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The impact of a partner's nursing home admission on individuals' mental well-being

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ABSTRACT

This study analyzes the effect of a partner's nursing home admission on individuals' mental well-being. To do so, we use longitudinal data on couples from the Health and Retirement Study and a quasi-experimental difference-in-differences design to isolate the causal effect of the transition. We hypothesize that: (i) a partner's nursing home admission has a negative impact on individuals' mental well-being and (ii) the size of the negative effect is decreasing in the amount of caregiving provided by respondents pre-admission. We find that a partner's nursing home admission raises respondents' depressive symptomology scores by 0.839, corresponding to a 50 percent increase from the average pre-admission baseline. Amongst respondents providing care to their partners pre-admission, a nursing home transition raises depression scores by 0.670, corresponding to a 36.8 increase from baseline. Non-caregiving respondents experience a corresponding 1.05 increase in depression scores, representing a 67.2 percent rise from baseline. Amongst pre-admission caregivers, we find that the negative well-being impact of a partner's admission decreases in the duration and intensity of caregiving pre-admission. We also find that partners of care recipients with more severe physical and cognitive impairment pre-admission experience less deterioration in mental well-being compared to their counterparts. Overall, our findings indicate that a partner's transition into residential care can provide respite from caregiving-related stressors. However, on average, the negative well-being effects of the transition tend to outweigh this positive respite effect. The policy implications are twofold: first, there is a need for continued support to families of care recipients during the latter's transition into institutional care. Second, nursing homes and other institutions have a role in providing respite care, especially for high-intensity caregivers.

1. Introduction

An estimated 70 percent of American adults aged 65 and above will develop long-term care (LTC) needs within their lifetimes and an estimated 28 percent will have a nursing home stay of at least 90 days.[1] A person's care needs affect both individuals themselves and the people around them (Wittenberg et al., 2019). Those who provide care and support experience the physical and mental consequences of caregiving (Bobinac et al., 2010, 2011). Family and friends may also experience negative emotions and stress from seeing the deterioration of their loved one's health and quality of life (Al-Janabi et al., 2016). Such 'spillover effects' have been extensively studied in the context of informal caregiving but less is known about the impact of a person's transition from a community to an institutional care setting.

A partner's nursing home (NH) admission is a culmination of multiple processes including changes in the care recipient's condition and the capacity of their family to provide care at home. The transition itself consists of multiple events including the separation of the couple, and a shift in the form and intensity of spousal caregiving (Gaugler, 2005; Zarit and Whitlatch, 1992). As these different processes need not affect individuals' well-being in the same way, the overall impact of a partner's admission is not evident. Yet, understanding the impact of a partner's transition into institutional care is important for policy as it contributes to the understanding of the wider costs and benefits of institutional versus community-based care. Furthermore, the identification of a negative and non-trivial well-being impact may also highlight a need for support directed at families of care recipients. To that end, this paper studies how individuals' NH admissions affect their spouse or partner's well-being. Specifically, our analysis seeks answers to the questions: "What is the impact on an individual's mental health when

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[1] https://aspe.hhs.gov/reports/what-lifetime-risk-needing-receiving-long-term-services-supports.

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their partner is admitted into a nursing home?" and "How does the impact depend on pre-admission characteristics such as caregiving?"

2 Nursing home admissions and well-being of family members

Existing evidence on the effect of individuals' nursing home admissions on their family caregivers' mental and physical well-being is mixed (Camões-Costa et al., 2022). Most studies focus on people living with dementia and compare their caregivers' mental (e.g., depression, anxiety, burden) and physical health outcomes (e.g., prescription drug use) before and after admission. Amongst these, some studies have found no significant improvements (Schulz et al., 2004; Zarit and Whitlatch, 1992) while others have found positive associations between care recipients' nursing home admissions and caregivers' well-being (Gaugler et al., 2007, 2009, 2010; Seltzer and Li, 2000). Improvements in mental health have been attributed to less restriction and a greater sense of mastery amongst caregivers post-admission (Mausbach et al., 2014). This study contributes to the literature by considering partners in caregiving and non-caregiving roles and care recipients with and without Alzheimer's disease or dementia (AD) diagnoses. Distinguishing between caregivers and non-caregivers is important because the two groups face different stressors arising from their partner's care needs and hence may be differentially affected by their partner's NH admission. Similarly, studying care recipients other than those living with AD allows us to understand if the impact of an NH admission differs with the form (i.e., cognitive, physical) and intensity of impairment. Methodologically, the present study departs from the existing literature by attempting to estimate the causal effect of nursing home admissions on well-being. In doing so, it addresses the presence of selection biases in care choices (Coe and Van Houtven, 2009).

3 The impact of caregiving on caregivers' well-being

A growing literature has found a negative causal effect of providing informal care on caregivers' mental (Bom et al., 2018; Bom and Stöckel, 2021; Coe and Van Houtven, 2009) and physical well-being (Coe and Van Houtven, 2009; de Zwart et al., 2017; Do et al., 2015). Moreover, this negative impact can be decomposed into a 'caregiving effect' and a 'family effect' (Bom et al., 2019). The caregiving effect stems from stressors associated with providing care while the family effect is the cognitive-emotional burden of care and concern about care recipients' well-being (Amirkhanyan and Wolf, 2003, 2006; Bobinac et al., 2010, 2011). The present study is similarly interested in the 'spillover effects' of care recipients' care needs on their significant others' well-being. To guide our empirical analysis and situate our findings, we adapt and extend the theoretical model of caregiving and non-caregiving stressors. Methodologically, it also draws on the recent caregiving literature's focus on estimating causal effects.

4 Transitions into and out of caregiving

A set of studies has conceptualized a care recipient's partner (or family) as going through a caregiving 'career' with transitions through different phases (Pearlin, 1992). Based on this perspective, informal caregiving involves transitioning from being a non-caregiver to a caregiver role (Hirst, 2005), while a partner's admission into residential or nursing home care involves a transition out of caregiving (Seltzer and Li, 2000). The present study draws on these insights to organize and interpret our findings. In doing so, we consider the transition from home to residential care settings in more detail and incorporate recent insights on the continued caregiving relationship post-transition.

1.1. Conceptual framework

Our analysis focuses on couples, consisting of individuals who admit into an NH (henceforth "care recipients") and their partners (henceforth "respondents"), and we are interested in the effect of a care recipient's NH admission on a respondent's mental well-being. Fig. 1 maps the channels through which an NH admission can affect a respondent's well-being and shows how the couple's characteristics can influence the admission decision. Drawing on the Andersen model of health service use, factors categorized as need, enabling, and predisposing/psychosocial factors can affect NH admission decisions (Andersen, 1995; Bradley et al., 2002). Need factors include the severity and duration of care recipients' physical and cognitive impairment while enabling factors include the availability of formal and informal care. In our context, the availability of informal care relates strongly to a respondent's willingness and ability to provide care. In turn, a respondent's capacity to provide care, together with the nature and intensity of care provided, can affect their mental well-being. Similarly, the severity of their partner's impairment can affect respondents' mental well-being directly through concern and empathy, and indirectly through its implications for caregiving burden.

