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Do carer tasks predict carer employment? Evidence from the Survey of Adult Carers in England

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Abstract

Due to the large number of unpaid carers in England, there is an extensive body of research which examines the determinants of carers' employment. Despite this, little is known about the relationship between the specific tasks that carers perform and their labour supply. Using data from the Survey of Adult Carers in England, we examine the relationship between carer tasks and carer employment outcomes. We find that carers who perform tasks that are time-bound have a lower probability of working compared to carers who do not perform these tasks. Similarly, carers who perform shiftable tasks have a higher probability of working compared to carers who do not perform these tasks. If future social policy is to be designed to allow carers to also maintain their employment, then targeting services at the carer tasks which have the largest impact on employment needs to be taken into account.

KEYWORDS
carer tasks, carers, employment, working

1 | INTRODUCTION

Due to rising longevity levels around the world, many countries will face rapidly ageing populations who will require help and support provided by carers (United Nations, 2022). In England specifically, there are 5.4 million carers according to the 2011 census (Carers UK, 2019). Carers provide unpaid caring services such as meal preparation and physical help to disabled and infirm people who are family members, close relatives, or friends. Because these carers are unpaid, many carers of working age are also in paid employment elsewhere. The extent of this employment has been shown to be affected by the type of care that carers provide. Personal care (help with dressing, eating, bathing etc.) has been shown to be negatively related to employment outcomes (Gomez-Leon et al., 2019; Van Houtven et al., 2013) while basic support (washing clothes, ironing, cleaning, and cooking) and instrumental support (financial assistance, shopping, transportation, gardening, personal affairs) does not appear to be related to working for pay (Gomez-Leon et al., 2019). A potential explanation for these differing results is that not all types of care place the same demands on the carer's time. Hassink and Van Den Berg (2011) found that some tasks are "time-bound", in that they have to be done at specific times of the day, regardless of whether the carer is also employed elsewhere. They also found that some tasks are "shiftable", in that they can be done at different times of the day, depending on whether the carer is working that day. However, their analysis was based on the aggregation of these caring tasks into broad measures, and they could not test the effect of performing these tasks on employment. We build upon this work by disaggregating the caring tasks into time-bound and shiftable categories and testing whether performing them is correlated with employment outcomes.

Being able to distinguish between time-bound and shiftable tasks is important for a number of reasons. To begin with, aggregating time-bound and shiftable tasks together into one measure could mask their relationship with employment. For example, Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) are measures used in health and social care to assess an individual's basic level of self-care and whether they can live independently. Common activities included in ADLs include dressing and bathing, while activities in IADLs include food preparation, shopping, and using medication. These measures are routinely used in academic studies on caring (Gomez-Leon et al., 2019; Hassink & Van Den Berg, 2011; Van Houtven et al., 2013). If, for example, no relationship is found between a carer providing IADL support and employment, it could be because each of those tasks have no effect on whether the carer is in paid work. However, it could also be because some tasks have a negative effect, some tasks have a positive effect, and both effects are hidden due to their aggregation. Secondly, from the carers' perspective, time-bound tasks can act as a barrier to employment. If time-bound tasks need to be done at the same time every day, then this imposes restrictions on the carers' time. Johnson and La Sasso (2000) provide a mathematical model of how utility maximising individuals allocate their time between informal care provision and formal labour supply. Their model predicts that additional restrictions put on the carer's time would lead to a fall in formal labour supply. Finally, from a policy perspective, many carers already struggle to combine care with paid employment. As a result, many carers reduce their hours of work, switch to part-time work, or leave their job altogether. These decisions can negatively affect the carers themselves through loss of income, their employers through higher turnover costs, and the wider economy through lost tax revenue (Her Majesty's Government and Employers for Carers, 2013). By knowing which carer tasks have the largest impact on employment, it allows policy makers to better target policies that will keep carers in work and reduce costs.

In this study, we combine four waves of data from the Survey of Adult Carers in England, a carer only data set, to examine the relationship between time-bound and shiftable tasks with carer employment. We find that male and female carers who perform time-bound tasks, such as providing physical help and giving them medicine, have a lower probability of being employed compared to carers who do not perform these tasks. Similarly, we find male and female carers who perform tasks which are shiftable, such as helping with paperwork, taking the cared for person out, and providing emotional support, have a higher probability of being employed when compared to carers who do not perform these tasks. We also perform additional analyses to provide evidence that it is the time-bound versus shiftable nature of these tasks that is the mechanism behind these results. To begin with, the results appear to

depend on the level of time flexibility between the outcome groups. For example, the results appear strongest when we compare carers in full-time employment to those who do not work and then disappear when we compare full-time to part-time workers. Secondly, we find that carers who perform time-bound tasks have a higher probability of using support to maintain their employment, while carers who perform shiftable tasks have a lower probability of using support to maintain their employment. Finally, we find that carers who perform time-bound tasks are more likely to report that they are not in paid employment because of their caring role, when compared to carers who do not perform these tasks.

These results add to the literature in three ways. Firstly, we build upon the work of Hassink and Van Den Berg (2011) by showing that time-bound tasks and shiftable tasks have different impacts on employment outcomes. Secondly, because our data contains detailed questions on caring behaviour and a large sample size, we are able to disaggregate the caring tasks that have been aggregated by previous studies and test their significance on an individual basis. Finally, we can demonstrate that there are other tasks, which have not been considered by previous studies, which also influence the employment status of carers.

The rest of the paper is organised as follows: Section 2 contains information on the relationship between caring and employment, including a review of the relevant literature and both a conceptual and theoretical framework. The data and statistical models are detailed in Section 3. Section 4 contains the results of the statistical analysis, and their implications are discussed in Section 5. Finally, Section 6 provides some conclusions.

2 | CARING AND EMPLOYMENT

2.1 | Related literature

There is an extensive body of literature that examines the effect that caring has on employment. The vast majority of these studies compare carers to non-carers and show that caring has a negative effect on employment status. Of more relevance to our analysis are studies which have compared different types of caring. For example, Van Houtven et al. (2013) found that in the US, male carers who provide personal care (help with dressing, eating, bathing etc.) are less likely to be in paid employment, while female cares who provide chore care (help with household chores, errands, transportation etc.) are more likely to be retired, when compared to those who provide no care. Lee and Tang (2015) showed that women who provided personal care to a parent were less likely to be in the labour force but found no effect for men providing personal care. They also found that providing care that involves chores, errands, and transportation, was unrelated to labour force participation. Similarly, for the UK, Gomez-Leon et al. (2019) found that providing personal care had a negative effect on employment outcomes for both men and women in a way that basic support (help with washing clothes, ironing, cleaning, cooking etc.) and instrumental care (financial assistance, shopping, transportation, gardening, personal affairs) does not. In terms of support with employment, Pickard et al. (2018) found that working carers who used support services to stay in employment most often have support providing personal care.

