


Association Between Spousal Caregiver Well-Being and Care Recipient Healthcare Expenditures

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OBJECTIVES: To measure the association between spousal depression, general health, fatigue and sleep, and future care recipient healthcare expenditures and emergency department (ED) use.

DESIGN: Prospective cohort study.

SETTING: Health and Retirement Study.

PARTICIPANTS: Home-dwelling spousal dyads in which one individual (care recipient) was aged 65 and older and had one or more activity of daily living or instrumental activity of daily living disabilities and was enrolled in Medicare Part B (N = 3,101).

EXPOSURE: Caregiver sleep (Jenkins Sleep Scale), depressive symptoms (Center for Epidemiologic Studies Depression-8 Scale), and self-reported general health measures.

MEASUREMENTS: Primary outcome was care recipient Medicare expenditures. Secondary outcome was care recipient ED use. Follow-up was 6 months.

RESULTS: Caregiver depressive symptoms score and six of 17 caregiver well-being measures were prospectively associated with higher care recipient expenditures after minimal adjustment ($P < .05$). Higher care recipient expenditures remained significantly associated with caregiver fatigue (cost increase, \$1,937, 95% confidence interval (CI) = \$770–3,105) and caregiver sadness (cost increase, \$1,323, 95% CI = \$228–2,419) after full adjustment. Four of 17 caregiver well-being measures, including severe fatigue, were significantly associated with care recipient ED use after minimal adjustment ($P < .05$). Greater odds of care recipient ED use remained significantly associated with caregiver fatigue (odds ratio

(OR) = 1.24, 95% CI = 1.01–1.52) and caregiver fair to poor health (OR = 1.23, 95% CI = 1.04–1.45) after full adjustment. Caregiver total sleep score was not associated with care recipient outcomes.

CONCLUSION: Poor caregiver well-being, particularly severe fatigue, is independently and prospectively associated with higher care recipient Medicare expenditures and ED use. *J Am Geriatr Soc* 65:2220–2226, 2017.

Key words: caregiving; healthcare use; depression; quality of life

With the population of adults aged 65 and older in the United States predicted to rise from 14.9% in 2015 to 22.1% in 2050,¹ supporting community-dwelling aging adults is critical.² One important component of this support is informal caregivers, who support an estimated 14.7 million Americans³ and are growing in number over the last decade.⁴ Given the common and critical role of the caregiver, a growing body of literature has explored the health effect of caregiving—positive and negative—on caregivers. Although caregiving itself may have health benefits,^{5,6} caregiver well-being may deteriorate if caregiver strain or burnout develops.^{7,8} Several pathways have been proposed that link care recipient illness and exposure to high-intensity medical care at the end of life to poor caregiver health and greater caregiver healthcare use.^{9–11} Extent of care recipient suffering has been identified as an additional risk factor for caregiver strain.¹²

Although care recipient illness and healthcare use are risk factors for poor caregiver well-being, the reverse may also be true: that poor caregiver well-being could contribute to higher care recipient healthcare use through several possible mechanisms. Caregiving demands may contribute to more physical and mental impairment in the caregiver,⁹ resulting in inability to keep up with caregiving demands, which may worsen the care recipient's health, requiring medical attention and leading to additional

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healthcare expenditures. In addition, caregivers with poor well-being, such as severe fatigue, may be more prone to burnout and thus less capacity to provide care,^{12–15} leading to reliance on the health system, and the emergency department (ED) in particular as a source of respite, which clinicians commonly describe as the “Pop drop.” Complicating these hypothesized pathways is the potential for reverse causality. High care recipient treatment intensity¹⁶ or the emotional effect of worsening illness^{8,9} may result in poor caregiver well-being and higher care recipient healthcare use, confounding the association. Therefore, longitudinal measurements of caregiver well-being and spousal care recipient healthcare expenditures are necessary to elucidate the association.