By recognizing that a partner's NH admission alters, but does not end, caregiving and concern between members of the couple, the same mechanisms can help us understand the impact of the transition on respondents' well-being. Specifically, we can conceptualize the well-being impact of the NH admission as consisting of changes in the caregiving effect, the family effect, and other direct effects. For example, a partner's NH admission could free a respondent from full-time, high-intensity caregiving. This could reduce caregiving-related stress and improve mental well-being. Similarly, where the NH admission coincides with a worsening in care recipients' health, we may expect an increase in respondents' stress and deterioration in their mental well-being driven by concern for their partners. Beyond the caregiving and family effect channels, an NH admission could also affect respondents through direct changes to their circumstances. First, an admission typically entails changes in household structure and living conditions, which could be especially stark if the NH admission leaves respondents living alone. Second, where insurance is lacking, an NH admission could imply a substantial financial burden. Third, the transition physically separates the couple and this separation could directly affect individuals' mental well-being (Glasier and Arbeau, 2019).

1.2. Hypotheses

We derive three hypotheses from the above model. First, we conjecture that, on average, a partner's NH admission has a negative impact on respondents' mental well-being (Hypothesis 1). Second, all else equal, the negative well-being impact is decreasing in the amount of care provided by respondents' pre-admission (Hypothesis 2). Third, all else equal the negative well-being impact is decreasing in care recipients' pre-admission level of impairment (Hypothesis 3).

2. Data and methods

2.1. Data

We use data from Waves 1 to 14 of the Health and Retirement Study (HRS), a biennial longitudinal survey of a representative sample of the non-institutionalized U.S. population over 50 years old. At each wave, the survey collects from the primary survey respondent and any cohabiting spouse or partner information on demographics, income and wealth, health conditions, physical and cognitive impairment, and LTC received (details in Supplemental Appendix Table B1). The HRS also collects proxy information on respondents if they die between waves, including deaths occurring in NH. This allows us to account for care recipients' survival in our analysis.

2.1.1. Nursing home admissions and definition of treatment group

Our sample of interest consists of couples in which we observe one member (the care recipient) transition from the community into an NH

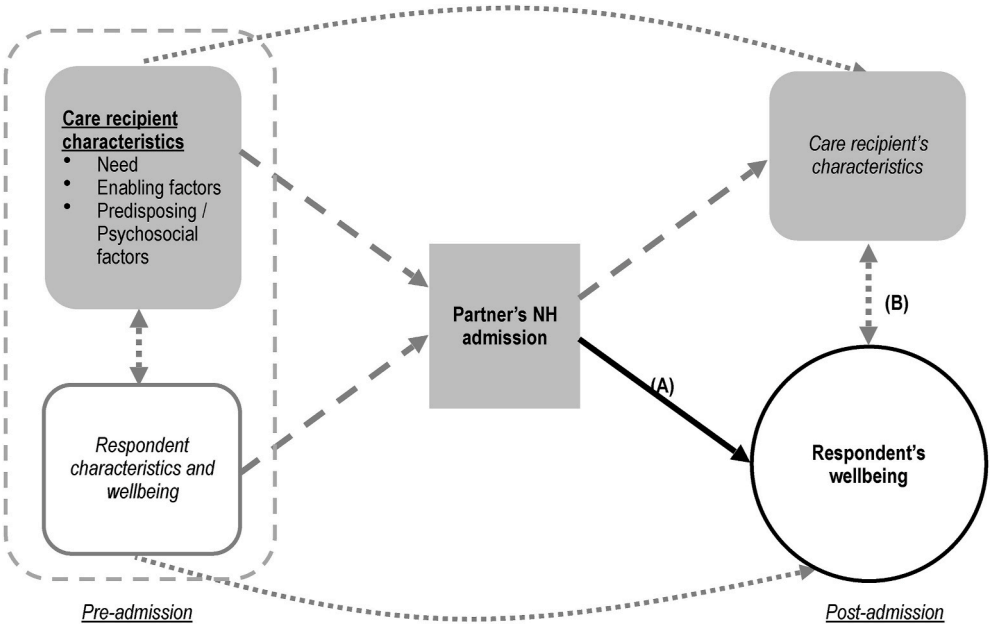

Fig. 1. Conceptual model.

and the other member (the respondent) remain in the community during this transition. To identify this group, we first identify all individuals who enter an NH at any point in the 14 survey waves and locate their first reported admission. We call these NH entrants 'care recipients' and their survey wave of entry their "admission wave". For the minority of individuals with multiple NH spells, we consider their first observed spell. Next, we keep only care recipients who we also observe in the wave before admission (hereafter the "pre-admission wave"). From this subset, we keep cases where care recipients are living with their spouse or partner at the pre-admission wave and require these partners to be identifiable in the HRS. Where both members of a couple have NH stays at some point in time, we focus on the first NH spell between the couple and drop cases where both partners enter an NH in the same wave. Finally, we focus on cases where the care recipient is either alive and residing in an NH at the admission wave or died while resident in the facility. Because NH-related questions are backward-looking, this criterion excludes individuals who transition into and out of an NH between survey waves.

2.1.2. Pre-admission caregiving

A respondent is either classified as a "caregiver" or a "non-caregiver" based on caregiving at the pre-admission wave. We take a respondent to be a caregiver if their partner, the care recipient, reports receiving help with (Instrumental) Activities of Daily Living (ADL) from their partner. For brevity, we call couples with a caregiving respondent a "caregiver couple" and similarly for "non-caregiver couples".

2.1.3. Outcome measure

We measure mental well-being using the eight-item version of the Center for Epidemiological Studies-Depression (CES-D) instrument (Turvey et al., 1999). The CES-D has been widely used in studies of the mental health impact of family members' nursing home admissions (Mausbach et al., 2014; Schulz et al., 2004) and caregiving (Amirkhanyan and Wolf, 2003, 2006; Coe and Van Houtven, 2009). The measure takes values from zero to eight with higher values indicating more depressive symptoms. Our main analysis treats this score as a continuous variable. In additional analyses, we consider alternative specifications of the outcome variable and show that our main findings are robust to these. While the presence of depressive symptoms captures only one aspect of an individual's well-being, CES-D scores are highly negatively correlated with other measures of subjective well-being in the HRS (see Supplemental Appendix C). These well-being measures are, unfortunately, only available for a small subsample and over fewer waves and hence infeasible for the present analysis.

2.2. Empirical strategy

Let i index respondents and t index time measured in survey waves. Let NH_{it}^{e} be a dummy indicator that equals one for observations e waves away from the NH admission wave and zero otherwise. e is known as 'event time'. We model an individual's mental well-being, y_{it}, by

$$y_{it} = \sum_{e=\underline{L}, e\neq -1}^{\overline{L}} \beta_e NH_{it}^{e} + X_{it}\gamma + \delta_t + \alpha_i + \varepsilon_{it} \quad (1)$$

β_e is the effect of a partner's NH admission on the respondent's well-being, e waves away from the NH admission wave, with the pre-admission wave, $e = -1$, as the reference period. The summation term thus captures the path of well-being effects from $e = \underline{L}$ to $e = \overline{L}$. X_{it} represents a set of observable factors that affect an individual's well-being. δ_t is a dummy indicator that equals one at wave t and zero otherwise and captures aggregate time effects common to all individuals. α_i captures time-invariant and possibly unobserved individual-level factors, including attitudes and perceptions toward residential versus community-based care. ε_{it} is a time-varying idiosyncratic error term.