More recently, there have been a number of studies using data which focuses exclusively on carers, rather than comparing carers to non-carers like the previous articles. Using UK data, Henz (2004) finds that compared to older workers, younger female workers are more likely to report that they do not stop working once they begin caring, while younger male workers are more likely to report no change in their working conditions upon commencement of caring. Carmichael et al. (2008) collect their own data on carers in the northwest of England and find that carers who care for more than 50 h per week have had to change their working hours to accommodate caring responsibilities. They also show that carers who have been caring for more than 5 years are more likely to have changed job to accommodate caring responsibilities, when compared to carers who have been caring for fewer than 5 years. With regards to caring services, Pickard et al. (2015) use cross sectional data from the 2009/10 Personal Social Services Survey of Adult Carers in England to investigate whether the cared for person receiving paid (formal) services has an

effect on the employment of the carer. Specifically, they find that services such as home care and a personal assistant are associated with increased employment among carers of both genders, while day care and meals-on-wheels are associated with increased employment among female carers. Pickard et al. (2018) build upon this work, by collecting their own longitudinal data, and again find that carers are more likely to be employed when the cared for person is in receipt of at least one of these services. They also compliment the quantitative analysis with qualitative analysis to discover the reasons that carers leave employment. Interestingly, they found that working carers who used support services to stay in employment most often have support providing personal care, which is a form of care that has been shown to be negatively correlated with employment outcomes in the articles mentioned earlier.

2.2 | Conceptual framework

Our conceptual framework is based on the work of Hassink and Van Den Berg (2011). They started from the premise that some tasks are "time-bound' because they need to be performed at certain parts of the day. For example, helping a cared for person prepare meals needs to be done at fixed times every day, whereas helping them with financial matters can be done at any time for a carer who is not working, or outside working hours for a working carer. If this is the case then they expected to find that carers who performed time-bound tasks to perform them at the same time, regardless of whether they were working, but carers who performed tasks that were not time-bound would shift them based on their working commitments. When they analysed the time diaries of carers in the Netherlands their findings supported this hypothesis. They found that carers who performed household activities (including housecleaning; preparation of foods and drinks; washing, ironing or sewing; shopping; chores, gardening, maintenance; looking after children) and carers who performed organisational activities (including support with financial matters or other organisational tasks; visiting family and friends or journeys; social support) could shift the times that they performed these tasks, depending on whether they were working that day. However, carers who performed personal care tasks (including dressing, hair combing and shaving; eating, drinking and taking medication; moving around inside and outside the house, including visiting health care suppliers; visiting the toilet; supervision) needed to perform these tasks at the same time every day, even if they were working. However, their study did not directly address the question of whether carers who perform the time-bound tasks are less likely to be employed.

We have information on 10 carer tasks in our data set. The list of these tasks, and details of what specific actions they contain, is available in Table 1. As can be seen from this list, the classification of these tasks as time-bound or shiftable is complicated by within task heterogeneity: there are tasks which contain some actions which are time-bound and other actions which are shiftable. An example of this is the giving medicines task which contains actions such as reminding the cared for person to take their pills (which appears to be shiftable as it can be done with a phone call) and giving them injections (which would require the carer to be physically present). Therefore, in order to classify these tasks as time-bound or shiftable, we begin with how the tasks were classified in Hassink and Van Den Berg (2011).

Personal care, physical help, giving medicine, and supervision, were among the tasks that Hassink and Van Den Berg (2011) found to be time-bound. We have measures for the first three carer tasks, and we substitute the supervision variable with the carer task: "keeping an eye on them to make sure they are alright". Similarly, other tasks such as help with paperwork and finances, taking them out, and social support, were tasks that Hassink and Van Den Berg (2011) found to be shiftable. We have measures for the first two tasks, and we use the "keeping them company" task and "giving emotional support" task as our measures of social support. This leaves two tasks, "other practical help" and "help dealing with the care services and benefits", as tasks where classification is unclear. Other practical help contains some actions which Hassink and Van Den Berg (2011) found to be time-bound, such as bringing the care recipient to medical appointments, but many other actions which they found to be shiftable, such as preparing meals and doing shopping. Due to the vast majority of actions contained in this task appearing in the category that Hassink and Van Den Berg (2011) found to be shiftable, we make the decision to classify the entire task as

TABLE 1 Description of caring tasks.

Question on caring tasks from the Survey of Adult Carers in England
Over the last 12 months, what kinds of things did you usually do for the person you cared for?

Time-bound tasks

Personal care: Things like dressing, bathing, washing, shaving, cutting nails, feeding, using the toilet

Physical help: Such as helping with walking, getting up and down stairs, getting into and out of bed

Giving medicines: Things like making sure he/she takes pills, giving injections, changing dressings

Keeping an eye on him/her to see he/she is all right: –

Help with dealing with care services and benefits: Things like making appointments and phone calls, filling in forms

Shiftable tasks

Other practical help: Things like preparing meals, doing his/her shopping, laundry, housework, gardening, decorating, household repairs, taking to doctor's or hospital

Help with paperwork or financial matters: Such as writing letters, sending cards, filling in forms, dealing with bills, banking

Taking him/her out: Such as taking out for a walk or drive, taking to see friends or relatives

Keeping him/her company: Things like visiting, sitting with, reading to, talking to, playing cards or games

Giving emotional support: –

shiftable. Finally, we classify help dealing with the care services and benefits as time-bound. While actions such as filling in paperwork for the care services could easily be considered shiftable, it is likely that calls or appointments with the care services would be restricted to traditional business hours, which we consider to be time-bound. This is further supported by Brimblecombe et al. (2018) who noted that working carers have less available time and opportunity to contact the relevant people during working hours.