Even in the absence of a causal association, there is a need to identify factors associated with higher future care recipient healthcare use, especially potentially burdensome use such as ED visits. Care recipient factors that traditional claims-based risk models do not capture have been shown to predict hospital readmissions,¹⁷ use, and mortality better than claims-based approaches.¹⁸ For older adults with functional impairment, it is possible that caregiver factors such as well-being predict use as well. If this is true, screening for poor caregiver well-being and offering targeted supports has the potential to reduce future care recipient healthcare use and to improve caregiver health and outcomes.

The Health and Retirement Study (HRS) provides a unique opportunity to study these phenomena because both individuals in spousal pairs are enrolled in this longitudinal cohort study.¹⁹ In this analysis, we tested the association between caregiver symptoms of well-being and care recipient healthcare use using data on these spousal caregiver and care recipient dyads. To help account for the possibility that care recipients’ healthcare use might drive caregiver distress, we determined care recipient healthcare use after the caregiver assessment, adjusting for the care recipients’ previous 6 months of use.

METHODS

This study used Medicare-linked data from the HRS between 2000 and 2012. The HRS is a nationally representative longitudinal panel study in the United States designed to assess well-being and disability in respondents aged 51 and older through biennial surveys. HRS also enrolls the spouses of all respondents, which allows for spousal dyads to be examined. Proxy respondents were interviewed when sampled participants were unable to complete the survey. HRS has baseline response rates of 70% to 82% and re-interview rates of 90%.²⁰ HRS respondents were asked for permission to release their Medicare claims, which were then linked to their survey responses.

Study Population

This study included 8,785 HRS observations of respondents from 2000 to 2012 who lived at home, had activity of daily living (ADL; bathing, dressing, eating, toileting, walking, or transferring in and out of bed) or instrumental activity of daily living (IADL; grocery shopping, cooking,

making telephone calls, managing money or taking medications) limitations, reside with a spouse, and were alive 6 months after interview. Of these, 463 (5.3%) were excluded because they did not consent to Medicare linkage or had failed linkage, and 2,362 (26.9%) were excluded because they did not have continuous Medicare fee-for-service coverage the 6 months before and after the survey, which resulted in 5,960 observations.

Study Variables

The primary dependent variable was care recipient Medicare expenditures during the 6 months after the spousal caregiver HRS survey. We adjusted expenditures to 2012 U.S. dollars using the medical Consumer Price Index.²¹ The secondary outcome was care recipient ED use, defined as the number of ED visits.

Prior work has demonstrated that well-being measures that capture depressive symptoms, sleep symptoms, and self-reported health status have all been associated with caregiver strain in this population.^{22–24} Given that there is no composite scale of caregiver well-being in the HRS, these well-being measures were instead used. Primary independent variables were therefore the eight-item (yes/no) Center for Epidemiologic Studies Depression Scale (CES-D-8);²⁵ four items of the Jenkins Sleep Scale,²⁶ with responses classified as rarely or never (0), sometimes (1), or most of the time (2); a single-item severe fatigue item (yes/no); and the validated single-item general self-rated health item,²⁷ which was dichotomized into fair or poor versus good, very good, or excellent. Within the HRS, the CES-D-8 items were not surveyed in the case of a proxy respondent. These measures have all been validated in an older adult population.^{25,27,28}

It is uncertain whether items comprising the CES-D-8 and Jenkins Sleep Scale impact caregivers differently than the total scale scores. Therefore, we tested the effect of the total CES-D-8 score, total Jenkins Sleep Scale score, and individual measures from these scales on the two care recipient outcomes.

All models adjusted for care recipient total Medicare expenditures or ED visits in the 6 months before the care recipient HRS survey depending on whether the outcome variable was expenditures or ED visits. All models also adjusted for caregiver age, sex, and proxy-respondent status. Other covariates included caregiver race (white, black, other), net worth, education level, and presence of children residing within 10 miles to help account for support for the caregiver. We also included the number of ADL and IADL impairments and the presence of cognitive impairment for care recipients and caregivers, as determined using the Langa-Weir method, which includes cognitive measures assessed in the HRS.²⁹ Final models also included whether the spouse assisted with the care recipients’ ADLs.