Because factors that affect NH admission decisions could simultaneously affect respondents' well-being, estimates of β_e from comparing y_{it} before and after an NH admission would be biased. For example, care recipients whose partners can provide (more) informal care may be less likely to use an NH. Yet, partners with greater willingness or ability to provide care may be less mentally or physically susceptible to caregiving-related stress. Thus, to the extent that respondents' willingness or ability to provide care cannot be fully accounted for, pre-post estimates would understate the impact of NH admissions on non-caregivers and overstate the impact on caregivers. Similarly, all else equal, couples may differ in their preferences for care in the community versus residential settings. To the extent that these preferences cannot be accounted for, cross-sectional comparisons of NH and non–NH–using couples would be biased.

To address these concerns, we use a (dynamic) difference-in-differences (DID) design with a matched comparison group. The idea is to compare the trajectory of the treated respondent's well-being against the corresponding trajectory of the comparison individual. The effect of an NH admission on well-being at each time is identified from the difference in trajectories between these two individuals. We implement this design using a 'doubly robust' approach by first using statistical matching to construct a comparison group before estimating the treatment effects by regression.

2.2.1. Identifying assumptions

Since NH admissions occur in different survey waves, there is 'staggered treatment adoption' (Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021). In this setting, identification of causal effects of NH admissions on respondent outcomes requires three key assumptions (Callaway and Sant'Anna, 2021). First, any effects of the NH admission on well-being before admission occur within a limited window (i.e., 'limited treatment anticipation'). Second, conditional on observable covariates and admission wave, the counterfactual well-being of treated individuals follows the same path as the average well-being of comparison individuals (i.e., conditional parallel trends). Third, treatment and comparison groups are similar in terms of observable characteristics (i.e., covariate overlap). In practice, we can verify limited treatment anticipation by inspecting pre-admission outcomes in the data, and ensure covariate overlap by matching and/or dropping individuals whose propensity scores fall outside the common support. In contrast, the conditional parallel trends assumption cannot be verified. Nonetheless, we check that our analysis sample is consistent with the assumption by analyzing pre-event treatment effects. Here, statistically significant pre-treatment effects are evidence against the null hypothesis that the parallel trends assumption holds. As treatment effects can in general differ across admission cohorts in the staggered adoption setting, we must check for pre-treatment effects separately for each treatment cohort.

2.3. Empirical implementation

2.3.1. Sample selection

Our analysis sample is restricted to age-eligible (i.e. 50 years or older) respondents with non-missing outcome variables (i.e. CES-D score) and non-missing pre-admission variables required for matching and as regression covariates. Because some required covariates are only available in later waves (e.g., Alzheimer's or dementia diagnoses from Wave 4 onwards, hours of care per week from Wave 5 onwards) our final analysis sample contains individuals with NH admissions from Waves 6 to 14. Of this initial pool of 507 candidates satisfying the treatment group definition and with non-missing matching and regression variables, trimming and matching leaves 471 pairs of treated and comparison individuals (details in Supplemental Appendix B2).

2.3.2. Matching procedure

We use a combination of propensity score and exact matching to select, from a pool of candidates who never experience a partner's admission into an NH (i.e., "never-treated"), a comparison group. Matching is based on couples' pre-admission characteristics to avoid variables that may be affected by NH admissions. Specifically, we first stratify the pool of treated and never-treated observations by wave, respondents' gender, whether the care recipient has an Alzheimer's disease or dementia (AD) diagnosis, whether they have one or more ADL difficulties, whether respondents are caregivers and whether they were caregivers in the previous wave (i.e. two waves before admission). Within each stratum, we use nearest-neighbor matching on propensity scores to pair each treated respondent to a never-treated respondent.

We compute the propensity score, i.e., the predicted probability of a partner's NH admission in the next wave, for each candidate treated and never-treated individual by logit regression on the pooled sample of all pre-event observations. The propensity model includes variables capturing the couple's demographics, financial status, sources of informal and formal care at home, care recipients' level of physical and cognitive impairment, and their pre-existing health conditions (details in Supplemental Appendix B3). To ensure overlap, we trim candidates with propensity scores close to zero or one before matching (Imbens, 2015).

Because the NH admission decisions of caregiver and non-caregiver couples may be affected by different factors, we estimate separate propensity score models for these two caregiving subgroups. Matching is then performed separately before combining the two matched subsamples for aggregate analysis. To gauge the sensitivity of our main findings to this modeling choice, we report a second set of estimates based on a pooled propensity score estimation and matching procedure. We check for the robustness of our main estimates to alternative matching and estimation procedures in Section 3.7.3.

2.3.3. Estimation

We estimate the effect of partners' NH admissions on respondents' well-being using the outcome regression estimator (Callaway and Sant'Anna, 2021) and include as covariates respondents' and care recipients' pre-admission age, gender, respondents' pre-admission caregiving intensity and duration, and care recipients' pre-admission health and impairment (details in Supplemental Appendix Table B4). These covariates act as conditioning variables under which the parallel trends condition is assumed to hold.

For our analysis of the full sample and caregiving subgroups, we consider effects starting from two waves before to one wave after the NH admission wave and report the average effect of an NH admission on treated respondents' CES-D at each event time. For other subgroup analyses and extensions, we use a window from two waves before to the admission wave due to sample size limitations. To aid the comparison across subsamples, we also report the proportional change in CES-D between pre and post-admission waves (i.e. the effect at admission divided by pre-admission average). All analysis is performed in *R* with propensity score estimation using *glm*, nearest-neighbor matching using *MatchIt* (Ho et al., 2011), and estimation using *did* (Callaway and Sant'Anna, 2021).

3. Results

3.1. Descriptive statistics

Table 1 reports the descriptive statistics of key variables measured at the pre-admission wave for treated couples in the main analysis sample. Column 1 covers all treated couples while Columns 2 and 3 split the sample according to respondents' pre-admission caregiving status. Column 4 reports the t-statistic for the two-sided test of difference in means of non-caregivers versus caregivers. On average, respondents and care recipients tend to be white and have completed high school but less than a college education. Around 68.8 percent of respondents are female with an average age of 74, while care recipients are predominantly male with an average age of 77. 83.6 percent of couples live on their own and have an average of 3.42 living children. 81.5 percent of couples own their home, and have, on average, $174,600 worth of financial wealth and about $35,040 of per-person annual income. About 13.4 percent of care recipients have private LTC insurance and 11.0 percent have Medicaid coverage. Informal care from partners is the most prevalent source of long-term care, with 44.6 percent of care recipients receiving care from their partners and 15.5 percent from other sources, predominantly children or grandchildren. 19.5 percent of care recipients received professional home care services and about 46.5 percent had a hospital stay in the past two years.

Comparing Columns 2 and 3 shows that non-caregiver and caregiver couples are similar in their demographic and financial characteristics. However, care recipients receiving care from their partners have

Table 1
Summary statistics.

