Who Benefits from Paid Family Leave? The Impact on Informal and Formal Care Receipt for Middle-Aged and Older Adults with Disabilities

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ABSTRACT

This paper analyzes the impact of paid family leave (PFL) policies on both informal and formal care receipt among middle-aged and older adults with disabilities in the U.S., and the heterogeneous effects by family structure. We use data from the 1998-2018 Health and Retirement Study (HRS) and leverage the PFL programs implemented in California (2004), New Jersey (2009), and New York (2018) in a difference-in-differences (DiD) design. We deploy both the conventional two-way fixed effects (TWFE) model and an adapted DiD estimator developed by Sun and Abraham for staggered rollout designs. We find that PFL access is associated with an 5.7 percentage point increase in the likelihood that individuals with disabilities receive informal care from their children. We also show that PFL access significantly increases the use of home care services and nursing home care. These effects are primarily concentrated among individuals with disabilities who have both a spouse and children and are almost non-existent among those who have only children and no spouse. Our findings demonstrate that PFL policies could improve care access and help address unmet care needs for middle-aged and older adults with disabilities, but its impact remains limited for certain vulnerable subgroups, particularly those with only children.

KEYWORDS: Paid family leave, Informal care, Formal care, Activities of daily living, Aging, Home health care, Nursing home

1. Introduction

In the United States, approximately one in six adults aged 50 years and older have difficulty with at least one activity of daily living (ADL) (Heimbuch et al. 2023), and the prevalence of ADL disabilities in this age group has been increasing over time (Martin et al. 2010; Zajacova and Montez 2018). Additionally, there has been a growing share of older adults reporting a need for help with ADLs (Martin et al. 2010). Despite this increasing demand for support, there remains a substantial gap in care provision. Notably, among those requiring assistance to perform one or more ADLs, one in five reported receiving inadequate support (Desai, Lentzner, and Weeks 2001). Unmet care needs for ADLs can lead to various adverse consequences, including increased risk of hospitalization, institutionalization, and mortality, as well as increased health care costs (Xu et al. 2012; He et al. 2015).

In the absence of a national system in the U.S. to pay for long-term services and support for adults with disabilities, a significant portion of care for those needing help with ADL is provided by informal family caregivers. However, working caregivers face a trade-off between spending time earning income for the family and providing care for their family members with disabilities. In recognition of the struggles that family caregivers face, paid family leave (PFL) has been proposed to support caregiving by maintaining a steady income for caregivers while they care for their family members with disabilities. By improving economic security during leave and increasing caregivers' labor force attachment, PFL can also enhance families' financial flexibility, potentially enabling them to afford formal care services.

Although the federal Family and Medical Leave Act (FMLA) of 1993 provides certain employees in eligible firms job-protected leave, the leave is unpaid. PFL was absent in the US until 2002, when California became the first state to pass a PFL policy. As of 2023, thirteen states and Washington, D.C. have implemented or recently passed mandatory PFL programs. While there are differences in benefits and eligibility across states, these programs are all similar in that they have minimal eligibility requirements, which lead to near-universal coverage, and provide partially paid leave for workers caring for ill family members that could affect people's caregiving decisions. However, there is little evidence of the extent to which PFL may affect care arrangements for individuals with disabilities. Using data from the Health and Retirement Study (HRS), this study leverages variation in the timing of PFL adoption and applies a difference-in-differences approach to analyze how PFL policies shape care decisions, particularly the use of both informal and formal care, among middle-aged and older adults with disabilities in the U.S. and the heterogeneity in such effects by family structure.

We report four main findings. First, we show that access to PFL has significant impacts on increasing informal care received from children for middle-aged and older adults with disabilities. Specifically, following PFL, individuals with disabilities are 5.7 percentage points (34 percent at the sample mean) more likely to receive informal care from their children. Second, PFL access also increases formal care use, leading to a 5.6 percentage point increase (25 percent at the sample mean, marginally significant at 10% level) in the likelihood of using home health care, and a 4.9 percentage point increase (55 percent at the sample mean) in the likelihood of using nursing home care. The increase in formal care aligns with our hypothesis, and we discuss in our conceptual framework how PFL can lead to greater reliance on formal care, drawing on

prior evidence. Third, other than these salient effects on informal and formal care receipt, we see a marked reduction in the probability of having children residing within 10 miles post-PFL. Finally, we find that these effects are concentrated among those with both a spouse and children, with no significant impact for those with only children, for which we discuss several possible explanations.

Overall, our findings suggest that PFL policies play a crucial role in increasing the availability of informal care from children for middle-aged and older adults with disabilities and may help alleviate some of the caregiving burden on spouses at the intensive margin. Furthermore, the increased use of formal care services, such as home health care and nursing home care, indicates that PFL may facilitate access to a broader spectrum of care options. Our results also highlight how variations in family structure shape the extent to which PFL affects care arrangements. This novel evidence enriches our understanding of the functioning and mechanisms of PFL and provides insights for policymakers on how to leverage paid leave policies to better address unmet caregiving needs and support healthy aging, especially for more vulnerable populations.

The remainder of the paper is organized as follows. The next section explains the institutional background of the PFL policies and summarizes the relevant literature. Section 3 discusses the conceptual framework to formulate our hypotheses. Section 4 describes the data used. Section 5 introduces the empirical methods. Section 6 presents the results. Section 7 discusses our findings and concludes.

2. Institutional Background

The Family and Medical Leave Act (FMLA) of 1993 was the first U.S. federal law to guarantee job-protected leave to eligible employees in various circumstances, including caring for a newborn or newly adopted child, an ill family member, or one's own serious medical condition. The legislation guaranteed workers access to unpaid leave for up to 12 weeks in a 12-month period if they have worked for their employer for at least 12 months, at least 1,250 hours over the 12 months preceding the leave, and work at a location where the company employs 50 or more employees within 75 miles (Ruhm 1997). Given these eligibility requirements, only about half (56 percent) of employees are eligible for this leave (U.S. Department of Labor 2020). In addition, FMLA does not mandate employers to provide paid leave, thus workers may lose their primary source of income during a leave period. The restricted coverage of the FMLA underscores the need for PFL policies, particularly for individuals who require longer periods of absence.

In 2004, California (CA) became the first state in the nation to implement a PFL program, which initially provided workers access to 6 weeks of partially paid leave to bond with a newborn or care for ill family members. The CA-PFL program applies to all workers without imposing restrictions based on firm size and has minimal eligibility requirements for wages and work hours (employees must have been paid $300 in gross wages during the base period). Following California's lead, thirteen additional states have also passed laws mandating PFL programs as of 2023: New Jersey (2009), Rhode Island (2014), New York (2018), D.C. (2020), Washington (2020), Massachusetts (2021), Connecticut (2022), Oregon (2023), Colorado (will go into effect in 2024), Maryland (will go into effect in 2025), Delaware (will go into effect in 2026),

Minnesota (will go into effect in 2026) and Maine (will go into effect in 2026). These state-level PFL programs differ in their lengths, eligibility requirements, wage replacement amounts, and maximum benefits. Regardless of their differences, most of these programs are funded by employee payroll taxes, and they all share the common components of offering paid personal medical leave, paid parental leave, and paid caregiving leave, which provides partial pay for workers' time spent caring for seriously ill family members.

To date, most of the literature on PFL policies primarily focuses on paid parental leave and its impact on new parents and their children (Byker 2016; Lalive and Zweimüller 2009; Baum and Ruhm 2016; Das and Polachek 2015). Only a few recent studies have examined the effects of PFL on labor market outcomes and the health of caregivers who have family members experiencing health shocks or disabilities. These studies show that PFL policies increase caregivers' labor force participation while providing care (Anand, Dague, and Wagner 2022; Braga et al. 2022; Kang et al. 2019; Saad-Lessler 2020; Coile, Rossin-Slater, and Su 2022b). Braga et al. also found a reduced likelihood of depression associated with PFL implementation among women caregivers (Braga et al. 2022). Additionally, a recent study shows that older adults spend less time caring for grandchildren and more time assisting their parents after PFL implementation (Abramowitz and Dillender 2024). While these studies suggest that PFL policies increased the likelihood of caregivers providing care while remaining employed, little is known about whether these policies translate into greater receipt of care for older adults, particularly those with ADL disabilities who require assistance and face substantial unmet needs. To the best of our knowledge, this paper is the first to contribute to filling this gap by examining the effects of PFL policies on care receipt among older adults with disabilities, including their use of both

informal care and formal care services. This study further explores the heterogeneity in these effects by care recipients' family structure and state implementations.

