-time choices, those who report spending time on care for less than 2 h per day are the youngest, 47, and the oldest (aged 55) are those who report time spent on care for

⁶ We have also repeated the analysis using a less recent wave of the Spanish Survey of Informal Assistance for the Elderly (1994). Results are quite consistent and are available upon request.

⁷ For instance, in the case of housework, only the additional part of housework due to the illness or disability of the care recipient should be seen as informal care.

Table 1 Summary statistics

	All		Caring time <2		Caring time 3–5		Caring time >5	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Caregiver demographic characteristics								
Age	52.035	13.628	46.605	12.921	49.284	12.899	54.683	13.465
Female	0.855	0.353	0.814	0.391	0.921	0.270	0.837	0.369
Illiterate	0.136	0.342	0.028	0.166	0.076	0.265	0.190	0.393
Low education	0.406	0.491	0.339	0.475	0.435	0.497	0.411	0.492
Secondary education	0.376	0.485	0.475	0.501	0.399	0.491	0.339	0.474
University education	0.083	0.276	0.158	0.366	0.090	0.287	0.060	0.237
Homemaker	0.454	0.498	0.277	0.449	0.468	0.500	0.497	0.500
Employed	0.289	0.454	0.446	0.499	0.360	0.481	0.216	0.412
Spouse	0.135	0.341	0.062	0.242	0.065	0.247	0.184	0.388
Son/daughter	0.599	0.490	0.554	0.499	0.586	0.493	0.617	0.487
Married	0.775	0.418	0.751	0.433	0.788	0.410	0.776	0.417
<10,000 inhabitants	0.185	0.389	0.164	0.371	0.158	0.366	0.202	0.402
10,000–100,000 inhabitants	0.343	0.475	0.282	0.451	0.353	0.479	0.356	0.479
>100,000 inhabitants	0.472	0.499	0.554	0.499	0.489	0.501	0.442	0.497
N children	1.001	1.011	1.345	1.097	1.158	1.029	0.840	0.945
Recipient demographic characteristics								
Age	80.552	8.218	78.870	7.917	80.673	7.726	80.957	8.453
Female	0.711	0.454	0.740	0.440	0.694	0.462	0.710	0.454
Illiterate	0.574	0.495	0.441	0.498	0.529	0.500	0.629	0.483
Low education	0.372	0.484	0.463	0.500	0.406	0.492	0.333	0.472
Secondary education	0.033	0.180	0.051	0.220	0.032	0.177	0.029	0.168
University education	0.021	0.143	0.045	0.208	0.032	0.177	0.009	0.096
Poor health status	0.950	0.217	0.949	0.220	0.924	0.265	0.962	0.192
Pension	0.927	0.261	0.904	0.295	0.914	0.281	0.939	0.240
Married	0.325	0.469	0.333	0.473	0.306	0.462	0.331	0.471
Help and decision variables								
Caring time <2 h	0.156	(0.363)						
Caring time 3–5 h	0.251	0.434						
Caring time >5 h	0.589	0.492						
IADL	0.964	0.187	0.927	0.262	0.993	0.085	0.962	0.192
ADL	0.738	0.440	0.537	0.500	0.683	0.466	0.816	0.388
Primary caregiver	0.814	0.389	0.616	0.488	0.745	0.437	0.897	0.304
Permanent help	0.733	0.443	0.701	0.459	0.644	0.480	0.779	0.415
Frequency	0.036	0.187	0.062	0.242	0.025	0.157	0.034	0.181
Relative cohabitation	0.536	0.499	0.237	0.427	0.374	0.485	0.686	0.465
Travel time	10.068	32.480	13.898	21.257	13.547	28.545	7.544	36.164
Monetary compensation	0.318	0.466	0.266	0.443	0.306	0.462	0.337	0.473
Formal help	0.164	0.370	0.237	0.427	0.151	0.359	0.149	0.356
Family member help	0.518	0.500	0.418	0.495	0.525	0.500	0.541	0.499
Caregiver decision	0.682	0.466	0.712	0.454	0.687	0.465	0.672	0.470
Family decision	0.257	0.437	0.198	0.399	0.255	0.437	0.273	0.446
Recipient decision	0.061	0.240	0.090	0.288	0.058	0.233	0.055	0.229
Observations	1,107		177		278		652	

Notes Data from the Spanish survey of informal assistance for the elderly (IMSERSO)

more than 5 h per day. The percentage of women engaged in care activities is greater (around 92%) among informal caregivers who report from 3 to 5 h per day of informal caring time. The typical informal caregiver has a low level of education, although those who report spending time in informal care for less than 2 h per day are highly educated. The average caregiver is normally the spouse or the child of the care recipient, suggesting that care for disabled people continues largely to be provided by family members, with the son/daughter of the care recipient primarily providing this caring time, about 59.9% of cases in all the informal caring-time choices. The average informal caregiver is married/cohabiting, has a small number of children (about 1 per informal caregiver) and lives in a city of more than 100,000 inhabitants. With respect to the work status of the average caregiver, only 28.9% of informal caregivers spend time in work activities, but there are large variations across informal caring-time choices, from 44.6% of informal caregivers devoting less than 2 h per day and being employed, to just 21.6% spending time in care activities for more than 5 h per day and also being employed. This may indicate the existence of more time constraints for those caregivers who also work. Among those who do not work, 45.4% report devoting time only to housework, the rest being unemployed, pensioners or students.

The average informal caregiver usually spends time caring for a woman aged 80 years old, with health problems, with a low level of education, receiving a pension and with no spouse. The average caregiver is also the primary caregiver, does these caregiver tasks every day (permanent care) and receives no monetary compensation from the care recipient (only 31.8% of caregivers receive monetary compensation).⁸ Again, there are differences across informal caring-time choices. The number of primary caregivers who spend less than 2 h per day is 61.6%, while the number of caregivers who are engaged in permanent care of more than 5 h per day is 77.9%. The average informal caregiver is more involved in IADL than in ADL, although the ADL activities are more important when the caregivers devote more than 5 h per day than when they devote less than 2 h per day. Given that different living arrangements are likely to affect the amount of care, and the kind of care activities, it is also important to observe whether there are large variations across informal caring-time choices. The travel time for the average caregiver who does not live with the care recipient is 10 min. This time is lower, 7.5 min, for those who report spending more than 5 h per day of caring time. The existence of care recipients who cohabit with a relative may

also affect the hours devoted to care. About 53.6% of care recipients cohabit with a relative.

Although the Spanish Survey does not provide information relative to formal caregivers—those who receive the equivalent of a salary—there is data on whether part of the care needs are supplied by people other than the respondent. Overall, 16.4% of informal caregivers report that the care recipients receive formal help, with those caregivers devoting less than 2 h per day reporting greater formal help, 23.7%, but less care supplied by other family members.

With respect to the care decision processes, our variables of interest, the decision to engage in care is taken by the caregivers in 68.2% of the sample, by the family in 25.7% and by the care recipient in only 6.1% of the cases. Then, the average informal caregiver is more likely to decide on her/his own. By informal caring-time choice, it is observed that caregivers decide by themselves in a greater percentage in all the informal caring-time choices, with the percentage being lower for those who report devoting more than 5 h per day to caring time. The family decision is reported more among those who report more than 5 h per day of caring time, while in the case of the recipient request, the care process is the least reported in all the informal caring-time choices.

Results

Table 2 reports the results for the main specification. For binary variables, we show the average of the absolute values of the discrete changes across all the outcome categories. For the remaining variables, we present the average of the absolute change of one standard deviation, centred on the base values.⁹ These results allow us to compare the impact of each of the explanatory variables on the informal caring-time choices. As can be seen in the first column, the family decision is important in informal caring-time choices. We find that the average of the absolute values of the discrete changes, across all the outcome categories, is 5.1 percentage points in the case of the family decision. The other care recipient process considered in the analysis is the care recipient request, which does not seem to be important in informal caring-time choices, since it is not statistically significant. Note that this does not imply that the care recipient request (or the rest of the estimates

⁸ There is no available information about the compensation that informal caregivers may receive from other family members.

⁹ Results are presented for the joint sample of men and women. Tests reject separate specifications by gender. For consistency, we have also estimated with different sub-samples to correct for other selection biases. We consider that the selection bias may be generated by either age or frequency of the help. To that end, we change the age range and we estimate only using those caregivers who devote time to care activities every day. Results are consistent and are available upon request.