Variable	All treated	Non-caregivers	Caregivers	t-statistic
Dependent variable				
Respondent's CES-D: Mean	1.677	1.563	1.819	−1.395
Respondent's CES-D: 25th percentile	0	0	0	NA
Respondent's CES-D: Median	1	1	1	NA
Respondent's CES-D: 75th percentile	3	2	3	NA
Respondent's characteristics				
Is female	0.6879	0.7203	0.6476	1.682
Is non-white	0.1338	0.1571	0.1048	1.691
Has college education	0.1529	0.1418	0.1667	−0.74
Age (years)	74.37	74.18	74.6	−0.532
Is employed	0.08493	0.08812	0.08095	0.278
Self-reported health: Excellent	0.07856	0.07663	0.08095	−0.1725
Self-reported health: Very good	0.2909	0.2835	0.3	−0.3898
Self-reported health: Good	0.3291	0.3295	0.3286	0.02132
Self-reported health: Fair	0.2357	0.2414	0.2286	0.3255
Self-reported health: Poor	0.06582	0.06897	0.0619	0.3082
Care recipient's characteristics				
Is female	0.3121	0.2797	0.3524	−1.682
Is non-white	0.1423	0.1686	0.1095	1.862
Has college education	0.2102	0.1954	0.2286	−0.8716
Age (years)	76.87	76.35	77.52	−1.452
Self-reported health: Excellent	0.0552	0.07663	0.02857	2.388
Self-reported health: Very good	0.1295	0.1916	0.05238	4.822
Self-reported health: Good	0.2866	0.3487	0.2095	3.409
Self-reported health: Fair	0.2633	0.249	0.281	−0.7772
Self-reported health: Poor	0.2654	0.1341	0.4286	−7.32
Number of difficulties with ADLs	1.561	0.4444	2.948	−15.27
Cognitive function: Normal	0.4076	0.5747	0.2	9.073
Cognitive function: Impaired	0.276	0.2797	0.2714	0.1992
Cognitive function: Severely impaired	0.3163	0.1456	0.5286	−9.37
Ever diagnosed with Alzheimer's/Dementia	0.2675	0.09962	0.4762	−9.601
Ever diagnosed with high blood pressure	0.6391	0.6284	0.6524	−0.5396
Ever diagnosed with diabetes	0.3206	0.3295	0.3095	0.4617
Ever diagnosed with cancer	0.2718	0.2912	0.2476	1.061
Ever diagnosed with lung disease	0.1571	0.1609	0.1524	0.2532
Ever diagnosed with heart problems	0.4374	0.3831	0.5048	−2.651
Ever had a stroke	0.2229	0.1571	0.3048	−3.784
Ever had psychiatric problems	0.1699	0.1188	0.2333	−3.229
Ever had arthritis	0.6582	0.682	0.6286	1.209
Had heart attack since last wave	0.0552	0.03831	0.07619	−1.732
Had angina since last wave	0.07431	0.0613	0.09048	−1.176
Had congestive heart failure since last wave	0.08761	0.07011	0.1117	−1.52
Received informal care from partner	0.4459	0	1	–
Hours of care per week from partner	23.94	0	53.7	−13.33
Received informal care from other sources	0.155	0.04215	0.2952	−7.461
Received home health care	0.1953	0.1226	0.2857	−4.375
Had a hospital stay	0.465	0.4138	0.5286	−2.49
Couple's characteristics				
Couple only household	0.828	0.8352	0.819	0.4604
Number of household residents	2.295	2.268	2.329	−0.7634
Number of living children	3.446	3.425	3.471	−0.223
Owns home	0.8153	0.8161	0.8143	0.05008
Couple's non-housing financial wealth (2012 USD)	174,600	188,000	157,900	0.8339
Net value of home (2012 USD)	135,600	135,100	136,300	−0.08619
Per-person household income (2012 USD)	35,040	36,720	32,950	1.205
Care recipient has private LTC insurance	0.1338	0.1341	0.1333	0.02424
Care recipient has Medicaid coverage	0.1104	0.1111	0.1095	0.05456
Census region: Northeast	0.1465	0.1456	0.1476	−0.06161
Census region: Midwest	0.3185	0.3257	0.3095	0.3737
Census region: South	0.397	0.41	0.381	0.6393
Census region: West	0.138	0.1188	0.1619	−1.33
Number of individuals	471	261	210	–

markedly higher rates of physical impairment and cognitive impairment as seen in their higher average number of ADL difficulties (2.95 versus 0.444), rates of severe cognitive impairment (52.9 versus 14.6 percent), and rates of Alzheimer's disease or dementia (47.6 versus 10.0 percent). Care recipients in the caregiver subgroup also have slightly higher reported rates of ever having a heart problem (50.5 versus 38.3 percent), stroke (30.5 versus 15.7 percent), psychiatric problem (23.3 versus 11.9 percent), and poor self-reported health (42.9 versus 13.4). In contrast, there is no significant difference in self-reported health between caregiving and non-caregiving respondents. Similarly, while caregivers have a slightly higher average CES-D, the difference is not statistically significant.

3.1.1. Post-matching balance

Fig. 2 reports post-matching balance statistics for health and care use variables for the full sample and by pre-admission caregiving subgroups. Standardized mean differences in the aggregate tend to fall under the rule-of-thumb level of 0.1 for good balance while balance within subgroups, particularly caregivers, is slightly poorer for some indicators of specific diseases. Ideal balance within subgroups is elusive in the current context due to the relatively small number of treated individuals and large number of health indicators. Nonetheless, this does not necessarily pose a critical threat to our analysis as we account for residual imbalance through regression. Supplemental Appendix Table A1 reproduces the above balance statistics alongside those for the estimation same constructed by the pooled matching procedure. Overall, our preferred approach of using group-specific matching tends to yield better balance, particularly within caregiving subgroups.

3.2. The well-being impact of a partner's nursing home admission

To illustrate the underlying variation in the data, Fig. 3(a) plots the mean CES-D scores of the treated and comparison groups at each event-time in the analysis window. Scores in both groups follow similar slightly increasing trends over time. Yet, only treated respondents show a sharp increase in CES-D scores at the admission wave before subsequently decreasing. Table 2, Column 1 and Fig. 3(b) report

Fig. 2. Post-matching balance.

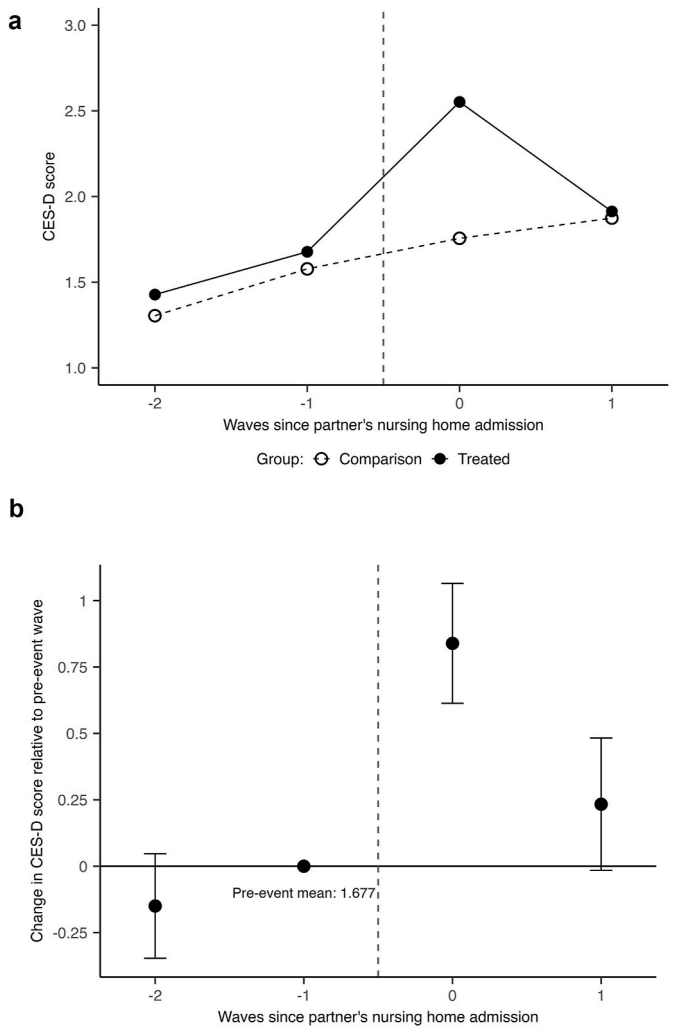

Fig. 3. Dynamic effect of a partner's nursing home admission on mental well-being