2.3 | Theoretical framework

Using the above task classification, we now form our hypotheses. Because Hassink and Van Den Berg (2011) found that time-bound tasks were done at the same time every day, regardless of the employment status of the carer, we assume that this represents a barrier to employment for carers which impacts their ability to work for pay:

> **H1a.** Carers who perform tasks that are time-bound have a lower probability of reporting that they are in paid employment (full-time or part-time) when compared to carers who do not perform these tasks.

> **H1b.** Carers who perform tasks that are shiftable have a higher probability of reporting that they are in paid employment (full-time or part-time) when compared to carers who do not perform these tasks.

Furthermore, if it is the case that it is the time-based nature of the tasks which is responsible for these differences in employment, then we expect that these differences dissipate (or disappear) when we compare groups that should be more similar in terms of their paid work time flexibility. For example, if our outcome was simply the decision to work full-time or not to work, then we would expect to see a difference in who performs time-bound tasks since there is a large differential in time flexibility between those who work full-time and those who do not work. However, if our outcome was working full-time versus part-time, then we expect to see a smaller difference since the time flexibility between the two groups is smaller: both groups have made the decision to work, but the full-time workers will have

slightly less flexibility than the part-time workers. We explore this gradient by examining the effects of carer tasks on employment for full-time workers (vs. those not working), for part-time workers (vs. those not working), and full-time versus part-time workers. This leads to the second hypothesis:

> **H2.** The size of the effect of carer tasks on employment is related to the time flexibility of the outcome groups. The effects will be larger when comparing groups with large flexibility differentials and smaller when comparing groups with smaller flexibility differentials.

In addition to this, we expect this time-bound barrier to employment to manifest itself in different ways. For the carers who are working for pay, the carers who provide time-bound services are more likely to need help from external sources, such as voluntary organisations or Social Services, in order to overcome this barrier and maintain employment:

> **H3a.** Carers who perform tasks that are time-bound have a higher probability of reporting that they used support to maintain employment when compared to carers who do not perform these tasks.

> **H3b.** Carers who perform tasks that are shiftable have a lower probability of reporting that they used support to maintain employment when compared to carers who do not perform these tasks.

Finally, if it is the case that this barrier is hampering their ability to work, then we expect that carers who are not in paid employment to report their time-bound caring responsibilities as the reason that they are not in paid employment:

> **H4a.** Carers who perform tasks that are time-bound have a higher probability of reporting that their caring responsibilities are the reason they are not in paid employment when compared to carers who do not perform these tasks.

> **H4b.** Carers who perform tasks that are shiftable have a lower probability of reporting that their caring responsibilities are the reason they are not in paid employment when compared to carers who do not perform these tasks.

Testing these hypotheses allows us to make three contributions to the literature: we can test whether the type of tasks that carers perform is a significant predictor of being employed; we can disaggregate caring tasks that have previously been pooled together and test their significance on an individual level; and we can test the significance of other carer tasks that are not described in other studies.

3 | METHODS

3.1 | Data

The Survey of Adult Carers in England (SACE) is a biennial survey of informal carers over the age of 18 who are caring for someone who is also over the age of 18. The survey contains information on the carers' age, gender, ethnicity, labour force status, and hours of care. The survey also contains information on the specific tasks that the carers perform. These variables will serve as our primary explanatory variables of interest. There are currently four waves of data: 2012–13, 14–15, 16–17, and 18–19. These waves are accessible via the NHS Digital website. Over 100,000 carers are surveyed in each wave. We combine the data from all four waves for the statistical analysis. The benefit

of using this data is the fact that this data set breaks down the types of care to the individual task level, while also having a large enough sample size to test the hypotheses that they have an effect on employment outcomes separately. This is the main motivation for using this data, as opposed to data sets that have access to longitudinal information but have smaller sample sizes and only contain generic measures of carer activity, such as the UK Household Longitudinal Study or the English Longitudinal Study of Ageing. Some recent examples from the literature of other articles which have used cross-sectional data in social policy contexts include Choi et al. (2022), de Klerk et al. (2021), Nawakitphaitoon and Tang (2021), and Trætteberg and Fladmoe (2020).

We only impose two restrictions on the data. Because we are interested in the relationship between carer tasks and employment, we first restrict the analysis to respondents who are below the age of 65. Second, we also restrict the analysis to those respondents who provide information for all the variables that we use in the analysis, in order to make comparisons between models meaningful. Table 2 provides some summary statistics for the variables we use in our analysis, broken down by carer gender, for the sample that remains after imposing these restrictions. All the variables we use are binary variables, so the results can be interpreted as percentages. The employed variable, which is our main outcome of interest, is defined as carers reporting that they are employed full-time, employed part-time, self-employed full-time, or self-employed part-time, while not employed is defined as being retired, not in paid work, doing voluntary work, or other. In some analyses, we only focus on full-time workers (employed full-time and self-employed full-time) and/or part-time workers (employed part-time and self-employed part-time). Other outcomes we use in the analysis include whether the carer has used support from organisations such as such as a voluntary organisation, a private agency, or Social Services to keep them in employment (vs. not using this type of support) and if they report the reason that they are not in paid employment as their caring responsibilities (vs. some other reason). With regards to the carer task variables, we have measures for the 10 carer task variables listed in the previous section. As mentioned earlier, all the variables are binary, so these measures simply indicate whether or not the respondent performs these tasks.

We also have more information on the carer and cared for person's characteristics. Carer ethnicity is a variable which indicates whether the respondent is white (vs. non-white). We also include variables which indicate whether the cared for person is under the age of 65 (vs. 65 and over) and whether they live with the carer (vs. not living with the carer) since the latter may indicate particularly intense types of caring. We include other variables based on their importance in previous research. We add a variable which measures the hours of caring per week and, based on Pickard et al. (2018), the indicator we use is caring for fewer than 20 h (vs. at least 20 h). Similarly, based on Carmichael et al. (2008), we include a caring tenure variable which indicates whether the respondent has been caring for fewer than 5 years (vs. at least 5 years). Finally, based on Pickard et al. (2015), we include the following paid services that the cared for person uses: home care, day care, personal assistant, meals services, being resident of a care home.