Statistical Analysis

Descriptive statistics, adjusted for survey weights and design, were used to compare the observations of spouses and care recipients in identified dyads. Separate models were constructed to assess the effect of each caregiver

well-being measure on total healthcare expenditures and numbers of ED visits in the following 6 months. Because expenditures and ED visits have a high concentration of observations with a value of zero and a skewed distribution, two-part models were used.^{30–32} The first part was a multilevel mixed-effects logistic regression for any expenditures versus no expenditures and any ED use versus no ED use, accounting for multiple observations for individuals. The second part of each model was a mixed-effects generalized linear regression model with a gamma distribution and log link to assess the effect of caregiver well-being characteristics on expenditures or ED use for those with nonzero values. Therefore, two separate statistics describe expenditures and ED use.

The first minimally adjusted models adjusted for care recipients' prior-6-month expenditures or ED visits, proxy status, caregiver age and sex. Prior-6-month expenditures or ED visits were included to isolate the association between caregiver well-being and future expenditures given the potentially bidirectional relationship.⁹ For caregiver characteristics with significant ($P < .05$) associations, fully adjusted models were built that included all demographic, socioeconomic, functional, and cognitive covariates of the care recipient and caregiver. Given that multiple caregiver well-being characteristics were tested, the Bonferroni method was used to adjust P -values to determine statistical significance. This altered the threshold for statistical significance from $P < .05$ to $P < .01$. This is considered a more-conservative approach to adjust for multiple comparisons.³³

To elucidate whether cohabitation versus caregiving determined the association between spousal well-being and care recipient healthcare use, one final analysis step was performed. For all fully adjusted models that remained statistically significant to a threshold of $P < .01$, interaction effects were assessed between the well-being characteristic and whether the spouse assisted the care recipient with ADLs. All analysis was done using Stata version 14.0 (Stata Corp., College Station, TX).

RESULTS

There were 3,101 care recipient-caregiver dyads with 5,960 observations (mean number of observations 1.83, median 1, range 1–7). Given the longitudinal nature of the HRS, some dyads were observed multiple times. Table 1 shows that the care recipient and spouse in each dyad were similar in age, race, and education, although care recipients were more likely to be male and have higher degrees of functional and cognitive impairment.

The mean \pm standard deviation adjusted healthcare expenditures for the cohort of functionally disabled home-dwelling care recipients for the 6 months after assessment were \$8,751 \pm 226. There were 311 observations (5.2%) that had zero expenditures in the 6 months after HRS assessment and 4,539 observations that had no ED visits over this time (76.2%). Mean number of ED visits the 6 months after HRS assessment was 0.39.

Caregiver well-being measures did not predict whether care recipients had any healthcare expenditures (Supplementary Table S1a), although for care recipients who incurred Medicare costs (94.8% of observations), caregiver

Table 1. Characteristics of Spousal Dyads (N = 5,960)

Characteristic	Care Recipient	Spousal Caregiver
Age, mean \pm SD	76.21 \pm 0.18	74.17 \pm 0.24
Sex, %		
Male	57.3	42.6
Female	42.7	57.4
Race, %		
White	90.9	90.2
Black	7.1	6.8
Other	2.0	3.0
Education, %		
<High school	29.6	24.8
High school	49.6	53.7
>High school	20.8	21.5
Household net assets, \$, mean \pm SD	488,824 \pm 33,325	
Independent in ADL and IADLs, %	0	66.19
Number of ADL and IADL impairments, mean \pm SD	2.75 \pm 0.06	0.86 \pm 0.05
Cognitive function, %		
Normal	57.1	73.1
Cognitive impairment, no dementia	26.7	20.7
Dementia	16.2	6.2
Child resided within 10 miles, %	62.1	
Healthcare use		
Expenditures next 6 months, \$, mean \pm SD ^a	8,751 \pm 226	
No expenditures next 6 months, %	5.2	
ED visits next 6 months, mean \pm SD	0.39	
No ED visits next 6 months, %	76.2	
Spouse well-being characteristics, %		
Depressed		16.1
Everything takes effort		28.3
Restless		32.1
Happy		87.3
Lonely		13.2
Enjoys life		92.1
Sad		19.7
Difficulty getting going		25.0
Fair to poor health		32.1
Difficulty falling asleep		14.2
Difficulty with waking up at night		30.6
Difficulty with early waking		13.8
Feel rested		58.9

Source: Health and Retirement Study, 2000–2012.