Note: Panel 3a plots mean CES-D scores of treated and comparison groups at each event time. Panel 3b plots estimates of the effect of a partner's nursing home admission on treated respondents' CES-D at each event time. Error bars represent 95 percent pointwise confidence intervals computed from standard errors clustered at the respondent level.

corroborating estimation results. They imply a partner's NH admission raises respondents' CES-D by 0.839 at the NH admission wave, corresponding to a 50.0 percent increase in depressive symptoms from a pre-admission mean of 1.67. The negative well-being impact decreases in the subsequent wave, with the estimated effect at 0.270 and not statistically significant.

Table 2 also reports the test statistic and p-value from a Wald test of the joint significance of cohort-specific pre-admission effects up to two waves before admission. A rejection of the null is evidence of a violation of the parallel trends assumption. In this instance, a p-value of 0.1152, indicates that we cannot reject the null of no pre-admission effects at all conventional levels of significance. For visual intuition, Figure A1 in the Supplemental Appendix plots the admission cohort-specific effect estimates that underlie this test and our main results.

Table 2, Column 4 reports the corresponding estimates from an alternative sample based on a pooled propensity score and matching procedure. Overall, the estimates are identical in sign but with a slightly larger effect size at the NH admission wave. A notable difference is the slightly smaller p-value for the Wald test, indicating rejection of the null of no significant pre-admission effects at the 10 percent level but not at the 5 percent level.

3.3. Prior caregiving and the impact of a partner's nursing home admission

Fig. 4(a) plots the trajectories of CES-D scores by Treatment × Caregiver subgroup. Similar to the pooled analysis, mean CES-D scores of treated non-caregivers and caregivers follow similar trends to their comparison counterparts pre-admission but show marked increases at the NH admission wave. Furthermore, while non-caregivers start from a lower pre-admission average, treated non-caregivers' and caregivers' admission wave scores are similar, indicating that the former experience a larger well-being impact. Table 2, Columns 2 and 3 and Fig. 4(b) report the corresponding DID estimates. A partner's NH admission raises non-caregivers' CES-D scores by 1.05 and caregivers' scores by 0.670. Accounting for differences in pre-admission baselines implies non-caregivers experience a 72.0 percent and caregivers a 34.9 percent increase in depressive symptoms at the admission wave. Estimates of the well-being impact one wave after admission are smaller and statistically insignificant.

The Wald test results in Table 2, Columns 2 and 3 indicate that we cannot reject the null of no pre-admission effects with p-values of 0.60 and 0.597 for the non-caregiver and caregiver subgroups, respectively. Supplemental Appendix Figures A2 and A3 plot the corresponding admission cohort-specific effect estimates that underlie these tests. Table 2, Columns 5 and 6 repeat the analysis using the alternative pooled matching procedure. Estimates of the effects at the NH admission wave are very close to our main specification and the tests of pre-admission effects are similarly unable to reject the null of no pre-admission effects at all conventional levels of significance.

3.3.1. Relationship with caregiving duration

We use information on caregiving two waves before admission to capture caregiving duration. We take 'longer-duration' caregivers to be those providing care in (at least) the two waves before admission and 'shorter-duration' caregivers to be those providing care in only the pre-admission wave. To provide intuition, we first compute the raw pre-post admission change in CES-D for each caregiver and plot the mean pre-post CES-D changes for each Treatment × Care duration subgroup in Fig. 5(a). Amongst treated caregivers, the average increase in CES-D is higher amongst shorter-duration compared to longer-duration caregivers. In contrast, the average increase in CES-D is higher for longer-duration caregivers in the comparison group. These observations suggest that the negative well-being impact of a partner's NH admission is decreasing in pre-admission caregiving duration. Moreover, the absence of the same pattern in the comparison group suggests that the relationship is not driven by the main effect of caregiving duration. Table 3, Columns 1 and 2 replicate these findings using our estimation framework. Accounting for pre-admission care intensity and other covariates, the estimates imply shorter-duration caregivers experience a 0.754 increase in CES-D, equivalent to a 43.3 percent increase from baseline. The estimates for longer-duration caregivers are close to zero but statistically insignificant, possibly due to the small sample size.

3.3.2. Relationship with caregiving intensity

We measure caregiving intensity by hours of caregiving per week in the pre-admission wave and group caregivers into five quintiles, plus an additional group for those reporting 168 h (i.e. 24 h × 7 days). Fig. 5(b) plots the mean pre-post change in CES-D against weekly hours of care of each of these groups, with best-fit lines as visual aids. Amongst treated caregivers, the average pre-post increase in CES-D appears to be decreasing in weekly hours of care. In contrast, the pre-post increase in CES-D appears to be increasing in weekly hours of care in the comparison group. These patterns suggest that the negative well-being impact of a partner's NH admission is decreasing in pre-admission caregiving intensity and this relationship cannot be explained by a main effect of

Table 2
Main estimation results.

Event time	(1)	(2)	(3)	(4)	(5)	(6)
	Group-specific matching			*Pooled matching*		
	All	Non-caregivers	Caregivers	All	Non-caregivers	Caregivers
−2	−0.1497	−0.1092	−0.1778	−0.2299	−0.2315	−0.2749
	(0.1005)	(0.1197)	(0.1565)	(0.1003)	(0.1410)	(0.1558)
−1	–	–	–	–	–	–
	–	–	–	–	–	–
0	0.8389	1.0499	0.6700	0.9098	1.0603	0.6625
	(0.1151)	(0.1532)	(0.1791)	(0.1191)	(0.1539)	(0.1699)
1	0.2334	0.2697	0.2359	0.1125	0.1131	0.1765
	(0.1272)	(0.1705)	(0.2374)	(0.1310)	(0.1749)	(0.2189)
Mean pre-admission CES-D	1.677	1.563	1.819	1.677	1.563	1.819
Proportional change in CES-D	0.5002	0.6716	0.3683	0.5424	0.6783	0.3642
Wald test-statistic	14.21	7.357	7.382	15.22	11.54	10.00
p-value	0.1152	0.6	0.5974	0.08516	0.2402	0.3504
Treated individuals	471	261	210	471	261	210
Observations	7368	4016	3352	7490	4074	3416

Note: Standard errors reported in parentheses are clustered at the respondent level. Columns 1 to 3 are based on an estimation sample constructed by separately estimating propensity score models and matching within each caregiver subgroup. Columns 4 to 6 are based on an estimation sample constructed by propensity score estimation and matching on the pooled sample.