3.2 | Statistical model

In order to examine whether caring tasks can predict carer employment, we use multiple linear regression analysis. We model carers' outcomes with the following equation,

$$y_i = \alpha + \beta \times \textbf{\textit{CarerTasks}}_i + \gamma \times \textbf{\textit{X}}_i + \delta_j + \theta_t + \epsilon_i, \tag{1}$$

where i represents individual-level, carer data. y_i represents an unspecified carer outcome. Overall, we examine six different outcomes: (1) employed versus not employed, which is our main outcome; (2) employed full-time versus not employed; (3) employed part-time versus not employed; (4) employed full-time versus part-time; (5) used support to maintain employment versus does not use support; (6) is not employed because of caring responsibilities versus not employed for some other reason. Our primary explanatory variables of interest are the 10 carer task variables,

TABLE 2 Summary statistics.

	(1) Male carers Mean	(2) Male carers SD	(3) Female carers Mean	(4) Female carers SD
Time-bound tasks				
Personal care	0.65	0.48	0.72	0.45
Physical help	0.66	0.47	0.58	0.49
Give them medicine	0.75	0.43	0.76	0.43
Keep an eye on them	0.92	0.27	0.93	0.26
Help with care services	0.84	0.37	0.91	0.28
Shiftable tasks				
Practical help	0.94	0.23	0.96	0.20
Help with paperwork	0.84	0.36	0.90	0.30
Take them out	0.82	0.39	0.84	0.37
Keep them company	0.86	0.35	0.88	0.33
Provide emotional support	0.84	0.36	0.89	0.31
Demographics				
Carer ethnicity (non-white)	0.11	0.31	0.13	0.34
Cared for person under 65	0.51	0.50	0.47	0.50
Carer lives apart from cared for person	0.25	0.43	0.35	0.48
Spends less than 20 h per week caring	0.18	0.39	0.19	0.39
Been caring for less than 5 years	0.40	0.49	0.34	0.47
Cared for person service				
Resident in care home	0.05	0.22	0.05	0.22
Personal assistant	0.13	0.34	0.16	0.36
Day care	0.20	0.40	0.27	0.44
Home care	0.37	0.48	0.29	0.46
Meal service	0.05	0.21	0.04	0.21
Outcomes				
Employed	0.40	0.49	0.43	0.50
Employed full-time (if employed)[a]	0.68	0.47	0.41	0.49
Employed part-time (if employed)[a]	0.32	0.47	0.59	0.49
Used support to maintain employment[a]	0.04	0.21	0.05	0.21
Not employed because of caring[a]	0.70	0.46	0.69	0.46
Observations	16,893		44,645	

Abbreviation: SD, standard deviation.

[a]Calculation based on relevant subsample of observations.

represented by the vector **$CarerTasks_i$**. **X_i** is a vector of the other carer characteristics and services that are mentioned in Section 2 and listed in Table 2. We also include survey wave fixed effects (θ_t) and region of England fixed effects (δ_j). Survey wave fixed effects can control for any factors that affect all of England in one particular wave and may affect whether carers are employed, such as a recession in a given year. Region of England fixed effects can control for a situation where some regions of England may have higher numbers of carers who are not employed than others, and this difference persists from wave to wave. The independent variables are the same in every regression.

The models are estimated with ordinary least squares. We estimate the models separately by gender, as is common practice based on many recent studies in this field (Jacobs et al., 2014; King & Pickard, 2013; Meng, 2013; Nguyen & Connelly, 2014; Pickard et al., 2015; Pickard et al., 2018; Van Houtven et al., 2013). Because the dependent variable is binary in all cases, the outcome is modelled as a linear probability model. While it is possible to model these outcomes with specialised limited dependent variable models, such as a probit or a logit, the marginal effects generated by such models tend to be similar to the partial effects generated by a linear probability model (Wooldridge, 2018).

4 | RESULTS

4.1 | Main results

The main results are presented in Table 3. We begin by examining the relationship between different caring tasks and employment for male and female carers in columns (1) and (3). Based on the hypotheses we presented in Section 2, we expect the coefficients on the carer tasks that are time-bound to be negative (H1a) and the coefficients on carers tasks that are shiftable to be positive (H1b). The first thing of note about the results from columns (1) and (3) are the extent to which they conform to our hypothesised relationships before the analysis. With regards to the time-bound tasks, two out of five for men and two out of five for women have a statistically significant negative correlation with working for pay. With regards to the shiftable tasks, three out of five for men and three out of five for women have a statistically significant positive correlation with working for pay. To give some examples, we find that the probability that a male carer who provides physical help works is 2.7 percentage points (pp) lower than a male carer who does not provide physical help. Similarly, the probability that a female carer who gives medicine works is 4 pp lower than a female carer who does not give medicine. The second point to note is the extent to which the results are similar for both men and women, in terms of sign and significance. There is only one task where the sign on the coefficient is different for men and women, and that is helping with the care services. For men, this relationship is negative, which we hypothesised, but for women the effect is positive. These differing results could be due to the within task heterogeneity mentioned in Section 2.2. It could be the case the male carers are selecting into the time-bound elements of this task, such as making appointments and phone calls, but the female carers are selecting into the shiftable elements, such as filling in forms. Despite this, there are some results which did not conform to our expectations. Male and female carers who keep the cared for person company have a lower probability of working compared to carers who do not perform this service. We had hypothesised the reverse relationship. An explanation for this could be that keeping the cared for person company is actually a time-bound task, rather than a shiftable one. It may be the case that, in order for the carer to provide useful companionship, it needs to be provided during times that are usually associated with work, and cannot be shifted to early in the morning, late in the evening, to the weekend etc.

4.2 | Additional analyses

4.2.1 | Multicollinearity

In the following subsections, we rule out some potential reasons why we may be finding these significant results even if the null hypotheses of no effects are true. The first potential explanation for why certain results are statistically significant, while others are not, is the presence of multicollinearity. While many of the results which are not significant have coefficients which are very close to zero (indicating they have no effect on the outcome), there are some results which are close to 2 pp and are not statistically significant because their standard errors are relatively large. This could be because these variables are highly correlated with the other variables in the regression. To

TABLE 3 Relationship between caring tasks and employment using linear regression.