Table 2 Average absolute change in the informal caring-time choice

	(1)	(2)	(3)	(4)	(5)
Recipient demographic characteristics					
Age			0.0287	0.0295	
Age recipient <65					0.0325
Age recipient 65–80					0.0324
Age recipient >80					0.0322
Age recipient square/100			0.0179	0.0184	
Female			0.0404	0.0390	0.0406
Illiterate			0.1116	0.1135	0.1115
Low education			0.0489	0.0494	0.0493
Married			0.0045	0.0052	0.0040
Poor health status			0.0713	0.0706	0.0679
Pension			0.0553	0.0570	0.0574
Caregiver demographic characteristics					
Age		0.0030	0.0030	0.0032	0.0029
Age square/100		0.0037	0.0038	0.0039	0.0036
Female		0.0764**	0.0722**	0.0727**	0.0714
Secondary education		0.0297	0.0228	0.0228	0.0233**
University education		0.0610*	0.0450	0.0460	0.0466
Married		0.0244	0.0199	0.0188	0.0184
<i>N</i> children		0.0218*	0.0227*	0.0226*	0.0228*
<10,000 inhabitants		0.0290	0.0188	0.0194	0.0191
10,000–100,000 inhabitants		0.0206	0.0130	0.0148	0.0138
Homemaker		0.0570**	0.0586**	0.0597**	0.0594**
Employed		0.0909**	0.0792**	0.0923**	0.0783**
Help and decision variables					
Instrumental activities (IADL)		0.1552***	0.1555***	0.1562***	0.1552***
Personal activities (ADL)		0.1208***	0.1129***	0.1120***	0.1131***
Primary caregiver		0.1325***	0.1318***	0.1327***	0.1326***
Permanent help		0.0521***	0.0508**	0.0507***	0.0498**
Frequency		0.1166**	0.1108*	0.1171**	0.1110*
Relative cohabitation		0.2099***	0.2027***	0.2051***	0.2028***
Travel time		0.0003	0.0004	0.0004	0.0004
Spouse		0.0793	0.1022	0.1008	0.1054*
Son/daughter		0.0620*	0.0676**	0.0693**	0.0684**
Monetary compensation		0.0221	0.0237	0.0249	0.0240
Formal help		0.0154	0.0140	0.0134	0.0121
Family member Help		0.0352*	0.0353*	0.0329*	0.0356*
Family decision	0.0514**	0.0851**	0.0780**	0.0548**	0.0778**
Recipient decision	0.0432	0.0454	0.0449	0.0658	0.0430
Employed × family decision				0.0676	
Employed × recipient decision				0.0692	
Observations	1,107	1,107	1,107	1,107	1,107
Pseudo- <i>R</i> ²	0.0029	0.1705	0.1797	0.1818	0.1807
McFadden's Adj <i>R</i> ²	0.003	0.115	0.277	0.114	0.112

Table 2 continued

	(1)	(2)	(3)	(4)	(5)
BIC	-5,616	-5,553	-5,646	-5,530	-5,528

Notes Data from the Spanish Survey of Informal Assistance for the Elderly (IMSERSO). For binary variables, it is computed the average of the absolute values of the discrete changes across all the outcome categories. For the rest of the variables, we have computed the average absolute change of one standard deviation centred on the base values. The hypothesis that x_i does not affect the dependent variable is tested here, $H_0 : \beta_{i,1|b} = \dots = \beta_{i,J|b} = 0$ where b is the base category. Because $\beta_{i,b|b}$ is necessarily 0, the hypothesis imposes constraints on $J - 1$ parameters. This hypothesis is tested with LR test

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10 % level

that are not significant in Table 2) is not meaningful for the analysis of the dynamics among some of the outcome categories, since the average of the absolute values of the discrete changes (or of the one standard deviation centred on the base values for those variables that are not binary) gives no information about the dynamics among the informal caring-time choices. We revisit this issue below.

In Column 2, the caregiver's demographic characteristics and the help and decision variables are added to the specification, and the inclusion of these variables slightly changes the magnitude of the average of the absolute discrete change for the family decision, but there is no effect in the case of the care recipient decision. Consistent with the informal care literature, education and the gender of the caregiver (being a woman, or not) are found to be important caregiver characteristics of informal caring-time choices (see [15, 24]). In addition, the variables controlling for the work status (employed, or not) and for whether the caregiver is a homemaker, are significant as, for example, in Wolf and Soldo [48]. A potential concern with the introduction of the work status in the analysis is that the family decision may be more important for those who do not work, since they are less time constrained. Then, the family decision may be capturing the work status of the informal caregivers rather than the care decision process. To check this, we also interact the care decision processes with the variable employed and we find that the family decision is still important in informal caring-time choices (see Column 4). Also, we revisit the endogeneity of the work status of informal caregivers below. With respect to the help variables, our results suggest that those variables (IADL, ADL, primary caregiver, permanent help, frequency and relative cohabitation) are the most important to informal caring-time choices, with the greatest average of the absolute discrete change being for the relative cohabitation variable. This is consistent with the existing literature, in that living arrangements are important issues in informal caring-time choice (see [14, 24], among others).

In the third column, care recipient demographic characteristics are added to the model. We have included these

variables to check whether our variables of interest are measuring the care recipient characteristics rather than the care decision process. For instance, if the care recipient cannot take any decision because of health problems, then we would not expect the care recipient request to be important in this analysis. Our results do not change significantly. We find that the estimated average absolute of the discrete change of the family decision slightly decreases from 8.5 to 7.8 percentage points and that again the care recipient request is not statistically significant. In addition, to account for the differences in care recipient needs at different periods of their lives, in Column 5, we add to the model recipient age dummies (for care recipients under 65 years old, those between 65 and 80 and those over 80) and the results are still robust.

In order to study the dynamics among the informal caring-time choices, the MNLM includes a number of coefficients that present difficulties of interpretation of the effects on all pairs of outcome categories. Thus, to make the comparison easier, we have developed odds-ratio plots [27]. Figure 1 presents the results for the model that includes the recipient demographic characteristics, the caregiver demographic characteristics, and the help and decision variables, corresponding to the model specified in Column 3 of Table 2, which is the better-fitting model.¹⁰ In the odds-ratio plot, the independent variables are represented in a separate row. The horizontal axis indicates the relative magnitude of the coefficients associated with each outcome. The numbers correspond to the outcome categories, that is to say, '1'

¹⁰ To select among the specifications presented in Table 2, we first use as a measure of fit the Pseudo- R^2 . This test favours the use of the specification in Column 4, since the test is greater in this case. We also utilize the McFadden's Adj R^2 since the Pseudo- R^2 always increases as new variables are added. Now, the model selected is that in Column 3, where the value of the test is greater. Additionally, we have also computed the Bayesian information criterion, an information measure, to compare the estimated models. As in the previous case, since the more negative value is the better-fitting model, the best is the model in Column 3. Thus, it seems that the better-fitting model is that in Column 3, which includes caregiver and recipient's characteristics and the help and decision variables.