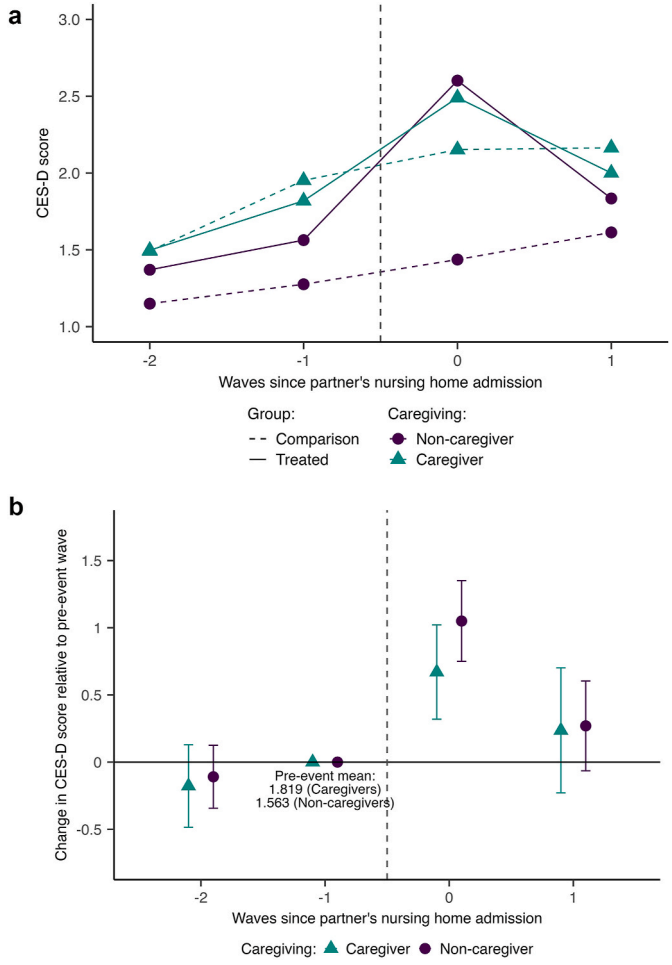

Fig. 4. Dynamic effect of a partner's nursing home admission on mental well-being by pre-admission caregiving Note: Panel 4a plots mean CES-D scores of treatment × caregiving subgroups at each event time. Panel 4b plots corresponding estimates of the effect of a partner's nursing home admission on treated respondents' CES-D at each event time. Error bars represent 95 percent pointwise confidence intervals computed from standard errors clustered at the respondent level.

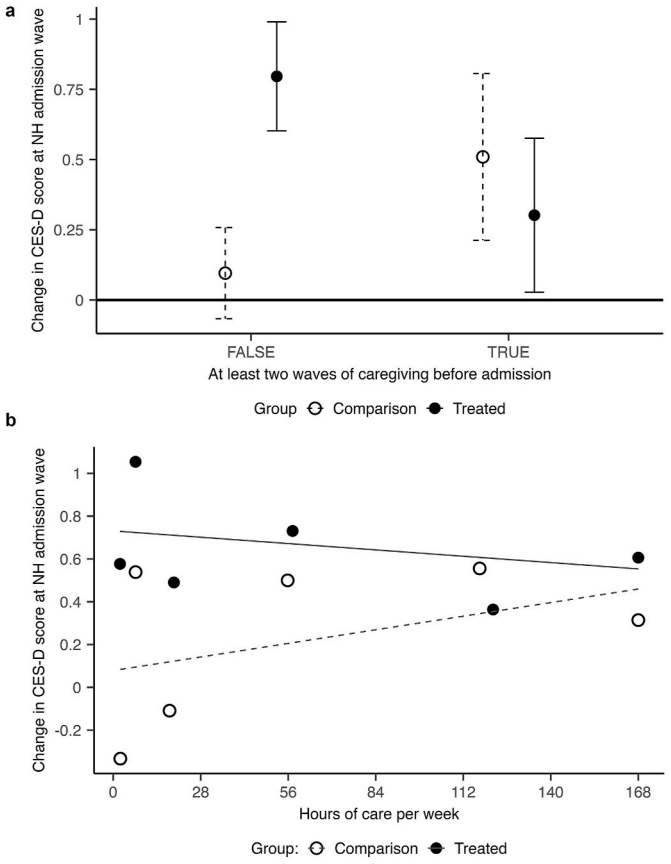

Fig. 5. Well-being effects by respondents' pre-admission caregiving duration and intensity
Note: Panel 5a plots mean pre-post admission changes in CES-D by pre-admission caregiving duration groups. Error bars represent 95 percent confidence intervals of the means in each subgroup. Panel 5b plots mean pre-post admission changes in CES-D by pre-admission hours per week of caregiving bins.

caregiving intensity. Table 3, Columns 3 and 4 report estimates from taking the first three bins and last three bins as 'low-intensity' and 'high-intensity' caregivers respectively. Accounting for pre-admission care duration and other covariates, the estimates imply low-intensity

Table 3
Effects by pre-admission caregiving duration and intensity.

Event time	(1)	(2)	(3)	(4)
	<2 waves of caregiving	2+ waves of caregiving	Low-intensity: <31 h	High-intensity: 31+ hrs
−2	−0.1262	−0.5636	−0.2749	−0.1514
	(0.1678)	(0.3389)	(0.1974)	(0.3287)
−1	–	–	–	–
	–	–	–	–
0	0.7535	−0.0987	0.7058	0.3774
	(0.2124)	(0.3931)	(0.2272)	(0.3348)
Mean pre-admission CES-D	1.739	2.057	1.605	2.073
Proportional change in CES-D	0.4333	−0.0480	0.4397	0.1821
Treated individuals	157	53	119	91
Observations	2490	862	1935	1417

Note: Standard errors reported in parentheses are clustered at the respondent level.

caregivers experience a 0.705 increase in CES-D, corresponding to a 44.0 percent increase from baseline. The estimated effect for high-intensity caregivers is 0.377 but imprecise, possibly due to the small sample size.

3.4. Heterogeneity across groups and the role of non-caregiving stressors

Table 4 reports the estimates from analyses of subgroups defined by care recipients' physical impairment, cognitive impairment, Alzheimer's disease or dementia (AD) diagnosis, and respondents' gender. Fig. 6 summarizes these subgroup analyses by plotting the proportional effect at the admission wave for each subgroup. Columns 1 and 2 report estimates based on care recipients' pre-admission physical impairment, which we take as having two or more difficulties with ADLs. Respondents with physically-impaired partners show a smaller increase in CES-D (0.662 versus 0.933). Moreover, because of their higher baseline CES-D (2.05 versus 1.48), partners of more impaired care recipients show a smaller proportional increase in depressive symptoms (32.2 percent versus 63.3 percent). Columns 3 and 4 report estimates based on care recipients' pre-admission cognitive impairment, as measured by the Langa-Weir measure of cognitive function (Crimmins et al., 2011). Cognitively impaired care recipients are those classified as "Cognitively Impaired Not Demented (CIND)" or "Demented" using the measure. Respondents of cognitively impaired partners report a smaller increase in CES-D (0.757 versus 0.982) from a higher average baseline (1.94 versus 1.29). This translates to a smaller relative increase of 39.0 versus 76.0 percent. Because the estimates for impairment subgroups condition on pre-admission caregiving intensity and duration, differences in caregiving do not drive the observed differences in well-being effects between impairment subgroups.