	(1) Male carers Employed	(2) Male carers VIF	(3) Female carers Employed	(4) Female carers VIF
Time-bound tasks				
Personal care	−0.017	1.44	−0.003	1.44
	(0.009)		(0.006)	
Physical help	−0.027**	1.41	−0.041***	1.38
	(0.009)		(0.005)	
Give them medicine	−0.045***	1.41	−0.040***	1.39
	(0.010)		(0.006)	
Keep an eye on them	−0.017	1.26	−0.020	1.26
	(0.015)		(0.010)	
Help with care services	−0.029	1.88	0.022	1.57
	(0.013)		(0.010)	
Shiftable tasks				
Practical help	−0.007	1.18	−0.006	1.19
	(0.017)		(0.012)	
Help with paperwork	0.036*	1.84	0.049***	1.56
	(0.013)		(0.009)	
Take them out	0.069***	1.22	0.074***	1.23
	(0.010)		(0.007)	
Keep them company	−0.043***	1.32	−0.025**	1.32
	(0.012)		(0.008)	
Provide emotional support	0.039***	1.26	0.028***	1.21
	(0.011)		(0.008)	
F statistic for time-bound tasks	12.95		30.50	
p value	0.0000		0.0000	
F statistic for shiftable tasks	15.11		35.68	
p value	0.0000		0.0000	
Observations	16,893		44,645	
R^2	0.010		0.078	

Note: Standard errors in parentheses. All regressions contain the control variables from Table 2 as well as survey wave and region fixed effects.
*$p < 0.01$; **$p < 0.005$; ***$p < 0.001$.

present evidence of this, we follow Shin et al. (2020) and present the paired correlations for all 10 of the carer task variables. The results are presented in Table 4. There are only two correlations (out of a possible 90) which are greater than 0.5. This indicates that there is very little multicollinearity present in the data. Nevertheless, according to Gujarati and Porter (2009), multicollinearity can exist in multiple regression models, even if the pairwise correlations are less than 0.5. Therefore, to provide more evidence against the possibility of multicollinearity, we also check the variance inflation factor (VIF) of each carer duty variable from the regressions we performed in Table 3. The VIF can tell us how the variance of an estimator is inflated when the variable is correlated with another. These VIFs are presented in columns (2) and (4) of Table 3. For each variable, for male and female carers, the VIF is never larger than

TABLE 4 Carer task correlations.

	A	B	C	D	E	F	G	H	I	J
A		0.45	0.35	0.14	0.12	0.17	0.08	0.17	0.18	0.11
B	0.47		0.30	0.15	0.09	0.15	0.07	0.18	0.20	0.12
C	0.32	0.29		0.29	0.23	0.22	0.20	0.21	0.22	0.20
D	0.13	0.14	0.29		0.23	0.24	0.21	0.21	0.30	0.28
E	0.08	0.05	0.28	0.23		0.25	0.57	0.21	0.23	0.20
F	0.17	0.18	0.24	0.23	0.21		0.22	0.21	0.21	0.15
G	0.05	0.03	0.24	0.21	0.66	0.20		0.21	0.24	0.21
H	0.18	0.22	0.21	0.18	0.15	0.19	0.15		0.31	0.22
I	0.15	0.16	0.23	0.32	0.26	0.18	0.26	0.26		0.32
J	0.17	0.17	0.23	0.28	0.19	0.15	0.18	0.24	0.34	

Note: Male results shaded white, female results shaded grey. A—Personal care; B—Physical help; C—Give them medicine; D—Keep an eye on them; E—Help with care services; F—Practical help; G—Help with paperwork; H—Take them out; I—Keep them company; J—Provide emotional support.

2 indicating that multicollinearity is not a problem in this case. This is a more conservative standard than other studies have used within social policy studies (Shin et al., 2020).

4.2.2 | Joint significance tests

Another issue to consider is that, because we have 10 variables representing carer tasks, we are testing multiple individual hypotheses. It is possible that because we are testing so many hypotheses at once, some results will show up as statistically significant, even if the null hypothesis of no effect is true. Because all of these hypotheses relate to the tasks that carers perform, we can solve this by performing an *F* test of their joint significance. This would allow to see whether carer tasks are correlated with the labour supply of carers when they are considered together. We perform two *F* tests on the regressions given in columns (1) and (3) of Table 3. The two tests are: a joint significance test for the time-bound tasks and a joint significance test for the shiftable tasks. The *p*-values for these *F* tests are presented in the bottom rows of Table 3. Given that there are a multitude of carer duty variables that are statistically significant in individual tests, it is no surprise that an *F* test on the joint significance of all the time-bound carer duty variables, and the shiftable carer duty variables, are also statistically significant. All results are statistically significant at the 1% level.

4.2.3 | Bonferroni corrections

While the *F* tests allow us to test multiple hypotheses together, a drawback to the *F* test is that it aggregates the carer task variables. This is unfortunate since one of the elements of the data that we wish to investigate is the information on individual carer tasks. Another way of dealing with multiple hypothesis testing, which does not involve aggregating the variables, is to adjust the significance level of each individual test. This will allow us to test the hypotheses individually, but still make sure that we are not finding significant results by simply running multiple tests. This can be done through a Bonferroni correction to the significance level of each test (Stock & Watson, 2015). For example, rather than test each hypothesis at a significance level of α (which increases the chance of making a Type I error), we test each hypothesis at a significance level of α/n, where n is the number of hypotheses being tested.

Traditionally, statistical significance tests are done at the 10%, 5%, and 1% level. Applying a Bonferroni correction, based on the 10 carer tasks variables that we have, would mean testing for these effects at the 1%, 0.5%, and 0.1% level. Therefore, we do not report a result as statistically significant unless it is significant at the 1% level. These significance levels are used in the results from columns (1) and (3) of Table 3, and throughout the rest of the analyses.

4.3 | Mechanism

4.3.1 | Other employment outcomes

Because the data in the SACE are cross-sectional, and carer tasks have not been experimentally (or quasi-experimentally) assigned to the carers, we do not interpret the results in Table 3 as cause-and-effect relationships. However, we can provide other evidence that the relative flexibility of these tasks is the mechanism behind the results by demonstrating how these tasks impact other outcomes, which we do in the following subsections.