3. Conceptual Framework

Paid Family Leave may affect a family's care decisions for older adults with disabilities through several pathways. First, by lowering the opportunity cost of taking time off work, PFL can incentivize potential new caregivers - those who would otherwise not have provided care - to offer informal support. Therefore, all else equal, the probability of receiving informal care for individuals in eligible working families is expected to rise after PFL implementation. The impact on formal care utilization, however, depends on the extent to which informal care can substitute for or complement professional support. Although prior research shows that informal home care can serve as a substitute for formal care (Van Houtven and Norton 2004; Charles and Sevak 2005), it may also act as a complement (Coe et al. 2019; McMaughan Moudouni et al. 2012). Indeed, evidence suggests that the degree of substitution between informal and formal care tends to diminish with higher disability levels, and informal care is often a weak complement to nursing care, irrespective of disability status (Bonsang 2009). Thus, older adults with disabilities who already rely on formal care in the absence of PFL may experience a complementary effect if caregivers choose to supplement existing services with additional informal assistance, rather than replacing necessary professional support.

Second, for caregivers who would have taken time off to provide care even without PFL, paid leave should be close to a pure income effect that makes formal care more affordable. In this scenario, PFL is not expected to change the extensive margin of informal care receipt among

individuals with disabilities, but it is likely to increase the use of formal care services. Particularly, if informal caregiving is an inferior good, workers may reduce their total informal caregiving time on the intensive margin by substituting formal care services. Moreover, given that PFL has been shown to increase employment continuity and reduce the likelihood of leaving one's job or cutting back on paid work hours for family caregiving (Anand, Dague, and Wagner 2022; Coile, Rossin-Slater, and Su 2022a), caregivers with access to PFL may be more inclined to turn to formal care services to address the longer-term needs of individuals with ADL disabilities and chronic conditions once the leave period ends. In contrast, caregivers without access to PFL who permanently withdraw from the labor force to provide care are likely to rely almost exclusively on informal care services.

People's responses to PFL can be heterogeneous in several dimensions. First, prior work has established that family availability is associated with caregiving patterns (Choi et al. 2021; Ali et al. 2022), suggesting that care receipt for older adults with disabilities may vary depending on whether they have children or a spouse available. Second, in older adults with ADL disabilities, those suffering from certain types of chronic conditions such as cognitive impairment and severe mental illness tend to be more dependent on caregivers, and thus the impact of PFL on families with such individuals may be more salient. We therefore also examine the effects of PFL on care receipt for individuals with respective chronic conditions. Third, the enormous diversity in state roll-out may generate unobserved heterogeneity in the effects of PFL on care utilization. In particular, differences in PFL benefits (e.g., amount of time off, proportion of income compensated), eligibility requirements, and roll-out timing across states can lead to heterogeneous responses. Thus, we also consider the impacts of PFL by state implementations.

This conceptual framework leads to three testable hypotheses. First, we expect an increase in the probability that older adults with ADL disabilities receive informal care from their eligible working caregivers with access to PFL following its implementation. Second, we expect that older adults with ADL disabilities will be more likely to utilize formal care services as a result of PFL. Finally, we expect that these effects may be heterogeneous by family structure of the care recipients, their specific chronic conditions, and differences in state-level PFL implementations.

4. Data and Sample

We use data from the Health and Retirement Study (HRS), a nationally representative longitudinal survey of middle-aged and older adults in the United States. The survey is conducted every two years and collects detailed information on respondents' demographics, socioeconomic status, cognitive and physical functioning, health, health service utilization, and informal and formal care use. The analysis pools data from the 1998 through 2018 HRS waves. We also use the Cross-Wave Geographic Information file and Child ZIP Codes file from the restricted-use version of the HRS to match respondents and their children with the corresponding zip code of residence from 1998 to 2018. The study was deemed exempt from review by the Institutional Review Board at Yale University.

4.1. Sample Selection Criteria

We limited our sample to respondents with at least one difficulty in activities of daily living and at least one chronic condition, who are aged 50 or older, and who have a spouse present (married or partnered) or child who reported living in a state that either has PFL policies effective during the

analysis period or a state that has passed the paid leave legislation and will be implementing the PFL programs in the near future[1].

A difficulty in ADL is defined as responding yes to one of the six questions about having difficulty with bathing, eating, dressing, walking across a room, getting in or out of bed, and using the toilet. An individual is considered to have a chronic condition if he or she reported a diagnosis of high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, psychiatric problems, and arthritis, or if the individual has probable depressive symptoms or cognitive impairment[2]. Restricting to middle-aged and older adults with ADL disabilities and chronic conditions, we focus on those most likely to require informal and formal care and whose families may need family caregiving leave. We excluded nursing home residents whose care arrangements might differ greatly from community-dwelling residents. We also drop respondents whose assigned treatment state changed during the observation period (i.e., movers).

4.2. Outcome Measures

The study estimates the effects of family members having access to PFL on the use of informal and formal care among middle-aged and older adults with ADL disabilities living in the community. We examine three measures of informal care: (1) an indicator for receiving any informal help with ADLs from a spouse or children, (2) an indicator for receiving any informal help with ADLs from

[1] As mentioned in Section 2, As of 2023, thirteen states and Washington, D.C., have implemented or passed PFL legislation. Four of these occurred during our study period of analysis: CA (2004), NJ (2009), RI (2014), and NY (2018). Our final sample did not include any respondents from Rhode Island. Details on the PFL implementation in CA, NJ, and NY can be found in Appendix Table A1.

[2] Following an established algorithm, probable depressive symptoms are flagged if the Center for Epidemiological Studies-Depression scale (CES-D) scores ≥3 on the 8-item CES-D, and cognitive impairment was defined as having a Modified Telephone Interview for Cognitive Status (TICS-M) score below 12.

a spouse, (3) an indicator for receiving any informal help with ADLs from children. Additionally, we examine the proximity of individuals with disabilities to their children, using indicators of whether they have any children living within 10 miles and whether they have co-resident children. These indicators serve as proxy measures for family living arrangements associated with care decisions.

Formal care in our study is measured by three binary indicators of whether respondents: 1) received any formal assistance with their ADLs from employees of institutions and organizations, paid helpers, or professionals, 2) used any home health care services, and 3) had any nursing home stays. All outcome measures were assessed in every wave of the HRS from 1998 to 2018.

4.3. Summary Statistics

Our sample includes 9,599 person-waves (4,436 unique persons) of community-dwelling individuals aged 50 or older with ADL disabilities and chronic conditions. These individuals also have spouses or children as potential caregivers who live in states that have passed PFL legislation. Table 1 shows the summary statistics for the characteristics of our main analysis sample. Among the 9,599 person-waves, the average age is 71 years, 39 percent are male, and 35 percent have 13 years of education or more. Overall, about 56 percent are non-Hispanic white, 18 percent are non-Hispanic black, and 22 percent are Hispanic. The average number of children in the household is 3.6, and 57 percent of the individuals have a spouse. Over 90 percent of families have at least one employed child, whereas just over 30 percent have an employed spouse[3]. In terms of ADL

[3] We did not restrict the sample to individuals with a working child or spouse, as employment status could be affected by PFL policies. However, since 98% of families in our sample have at least one child, and most have an employed child, a large proportion of our sample is likely eligible for PFL.

disabilities and chronic conditions, the average number of ADL limitations is 2.2, and the average number of doctor-diagnosed chronic conditions is 3.0. Approximately 42 percent of individuals have cognitive impairment, and nearly half (48%) have experienced hospitalization.

Table 1 also presents the characteristics of the individuals who have a spouse or children being potential caregivers living in states with and without PFL, in both pre-PFL year (2002) and post-PFL year (2018). In 2002, 437 individuals had either a spouse or children living in states that implemented PFL during our study period, and 201 individuals had neither a spouse nor children living in states where PFL became effective during the study period. In 2018, after PFL implementation in California, New Jersey, and New York, 668 individuals had either a spouse or children living in these states, while 212 individuals had neither a spouse nor children living in any of the states where PFL programs were in effect[4]. In both states with PFL and without PFL implementation, individual characteristics, including demographics and health conditions, remained largely similar before and after the implementation of paid leave mandates, suggesting no significant compositional change in our sample, although there were some differences in the racial and ethnic composition and the proportion of individuals with a spouse across the years.