Columns 5 and 6 compare well-being effects based on care recipients' pre-admission AD diagnoses. While partners of care recipients with AD show a slightly smaller increase in CES-D (0.797 versus 0.887), Fig. 6 showsthat the 95 percent confidence intervals for the estimates overlap the point estimates, thus indicating that the difference is not statistically significant. This lack of difference is unsurprising given that the estimates account for care recipients' level of cognitive and physical impairment. In this regard, Columns 3 and 4 suggest that care recipients' pre-admission AD diagnoses do not appear to affect respondents beyond the indirect effect through physical and cognitive impairment. Columns 7 and 8 compare well-being effects across gender and show that a partner's NH admission tends to have a greater impact on male respondents, raising their CES-D scores by 0.917 compared to 0.780 for female respondents. However, Fig. 6 shows that the 95 percent confidence intervals for the estimates overlap and hence they are not statistically distinguishable.

3.5. Effect on components of the CES-D

To explore how a partner's NH admission affects the different domains captured by the CES-D instrument, we follow the approach in (Amirkhanyan and Wolf, 2006) by repeating our main analysis with dummy indicators for a "yes" response to each of the eight component questions in the CES-D as the outcome variable. Fig. 7 reports the estimated effects on each component at the admission wave. The solid black points are based on the full estimation sample while the hollow triangles and squares correspond to the two caregiving subgroups. It shows that a partner's NH admission affects respondents primarily by increasing the prevalence of negative affect (i.e., feeling sad, depressed, lonely) and reducing positive affect (i.e., feeling happy, enjoying life), with little impact in the somatic domain. The effect on loneliness is particularly stark, with the admission increasing the probability of feeling lonely by about 0.332. Fig. 7 also indicates that despite our earlier finding that caregivers and non-caregivers experience different degrees of deterioration in mental well-being, the underlying cognitive-emotional domains affected are similar in both groups.

Table 4
Estimates from subgroup analyses.

Event time	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Care recipient: <2 ADLs	Care recipient: 2+ ADLs	Care recipient: No cognitive impairment	Care recipient: Cognitively impaired	Care recipient: No AD diagnosis	Care recipient: AD-diagnosed	Male respondents	Female respondents
−2	−0.1618	−0.1420	−0.0906	−0.2011	−0.2048	−0.1555	−0.1313	−0.1408
	(0.1199)	(0.1861)	(0.1279)	(0.1291)	(0.1122)	(0.2186)	(0.1663)	(0.1191)
−1	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–
0	0.9334	0.6623	0.9819	0.7568	0.8873	0.7971	0.9172	0.7797
	(0.1440)	(0.1860)	(0.1732)	(0.1539)	(0.1256)	(0.2663)	(0.2198)	(0.1297)
Mean pre-admission CES-D	1.476	2.055	1.292	1.943	1.583	1.937	1.429	1.790
Proportional change in CES-D	0.6326	0.3223	0.7602	0.3896	0.5606	0.4116	0.6420	0.4355
Treated individuals	315	155	199	272	345	126	147	324
Observations	4946	2422	3153	4215	5348	2020	2130	5238

Note: Standard errors reported in parentheses are clustered at the respondent level.

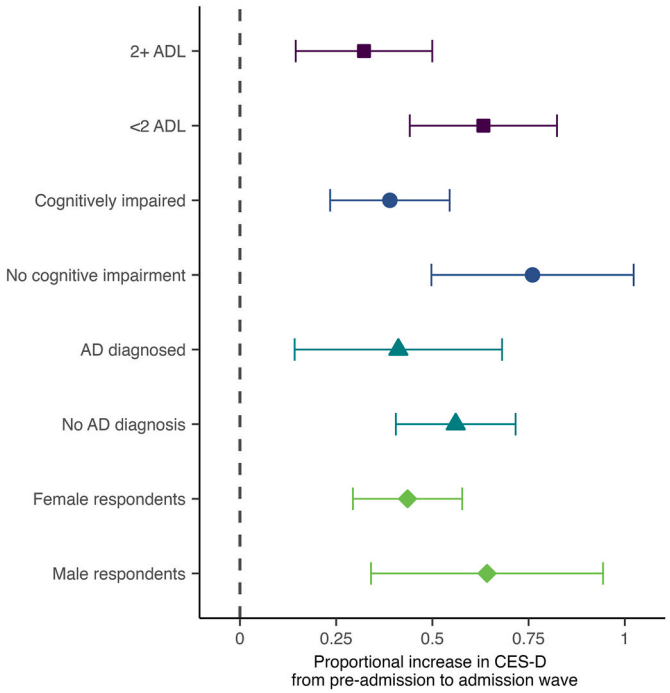

Fig. 6. Heterogeneity in well-being effects across subgroups
Note: The figure plots the average effect of nursing home admission on treated respondents at the admission wave as a proportion of average pre-admission CES-D. Error bars represent 95 percent pointwise confidence intervals derived from standard errors clustered at the respondent level.

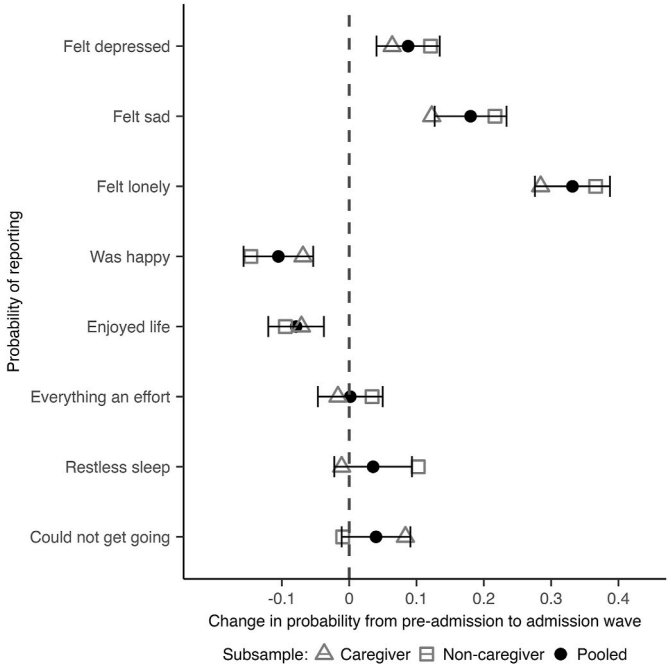

Fig. 7. Effect of effect of a partner's nursing home admission on components of CES-D
Note: The figure plots the average effect of nursing home admission on individual component questions of the CES-D. Error bars represent 95 percent pointwise confidence intervals for the pooled-sample estimates derived from standard errors clustered at the respondent level.