For the first set of analyses, we begin by changing the outcome variable to the other employment outcomes defined in Section 3: employed full-time (vs. not employed); employed part-time (vs. not employed); and employed full-time (vs. part-time). Based on our hypothesis (H2) outlined earlier, if it is the time-bound nature of the tasks that are driving the results, then we expect to see the results vary based on the difference in time flexibility of the outcome groups. In particular, we expect to find large differences in who performs these tasks when comparing carers who are employed full-time to carers who are not employed, and then smaller differences when comparing cares who are employed part-time to carers who are not employed, or when comparing cares who are employed full-time to carers who are employed part-time. The results of this analysis for male and female carers are presented in Table 5. Columns (1) and (2) detail the results for comparing those employed full-time to those not employed. Perhaps unsurprisingly, they are very similar to those from Table 3. However, practical help is now statistically significant, and has a negative sign, which is the opposite of what we had hypothesised. It is possible that within task heterogeneity is also responsible for this result since some elements of this task were time-bound, such as medical appointments, even though we ultimately classified it as shiftable.

Columns (3) and (4) provide the results for comparing those employed part-time to those not employed. The first thing to note with the results is that while the results for female carers are largely the same as they were previously, many of the results for male carers are now statistically insignificant. Based on our hypothesis of time flexibility, not working and part-time working appear similar in terms of their time flexibility for male carers. However, for female carers, this is not the case. It appears that the decision to work, even if only on a part-time basis, is something which impacts their time to a much greater extent than for male carers, meaning that their labour supply will be more sensitive to performing caring tasks. The exception to this is the taking them out task which is statically significant at the 0.1% level for both men and women. In addition, helping with the care services has become statistically significant again for female carers, after it was not significant in column (2). This adds further support to the idea that helping with the care services contains both time-bound and shiftable elements, where the time-bound elements prevent male cares working full-time, and shiftable elements help female carers work part-time.

Finally, columns (5) and (6) show the results comparing full-time to part-time workers. As we hypothesised earlier, we expect the results to be weaker here given that the time flexibility between full-time and part-time workers is smaller than the difference in flexibility between full-time workers and those who do not work. This is what we find, as only 1 of the 20 carer tasks tested here is statistically significant at the 1% level. In addition to this, and unlike the regressions in columns (1) to (4), the F tests here do not report results that are statistically significant at the 1% level. For example, in column (3), while none of the time-bound tasks are statistically significant at an individual level, an F test for their joint significance shows they are statically significant at the 1% level when taken together. However, in column (5), we again have a situation where none of the tasks are significant individually, but they are also not significant when tested jointly.

TABLE 5 Relationship between caring tasks and other employment measures using linear regression.

	(1) Male carers Full-time versus not employed	(2) Female carers	(3) Male carers Part-time versus not employed	(4) Female carers	(5) Male carers Full-time versus part-time	(6) Female carers
Time-bound tasks						
Personal care	−0.010	−0.002	−0.014	0.001	0.003	−0.003
	(0.009)	(0.006)	(0.009)	(0.006)	(0.014)	(0.009)
Physical help	−0.028**	−0.024***	−0.010	−0.037***	−0.013	0.001
	(0.009)	(0.005)	(0.009)	(0.006)	(0.014)	(0.008)
Give them medicine	−0.045***	−0.033***	−0.024	−0.030***	−0.020	−0.012
	(0.010)	(0.006)	(0.010)	(0.007)	(0.014)	(0.009)
Keep an eye on them	−0.013	−0.017	−0.009	−0.013	0.013	−0.017
	(0.015)	(0.009)	(0.015)	(0.010)	(0.021)	(0.014)
Help with care services	−0.042**	0.006	0.009	0.028*	−0.049	−0.028
	(0.013)	(0.010)	(0.013)	(0.011)	(0.020)	(0.016)
Shiftable tasks						
Practical help	−0.006	−0.032*	−0.015	0.013	0.004	−0.049*
	(0.017)	(0.012)	(0.017)	(0.013)	(0.024)	(0.018)
Help with paperwork	0.038**	0.045***	0.016	0.028**	0.020	0.038
	(0.013)	(0.009)	(0.013)	(0.010)	(0.021)	(0.015)
Take them out	0.056***	0.051***	0.046***	0.064***	0.000	0.004
	(0.010)	(0.006)	(0.010)	(0.007)	(0.016)	(0.011)
Keep them company	−0.039***	−0.021*	−0.024	−0.021	−0.013	−0.000
	(0.012)	(0.008)	(0.011)	(0.008)	(0.018)	(0.012)
Emotional support	0.037***	0.019	0.018	0.026**	0.002	−0.003
	(0.011)	(0.008)	(0.011)	(0.008)	(0.017)	(0.012)
F statistic for time-bound tasks	13.16	15.90	3.50	19.24	2.10	1.66
p value	0.0000	0.0000	0.0037	0.0000	0.0621	0.1403
F statistic for shiftable tasks	11.69	21.98	5.97	23.11	0.28	2.66
p value	0.0000	0.0000	0.0000	0.0000	0.9252	0.0209
Observations	14,966	34,133	12,529	37,183	6774	19,397
R^2	0.118	0.096	0.043	0.052	0.038	0.027

Note: Standard errors in parentheses. All regressions contain the control variables from Table 2 as well as survey wave and region fixed effects.
*$p < 0.01$; **$p < 0.005$; ***$p < 0.001$.

Despite the statistical insignificance of the results, it is important to note that the signs of the coefficients continue to align with our hypotheses. All but one of the coefficients with a magnitude of at least 0.02, such as help with the care services and help with paperwork, has a sign that is consistent with our hypotheses. The only exception to this is the coefficient on practical help for female carers. As mentioned earlier, the within task heterogeneity of the practical help task could be an explanation for this. In summary, we believe the results in Table 5 support the hypothesis that the time-based nature of the tasks is responsible for the results we find.

TABLE 6 Relationship between caring tasks and non-employment outcomes using linear regression.