[4] The sample sizes in the cells with and without PFL do not directly correspond to those used for the treated and control groups in our analyses. In particular, not all individuals in PFL states are included in the treated group. In our main analysis, described below, we restricted the sample to 1998–2016 and used individuals with a spouse or child living in New York as the control group, as NY implemented PFL in 2018 and had only one post-PFL wave. Additionally, in our subgroup analysis, we examined the effect by state, where the treated group's sample size varies by state.

5. Methods and Empirical Models

To measure the effect of access to PFL on the receipt of informal and formal care among middle-aged and older adults with disabilities, we leverage the state-year variation in PFL access in difference-in-differences (DiD) and event-study models. Particularly, we employ both the two-way fixed effects regression and the Sun and Abraham (2021) estimator, with details of each method described below.

Given that spouses and children often serve as primary caregivers for individuals with disabilities and are the ones applying for PFL benefits to care for their family members with disabilities, we assign HRS survey respondents to either the treatment or control group based on the state of residence of their spouse and children[5]. Specifically, in our primary analysis assessing the impact of PFL and its effects by family structure, we define individuals with a spouse or child who lived in California or New Jersey between 1998 and 2016 as the treatment group because these states implemented PFL programs during this period (CA in 2004, NJ in 2009)[6]. Individuals with a spouse or children residing in states where paid leave policies were adopted but not yet implemented during this period serve as the control group[7], as these states are likely more

[5] We assume that respondents co-reside with their spouse, and thus designate the respondents' state of residence as the same as their spouse. To determine the state of residence for the children of individuals with disabilities, we first link the HRS Child Zip Codes file with the respondent file to obtain the state of residence for the children who live more than 10 miles away from the respondent (the HRS Child Zip Codes file applies only to children residing more than 10 miles from the respondent). For children who either co-reside with the respondent or live within 10 miles, we assign the respondent's state of residence as the state of residence for these children.

[6] For individuals with disabilities whose spouse and child reside in different treatment states or who have multiple children living in various treatment states, we assign the state that implemented PFL earliest as the treatment state for these individuals.

[7] For individuals with disabilities whose spouse and child reside in different control states or who have multiple children living in various control states, we first use the state where the spouse resides as the control state for the respondent. If the spouse does not reside in any of the control states, or if the respondent does not have a spouse, we then assign the control state for the respondent based on the residence state of the respondent's first child (identified by the first kid identifier).

comparable to treated states in trends of untreated potential outcomes. Since New York implemented PFL in 2018 and had only one post-PFL wave within our study period (1998-2018), we analyze its impact separately in our examination of effect heterogeneity by state PFL implementation.

We then compare the differences in outcomes between respondents surveyed before and after PFL in the treated states relative to the analogous differences among those in the control states. To do this we first estimate the following DiD model using ordinary least squares (OLS):

$$Y_{ist} = \alpha_0 + \alpha_1 PFL_{st} + X_{it}\Gamma + \theta_t + \rho_s + \epsilon_{ist} \quad (1)$$

for individual i who is assigned to a treatment or control state s in calendar year t, Y_{ist} is an outcome of interest, such as the informal and formal care that the individual received. PFL_{st} is an indicator set to 1 for state-years in which PFL exists, and 0 otherwise. We control for the following individual and family characteristics measured in each HRS wave in X_{it}: age (in five-year bins), indicator for male gender, indicators for race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, other), education level (less than 13 years, 13 years of education or more), an indicator of whether the individual has a spouse, the number of living children in the household, and the number of doctor-diagnosed chronic conditions. We include calendar year fixed effects, θ_t, which account for aggregate time trends in outcomes, and state fixed effects, ρ_s, which account for all time-invariant differences across states. We cluster standard errors at the individual level to account for the panel structure of the data. The key coefficient of interest is

α_1, which measures the difference between the pre- post-PFL change in individuals' care receipt outcomes in treated states and the change over the same time period in control states.

We also estimate a corresponding event-study model:

$$Y_{ist} = \beta_0 + \sum_{k=-8, k\neq -2}^{k=8} \beta_k \times PFL_{st}^{k} + X_{it}\psi + \eta_t + \gamma_s + \epsilon_{ist} \qquad (2)$$

for individual i who is assigned to a treatment or control state s in calendar year t. The event-time variables PFL_{st}^{k} denote being k years relative to PFL implementation[8], and are set to 0 in all years for states without PFL availability during the study period. All the other variables are the same as in the equation (1). We implement the Sun and Abraham estimator (Sun and Abraham 2021) for Eq. (1) and Eq. (2) in order to address potential bias in the standard DiD estimates due to variations in treatment timing and potentially heterogeneous treatment effects over time[9]. The estimator uses never-treated individuals (defined as those with a spouse or children residing in states and periods where PFL had not yet been implemented during the study period) as controls.

While the Sun and Abraham (2021) estimator is robust to heterogeneous effects and staggered treatment adoption, there could be a trade-off between bias and efficiency due to estimating multiple sub-group effects (Freedman et al. 2023). Therefore, we estimate both two-way fixed

[8] During our primary analysis period (1998–2016), we observe six pre-PFL years and eight post-PFL years, although California contributes up to six pre-PFL years, while New Jersey contributes up to six post-PFL years.

[9] We are aware that several alternative estimators address bias in TWFE due to staggered treatment timing. However, we use the Sun and Abraham estimator, as it is regression-based and allows for direct comparisons with TWFE results that include leads and lags of treatment indicators under the same model specifications. We also repeated our analysis using the Callaway and Sant'Anna (2021) estimator, and the overall results remain largely consistent. Results for the Callaway and Sant'Anna estimator are available upon request.

effects (TWFE) models and the Sun and Abraham (2021) estimator while primarily presenting Sun and Abraham (2021) estimates of models (1) and (2) in our results.

For both the standard DiD model and the Sun and Abraham (2021) DiD estimator, a causal interpretation of our estimates relies on the parallel trend assumption - the over-time change in outcomes in the treated states would have been the same as that of the control states if the treated states had not actually been treated. Event study estimates allow for a visual examination of pre-trends in pre-policy years. If all estimates for pre-treatment periods are not statistically different from 0, the parallel trend assumption would be supported.

6. Results

6.1. Effects on Informal Care Receipt

The estimates of the aggregate impact of PFL on informal care receipt are presented in Figure 1, including estimates for the overall sample and two main sub-groups stratified by family structure (i.e., those with both a spouse and children and those with only children)[10]. In the overall sample, we find no statistically significant impact on the receipt of any informal care (Figure 1, Table 2). However, access to PFL is associated with a 5.7 percentage point (34 percent at the sample mean) higher likelihood that an individual with disabilities receive help from their children following PFL. In contrast, no similar effect is observed for care received from a spouse, with an estimate close to zero. We see no indication of pre-trends for any informal care outcomes in the overall sample (Figures 4, Panels a-c).

[10] Our subgroup analysis does not include individuals with only a spouse due to the small sample size of this group (n = 192, 2% of the sample).

The subgroup analysis by family structure shows that the effect of PFL access on receiving informal care from children is substantial for individuals with both a spouse and children (8.3 percentage points increase, 84 percent at the sample mean), but is not statistically significant for those with only children.

Appendix Figure A3 presents additional analyses for eight subgroups constructed using respondents' chronic conditions information in each HRS wave[11]. These conditions include cognitive impairment, mental health disorders, high blood pressure, diabetes, arthritis, cardiovascular diseases, lung conditions, and cancer. We observe a pronounced impact of PFL on increasing the likelihood of individuals with disabilities receiving informal care from their children in various subgroups, including those with cognitive impairment, arthritis, and high blood pressure. In contrast, a significant increase in receiving informal care from a spouse following PFL was only observed in those with mental health disorders.

6.2. Effects on Formal Care Receipt

We next consider whether family members' access to PFL affects the receipt of formal care for individuals with disabilities. Figure 2 presents estimates of the overall effect of PFL on three formal care outcomes: any formal help with ADL disabilities, any use of home health services, and any nursing home stay, both in aggregate and by subgroup. In the overall sample, we find that PFL access is associated with a 5.6 percentage point increase (25 percent at the sample

[11] These subgroups are not mutually exclusive. Each group consists of individuals with a specific chronic condition. Through this sub-analysis, we aim to examine the impact of PFL on care receipt for populations with different chronic diseases. Depression and psychiatric problems are categorized as mental health disorders, while stroke and heart conditions are grouped as cardiovascular diseases.

mean, marginally significant at 10% level) in the likelihood of individuals with disabilities using home health care services, as well as a 4.9 percentage point increase (55 percent at the sample mean) in their likelihood of receiving nursing home care. The coefficients on the pre-PFL years for these outcomes are mostly small and statistically insignificant. We also find a 2.4 percentage point increase in the likelihood of individuals with disabilities receiving any formal assistance with their ADL disabilities, although the effect is not statistically significant.