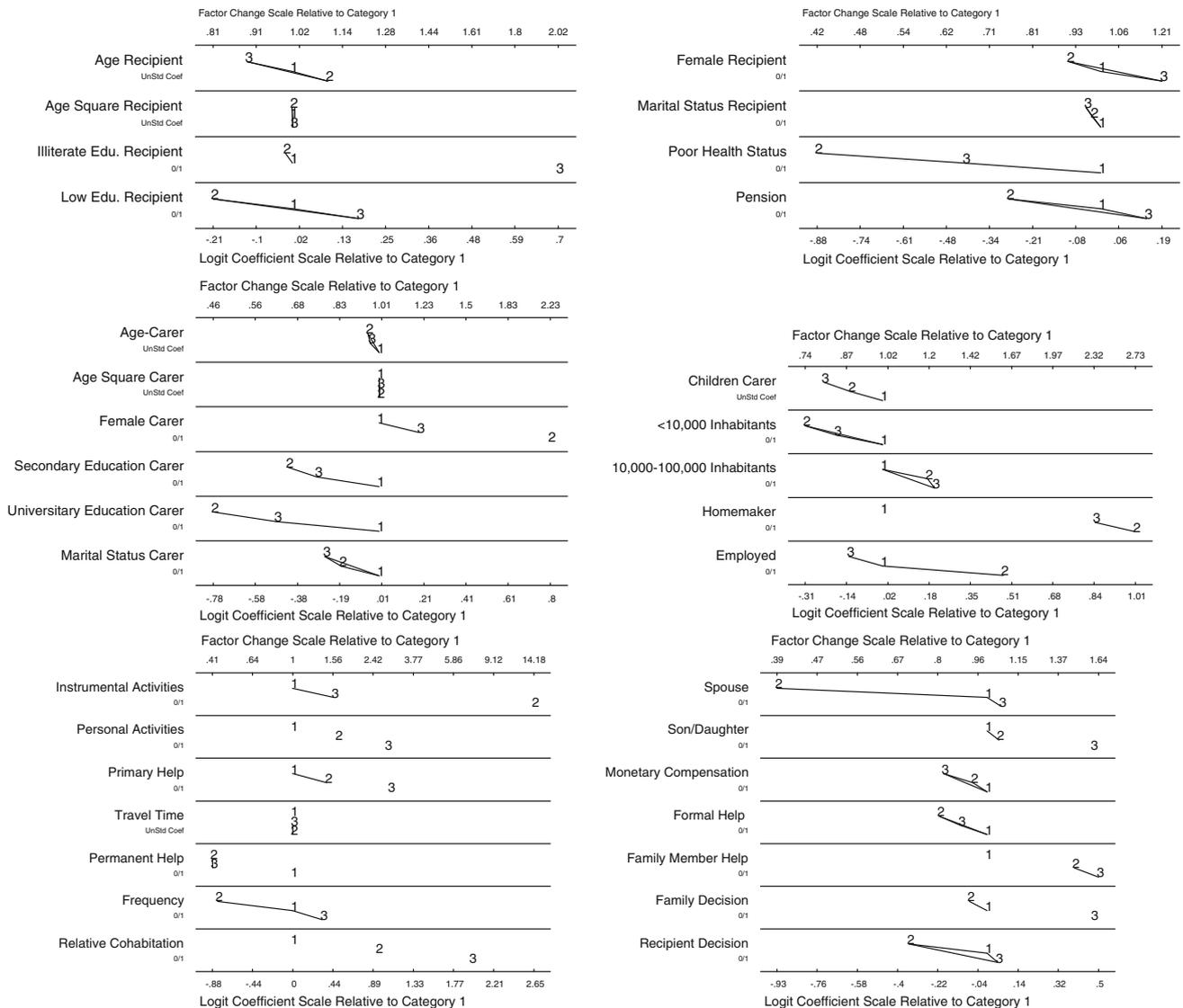


Fig. 1 The numbers correspond to the outcome categories: ‘1’ denotes less than 2 h per day of caring time, which corresponds to the base category, ‘2’ indicates from 3 to 5 h per day of caring time and ‘3’ corresponds to more than 5 h per day of caring time. The additive scale on the *bottom* axis measures the value of $\beta_{i,m1n}\delta$. The

denotes less than 2 h per day of caring-time or the *white-collar* caregiver, which corresponds to the base category, ‘2’ indicates from 3 to 5 h per day of caring-time, or the *housewife* caregiver and ‘3’ corresponds to more than 5 h per day of caring time, or the *blue-collar* caregiver. The additive scale on the bottom axis measures the value of $\beta_{i,m1n}\delta$. The multiplicative scale on the top axis measures $\exp(\beta_{i,m1n})\delta$, which are the odds of a person to devote one amount of caring time over another. The distance between a pair of outcomes indicates the magnitude of the effect, and the statistical significance is added by drawing a line between categories for which there is no significant coefficient.

multiplicative scale on the *top* axis measures $\exp(\beta_{i,m1n})\delta$, which are the odds of a person to devote one amount of caring time over another. The statistical significance is added by drawing a *line* between categories for which there is no significant coefficient. Robust Standard Errors

Results suggest that the family decision is important in the choice of the category ‘3’, more than 5 h per day of caring time, but not in the choice between categories ‘1’ and ‘2’, less than 2 h and from 3 to 5 h per day of caring time. We find that the odds of choosing more than 5 h, versus less than two, and versus from 3 to 5 h, are 60.1 and 73.3% greater, respectively.¹¹ The care recipient decision does not affect the choices between the outcome categories; we find no significant coefficients. This result suggests

¹¹ The per cent changes are obtained as follows: $100(\exp(\beta_{i,m1n} \times \delta) - 1)$, $\delta = 1$ except when we note the contrary.

that there are no differences between the informal caring time decided by the informal caregiver, and that determined by the care recipient.

For the case of the care recipient characteristics, it is observed that only the level of education has a significant impact on the dynamics among the informal caring time, affecting the odds of devoting more than 5 h per day versus from 3 to 5 h and less than 2 h per day. In the case of the health status of the care recipient, if the care recipient has poor health status, the odds of devoting less than 2 h per day increase with respect to from 3 to 5 h per day; this is presumably because those who do not devote more than 5 h per day of caring time are not the primary caregivers, and so they are more likely to devote more time to administrative tasks. The remaining variables (age, gender and marital status of the care recipient) are not important in the dynamics among the informal caring-time choices, since the estimates are not statistically significant.¹²

With respect to the informal caregiver's demographic characteristics, as expected, being a woman and devoting time to housework has larger effects on choosing the outcome category '2', from 3 to 5 h per day of caring time, which seems to confirm our hypothesis that when the caregiver devotes from 3 to 5 h per day of caring time, this individual is engaged in housework or IADL activities. On the other hand, because of time constraints, when the caregiver is employed and has children he/she is less likely to choose more than 5 h per day of caring time. The caregiver is also more likely to devote less than 2 h per day if he/she is more educated. The other caregiver demographic characteristics (marital status and dummies for the place of residence) have no impact on the dynamics of informal caring time.

As expected, cohabitation with a relative produces the largest effect, increasing the likelihood that the caregiver will spend more than 5 h per day on caring time. This is presumably because the relative who cohabits with the care recipient is also the primary caregiver. It should be noted that this variable could affect the care decision process. For instance, it is possible that the family decision follows from the fact that the recipient is a cohabitant, and thus it is more convenient to arrange the care in this way. Unfortunately, we are unable to control for that, since we have no

information about the living arrangements when the care decision process took place, but we run some simple robustness checks to test whether our results are consistent, as we explain below.

When the caregiver is the primary caregiver, it is also more likely that the informal caregiver will spend more than 5 h per day in care activities. The same occurs if the caregiver is engaged in ADL, which are more time-consuming activities. This may reinforce our classification regarding the outcome categories: those who devote more than 5 h per day can be defined as *blue-collar* caregivers. Considering the relationship with the care recipient, we find that it is more likely that the spouse of the care recipient will spend more than 5 h, versus from 3 to 5 h per day. The same occurs in the case of the son/daughter, increasing the probability of devoting more than 5 h per day to care. As regards other forms of care assistance, we find no significant coefficients, indicating that receiving formal help is not important in the dynamics among outcome categories for the informal caregiver. This is not observed in the case of receiving care by other family members in addition to the care provided by the respondent. Results show that devoting less than 2 h per day to informal care is less likely. This could be due to the fact that, as caring needs increase, more family members become involved in care activities. Of course, we have rerun the analysis excluding those informal caregivers who report that the care recipient receives formal care and care assistance from other family members, since the sample of individuals who receive formal care or family care assistance may not be a random sample; but our results do not change. As an additional control, we introduce the possibility that the caregiver receive a compensation from the care recipient, since this can also affect the caring-time choice. Those who receive a compensation may decide to devote more time to care activities. The inclusion of this variable is not important, since receiving a monetary compensation is not significant in our estimations. We also rerun the analysis excluding those caregivers who receive a compensation, and our results do not vary.

It is also arguable that we have endogeneity problems if we include in the analysis controls for cohabitation, or for the work status of the caregiver [21]. Both the decision to cohabit and the work status of the caregiver may be endogenous, since the care recipient could cohabit with a relative or the informal caregiver could be employed, depending on the amount of informal caring time required by the care recipient. We have rerun our analysis using different sub-samples and results are quite consistent. First, we have analysed separately those who cohabit with a relative and those who do not. Second, we have studied the informal caregiver subsample of those who devote time to work activities and the subsample of those who are not

¹² The Spanish Survey also provides information on the nature of the illness of the dependent person. Certainly, the type of illness may well affect the informal care the disabled person needs and it can also influence on how the decision of care is taken. We have repeated the analysis including dummies to control for the type of illness and results do not change. Then, this suggests that our estimations are not capturing the effect of the type of illness instead of the care decision process. Since we have few observations when we include the type of illness and the type of illness is highly correlated with the care needs (those are included as controls), we prefer to present our results without those controls.

employed independently. Third, we have carried out our estimates without those variables that can generate endogeneity problems, and our results are quite robust. Of course, with these analyses we are not solving the endogeneity problems, see the next subsection, but it is comforting that our results are maintained, even when including or excluding all those variables that could produce endogeneity problems.¹³

Finally, these results allow us to define a profile for the informal caregivers who report devoting less than 2 h per day to caring time (*white-collar* caregiver), for those spending from 3 to 5 h per day (*housewife* caregiver), and for those who devote more than 5 h per day (*blue-collar* caregiver). A *blue-collar* caregiver versus a *housewife* caregiver tends to decide to care by way of a family decision, is more likely to devote time to ADL activities, to be the primary caregiver, and to be the spouse or child of the care recipient. This *blue-collar* caregiver also cares for an illiterate care recipient, who receives a pension, and who lives with a relative. A *housewife* caregiver is more likely to be a woman, to devote time to IADL activities, and to be employed, than a *blue-collar* caregiver.