	(1) Male carers Used support to keep in employment	(2) Female carers	(3) Male carers Not in paid employment because of caring responsibilities	(4) Female carers
Time-bound tasks				
Personal care	0.040***	0.019**	0.056***	0.085***
	(0.010)	(0.006)	(0.012)	(0.008)
Physical help	0.001	0.010	0.072***	0.065***
	(0.010)	(0.005)	(0.012)	(0.007)
Give them medicine	0.013	0.011	0.075***	0.054***
	(0.010)	(0.006)	(0.013)	(0.009)
Keep an eye on them	−0.029	−0.000	0.003	0.010
	(0.015)	(0.009)	(0.021)	(0.014)
Help with care services	0.051***	0.024	0.037	0.055***
	(0.014)	(0.010)	(0.017)	(0.013)
Shiftable tasks				
Practical help	−0.026	−0.040***	0.018	0.022
	(0.017)	(0.012)	(0.024)	(0.017)
Help with paperwork	−0.036	−0.035***	0.019	0.016
	(0.015)	(0.010)	(0.017)	(0.012)
Take them out	−0.019	−0.011	0.025	0.048***
	(0.012)	(0.007)	(0.013)	(0.009)
Keep them company	0.000	0.001	0.014	0.017
	(0.013)	(0.008)	(0.016)	(0.011)
Provide emotional support	−0.003	−0.001	0.002	0.013
	(0.012)	(0.008)	(0.015)	(0.011)
F statistic for time-bound tasks	8.21	7.50	32.68	87.15
p value	0.0000	0.0000	0.0000	0.0000
F statistic for shiftable tasks	2.72	6.52	1.68	9.98
p value	0.0183	0.0000	0.1366	0.0000
Observations	5058	16,168	8839	21,469
R^2	0.049	0.034	0.123	0.119

Note: Standard errors in parentheses. All regressions contain the control variables from Table 2 as well as survey wave and region fixed effects.
*$p < 0.01$; **$p < 0.005$; ***$p < 0.001$.

4.3.2 | Support to maintain employment

We next examine the hypothesis surrounding the use of support to keep carers in employment. If time-bound tasks are less flexible than shiftable tasks then we would expect carers who perform the time-bound tasks to have a higher probability of reporting that they used support to keep them in employment (H3a), whereas carers who perform shiftable tasks would have a lower probability (H3b). The results are presented in columns (1) and (2) of Table 6. Regarding time-bound tasks, male and female carers who provide personal

care have a higher probability of reporting that they used support to maintain their employment when compared to carers who do not perform these tasks. In addition, male and female carers who provided help with the care services had a higher probability of using support, though only the male result is statistically significant due to the Bonferroni adjustments made to the significance levels. Carers who provide physical help and give medicine are no more likely to use support, despite the fact that these variables have strong negative correlations with employment outcomes in previous tables.

For shiftable tasks, female carers who offered practical help and help with paperwork had a lower probability of using support. The coefficients for male carers were also negative but, again due to the Bonferroni adjustments, statistically insignificant. As with some of the time-bound results described above, there are some shiftable tasks which have very strong correlations with employment outcomes but no relationship with using support. For example, the coefficients on taking the care recipient out and providing emotional support are relatively small and statistically insignificant, but in Tables 3, 5 we showed that the carers who perform these tasks have a higher probability of being employed (whether full-time or part-time) than carers who do not perform these tasks.

4.3.3 | Reason for not being employed

Our final set of analyses tests the hypothesis regarding the reason for why carers are not employed. If time-bound tasks are less flexible than shiftable tasks, then we would expect carers who perform the time-bound tasks to have a higher probability of reporting that they are unemployed because of their caring role (H4a), whereas carers who perform shiftable tasks have a lower probability (H4b). The results are presented in columns (3) and (4) of Table 6. For both men and women, 7 out of 10 time-bound tasks are statistically significant in their association with not being employed because of caring responsibilities. The probability that a male carer who gives medicine is not employed because of caring is 7.5 pp higher than a male carer who does not give medicine. Similarly, the probability that a female carer who provides personal care is not employed because of caring is 8.5 pp higher than a female carer who does not provide personal care. Keeping an eye on them is the only task that is not significant for men and women. For shiftable tasks, only 1 out of 10 are associated with not being employed because of caring responsibilities. In this case it is taking the cared for person out that is statistically significant for women.

We also find that the coefficient on every carer task is positive, regardless of whether it is a time-bound or shiftable task. This serves as a reminder that even though the shiftable tasks may be easier to combine with paid work, they still take up the carers time in some form and any reduction in the time available to carers necessarily takes away from available time from other activities such as work and leisure (Johnson & La Sasso, 2000). Therefore, a carer who is not employed and performing any these tasks is likely to list their caring responsibilities as a reason for not being employed. However, the coefficients on the time-bound tasks are quite large in comparison to the shiftable tasks, meaning this issue is exacerbated for time-bound tasks and the distinction between the sets of tasks is still important.

5 | DISCUSSION

5.1 | Summary

Taken together, the results from Tables 3–6 present an illuminating picture on the differing role of time-bound versus shiftable tasks. Beginning with personal care, this task is not correlated with whether carers are in employment in Tables 3, 5. However, male and female carers who provide personal care have a higher probability of reporting that they used support to maintain their employment when compared to carers who do not perform personal care. Therefore, it would appear that personal care is not negatively related to employment since the people who provide

personal care are receiving support to stay in employment. Similarly, this could explain why there is no statistically significant relationship between physical help and giving medicine with using support to maintain employment. These tasks are already negatively correlated with employment outcomes, so it could be the case that the carers who perform them either do not work, or the carers who managed to combine these tasks with employment do not need help to do so. In addition, all three tasks appear to be barriers to working for pay as carers who perform them report that their caring responsibilities are the reason they are not in employment.

Regarding shiftable tasks, we find that carers who help with paperwork, take the cared for person out, and provide emotional support, have a higher probability of working for pay when compared to carers who do not perform these tasks. These tasks are also positively related to whether the carers work full-time (vs. not working) and part-time (vs. not working). Based on these results we might expect that these carers would have a lower probability of using support to stay in employment but that does not appear to be the case as only the carers who help with paperwork have a lower probability of using support. Our interpretation for this is that some of the carers who provide emotional support and take them out actually use this support, and this support to stay in employment is the reason for the strong results in Tables 3, 5.

While many of the results listed above conformed to our hypotheses, there were other results which were unexpected. For example, we hypothesised that keeping the cared for person company would be a shiftable task and be positively correlated with employment but the results in Table 3 show that it has a statistically significant negative relationship with working. A possible explanation for this, that we discussed in Section 4, is that this task is actually time-bound: keeping them company needs to be given at specific times of the day in order to be meaningful. Another possibility is that respondents attributed activities to this variable that could have been attributed to the similar named variable, keeping an eye on the cared for person. We had originally thought this variable would be negatively related to employment, but it did not appear as statistically significant in any regression.