The sub-group analyses by family structure show that the significant increases in home health care and nursing home care use are primarily driven by individuals with both a spouse and children, who are 10.4 percentage points more likely to use home health care (54 percent at the sample mean) and 5.6 percentage points more likely to use nursing home care (74 percent at the sample mean). However, these effects are not observed for those with only children.

Similar to the results from the subgroup analysis of individuals with different chronic conditions for informal care outcomes, Appendix Figure A4 shows that the effect of PFL on formal care use is more pronounced for certain conditions. In particular, there is a consistent increase in the likelihood of individuals with disabilities receiving home health care and nursing home care among several subgroups following PFL implementation. These include individuals with arthritis (a 9.9 percentage point increase in home health care and a 5.9 percentage point increase in nursing home care) and those with cancer (a 16.5 percentage point increase in home health care and a 14.4 percentage point increase in nursing home care). We also observe a significant increase in the likelihood of receiving formal assistance with ADL disabilities for individuals

with cognitive impairment, mental health disorders, and cardiovascular disease, although these effects are marginally significant at the 10% level.

6.3. Effects on Family Living Arrangement

Figures 3 presents the aggregate impact of PFL on family living arrangements.[12] We see a decline in the likelihood of individuals with disabilities having any children living within 10 miles post-PFL[13]. Specifically, access to PFL is associated with a 11.7 percentage point lower likelihood (19 percent at the sample mean, Table 2) that an individual with disabilities has children residing within 10 miles, with the effect being driven by those who have both a spouse and children (16.4 percentage points decrease, 29 percent at the sample mean). In addition, individuals in this group are more likely to have children co-residing with them post-PFL compared to their counterparts in states without PFL (4.7 percentage points increase, 15 percent at the sample mean), although the effect is not statistically significant. By contrast, for individuals with only children, we do not observe any statistically significant impacts of PFL on the proximity of their children.

Appendix Figure A3 shows that PFL significantly reduces the likelihood of individuals with disabilities having any children residing within 10 miles across various subgroups categorized by different chronic conditions. However, for the outcome of having any co-resident children, no significant effects are observed in any subgroup.

[12] From the event-study estimates (Figure 4), we do not observe a pre-trend for family living arrangement outcomes.
[13] This outcome determines whether, among the children who do not co-reside with their parents, any children live within a 10-mile radius of the individual.

6.4. Heterogeneous Effects by State Implementation

Lastly, Figure A5 shows that the overall effect of PFL on increasing informal care from children is primarily driven by individuals with potential spousal and/or child caregivers residing in California (CA) (6.7 percentage point increase). In contrast, no significant increase in informal care was observed in New Jersey (NJ). Home health care use, however, increased substantially post-PFL in both CA and NJ, with increases of 5.3 percentage points in CA and 6.9 percentage points in NJ, although neither effect is statistically significant. For nursing home care, there was a 5.1 percentage point increase in CA and a 3.6 percentage point increase in NJ, with the effect in CA being statistically significant. Additionally, individuals with disabilities who have potential spousal and/or child caregivers in NJ were 5.7 percentage points more likely to receive formal assistance with their ADL disabilities following the implementation of PFL, and this effect was statistically significant. Conversely, the effect in CA was muted.

For individuals with potential spousal and/or child caregivers residing in New York (NY), the effects are all non-significant, potentially because the analysis is based on data covering only one year after PFL was implemented in NY[14]. However, there is a notable, though statistically insignificant, 8.5 percentage point increase in the likelihood of individuals with disabilities receiving any informal care for their ADL disabilities following PFL, as well as a 5.5 percentage point increase in the likelihood of using home health care.

[14] PFL was implemented in NY in Jan 2018, and the data collection period for the 2018 HRS interview spanned from Apr 2018 through Jun 2019. Therefore, our analysis includes data up to one and a half years post-PFL implementation in NY.

7. Discussion and Conclusion

This study examines the impact of PFL policies on the receipt of informal and formal care for middle-aged and older adults with ADL disabilities and chronic conditions. The study makes three main contributions to the literature. 1) This is the first study to evaluate the effects of access to PFL on care receipt, including both informal and formal care receipt, for middle-aged and older adults with disabilities and chronic conditions. 2) The study probes the heterogeneity in the PFL impacts by individuals' family structure, chronic conditions, and state implementations. 3) Using the restricted-HRS data covering the years 1998-2018, the study is also the first to analyze such effects across multiple state PFL implementations, including New York's PFL policies that went into effect in 2018, in addition to PFL in California and New Jersey, and thereby delivering evidence that is much more recent.

We find that access to PFL has a significant impact on receiving informal care from children among middle-aged and older adults with disabilities. Given that spouses often act as primary caregivers for their partners with disabilities (Lima et al. 2008), our results suggest that PFL may expand the role of children in assisting their parents with disabilities, potentially alleviating the caregiving burden on spouses at the intensive margin. However, we do not find significant effects of PFL access on receiving informal care from a spouse, likely because only a small proportion of families in our sample have an employed spouse[15]. In contrast, the majority of families have an employed child, making them more likely to be eligible for PFL. Our findings on informal care aligns with a prior study by Braga et al., who found a significant association

[15] As shown in the summary statistics in Table 1, over 90% of families with children have at least one employed child, whereas only about 30% of families with a spouse have an employed spouse.

between PFL and caregiving for parents in poor health but not for spouses (Braga et al. 2022), although the spouses in our sample are older than in their study.

Our evidence on formal care outcomes reveals that PFL access leads to a significant increase in the likelihood of individuals with disabilities using formal care, including home health care services and nursing home care. Additionally, we observe a significant increase in the likelihood of individuals reporting receiving formal assistance with their ADL disabilities in certain subgroups (e.g., those with cognitive impairment). The increase in formal care use following PFL implementation aligns with our hypothesis in the conceptual framework and suggests that informal care does not necessarily substitute for formal care among individuals with disabilities and chronic conditions who likely require professional services. As working caregivers become more attached to the labor market and gain greater income stability in response to PFL, they may opt for formal care to meet the long-term care needs of older adults with ADL disabilities, for which informal care provided through short-term paid leave may be insufficient.

Prior studies on the impact of PFL on spousal caregiving have found a decreased likelihood of leaving the labor market to care for family (Coile, Rossin-Slater, and Su 2022b) or reducing paid work hours to provide caregiving (Anand, Dague, and Wagner 2022). These findings are also consistent with our hypothesis that PFL helps sustain labor force participation, which may, in turn, encourage families to supplement informal care with formal services to better address long-term care needs. One study by Arora et al. on PFL and nursing home use in California found that PFL implementation reduced the proportion of individuals in nursing homes by 0.5 to 0.7 percentage points (Arora and Wolf 2018). However, their study examined the general elderly

population, while ours focuses on individuals with disabilities and chronic conditions, for whom informal and formal care are less likely to be substitutes, and formal care, such as nursing home care, is more likely to be needed to address long-term needs. This difference in the study population may explain the differences in our findings compared to theirs in terms of nursing home use.

Additionally, we find a substantial reduction in the likelihood of having any children living within 10 miles post-PFL, suggesting that PFL may reduce migration costs for child caregivers. Several factors may explain this finding. PFL may enable children to retain jobs in distant locations while using short-term leave to provide caregiving before returning home. In the absence of PFL, they might otherwise quit their jobs and relocate closer to their parents. It is also possible that the increased use of formal care in response to PFL provides children with greater flexibility in caregiving, allowing them to live farther away while relying on formal care services once short-term PFL ends.

Notably, the observed effects on informal and formal care receipt, as well as living arrangements, were concentrated among individuals with both a spouse and children. We do not find significant impacts of PFL among those without a spouse and with only adult children. Several factors may explain this lack of impact. Individuals without a spouse may have already relied more on formal care services prior to PFL implementation (Indeed, this group in our sample has the highest use of all formal care services). Additionally, child caregivers in this group may face greater economic constraints, limiting their ability to utilize PFL benefits. Given that individuals with only children and no spouse had the lowest average receipt of informal care, with a sample mean

of 0.26 compared to 0.43 among those with both a spouse and children, our findings suggest that this group may be particularly vulnerable under current PFL policies.