^aExpenditures are adjusted 2012 US\$.

SD = standard deviation, ADL = activity of daily living, IADL = instrumental activity of daily living.

total CES-D score and 6 of 17 individual caregiver well-being measures were significantly associated with higher care recipient healthcare costs after adjusting for prior expenditures, age, sex, and proxy status ($P < .05$) (Table 2). Specifically, caregiver reports of feeling depressed, feeling sad, and severe fatigue were associated with higher care recipient healthcare costs; conversely,

Table 2. Association Between Caregiver Well-Being Characteristics and Care Recipient Healthcare Expenditures

Characteristic	Minimally Adjusted ^a	Fully Adjusted ^b
	Coefficient (95% Confidence Interval) P-Value	
Center for Epidemiologic Studies 8-item Depression Scale		
Total score	0.02 (0.00–0.05) .03	0.01 (–0.01–0.04) .26
Depressed	0.12 (0.01–0.23) .04	0.07 (–0.04–0.19) .23
Everything takes effort	–0.03 (–0.12–0.06) .52	
Restless	0.06 (–0.03–0.15) .18	
Happy	–0.14 (–0.26 to –0.02) .02	–0.10 (–0.23–0.02) .11
Lonely	0.04 (–0.08–0.16) .49	
Enjoys life	–0.01 (–0.15–0.13) .88	
Sad	0.19 (0.09–0.29) <.001	0.13 (0.03–0.23) .01
Difficulty getting going	0.03 (–0.06–0.12) .51	
Self-reported general health fair to poor	0.04 (–0.05–0.13) .39	
Severe fatigue	0.26 (0.15–0.38) <.001	0.20 (0.08–0.32) .001
Jenkin's Sleep Scale		
Total score	–0.00 (–0.03–0.03) .98	
Trouble falling asleep	–0.02 (–0.09–0.06) .67	
Trouble with waking at night	–0.04 (–0.11–0.02) .18	
Trouble waking up early	–0.01 (–0.08–0.06) .83	
Rested	–0.07 (–0.13 to –0.01) .03	–0.05 (–0.11–0.02) .14

Data source: Health and Retirement Study, 2000–2012.

Expenditures are of care recipients with nonzero expenditures. Coefficients are the unstandardized logit-scale regression coefficients. See Supplementary Appendix 1 for first part of two-part model examining the association of caregiver characteristics and odds of nonzero expenditures.

^aMinimally adjusted models include proxy status, caregiver age, and sex as covariates.

^bFully adjusted models additionally adjusted for race, net assets, functional limitations of caregiver and care recipient, cognitive function of caregiver and care recipient, whether a child resided within 10 miles, and whether the spouse reported assisting with activities of daily living or instrumental activities of daily living.

caregiver reports of feeling happy and rested were associated with lower care recipient costs. The total Jenkin's Sleep Scale core and the other individual caregiver measures (caregiver reports that everything takes effort, restlessness, loneliness, enjoying life, difficulty getting going, fair to poor health, trouble falling asleep, waking at night, waking up early) were not associated with healthcare expenditures. In fully adjusted models, only caregiver sadness (coefficient = 0.13, 95% confidence interval (CI) = 0.03–0.23, $P = .01$) and caregiver severe fatigue (coefficient = 0.20, 95% CI = 0.08–0.32, $P = .001$) remained significantly associated with higher care recipient expenditures. These results remained statistically significant after adjusting for multiple comparisons. The interaction for spousal fatigue and whether the spouse assisted with ADLs or IADLs was significant ($P = .02$). Care recipients of spouses who assisted with ADLs or IADLs and were fatigued had \$3,262 higher expenditures over the following 6 months than care recipients of spouses who assisted with ADLs or IADLs but were not fatigued (standard error \$1,952–4,572) (Figure 1). There was no significant difference between noncaregiving spouses reporting fatigue and those reporting no fatigue. The interaction term for spousal sadness and caregiving was not significant ($P = .17$). Regardless of ADL or IADL assistance, care recipients with sad spouses had \$1,323 (95% CI = \$228–2,419) greater adjusted expenditures over the following 6 months.