On the other hand, a *white-collar* caregiver is more likely than a *housewife* caregiver to care for a dependent individual who does not live with a relative. The *white-collar* caregiver is less likely to be a woman, and the primary caregiver, and also tends to devote less time to IADL, and ADL activities than a *housewife* caregiver. Relative to a *blue-collar* caregiver, a *white-collar* caregiver is less likely to care as a result of a family decision, and to be a homemaker. He/she is also less likely to devote time to ADL activities, to be the primary caregiver, to care for a care recipient who lives with a relative and to devote time to a care recipient who receives care from other relatives.

Addressing endogeneity

Two-stage prediction substitution and two-stage residual inclusion

A major concern with the analysis presented here is that the care decision processes, our explanatory variables of interest, have been considered as exogenous regressors. As suggested by Stern [42], family members may make decisions about care activities strategically, implying that those decisions are endogenous. In our framework, endogeneity concerns may arise owing to the omission of unobservable determinants of informal caring-time choices that can also impact on the care decision processes. For instance, the ability of an informal caregiver to

carry out caring activities, which is unobserved in our sample, or whether one individual is more altruistic than another may influence the time devoted to those activities, but it can also have an effect on the decision process itself. Then, our estimates may be inconsistent if we do not take these endogeneity problems into consideration.

As mentioned in the Introduction, we acknowledge that we have no information on how the underlying care arrangement took place, although we discuss some possible explanations below. Of course, this does not solve the potential endogeneity bias, but to tackle this problem, we use instrumental variables methods (IV), commonly used in the literature in the case of cross-section data. As proposed by Terza et al. [44], we focus on two widely exploited approaches in empirical health economics to correct for endogeneity bias in nonlinear models: the two-stage predictor substitution (2SPS) and the two-stage residual inclusion (2SRI). The 2SPS method is an extension to a nonlinear framework of the linear two-stage least squares estimator. As in the linear case, in the first stage of 2SPS, auxiliary regressions are estimated and the results are used to generate predicted values for the endogenous regressors. The second-stage regression is then conducted for the outcome equation of interest, but replacing the endogenous variables with their predicted values obtained in the first stage. The 2SRI estimator is similar to the previous methodology (both have the same first stage), except that, in the second-stage regression, first-stage residuals are added as additional regressors, rather than replacing the endogenous variables by the first-stage predictors.

The choice of an appropriate instrument is also a key element in correcting for endogeneity bias. The instrumental variable should be uncorrelated with the error term of the outcome equation of interest (the exclusion restriction) and correlated with the regressor of interest (the rank condition). In our case, we first consider the quality of the relationship prior to the need for care—between the care recipient and the caregiver—as a possible instrument. Obviously, the reason why an individual takes the decision to care on his/her own may be due to a good relationship with the care recipient. Less likely would be acceptance of the care recipient request vs. the caregiver's own decision, since the perception of the quality of the relationship can differ between the recipient and the caregiver. Although the recipient of the care activities asked for help from the caregiver resulting from a perceived good quality relationship, the potential caregiver can reject this care decision proposal because he/she does not have the same opinion of the quality of the relationship. Less likely possibilities would also make the family decision more probable versus the caregiver own

¹³ All these results are available upon request.

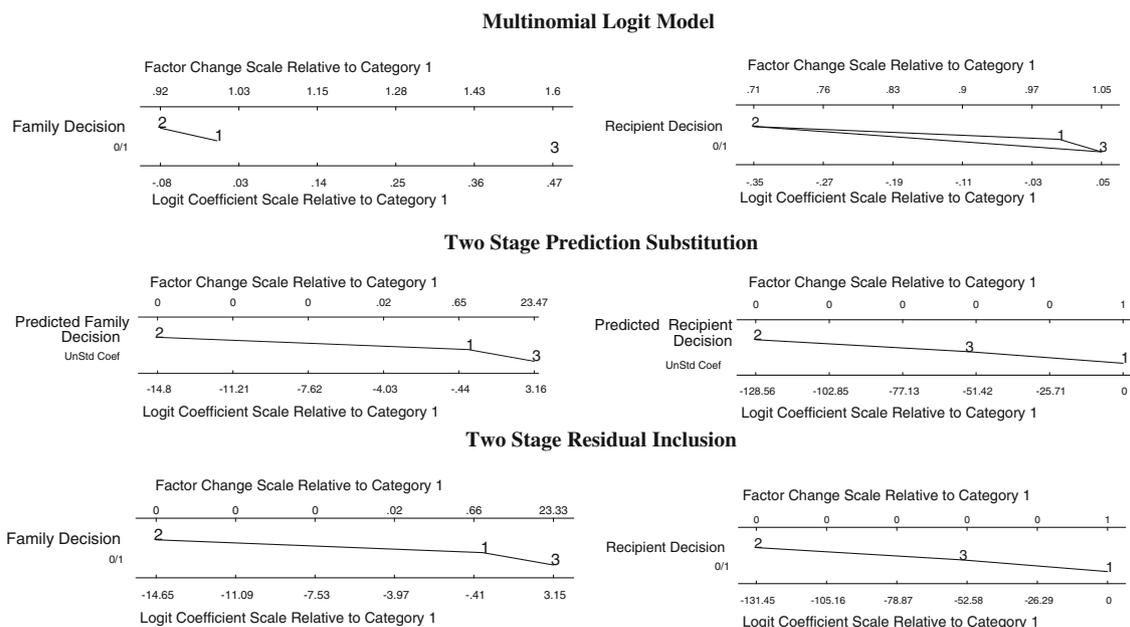


Fig. 2 **a** Multinomial logit model. **b** Two-stage prediction substitution. **c** Two-stage residual inclusion. The numbers correspond to the outcome categories: ‘1’ denotes less than 2 h per day of caring time, which corresponds to the base category, ‘2’ indicates from 3 to 5 h per day of caring time and ‘3’ corresponds to more than 5 h per day of caring time. The additive scale on the *bottom* axis measures the value

of $\beta_{i,\min}\delta$. The multiplicative scale on the *top* axis measures $\exp(\beta_{i,\min})\delta$, which are the odds of a person to devote one amount of caring time over another. The statistical significance is added by drawing a *line* between categories for which there is no significant coefficient. Robust Standard Errors

decision or the recipient request, since other factors, such as the existence of compensation and/or the low opportunity costs of the potential caregiver (even within the terms of a bad relationship between both care agents), can lead to the acceptance of the family decision. Thus, the quality of the relationship seems to be correlated with how the care decision process took place. However, after running the analysis we observed that the instrumental variable was highly correlated with the error term of the Multinomial Logit analysis of the informal caring-time choices, violating the exclusion restriction, which makes this instrument inappropriate for the analysis. For that reason, we prefer not to use the quality of the relationship as an IV variable.

Accordingly, we use an alternative IV regressor defined as a dummy variable that takes the value ‘1’ if both the care recipient and the caregiver are women, and ‘0’ otherwise. We favour the use of this variable since it seems to satisfy the exclusion restriction and is correlated with the caregiver decision process. Since the more likely the participation in caregiving, the lower the opportunity cost of doing so [11, 16], it would be expected that women, who are more likely to not be in paid employment (or their wages are relatively lower than those of men) find it more difficult to reject a recipient request for informal care, or a family decision, as Carmichael et al.