Moreover, we do not observe clear patterns of heterogeneity in the impacts of PFL on care receipt among individuals with various chronic conditions. However, individuals with cognitive impairment, who may have greater care needs than those with other conditions, consistently show increased likelihood of receiving both informal care from children and formal assistance with ADL disabilities. This suggests that the extent to which PFL influences care decisions may depend on the nature and intensity of care needs associated with specific conditions.

Lastly, our analysis reveals notable variations in the impact of accessing PFL on receiving informal care from children or formal assistance with ADL disabilities between California and New Jersey. These differences might be related to state-specific variations in the scope and generosity of paid leave mandates (Appendix Table A1). Other factors, such as timing and duration of PFL roll-out, public awareness of the policy, the ease of public transportation for caregivers, and the availability of a formal caregiving workforce within the residing state of individuals with disabilities may also contribute to the heterogeneous impacts of PFL across states.

The findings of this study should be interpreted with a number of limitations in mind. First, since only a small number of states have implemented paid leave mandates during the study period, the observed effects of PFL may not be representative of all states. Although we include New York which has newly rolled out PFL, in our analysis of state heterogeneity, the post-PFL time

window for NY might be too short to observe longer-term impacts. Second, due to the HRS survey's bi-annual nature, the study can only identify the effects of PFL every two years up to eight years following PFL. Third, the state of residence for care recipients' spouses or their children may not correspond to their state of employment. However, state of residence information is the best data that HRS could release and has been widely used in studying the effects of paid leave policies. Fourth, given the lack of accurate data on individuals' PFL eligibility and take-up decisions, our DiD estimates may understate the effects of PFL access on the outcomes. However, our estimates do provide insights into the intention-to-treat effects, which are also of significant value to the policy implications of PFL programs. Finally, our analysis focuses on the impact of PFL on the extensive margin of care receipt. Though challenging to measure, future work should consider additional outcomes, including the intensive margin of care use intensity and quality, as well as well-being measures.

Taken together, our findings suggest that PFL access supports healthy aging for middle-aged and older adults with disabilities by increasing their receipt of informal care from children and their use of home health care and nursing home care, with the effects primarily driven by those having both a spouse and children in the family. Despite the low levels of informal care received by individuals who have only children and no spouse, we find no significant impact of PFL policies on informal care receipt for these individuals. Our findings underscore the need for improving PFL policy design to better address the caregiving gaps for individuals with disabilities in families without spousal support and reduce disparities in care access across subgroups with different family structures. Healthy aging could yield meaningful returns to individuals, families,

and society, and PFL programs could be improved to better address unmet caregiving needs and support healthy aging for individuals with disabilities and more family constraints.

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Table 1. Characteristics of Disabled Individuals with Caregivers in States With and Without Paid Family Leave Availability, Before and After PFL, 2002 and 2018

Characteristic	Complete sample	Pre-PFL (2002)		Post-PFL (2018)	
		With PFL	Without PFL	With PFL	Without PFL
Observations, N	9,599	437	201	668	212
Sociodemographic Characteristics					
Age, mean (SD)	71.4 (11.8)	72.4 (11.3)	72.6 (10.1)	70.7 (12.2)	71.0 (12.9)
Male, n (%)	3,718 (38.7)	154 (35.2)	81 (40.3)	245 (36.7)	80 (37.7)
Non-Hispanic White, n (%)	5,389 (56.1)	255 (58.4)	166 (82.6)	246 (36.8)	130 (61.3)
Non-Hispanic Black, n (%)	1,749 (18.2)	74 (16.9)	21 (10.4)	161 (24.1)	40 (18.9)
Hispanic, n (%)	2,114 (22.0)	91 (20.8)	10 (5.0)	219 (32.8)	31 (14.6)
13+ years of education, n (%)	3,375 (35.2)	138 (31.6)	61 (30.3)	278 (41.6)	99 (46.7)
Have a spouse, n (%)	5,502 (57.3)	251 (57.4)	147 (73.1)	354 (53.0)	109 (51.4)
Age of spouse, mean (SD)	68.0 (11.2)	69.0 (9.6)	70.3 (9.6)	66.8 (12.0)	69.3 (11.6)
Spouse fair or poor health, n (%)	1,990 (38.0)	92 (36.9)	46 (31.7)	128 (40.0)	25 (27.2)
Age of children, mean (SD)	44.0 (12.1)	44.1 (10.4)	45.1 (10.9)	43.6 (13.1)	44.5 (13.0)
Number of living children, mean (SD)	3.6 (2.2)	3.6 (2.3)	3.2 (2.2)	4.0 (2.2)	3.1 (1.7)
Have spouse employed, n (%)	1,601 (30.6)	61 (24.5)	45 (31.0)	100 (31.3)	33 (35.9)
Have children employed, n (%)	8,395 (90.0)	394 (92.3)	178 (92.2)	590 (90.1)	179 (89.9)
Health Conditions					
Number of ADL limitations, mean (SD)	2.2 (1.5)	2.3 (1.5)	1.9 (1.3)	2.3 (1.6)	2.3 (1.5)
Number of doctor-diagnosed chronic conditions, n (%)	3.0 (1.4)	2.8 (1.3)	3.0 (1.3)	3.3 (1.5)	3.3 (1.5)
Have cognitive impairment, n (%)	4,006 (41.7)	198 (45.3)	74 (36.8)	253 (37.9)	76 (35.8)
Have depression, n (%)	4,093 (48.4)	168 (49.1)	76 (44.7)	301 (49.5)	85 (43.4)
Experienced hospitalization, n (%)	4,,303 (45.1)	210 (48.2)	82 (40.8)	256 (38.5)	91 (43.1)

Experienced outpatient surgery, n (%)	2,052 (21.5)	77 (17.6)	38 (19.0)	142 (21.4)	39 (18.5)

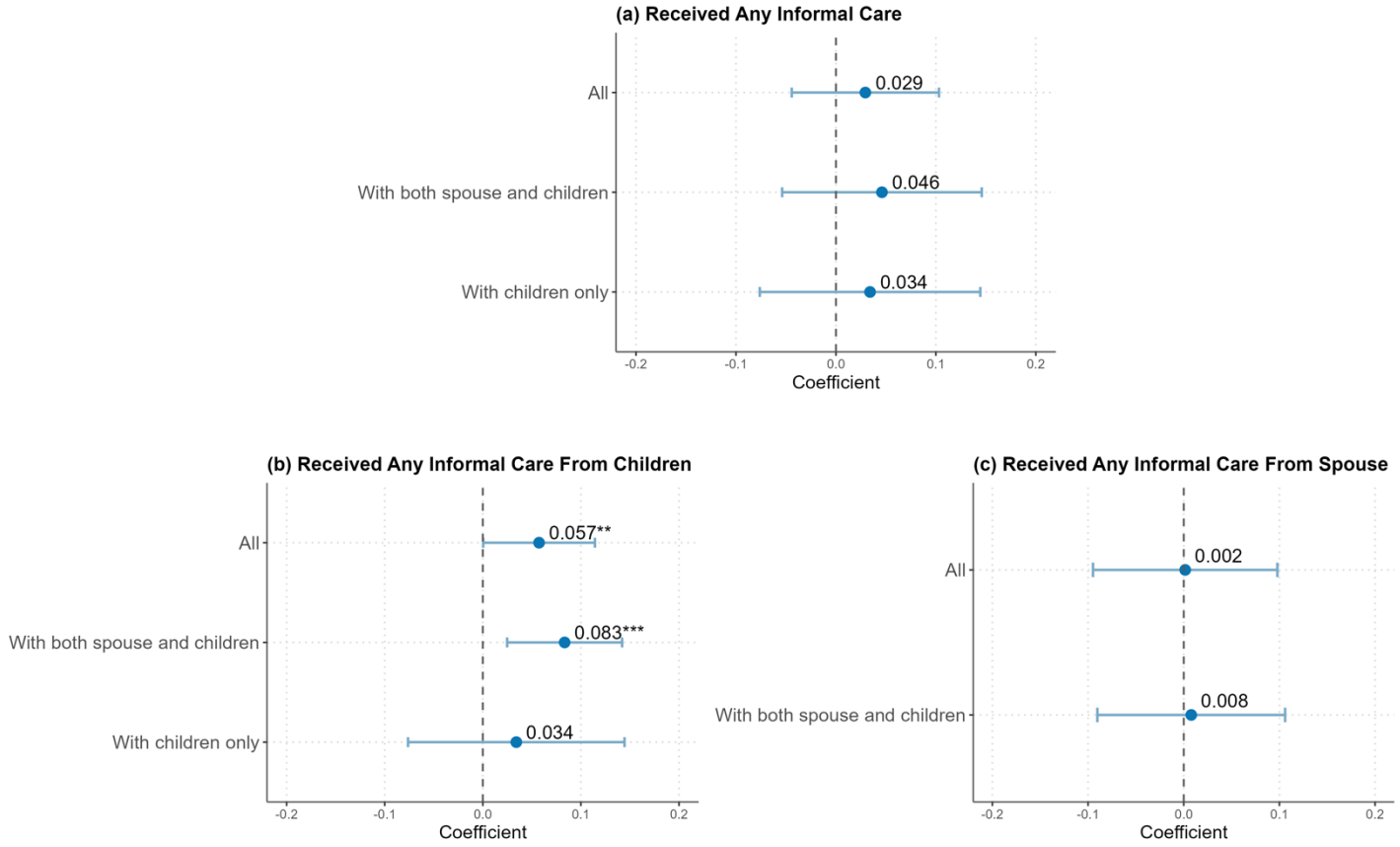
Data source**:** Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2018. Includes only states that have implemented or recently passed mandatory paid family leave (PFL) programs.
Notes: The doctor-diagnosed chronic conditions include high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, psychiatric problems, and arthritis.