In models predicting care recipient ED use (binary outcome) (Table 3), spousal report of depression, sadness, fair to poor health, and severe fatigue were significantly ($P < .05$) associated with greater odds of the care recipient

having an ED visit in the next 6 months, adjusted for sex, age, proxy status, and ED use over the prior 6 months. Caregiver total CES-D score and report of trouble waking at night were nonsignificantly associated with odds of the care recipient having an ED visit. Measures for caregiver reports that everything takes effort, restlessness, happiness, loneliness, enjoying life, and difficulty getting going, as well as total Jenkins Sleep Scale core were not associated with odds of ED use. In fully adjusted models, caregiver fair to poor health was associated with significantly greater odds of having an ED visit (odds ratio (OR) = 1.23, 95% CI = 1.04–1.45, $P = .01$), as was caregiver severe fatigue (OR = 1.24, 95% CI = 1.01–1.52, $P = .04$), although only caregiver fair to poor health was statistically significant when alpha was adjusted for multiple comparisons. An added interaction term for caregiver fair to poor health and whether the spouse provided ADL assistance was not significant ($P = .25$).

In minimally adjusted models predicting number of ED visits (continuous outcome) for the 23.8% of care recipients with nonzero ED use, caregiver total CES-D score and six of 17 individual caregiver well-being measures were associated with number of ED visits (Table S2A). In particular, caregiver total CES-D score and reports of sadness, difficulty getting going, fair to poor health, and severe fatigue were associated with more ED visits. Conversely, having fewer ED visits was significantly associated with caregiver reports of feeling happy and rested and nonsignificantly associated with caregiver reports of enjoying life. After full adjustment, only caregiver report of difficulty getting going was associated with