[11] suggest.¹⁴ Hence, when the informal caregiver is a woman, the more likely she is to accept a family decision or a recipient request, but it is less clear how this can affect her own caring decision. Even though women have lower opportunity costs, it could be more difficult for them to take the decision on their own because of the losses of earnings when they engage in care activities. Thus, in the case of women, if monetary compensation is more likely to occur when the decision is taken by way of a family decision or a recipient request (*‘Discussion’*), the caregivers own decision would be less likely to occur than in the other two care decision processes. Additionally, we consider that the gender of the care recipient can be significant since, at this point, considering only the gender of the caregiver does not allow us to distinguish between the family decision and the recipient request. Given that women are more likely to have lower incomes and that they are more likely to live longer, with the

¹⁴ Women are today more likely to participate in the labour market and to contribute to the family finances in Spain (OECD Labour Market Statistics), but there remain some differences between men and women. Since our sample consists of informal carers who are around 52, an age where these differences are more pronounced, it is not unrealistic to suppose that women are less likely to be in paid work or to earn more than men, so that potential female caregivers could have lower opportunity costs when the care decision was taken.

increase in life expectancy increasing anticipated expenditures on informal care [30], we would expect a greater compensation for the female caregiver to undertake the care of a female recipient than in a mixed care situation (with the care recipient and the caregiver being of different gender) or with both agents being men. This compensation would be greater under the family decision than under the female recipient request, since a female recipient is likely to have less money to with which to compensate the caregiver. Thus, the fact that both caregiver and care recipient were women when the care decision took place makes the family decision the most likely, followed by the care recipient request, with the caregiver's own decision being the least likely.

Figure 2 shows the results for the better-fitting model, which includes controls for the recipient demographic characteristics, the caregiver demographic characteristics and the help and decision variables. To make the result easily comparable, we first plotted the odds ratios of the variables of interest—the care decision processes—of the model, without considering the endogeneity problem in Fig. 2a. Next, we report the odds ratios obtained using the 2SPS method (see Fig. 2b). In this case, an MNLM model is implemented to generate the predicted values of the care decision processes in the first stage. In the second stage, we incorporate those predicted values in the outcome equation of interest, which is also an MNLM where the outcomes of interest are the informal caring time choices. As can be seen in Fig. 2b, the family decision is still the most relevant care decision process in the choice of the category '3', more than 5 h per day of caring time, albeit the choice between categories '1' and '3' is not significant as it is in the case of categories '1' and '2', less than 2 h and from 3 to 5 h per day of caring time. With respect to the care recipient decision, we observe that the care recipient request is relevant in the choice between categories '1' and '2', with the category less than 2 h of caring time being the most likely choice under the recipient request. Odds Ratios for the 2SRI are displayed in Fig. 2c. Results are quite similar to those previously described, although these estimates generated by the 2SRI model are normally consistent, while the 2SPS approach is not (Terza et al. 2008). All in all, our estimates suggest that the family decision plays an important role in deciding more than 5 h of caring time. In contrast, the recipient request is only important in the choice of less than 2 h of caring time.

The magnitude of the impact of the care decision processes, using the IV approaches, seems at odds, since it is considerably greater than that observed when these methods are not implemented. This could indicate that we are not using an appropriate IV variable, or that we are not taking into consideration another source of endogeneity

that arises in this analysis: labour supply decisions.¹⁵ To examine this issue, we use another standard method in health economics, the multivariate probit approach, that also allows us to correct our estimates for the two sources of endogeneity bias (see the following subsection).

Multivariate probit approach

The interpretation of our previous results has been made under the consideration that labour market decisions are exogenously determined, i.e. the decision to participate in the labour market is assumed to be independent of unobserved characteristics that can also influence the informal caring-time choices, such as the altruism of individuals. However, as indicated above, this is difficult to sustain. As proposed by one referee, more altruistic individuals (deciding on their own) may prefer to combine work and caregiving, but those who are less altruistic (who undertake care responsibilities by a family decision or a recipient request) may not be willing to do that. Hence, if employment decisions are correlated with the unobservables, coefficients estimated in the MNLM will also be biased and inconsistent.

To deal with this issue, we use a multivariate probit model. This model consists of a recursive system of equations for informal caring-time choices, employment and care decision processes. It not only gives informal caring-time choices a structural representation, but also allows for dependence and deals appropriately with unobservable heterogeneity and potential endogeneity. This is so, since the random components of the care decision employment equation are freely correlated with the random component of the informal caring-time choice equations. Then, if there are unobservable determinants of informal caring-time choices, influencing also the care decision process and the employment decisions, this model is able to take them into account. This methodology is also implemented in other papers of health economics to address endogeneity problems (see, for example, Balia and Jones [3], who analysed the effect of lifestyle choices on mortality).

Relying on Wilde's [47] finding on identification of multiple equation probit models, we first estimate the multivariate model where each equation has the same regressors.¹⁶ The multivariate probit model is estimated using a Geweke-Hajivassilou-Keane (GHK) simulator for probabilities and a maximum simulated likelihood procedure (see [8]). The GHK simulator exploits the Choleski

¹⁵ Note that we have also repeated the analysis without the variable that controls for the employment status of the caregiver, and our results are robust.

¹⁶ Wilde [47] explains that, given the assumption of joint normality, the model is identified by functional form, which requires no exclusion restrictions.

Table 3 Selected coefficient estimates for the informal caring-time equations under exogeneity and endogeneity

	IC time <2	IC time 3–5	IC time >5
Panel A: probit estimates			
Employed	−0.068 (0.147)	0.315** (0.134)	−0.253** (0.127)
Family decision	−0.112 (0.133)	−0.240** (0.110)	0.317** (0.107)
Recipient decision	0.065 (0.208)	−0.167 (0.190)	0.155 (0.182)
Panel B: multinomial probit estimates without exclusion restrictions			
Employed	0.210 (0.268)	0.166 (0.218)	−0.393 (0.257)
Family decision	0.149 (0.303)	−0.691*** (0.174)	0.555** (0.228)
Recipient decision	−0.521 (0.526)	1.330 (0.255)	−0.842** (0.361)
Panel C: multinomial probit estimates with exclusion restrictions			
Employed	0.224 (0.245)	0.135 (0.225)	−0.395 (0.247)
Family decision	0.093 (0.255)	−0.652*** (0.173)	0.583** (0.211)
Recipient decision	−0.634 (0.102)	1.372 (0.265)	−0.781** (0.374)

Notes Data from the Spanish survey of informal assistance for the elderly (IMSERSO)

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level. Robust standard errors

decomposition of the covariance matrix, so that the joint probability originally based on unobservables can be written as the product of univariate conditional probabilities, where the errors are replaced by disturbances that are independent of each other by construction [25].

Table 3 shows the coefficient estimates of the variables of interest—the care decision processes and the employment status (being employed or not)—obtained using univariate and multivariate probit models from two different specifications (with and without exclusion restrictions).¹⁷ It is important to note that, using this approach, we cannot speak to the dynamics of informal caring-time choices, as we do using the MNLM, but it is possible to analyse how the care decision process affects one of the informal caring-time choices versus the other two. Panel A reports the coefficients estimated from the univariate probit model for each of the informal caring-time choices. As can be seen, being employed positively impacts on the 2–5 h of informal caring time and has a negative effect on the choice of more than 5 h of caring time. This is consistent with the argument of time restrictions of those in paid work who have less time to devote to care activities. However, after allowing for endogeneity, we observe that the coefficients capturing the impact of the employment status of the informal caregiver turn out to be non-significant, even though the sign of the coefficient is maintained with respect to those more time-intensive care choices, Panel B and Panel C.

In Panel B, we have included all variables (care recipient characteristics, caregiver characteristics, and help and decision variables) as regressors, but in Panel C, we impose exclusion restrictions, following Maddala's [28] argument on the identification of the parameters of a multivariate probit model. In this case, the work equation only includes caregiver characteristics and the care decision variables as controls. This set of variables was chosen looking at the statistical significance of the variables in the model without restrictions and by using the Akaike information criterion (AIC) and the Bayesian information criterion (BIC).¹⁸ As in other studies that analyse the labour market participation of informal caregivers (see, for example, [21]), it can be argued that the decision to be involved in market work strongly depends on the demographic characteristics of the informal caregiver. But, as we point out above, it can also depend on how the care decision process took place, i.e. the potential informal caregiver can give up his/her work if the family decision implies compensation.

With respect to the family decision and the recipient request, we find little variation in the estimates moving from one specification to another, indicating that our results are robust to alternative identification assumptions. As we found in the previous analyses, the family decision has a positive effect on the informal caring-time choice of devoting more than 5 h to care, even when the endogeneity problems are taken into account. In contrast, the recipient

¹⁷ For purposes of consistency, we also run the analysis using several different sub-samples, dropping each variable in turn. Our results do not vary significantly.

¹⁸ The BIC was obtained using the Schwarz formula as $(-2\log L + \log(N)p)$ where p is the number of parameters and N is the number of observations. The AIC is defined as $(-2\log L + 2p)$. Information criteria suggest that the better-fitting model is that showed in Panel C which includes exclusion restrictions.