Table 2. The Aggregate Impact of PFL on Care Receipt and Living Arrangements for Middle-Aged and Older Adults with Disabilities

	Respondents' Receipt of Informal Care			Respondents' Receipt of Formal Care			Family Living Arrangements	
	(1) Any informal care from spouse or children	(2) Any informal care from spouse	(3) Any informal care from children	(6) Any formal care with ADL difficulties	(7) Any home health care services	(8) Any nursing home stay	(4) Any children living within 10 miles	(5) Any co-resident children
Panel A: All Individuals								
PFL	0.029	0.002	0.057**	0.024	0.056*	0.049**	-0.117***	0.029
	[0.038]	[0.049]	[0.029]	[0.016]	[0.032]	[0.021]	[0.036]	[0.036]
Dep. Var. mean	0.357	0.396	0.168	0.063	0.226	0.089	0.606	0.351
N	8,718	5,025	8,534	8,682	8,679	8,688	7,897	8,516
Panel B: Respondents with Both Spouse and Children								
PFL	0.046	0.008	0.083***	0.025	0.104***	0.056**	-0.164***	0.047
	[0.051]	[0.05]	[0.03]	[0.016]	[0.038]	[0.024]	[0.049]	[0.045]
Dep. Var. mean	0.428	0.396	0.099	0.036	0.191	0.076	0.570	0.315
N	4,854	4,841	4,854	4,841	4,842	4,842	4,506	4,836
Panel C: Respondents with Children Only								
PFL	0.034		0.034	0.009	-0.012	0.021	-0.032	-0.004
	[0.056]	NA	[0.056]	[0.032]	[0.055]	[0.039]	[0.047]	[0.06]
Dep. Var. mean	0.260	NA	0.260	0.100	0.272	0.105	0.655	0.400
N	3,680	NA	3,680	3,657	3,654	3,663	3,391	3,680

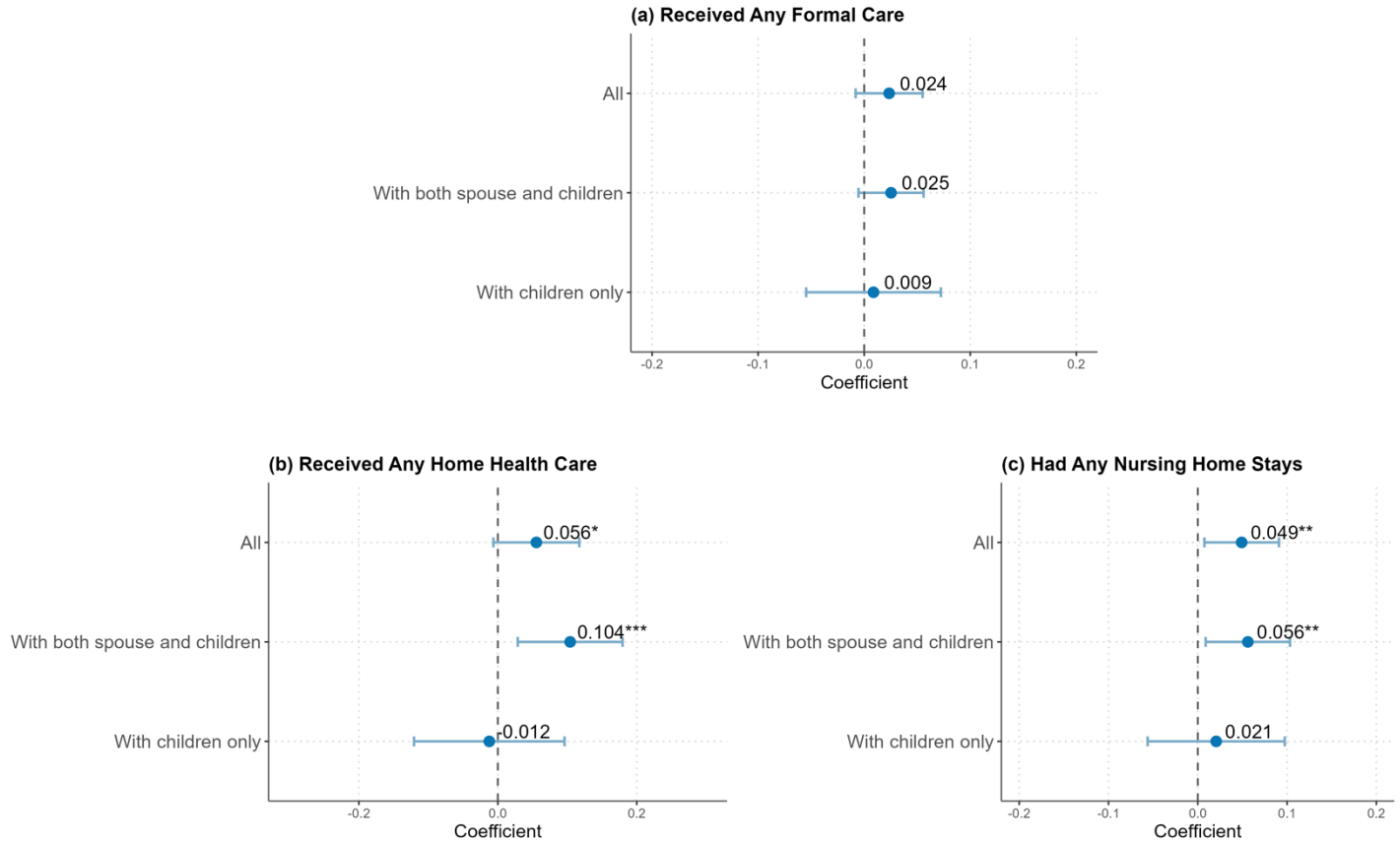
Data source**:** Authors' estimates from the Health and Retirement Study (HRS) data covering years 1998-2016.
Notes: This table shows coefficients of interest from Sun and Abraham (2021) estimates of Eq. (1), using the entire analysis sample (Panel A) and for sub-groups of individuals with both a spouse (married or partnered) and children (Panel B), individuals with children only (Panels C). Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered at individual level in parentheses. Abbreviations: PFL, paid family leave; NA, not applicable.