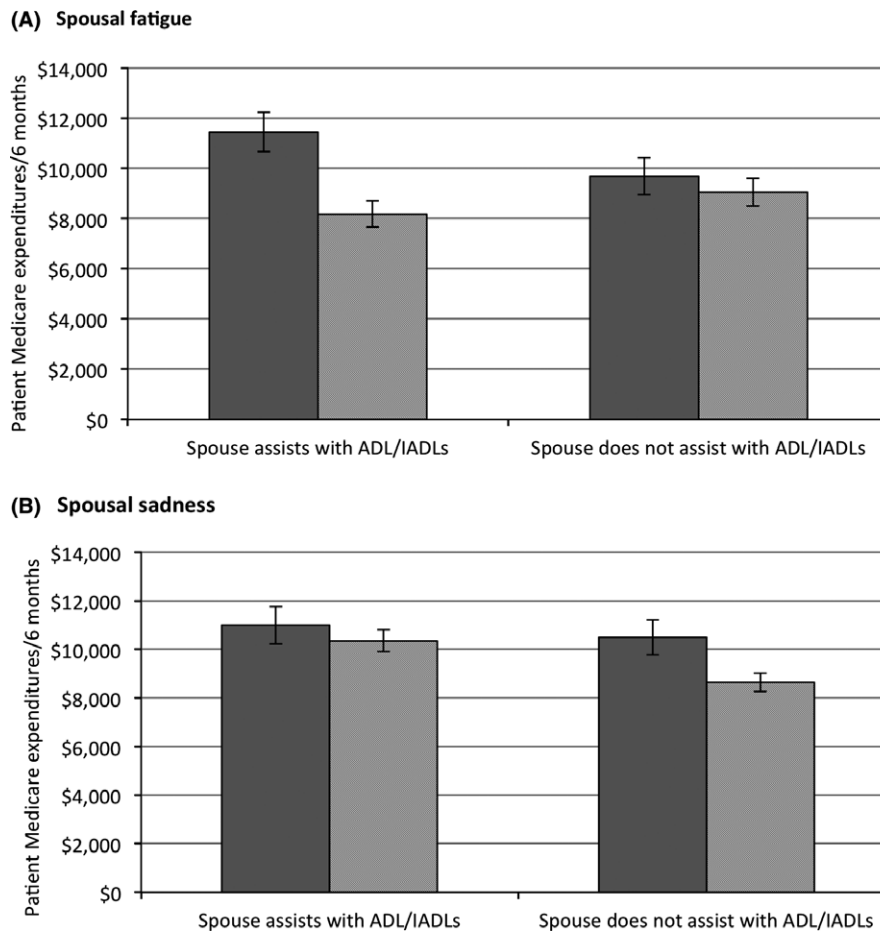


Figure 1. Mean adjusted care recipient healthcare expenditures according to spousal well-being characteristics and caregiver role. Gray = spouse reports fatigue (A) or sadness (B); Black/white stripe = spouse does not report fatigue or sadness.

more ED visits (coefficient = 0.07, 95% CI = 0.00–0.13, $P = .04$); this result was not statistically significant after adjusting for multiple comparisons.

DISCUSSION

The recent National Academies of Sciences, Engineering, and Medicine report highlights the dire need for greater attention and support for caregivers in the United States.³⁴ Our findings are novel in linking caregiver well-being to care recipient healthcare use. Even with a conservative analysis approach that adjusted for prior health care use as well as caregiver and care recipient characteristics, caregiver sadness and severe fatigue were significantly associated with higher expenditures for functionally disabled care recipients. In addition, these disabled spouses of caregivers with fair to poor health and severe fatigue were significantly more likely to visit the ED. These findings suggest that identifying spousal caregivers with suboptimal well-being may help to identify care recipients with impending higher healthcare costs and ED use. This work raises the potential that screening for caregivers with poor well-being could not only benefit caregivers, but also help target interventions to reduce care recipient healthcare use.

Caregiver total CES-D score and several individual caregiver well-being measures were prospectively and significantly associated with care recipient healthcare costs

and number of ED visits over the next 6 months, with the effects in the expected directions after adjusting for caregiver age, sex, and proxy status. Our results also suggest that caregiver and care recipient factors explain some, but not all, of the association between these caregiver well-being measures and care recipient healthcare use. In particular, caregiver fatigue was consistently associated with care recipient healthcare costs and ED use, although some associations were no longer statistically significant after accounting for all caregiver and care recipient characteristics. Our analysis of caregiver fatigue showed that the association between fatigue and care recipient healthcare use was specifically associated with higher care recipient healthcare costs when the spouse was assisting with impaired ADLs or IADLs (one of many forms of caregiving), indicating that it is caregiving and not cohabitation driving this pattern. Taken together, our data suggest that caregiver well-being is associated with care recipient outcomes and that caregiver and care recipient factors may attenuate these associations. Our findings suggest a need to better understand the pathways between caregiver well-being and care recipient outcomes and to determine how caregiver and care recipient factors influence these pathways.

The nature and direction of the relationship between care recipient medical care and caregiver characteristics are challenging to disentangle because of likely

Table 3. Association Between Caregiver Well-Being Characteristics and Odds of Emergency Department Use in the Next 6 Months

	Minimally Adjusted ^a	Fully Adjusted ^b
Characteristic	Odd Ratio (95% Confidence Interval) P-Value	
Center for Epidemiologic Studies 8-item Depression Scale		
Total score	1.03 (1.00–1.07)	.08
Depressed	1.25 (1.05–1.49)	.01
Everything takes effort	1.02 (0.88–1.19)	.77
Restless	1.01 (0.87–1.17)	.89
Happy	0.92 (0.75–1.11)	.39
Lonely	1.09 (0.90–1.32)	.37
Enjoys life	0.94 (0.74–1.20)	.63
Sad	1.26 (1.07–1.48)	.006
Difficulty getting going	1.06 (0.91–1.24)	.46
Self-reported general health fair to poor	1.24 (1.07–1.43)	.004
Severe fatigue	1.30 (1.07–1.57)	.007
Jenkin's Sleep Scale		
Total score	0.98 (0.94–1.02)	.31
Trouble falling asleep	0.99 (0.88–1.11)	.81
Trouble with waking at night	0.91 (0.82–1.01)	.07
Trouble waking up early	0.98 (0.87–1.09)	.67
Rested	0.99 (0.89–1.09)	.82

Data source: Health and Retirement Study, 2000–2012.