Table 4 Average partial effects in alternative models for the informal caring time choice: less than 2 h

	Probit model		Multivariate probit no restrictions		Multivariate probit with restrictions	
	APE	SD	APE	SD	APE	SD
Care recipient demographic characteristics						
Age	0.004	0.003	0.005	0.003	0.006	0.004
Age recipient square/100	-0.003	0.001	-0.003	0.002	-0.004	0.002
Female	-0.009	0.006	-0.006	0.004	-0.005	0.003
Illiterate	-0.040	0.024	-0.045	0.027	-0.052	0.031
Low education	0.005	0.003	0.002	0.001	-0.003	0.002
Married	0.004	0.003	0.001	0.001	-0.001	<0.000
Poor health status	0.053	0.037	0.050	0.035	0.048	0.033
Pension	0.008	0.005	0.010	0.007	0.006	0.004
Caregiver demographic characteristics						
Age	0.004	0.003	0.004	<0.000	0.004	0.002
Age square/100	-0.005	0.003	-0.004	0.003	-0.004	0.003
Female	-0.046	0.027	-0.039	0.023	-0.038	0.022
Secondary education	0.032	0.020	0.019	0.012	0.016	0.010
University education	0.074	0.040	0.054	0.030	0.050	0.027
Married	0.029	0.019	0.029	0.019	0.029	0.019
N children	0.019	0.012	0.017	0.010	0.017	0.010
<10,000 inhabitants	0.025	0.015	0.033	0.020	0.034	0.020
10,000–100,000 inhabitants	-0.016	0.010	-0.013	0.008	-0.011	0.007
Homemaker	-0.091	0.055	-0.092	0.054	-0.091	0.054
Employed	-0.012	0.008	0.043	0.025	0.046	0.026
Help and decision variables						
Instrumental activities (IADL)	-0.144	0.068	-0.151	0.070	-0.153	0.071
Personal activities (ADL)	-0.094	0.051	-0.104	0.055	-0.104	0.055
Primary caregiver	-0.088	0.047	-0.076	0.041	-0.076	0.041
Permanent help	0.088	0.062	0.104	0.074	0.103	0.073
Frequency	0.030	0.018	0.036	0.020	0.037	0.021
Relative cohabitation	-0.176	0.088	-0.177	0.089	-0.181	0.090
Travel time	-0.001	<0.000	-0.001	<0.000	-0.001	<0.000
Spouse	0.009	0.006	<0.000	<0.000	-0.002	0.001
Son/daughter	-0.030	0.019	-0.042	0.025	-0.043	0.026
Monetary compensation	0.017	0.010	0.021	0.013	0.024	0.015
Formal help	0.019	0.012	0.024	0.014	0.029	0.017
Family member help	-0.044	0.027	-0.053	0.032	-0.052	0.032
Family decision	-0.021	0.014	0.030	0.018	0.018	0.011
Recipient decision	0.013	0.008	-0.085	0.062	-0.100	0.075

Notes Data from the Spanish survey of informal assistance for the elderly (IMSERSO)

request is not meaningful in the univariate analysis, but negatively and significantly impacts on the informal caring-time choice of more than 5 h of caring, versus the other two choices, when we allow for endogeneity.

Tables 4, 5, and 6 report the average of the partial effects and standard deviations, permitting us to compare the partial effects from the recursive models and the univariate probit models, including exogenous care decision processes and employment status, in order to evaluate the advantages of estimating the informal caring-time choices controlling

for endogeneity. Looking at our variables of interest, we observe that the partial effects of the family decision and the recipient request are greater in absolute value than in the univariate probit in the case of the informal caring-time choices from 3 to 5 h and more than 5 h. We find that the probability of devoting more than 5 h of caring time for an informal caregiver who undertakes care activities by way of a family decision is about 17% greater, a sizeable effect given the average partial effect of the family decision is just 9.7% in the univariate analysis. It is also worth noting that

Table 5 Average partial effects in alternative models for the informal caring time choice: from 3 to 5 h

	Probit model		Multivariate probit no restrictions		Multivariate probit with restrictions	
	APE	SD	APE	SD	APE	SD
Care recipient demographic characteristics						
Age	0.031	0.009	0.023	0.007	0.022	0.007
Age recipient square/100	-0.019	0.005	-0.014	0.005	-0.014	0.004
Female	-0.042	0.012	-0.038	0.012	-0.038	0.012
Illiterate	-0.067	0.020	-0.032	0.010	-0.028	0.010
Low education	-0.031	0.010	-0.009	0.003	-0.006	0.002
Married	0.005	0.002	0.013	0.001	0.013	0.004
Poor health status	-0.109	0.028	-0.085	0.024	-0.084	0.024
Pension	-0.069	0.019	-0.052	0.016	-0.048	0.016
Caregiver demographic characteristics						
Age	-0.001	<0.000	0.001	0.000	0.001	0.000
Age square/100	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Female	0.097	0.031	0.098	0.034	0.097	0.033
Secondary education	-0.031	0.010	-0.007	0.002	-0.004	0.001
University education	-0.067	0.023	-0.034	0.012	-0.029	0.010
Married	0.002	0.001	0.012	0.004	0.011	0.004
N children	0.005	0.002	0.012	0.004	0.012	0.004
<10,000 inhabitants	-0.022	0.007	-0.032	0.010	-0.033	0.011
10,000–100,000 inhabitants	0.003	0.001	0.002	0.001	0.001	<0.000
Homemaker	0.054	0.016	0.015	0.014	0.045	0.014
Employed	0.095	0.026	0.048	0.015	0.038	0.012
Help and decision variables						
Instrumental activities (IADL)	0.223	0.097	0.236	0.118	0.235	0.116
Personal activities (ADL)	-0.034	0.010	-0.007	0.002	-0.008	0.003
Primary caregiver	-0.045	0.013	-0.066	0.020	-0.066	0.020
Permanent help	-0.055	0.016	-0.096	0.029	-0.093	0.027
Frequency	-0.149	0.058	-0.145	0.060	-0.145	0.059
Relative cohabitation	-0.093	0.025	-0.077	0.023	-0.075	0.022
Travel time	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Spouse	-0.136	0.046	-0.119	0.042	-0.118	0.041
Son/daughter	-0.056	0.017	-0.021	0.007	-0.021	0.007
Monetary compensation	0.010	0.003	0.001	<0.000	<0.000	<0.000
Formal help	-0.029	0.009	-0.047	0.016	-0.049	0.016
Family member help	0.004	0.001	0.027	0.009	0.025	0.008
Family decision	-0.067	0.022	-0.179	0.064	-0.170	0.060
Recipient decision	-0.072	0.024	0.446	0.065	0.461	0.065

Notes Data from the Spanish survey of informal assistance for the elderly (IMSERSO)

the impact of the family decision considerably increases, relative to the rest of the controls, when endogeneity is allowed. The acceptance of the recipient request is found to be associated with a lower probability of choosing more than 5 h of caring time, but it seems to be non-significant when we do not introduce exclusion restrictions. The care decision processes seem to be non-significant in the case of less than 2 h devoted to care activities.

In summary, our findings suggest that the family decision is a meaningful care decision process in the choice of more than 5 h of caring time, relative to the caregiver own decision, which is consistent with our findings when using the multinomial logit model. The impact of the care recipient request is not so clear, since many of the coefficients are non-significant even after allowing for endogeneity.

Table 6 Average partial effects in alternative models for the informal caring time choice: more than 5 h

	Probit model		Multivariate probit no restrictions		Multivariate probit with restrictions	
	APE	SD	APE	SD	APE	SD
Care recipient demographic characteristics						
Age	-0.030	0.007	-0.022	0.006	-0.023	0.006
Age recipient square/100	0.019	0.005	0.002	0.003	0.014	0.003
Female	0.049	0.011	0.047	0.012	0.047	0.012
Illiterate	0.132	0.028	0.095	0.023	0.102	0.025
Low education	0.053	0.014	0.030	0.008	0.035	0.010
Married	-0.005	0.001	-0.017	0.004	-0.016	0.004
Poor health status	0.034	0.008	0.019	0.005	0.021	0.006
Pension	0.058	0.013	0.043	0.011	0.046	0.012
Caregiver demographic characteristics						
Age	-0.002	0.000	-0.002	<0.000	-0.002	<0.000
Age square/100	0.002	0.001	0.001	<0.000	0.001	<0.000
Female	-0.048	0.012	-0.057	0.015	-0.058	0.016
Secondary education	0.003	0.001	-0.009	0.002	-0.007	0.002
University education	-0.006	0.002	-0.015	0.004	-0.010	0.003
Married	-0.024	0.006	-0.034	0.009	-0.033	0.009
N children	-0.029	0.007	-0.032	0.008	-0.032	0.008
<10,000 inhabitants	-0.002	0.001	<0.000	<0.000	-0.001	<0.000
10,000–100,000 inhabitants	0.015	0.004	0.013	0.003	0.012	0.003
Homemaker	0.028	0.007	0.026	0.007	0.026	0.007
Employed	-0.082	0.017	-0.126	0.028	-0.126	0.028
Help and decision variables						
Instrumental activities (IADL)	-0.101	0.028	-0.114	0.034	-0.111	0.034
Personal activities (ADL)	0.138	0.026	0.113	0.025	0.114	0.026
Primary caregiver	0.170	0.030	0.177	0.037	0.178	0.038
Permanent help	-0.047	0.012	-0.020	0.005	-0.018	0.005
Frequency	0.115	0.032	0.118	0.036	0.117	0.036
Relative cohabitation	0.272	0.039	0.243	0.045	0.246	0.046
Travel time	<0.000	<0.000	<0.000	<0.000	<0.000	<0.000
Spouse	0.126	0.032	0.113	0.031	0.114	0.032
Son/daughter	0.080	0.019	0.054	0.014	0.054	0.014
Monetary compensation	-0.029	0.007	-0.017	0.004	-0.018	0.005
Formal help	0.003	0.001	0.023	0.006	0.020	0.005
Family member help	0.045	0.011	0.030	0.008	0.028	0.007
Family decision	0.097	0.025	0.165	0.046	0.173	0.049
Recipient decision	0.048	0.012	-0.269	0.063	-0.248	0.059