In addition, the results for carers helping with the care services and providing practical help were somewhat mixed across the analyses. Some of the results corresponded to our hypotheses, but some of the results also contradicted them. As we stated earlier, we attribute this to the fact that these particular tasks were difficult to classify based on the classification from Hassink and Van Den Berg (2011) and so contained elements which were both time-bound and shiftable.

Finally, for male and female carers, the results from the analyses were largely the same. The one exception to this were columns (3) and (4) of Table 5. When comparing carers who work part-time to carers who do not work, it appears as if the individual time-bound and shiftable tasks have very little effect on male carers, but several carer tasks are statistically significant for female carers, leading us to conclude that the flexibility differential for part-time work is smaller for male carers than for female carers. A potential explanation for this is that, because men have a historically stronger connection to the labour market in terms of participation and weekly hours of work, they may be more comfortable bundling part-time employment and caring responsibilities into one overall measure of work. However, if women had only planned to be employed part-time, the addition of caring responsibilities forces them to substitute employment hours for caring hours. There is some evidence to support this hypothesis in the literature as Henz (2004) found that when female workers become carers, part-time workers are more likely to reduce their hours than full-time workers.

5.2 | Strengths

The main strength of this paper that we wish to highlight is the benefit of disaggregating carer tasks. For example, if the variable for keeping the cared for person company and the variable for taking them out had been aggregated together in some broad measure of social support, then those relationships may have diluted one another down to a small, statistically insignificant result. However, since they have been separated, we can see that male and female carers who keep the cared for person company have a lower probability of working compared to the carers who do

not perform that task, while male and female carers who take them out have a higher probability of working compared to carers who do not perform that task.

It is also worth noting that there are some results here for tasks which have not been explicitly considered in other studies. For example, helping the cared for person with paperwork and providing them with emotional support are both significant positive predictors of working for male and female carers. In Hassink and Van Den Berg (2011) the closest equivalents are support with financial matters/other organisational tasks and social support respectively, but even these are subcategories that were combined to construct the broader "Organisational" category. Van Houtven et al. (2013) is another paper which looks at categories of care giving but they use similarly less refined measures such as personal care (defined as helping with dressing, eating, or bathing) and chore care (defined as help with household chores, errands, or transportation).

A final strength of the study is that we have evidence that the time-bound versus shiftable nature of the tasks have similar relationships with other outcomes. Carers who perform time-bound tasks have a higher probability of using support to maintain their employment and a higher probability of reporting that they are not in paid employment because of their caring responsibilities. This is a benefit of using a specific cross-sectional study on carers, which asks detailed questions on caring behaviour, rather than a general longitudinal study which happens to cover the topic of caring, among others. Indeed, it is important to note that, even if longitudinal data were available, it would still be difficult to assign causality to the results in Table 3. To illustrate this, imagine a longitudinal setting where in the first period we observed that a carer was working, but not providing a caring service, such as giving medicine. In the second period, we observe that they are now giving medicine, but they have stopped working. It could be the case that, because they are giving medicine, they are so time constrained that they can no longer work. Or it could be the case that the carer has stopped working for some other reason (e.g. redundancy), which in turn frees up time for them to give medicine. So even longitudinal data would not allow us to observe which event comes first due to the discrete nature of surveys.

5.3 | Limitations

It is also important to be aware of the limitations of this paper. To begin with, it would be useful to have information on both the health of the carer, and the health of the cared for person, so they could be used as extra control variables in the models. In particular, having information on the health of the cared for person would be significant as it is possible that the estimators suffer from omitted variable bias in its absence. For example, if the cared for person is very ill, that may force the carer into having to give them medicine, but also have a separate effect on their employment due to the severity of the illness. If we do not control for this severity in the model, this separate effect gets attributed to the medicine variable, and we overestimate the effect that it has on employment. However, such an omitted variable would still not be able to explain why we find that there are a group of tasks (help with paperwork, take them out, emotional support) where there is a positive association between the caring task and working. Finally, it would have been advantageous to supplement this quantitative analysis with qualitative analysis. For example, Pickard et al. (2018) use a mixed methods approach to examine the effect of paid services on employment and then interviewed the carers to find out exactly how these services had affected them. Similarly, Brimblecombe et al. (2018) also use quantitative and qualitative data to examine the barriers that carers face when they try to access care services and how this affects their ability to maintain employment. An approach like that here would have helped to confirm that the mechanism behind the results that we see is the time element of these tasks.

5.4 | Policy recommendations

From a policy perspective, these results have important implications. The funding strategy for social care has recently received renewed attention. From the carers' perspective, any new proposal should help carers maintain paid

employment since, as mentioned earlier, many carers already struggle to combine care with other work (Her Majesty's Government and Employers for Carers, 2013). In terms of supporting these workers, Pickard et al. (2015) show that there is a positive association between carer's employment and the cared for person receiving paid-for services such as home care or a personal assistant. If public funding is to be used to provide these, and other types of services for the cared for person, it is important to be aware of the tasks that have the largest impact on carer labour market outcomes, in order to ensure the most efficient use of public resources. For example, local authorities may want to prioritise services towards tasks that carers are not receiving support for, such as giving medicine and providing physical help, but which do have a negative relationship with employment. This research offers a valuable insight into how best these funds could be used to both ensure that the cared for person is taken care of, and to also allow the carer to remain in work or work more hours.

6 | CONCLUSION

Despite the large and rising number of carers in England, relatively little is known about the relationship between the specific tasks they perform and their labour supply. Using data from the SACE, we examine the association between caring tasks and whether carers are working. We find that, for both male and female carers, tasks which are time-bound are negatively correlated with the probability of working while tasks which are shiftable are positively correlated with the probability of working. Specifically, we find that carers who provide physical help and give medicine are less likely to work compared to carers who do not do these tasks, while carers who help with paperwork, provide emotional support, and take their cared for person out, are more likely to work compared to carers who do not perform these tasks. If future social policy is to be designed in order to allow carers to also maintain their employment, then targeting services at the care tasks which have the largest impact on employment needs to be taken into account.

CONFLICT OF INTEREST STATEMENT
The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT
The data used in this paper is from the Survey of Adult Carers in England, a publicly available data set from NHS Digital. All material relating to the Survey of Adult Carers in England is the copyright of NHS Digital. The computer code used to generate the results is available on request.

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