The first of a two-part model: see Table S2A for the association between caregiver well-being and greater emergency department use for those with nonzero use.

^aMinimally adjusted models include proxy status, caregiver age, and sex as covariates.

^bFully adjusted models additionally adjusted for race, net assets, functional limitations of caregiver and care recipient, cognitive function of caregiver and care recipient, whether a child resided within 10 miles, and whether the spouse reported assisting with activities of daily living or instrumental activities of daily living.

bidirectional relationships between caregiver well-being and care recipient healthcare use. Previous research has established that care recipient severity of illness and intensity of medical treatment are risk factors for caregiver burnout,⁹ although as we suggest in our conceptual model, it is possible that caregiver characteristics could also drive care recipient healthcare use. We used the care recipients' prior 6 months of expenditures and adjusted for their levels of cognitive and functional disability to account for the care recipient characteristics that might drive caregiver distress. By adjusting for these important care recipient characteristics and incorporating prior expenditures, our findings contribute evidence that caregiver distress may lead to higher care recipient expenditures and greater healthcare use. These results also suggest that caregiver distress could serve as a marker for care recipients likely to have higher healthcare use in the future.

This study has several limitations. Two of our models had null results (for predicting likelihood of healthcare expenditures and numbers of ED visits), but it is likely that

the study was underpowered to assess these effects. Nevertheless, given the distribution of expenditures and ED visits, relying on two-part models was the best statistical approach and allowed for better estimations of healthcare expenditures and likelihood of ED visits. This study was unable to establish a causal relationship between caregiver well-being and care recipient healthcare use because our data were observational and it is likely that the relationship is bidirectional. We attempted to isolate the directionality of the association by adjusting for prior costs, recognizing that this probably results in a conservative bias to our estimates, given the probable correlation of caregiver well-being and prior costs as well. Although the HRS captures several valuable measures of caregiver well-being domains that we used in this study, caregiver strain is not specifically assessed. Future work should specifically explore the association between strain and healthcare use. In addition, although we adjusted for degree of caregiver assistance with ADL and IADLs and presence of children, a more-nuanced picture of the roles of the caregiver, such as emotional support, medication administration, and healthcare decision support, would be useful to understand moderating factors for the association between caregiver symptoms and care recipient healthcare use.

The HRS presents a unique opportunity to explore how caregiver factors influence care recipient healthcare use and expenditures that has not been measured before, but because the HRS enrolls spouses but no other individuals (e.g., children) providing care for older adults, our results are not generalizable to other caregivers and may underestimate the total effect of caregiver well-being on care recipient healthcare use. The role of caregivers is critical to understand given the growing recognition that factors external to the health system often drive healthcare use. Although our goal is not to reduce disabled care recipients' healthcare costs, it is likely that excessive ED use signals care that is not optimal for care recipients and their families and is a potential marker of caregiver distress and unmet needs. The attenuation of some of the effects of caregiver distress on care recipient healthcare costs and ED use by adjusting for caregiver and care recipient factors such as availability of child help and net assets suggests that these effects may be modifiable and that these care recipient and caregiver factors or subgroups are potential targets for interventions. Because functionally disabled older adults are a high-cost population, our findings suggest that caregivers are critical targets to improve the care that older adults with functional disabilities receive.

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Author Contributions: Dr. Ankuda had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Concept and design: Ankuda, Kabeto, Langa, Levine, Maust, McCammon. Acquisition, analysis, or interpretation of data: Ankuda, Kabeto, Levine, McCammon. Drafting of manuscript: Ankuda, Levine, Maust. Critical revision of manuscript for important intellectual content: Ankuda, Kabeto, Langa, Levine, Maust, McCammon. Statistical analysis: Ankuda, Kabeto, Levine, McCammon.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Table S1. The association of caregiver wellbeing characteristics with odds of having patient healthcare expenditures.

Table S2. The association of caregiver wellbeing characteristics with higher ED utilization.

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