Notes Data from the Spanish survey of informal assistance for the elderly (IMSERSO)

Informal caregiver’s satisfaction: empirical model and results

Empirical model

In this section, we examine whether care arrangements are related to the informal caregiver’s satisfaction. The care satisfaction information may help to explain informal

caregivers’ behaviour, in the same way that job satisfaction information is used to measure the worker’s well-being, which may in turn help policy makers to design strategies to increase the satisfaction of informal caregivers [4]. As mentioned above, the informal caregiver’s decisions about whether to devote time to care activities is associated, in part, with the informal caregiver’s expected subjective evaluation of their informal care status. Unfortunately, we

have no information on their expected well-being. In the Spanish Survey of Informal Assistance for the Elderly, 2004, respondents are asked whether engaging in care provides them with great satisfaction. This variable can be representative of the level of satisfaction that the informal caregiver derives from devoting time to care activities, in such a way that we are able to study the relationship between care arrangements and satisfaction. This question provides the response categories of strongly disagree (SD), disagree (D), neither disagree nor agree (ND), agree (A) and strongly agree (SA).

To analyse such responses, ordinal regression models have become common [52]. These models for ordinal outcomes account for the different distance between two responses, which is adequate in the case of response categories of the level of satisfaction, since the distance between strongly agreeing and agreeing might not be the same as the distance between agree and disagree.¹⁹ We use an ordered logit model (OLM). Formally, the model is built around a latent regression:

$$u_i^* = \mathbf{x}_i' \beta + \varepsilon_i$$

where u^* is the latent variable, and ε is an unobserved disturbance term that is assumed to be logistically distributed. As usual, u^* is unobserved. The relation between the unobserved u_i^* and the observed outcome for i ,

$u_i = 1, 2, \dots, 5$ can be summarized as follows:

$$\begin{aligned} u_i &= 1 \text{ if } u_i^* \leq \mu_1, \\ &= 2 \text{ if } \mu_1 < u_i^* \leq \mu_2, \\ &\dots \\ &= 5 \text{ if } \mu_4 \leq u_i^* \end{aligned}$$

When the latent u^* crosses a cutpoint μ , the observed category changes. The μ s are unknown parameters to be estimated with β . The OLM is defined as:

$$\ln \phi_{\leq m | > m}(\mathbf{x}) = \ln \frac{\Pr(u \leq m | \mathbf{x})}{\Pr(u > m | \mathbf{x})}$$

for $m = 1, \dots, J - 1$

with \mathbf{x} being a vector that includes the care decision processes and a set of controls which can affect the level of satisfaction for reasons unrelated to the care decision processes. It is added controls for the demographic characteristics of the caregiver and the care recipient, the informal caring-time choices, and the labour, leisure and health

costs.²⁰ We would expect lower levels of satisfaction derived from care activities when the informal caring-time choice does not coincide with the preference of the informal caregiver. In contrast, we would not expect to observe differences in the case of the care recipient request, since this care decision process is not important for the dynamics among informal caring-time choices.

In order to analyse whether care arrangements are related to informal caregiver's satisfaction, we use odds ratios. Formally, the odds ratios are computed as:

$$\frac{\phi_{\leq m | > m}(\mathbf{x}, x_i + 1)}{\phi_{\leq m | > m}(\mathbf{x}, x_i)} = e^{-\beta_i}$$

They are interpreted as follows: for a unit increase in x_i , the odds of a lower outcome compared with a higher outcome are changed by the factor $e^{-\beta_i}$, holding all other variables constant. When interpreting these odds ratios, we take into consideration that positive effects are greater than one and negative effects are between zero and one. Magnitudes of positive and negative effects should be compared by taking the inverse of the negative effect (or vice-versa) (see [27]).

Results

Table 7 presents regression results. As can be seen in the first column, the family decision is negatively associated with the caregiver's satisfaction derived from care activities. We find that the odds of having more care satisfaction compared to lower satisfaction are 0.60 times smaller when the caregivers devote time to care activities as a result of the family decision. In contrast, the care recipient decision is not statistically significant. In the second column, the informal caring-time choices are added and results do not change substantially.²¹ The care recipient decision remains insignificant, and the family decision is negatively associated with the caregiver's satisfaction. With respect to the time choices, results show that the informal caring time choices are not significant and this is maintained even when we include only these variables in the analysis in column 3.

Since informal caregivers are time- and budget-constrained, if they devote more time to informal care, it is

¹⁹ Of course, we also checked whether this model is appropriate by testing the parallel regression assumption, which is a property implicit in the OLM. To do that, we compute the approximate likelihood-ratio test of proportionality of odds across response categories. This test provides evidence that the parallel regression assumption cannot be rejected at the 5% level. Thus, we favour the use of the OLM.

²⁰ We do not include the labour, leisure and health costs in the previous analysis, since they are not exogenous factors in the estimation of the informal caring-time choice. In the Spanish survey, respondents are asked whether they have labour, leisure and health costs through their participation in informal care activities.

²¹ The informal caring-time choices are included as dummy variables; one takes the value one if the informal caregiver reports devoting time from 3 to 5 h per day, and the other dummy variable takes the value one if the informal caregiver devotes more than 5 h per day. The informal caring-time choice for less than 2 h per day is the variable of reference.

Table 7 Estimation of informal caregiver's satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)
Family decision	0.596*** (0.083)	0.592*** (0.082)		0.612*** (0.086)	0.694** (0.100)	0.777** (0.113)
Recipient decision	0.954 (0.248)	0.965 (0.249)		0.933 (0.243)	1.137 (0.332)	1.694 (0.693)
Caring time 3-5		0.926 (0.170)	0.906 (0.167)		1.078 (0.210)	1.194 (0.278)
Caring time >5		1.213 (0.199)	1.179 (0.193)		1.497** (0.283)	1.193 (0.261)
Labour cost				1.114 (0.139)	1.016 (0.137)	
Leisure cost				0.707** (0.091)	0.722** (0.097)	
Health cost				0.614*** (0.078)	0.599*** (0.079)	
Caring time 3-5 × family decision						1.035 (0.411)
Caring time 3-5 × recipient decision						0.624 (0.426)
Caring time >5 × family decision						0.571* (0.187)
Caring time >5 × recipient decision						0.336* (0.216)
Carer demographic characteristics	No	No	No	No	Yes	Yes
Recipient demographic characteristics	No	No	No	No	Yes	Yes
μ_1	-4.362*** (0.266)	-4.275*** (0.286)	-4.131*** (0.279)	-4.576*** (0.295)	-3.719*** (0.953)	-4.015*** (0.933)
μ_2	-2.823*** (0.134)	-2.737*** (0.177)	-2.598*** (0.170)	-3.033*** (0.178)	-2.161** (0.910)	-2.458*** (0.893)
μ_3	-1.539*** (0.088)	-1.451*** (0.159)	-1.323*** (0.152)	-1.731*** (0.169)	-0.827 (0.901)	-1.135 (0.884)
μ_4	0.163** (0.074)	0.258* (0.153)	0.366** (0.148)	0.013 (0.162)	0.978 (0.901)	0.645 (0.884)
Observations	1013	1013	1013	1013	1013	1013
Pseudo- R^2	0.006	0.008	0.002	0.019	0.038	0.030
McFadden's Adj R^2	0.001	0.001	-0.003	0.010	0.015	0.006
AIC	2.424	2.424	2.435	2.404	2.391	2.412
BIC	-4525	-4515	-4514	-4521	-4451	-4424