3.6. Robustness of findings

3.6.1. Falsification analysis with unrelated outcome variables

Coincident events not caused by the NH admission but which affect respondents' mental well-being pose a threat to the validity of our findings. For example, acute changes to respondents' health may both worsen respondents' mental well-being and contribute to their partner's NH admission decision. Changes in employment may affect respondents' well-being and also affect their capacity to provide care. To assess such threats to validity, Supplemental Appendix Table A2 reports results from falsification analyses using respondents' health and employment status as the outcome variable. Specifically, we estimated Equation (1), replacing CES-D scores with dummy indicators for: (i) having either a heart attack, angina, or congestive heart failure since the previous wave; (ii) a newly diagnosed stroke since the previous wave; (iii) any hospitalization since the previous wave; (iv) reporting "fair" or "poor" overall health and (v) being currently employed. Overall, we find no significant effects with estimates close to zero across all specifications.

3.6.2. Robustness to alternative outcome specifications

We assess the robustness of our findings to alternative specifications of the outcome variable by repeating the analysis in Table 2, Columns 1 to 3 with dummy indicators for having CES-D scores of three or higher and four or higher as the outcome variable. These cutoffs have been used in the literature as thresholds for clinical depression. The estimates, reported in Supplemental Appendix Table A3, follow the same pattern of signs and relative magnitudes across time and between subgroups as our main analysis, indicating that our findings are not sensitive to the specification of depressive symptomology.

3.6.3. Sensitivity to alternative matching procedures

To assess the robustness of our results to different matching procedures, Supplemental Appendix Table A4 reports estimates from repeating our main analysis using: (i) outcome regression after matching by propensity score-based caliper, (ii) outcome regression after Coarsened-Exact Matching (CEM) and (iii) Inverse Propensity Weighting (IPW) estimation using all treated and untreated candidates after trimming and subclassification on our exact matching variables. Overall, these estimates are very similar to our main results with the exception that the alternative approaches tend to have statistically significant pre-admission effects.

3.6.4. Sensitivity to sample selection criteria

As we are interested in transitions from a community to an NH setting, we would ideally exclude short-term post-acute NH stays. Absent information on transfers of care, a 90-night cutoff, based on the Medicare post-acute care coverage limit, is typically used. However, as the length of stay of care recipients residing in the NH at the time of survey is, by definition, right-censored, more stringent cutoffs trade off correctly excluding short-term NH stays with incorrectly excluding relevant long-term stays. To assess our findings' sensitivity to this exclusion criterion, Supplemental Appendix Table A5 repeats the analysis in Table 2, Column 1 using alternative samples that require at least 30-, 60- and 90 nights of residence at the time of the survey. Overall, these estimates are close to that of our main analysis. Column 4 of the table also reports the corresponding estimates based on a sample that includes second and later NH spells and similarly shows very close estimates.

4. Discussion

This study provides, to our knowledge, the first estimates of the causal impact of a partner's nursing home admission on an individual's mental well-being. Overall, we found that a partner's NH admission impacts individuals' mental well-being negatively. However, aggregate estimates mask important heterogeneity. Indeed, we found that

individuals who were their partners' caregivers pre-admission experienced a smaller well-being impact compared to non-caregivers. All else equal, the well-being impact of their partners' NH admission tends to be decreasing in caregivers' duration and intensity of caregiving pre-admission. These patterns are consistent with NH transitions providing respite from caregiving-related stressors. Beyond the direct impact of caregiving, we also found evidence that NH transitions can provide respite from indirect stressors, via the "family effect" channel. All else equal, we found that respondents whose partners have more severe physical and cognitive impairment show a smaller negative well-being impact from their partners' NH admission.

Our findings synthesize the existing literature on the negative mental well-being impact of caregiving (Bom et al., 2018) with those on caregivers' stress associated with care recipients' NH transition (Gaugler et al., 2007). In doing so, our work highlights how post-transition well-being depends crucially on pre-transition conditions.

While the estimates are not directly comparable, our findings on the differential well-being impact on caregivers versus non-caregivers are consistent with the literature on the negative well-being effects of caregiving (Bom et al., 2019; de Zwart et al., 2017) in that they indicate a positive well-being effect of reducing caregiving-related stressors. The relationship between the size of the implied respite effect and caregiving intensity and duration also aligns with previous findings (Hirst, 2005). Similarly, our findings also relate to recent work which has found that financial and in-kind support improve caregivers' mental well-being (Costa-Font and Vilaplana-Prieto, 2022). In this regard, the implied respite effect in our analysis is of the same direction and order of magnitude as those from the above policy evaluation.

Our analysis of the individual components of the CES-D showed that a partner's NH admission predominantly impacts the negative affect domain, with notable increases in feelings of loneliness. This finding adds to the literature on risk factors for loneliness in old age, which finds that being married/partnered decreases loneliness and losing one's partner increases the risk of loneliness (Dahlberg et al., 2022). In this regard, a partner's transition into institutional care increases the risk of loneliness as it induces separation/loss and a change in household structure.

4.1. Policy implications

The negative well-being effect found consistently across our analyses suggests a role for support services for families. The marked increase in loneliness found in our analysis highlights, in particular, partners left living alone post-admission as targets for support. Our findings on respite effects suggest that despite negative aggregate effects, the well-being of the highest-intensity caregivers may yet be ameliorated by their partner's transition into institutional care.

Finally, our analysis is also relevant for evaluations of the costs and benefits of various models of care as it highlights the mechanisms underlying spillover effects on family members or informal caregivers (Basu and Meltzer, 2005; Wittenberg et al., 2019). Together with recent work which finds transitory well-being impacts of NH admissions on care recipients (Bom et al., 2022), our analysis adds nuance to conventional perceptions that NH admissions are detrimental. Specifically, the above study highlights the importance of the time horizon under which well-being impacts are considered and our present work highlights the importance of accounting for care recipients' and their families' pre-admission characteristics.

4.2. Limitations

Our analysis faces the following limitations. First, our findings derive from a relatively small analysis sample. A contributing factor is our sample selection criteria, which focuses on couples and the need for variables available only in later survey waves. These exclusions also imply that our findings need not be generalizable to the wider population. Relatedly, our focus on couples also systematically excludes people living alone, whose care service use may be driven by different factors and whose institutionalization may impact their families differently. Second, we are unable to assess short-term effects due to the biennial timing of the HRS. Relatedly, we are unable to follow transitions taking place entirely between waves. These limitations would be relevant to the extent that couples who make these transitions differ systematically from our sample or if we believe that short-term dynamic effects and/or their underlying mechanisms are different. Third, we are unable to assess longer-term effects due to the relatively old and frail sample. These characteristics imply that many care recipients do not survive past two waves after admission. Care recipients' mortality, in turn, threatens the validity of estimates in the longer horizon as the effect of bereavement may be confounded with the long-run impact of the initial nursing home admission. Finally, we are unable to examine the role of nursing home characteristics and interactions with nursing home staff due to a lack of information.

4.3. Future work

Our analysis has found a negative impact of a partner's nursing home admission but has not studied the underlying mechanisms driving this effect. Our finding that negative affect and loneliness are particularly impacted suggest that changes in social participation may be an important factor to explore. Additionally, nursing home characteristics and interactions with care staff may also be important as these factors could affect family members' perceptions of and ability to adapt to their loved one's institutionalization.

Data availability

The data used in this study are publicly available at: https://hrs.isr.umich.edu/. Replication code is available at: https://github.com/hansel-teo/partnersnursinghome-wellbeing

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2023.115941.

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