Odds ratio and robust standard errors in parenthesis. $\mu_i, i = 1, \dots, 4$ are the cutpoints

*** Significant at the 1% level

** Significant at the 5% level

* Significant at the 10% level

more likely that they will decrease both the leisure time and the time devoted to labour activities, which can also affect the caregivers' satisfaction. This is problematic in our analysis if those informal caregivers who are engaged in caring as a result of a family decision are more likely to report leisure costs or labour costs. In that case, our estimates of the family decision will capture the effect of the labour and leisure costs, rather than the impact of the family decision. The increase of the labour and leisure costs is possible because those who care as a result of a family decision are more likely to devote more than 5 h per day to caring, and they will then have less time to devote to other activities. To tackle this, we include in our specification in column 4 controls for both leisure and labour costs. We also add a control for whether the informal caregiver reports having health costs. As in the case of the labour and leisure costs, the estimates of the care decision variables may be capturing the health costs, since those who devote more hours to caring can be more likely to suffer health problems, such as depression. After adding all these controls, our results with respect to our main variables do not vary. We find that for those caregivers having leisure and health costs the level of caregiver satisfaction decreases, but not if they report labour costs.²² Of course, we have to recognize that these variables can suffer from endogeneity problems. If the informal caregiver gets on well with the care recipient, then we would not expect he/she to consider the time spent with the care recipient as a leisure lost. We rerun our analysis considering those who report having labour, leisure or health costs and those who do not, and our results are quite consistent.²³ We also add as controls the caregiver demographic characteristics and the recipient demographic characteristics, in column 5, and again our results are robust: the family decision is negatively related to the caregiver's satisfaction derived from care activities, but the care recipient request is still insignificant.²⁴

Finally, we interact the care decision process variables with the informal caring-time choices in order to study

whether selecting one informal caring time or another as a result of a care decision process is related to lower caregiver satisfaction. Results are shown in columns 6. Those caregivers devoting more than 5 h per day as a result of the family decision are more likely to report less satisfaction obtained from the care activities. We find that the odds of having greater care satisfaction compared to lower satisfaction are almost 0.6 times smaller.²⁵

Discussion

Up to this point, we have empirically examined the relationship between informal caring-time choices, caregiver's satisfaction and care decision processes. In this section, we present possible explanations for previous results. We consider the caregiver's own decision as a benchmark in which a non-altruistic informal caregiver maximizes his/her utility function subject to time and budget constraints. As mentioned above, note that the Spanish survey used here does not allow us to empirically test why informal caregivers accept a care arrangement.

We begin by considering the care recipient request. As shown above, the care recipient request does not have an important role in informal caring-time choices or in the informal caregiver's satisfaction. Here, we give two possible explanations. First, we consider the care recipient as an altruistic individual: he/she maximizes his/her utility function, taking into account the utility function of the informal caregiver. In this setting, the care recipient would not make a request in which an informal caring-time choice negatively affects the utility of the caregiver. This is so since the decline in satisfaction of the caregiver also decreases the utility of the care recipient (an altruistic individual), which can be even greater than the increase in the care recipient utility produced by the choice of that informal caring time. As Cahill et al. [7] suggest, a care recipient does not want to burden the caregiver. Thus, we would not expect to observe significant differences between the care recipient request and the informal caregiver decision. Second, we assume that the care recipient is not altruistic. In this case, the care recipient request depends on his/her needs but not on the utility of the informal caregiver. Then, the care recipient would ask for the informal caring choice that covers all his/her needs. Here, the informal caregiver can accept, or not, the request

²² We repeated the analysis considering informal caregivers of working age and results are quite consistent.

²³ We also repeat the analysis by allowing for endogeneity as we do in the previous analysis. Results do not change.

²⁴ For consistency, we have also estimated with different subsamples to correct for other selection biases. We consider that the selection bias may be generated by either age, frequency of care and living arrangements. To that end, we change the age range and we estimate only with those caregivers who devote time to care activities every day or who cohabit with the care recipient. Results are consistent with those previously obtained and are available upon request. The analysis cannot be repeated by using the Spanish Survey of Informal Assistance for the Elderly (Encuesta de Apoyo Informal a los Mayores) 1994, since the informal caregiver satisfaction question is not available.

²⁵ The better-fitting model is the one estimated in column 5, since it is the model with the smaller AIC, Akaike's information criterion, and the greater Pseudo- R^2 and McFadden's Adj R^2 . If we only compare the Bayesian information criterion (BIC), we conclude that the better-fitting model is that shown in column 4, which includes the same variables as in column 5, but does not include the controls for the caregiver and recipient demographic characteristics.

of the care recipient, depending on the losses of utility produced by the informal caring-time choice.²⁶ When the care recipient request is similar to the informal caring-time choice determined by the caregiver's own decision, we would expect the informal caregiver to accept the care recipient request, but when it is not, the contrary will occur and the informal caregiver will not accept the care recipient request. Then, one can conjecture that those caregivers who care as a result of the care recipient request do so since the care recipient informal caring-time choice is not different from that of the caregiver.

In previous explanations, we have omitted the possibility of any compensation from the care recipient to the informal caregiver (such as a monetary compensation, or even an inheritance), first, because the monetary compensation is insignificant in the empirical analysis and, second, since we would expect that the compensation made by the care recipient may lead a informal caregiver to accept a different informal caring-time choice than that determined under the caregiver's own decision, as we explain in the case of the family decision.

Under the family decision, we find that the informal caregiver is more likely to devote more than 5 h per day to care activities. The family decision is also associated with lower levels of satisfaction of the informal caregiver. This does not confirm the hypothesis that, in the case of the family decision, family members decide to devote time to the care activities that they prefer, since we would not expect to obtain differences between the family decision and the caregiver choice. Why, then, does an informal caregiver accept this agreement? The possible existence of compensation here is more feasible. The informal caregiver will accept the family decision if he/she obtained a monetary compensation that makes up for the loss of utility derived from the care activities. This compensation can also be a greater part of the inheritance of the care recipient. Thus, if the caregiver is compensated, we would expect that individual to accept the family decision. Unfortunately, this cannot be tested with the Spanish Survey, since we have no information on monetary compensation from other family members or about inheritances.

As suggested by one referee, it can be also the case that these results are due to the altruistic behaviour of the caregiver. It is likely that more altruistic potential caregivers are those who finally care for as a result of the caregiver's own decisions, whereas less altruistic individuals are those devoting time to care as a result of a family decision or a recipient request. However, it is somewhat puzzling that those caring as a result of the family decision (who are supposed to be non-altruistic caregivers) are more

likely to devote more time to care activities than those caring as a result of the caregiver's own decision (altruistic caregivers). Then, our findings suggest that factors other than altruism may drive the care decision process.

Conclusions

The purpose of this paper is to explore whether care decision processes and informal caring time are associated. We focus on three care decision processes (caregiver's own decision, family decision and recipient request) and three informal caring-time choices (less than 2 h of caring time, from three to 5 h, and more than 5 h, per day). We also extend our analysis by examining the relationship between care decision processes and caregiver satisfaction since the rejection or acceptance of a care decision process would entail the informal caregiver taking into consideration his/her level of expected satisfaction.

We view our results as strong evidence that care decision processes play a role in informal caring-time choices. The clear results of this analysis are that informal caregivers devoting time to care activities under a family decision are more likely to devote more than 5 h per day to care. This result is maintained even after allowing for endogeneity. The recipient request seems to be indistinguishable from the caregiver's own decision when choosing less than 5 h of caring time. With respect to the caregiver's satisfaction, we find that caregivers who engage in care as a result of the family decision are more likely to report lower levels of satisfaction, but that the care recipient request is not statistically significant. These findings are maintained, even after considering a range of alternative specifications.

Although an analysis of informal caregiver satisfaction and the informal caring-time choices can be a useful tool in designing policies to increase the well-being of the informal caregiver, we acknowledge that this analysis is limited. For example, we have omitted as care decision processes other types of formal care that are likely to interact with, or to substitute for, informal care: paid domestic help and nursing care [6, 45]. Our omission of those variables is partly due to data limitations, but it is unclear whether we would want to include them in the analysis even if the data been available since, in Spain, informal care is the main source of support for dependent people [33]. We leave the examination of these relationships to future research.

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²⁶ If it does not decrease the caregiver's satisfaction, then the informal caregiver would always accept the recipient request.

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