Figure 1. The Aggregate Impact of Paid Family Leave on Informal Care Receipt among Middle-Aged and Older Adults with Disabilities



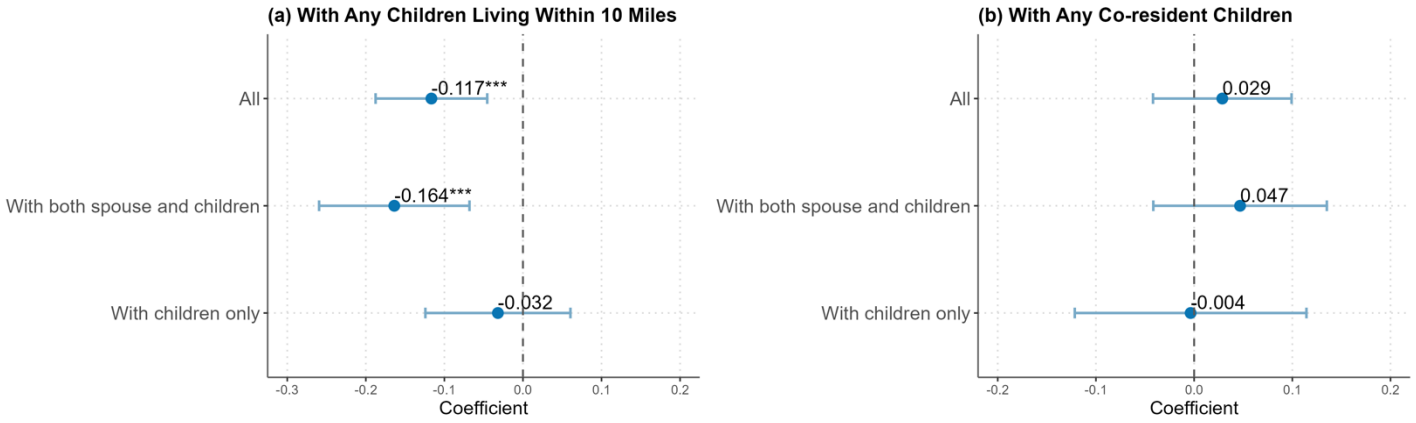
Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from Sun and Abraham (2021) estimates of Eq. (1) for informal care receipt outcomes, using the entire analysis sample and sub-groups of the following individuals: those with a spouse (married or partnered) and children, those with children only. Standard errors are clustered at the individual level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 2. The Aggregate Impact of Paid Family Leave on Formal Care Receipt among Middle-Aged and Older Adults with Disabilities



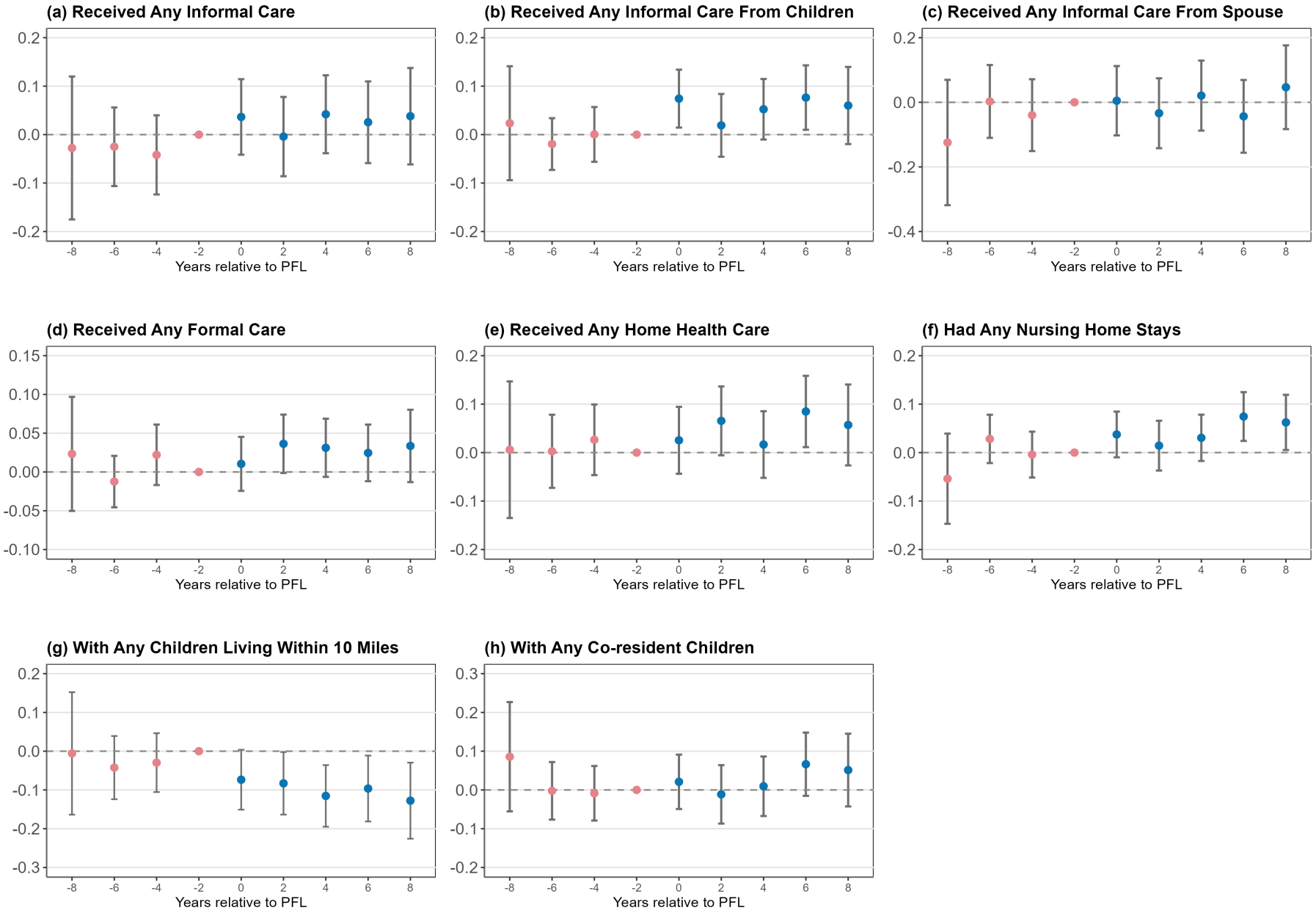
Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from Sun and Abraham (2021) estimates of Eq. (1) for formal care receipt outcomes, using the entire analysis sample and sub-groups of the following individuals: those with a spouse (married or partnered) and children, those with children only. Standard errors are clustered at the individual level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 3. The Aggregate Impact of Paid Family Leave on Living Arrangements among Middle-Aged and Older Adults with Disabilities



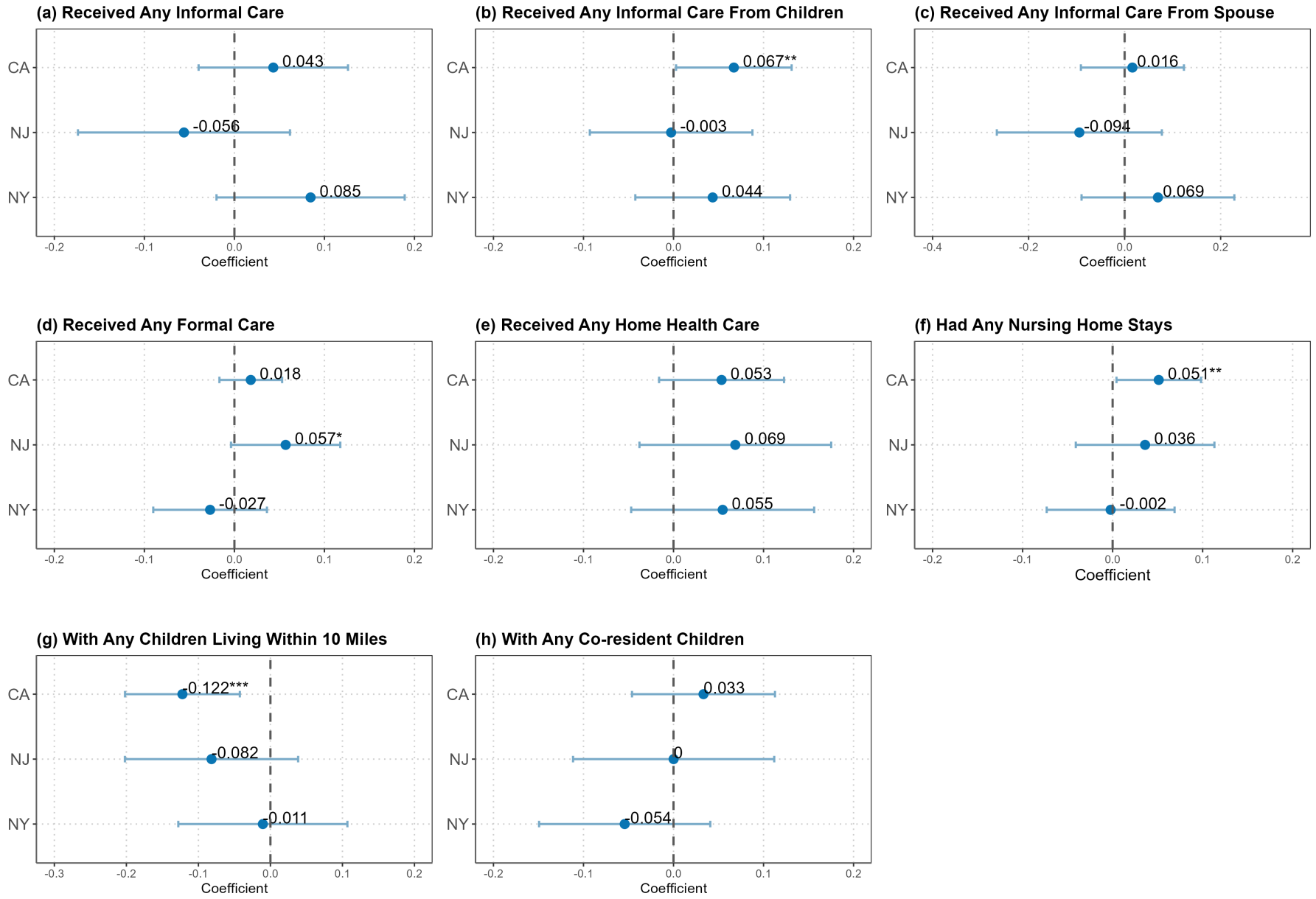
Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from Sun and Abraham (2021) estimates of Eq. (1) for living arrangements outcomes, using the entire analysis sample and sub-groups of the following individuals: those with a spouse (married or partnered) and children, those with children only. Standard errors are clustered at the individual level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 4. Event-Study Estimates of Impact of Paid Family Leave on Care Receipt and Living Arrangements among Middle-Aged and Older Adults with Disabilities



Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from Sun and Abraham (2021) estimates of Eq. (2) for care receipt and living arrangements outcomes, using the entire analysis sample where applicable. Standard errors are clustered at the individual level.

Figure 5. The Aggregate Impact of Paid Family Leave on Care Receipt and Living Arrangements among Middle-Aged and Older Adults with Disabilities, by State Implementation



Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2018.

Notes: These figures plot coefficients of interest and 95% confidence intervals from Sun and Abraham (2021) estimates of Eq. (1) for care receipt and living arrangements outcomes, estimated separately for each treated state (California, New Jersey, and New York). Standard errors are clustered at the individual level.

Appendix

Table A1: The Roll-out of U.S. Paid Family Leave Policy in California, New Jersey, and New York

State	Effective Date	Maximum benefit	How it works	Employee eligibility	Employer Coverage
California	Effective 2004	$1,216/week in 2018	As of 2018, employees can receive 60 percent to 70 percent of their weekly earnings, up to the maximum benefit, for up to six weeks within any 12-month period, to care for an ill spouse, registered domestic partner, parent, grandparent, child, grandchild or sibling.	Must have been paid $300 in gross wages during the base period[1].	Private sector employers.
New Jersey	Effective 2009	$637/week in 2018	As of 2018, workers can receive 67 percent of their average weekly earnings, up to the maximum, for up to six weeks of continuous or 42 days of intermittent PFL benefits during any 12-month period. The time can be taken to care for a sibling, grandparent, grandchild, child, spouse, domestic partner, civil union partner, parent-in-law, parent, any other individual related by blood to the employee, or any other individual who has a close association with the employee that is the equivalent of a family relationship.	An employee is eligible for PFL benefits if he or she meets the minimum earnings criteria during the base year[1]. Specifically, the employee must have either: (1) worked 20 calendar weeks in the base year, earning at least $172 each week; or (2) earned at least $8,600 in the base year.	Any employer that is subject to the state's unemployment compensation law.

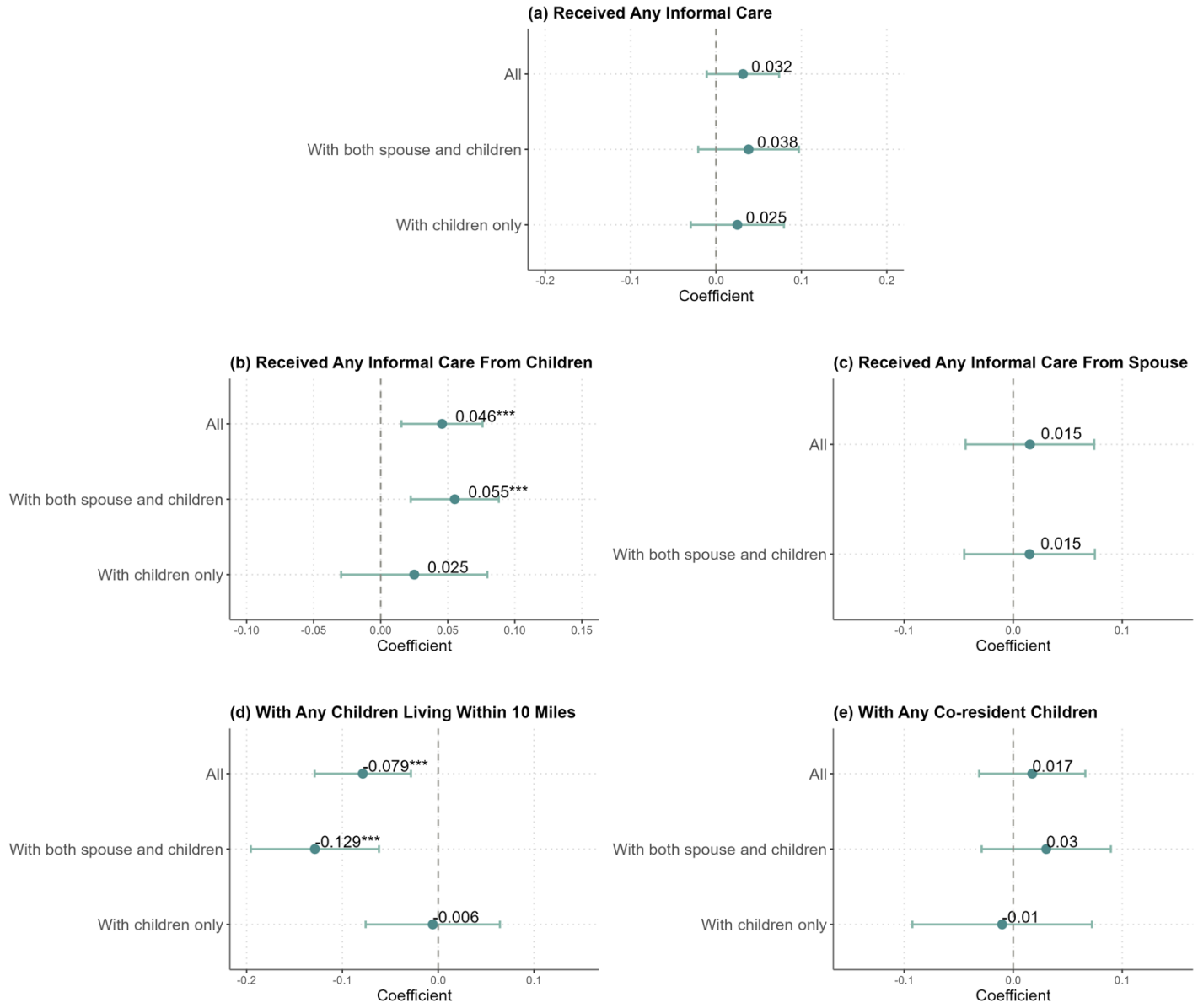
[1] The base period for California is the past four consecutive quarters (approximately 5 to 18 months before the leave begins). The base period for New Jersey is defined as the first four quarters of the five completed calendar quarters immediately before the week in which PFL benefits begin.

New York	Effective 2018	$653/week in 2018	As of 2018, employees could receive 50% of their average weekly earnings, up to the maximum benefit, for up to eight weeks within a 52-week period to care for a family member with a serious health condition. The program covered care for spouses, domestic partners, parents, parents-in-law, grandparents, children, and grandchildren.	Employees who regularly work 20 or more hours per week become eligible for New York PFL if they are employed by a covered employer for at least 26 consecutive weeks before the first full day of PFL begins. Employees who regularly work less than 20 hours per week become eligible for PFL after working 175 days for the covered employer before the first full day of PFL begins.	Employers that employ one or more employees on each of at least 30 days in any calendar year

Source: U.S. Chamber of Commerce. (2019). A Policy Patchwork: Paid family leave laws in the states. Retrieved from https://www.uschamber.com/assets/documents/023871_empl_paid_family_leave_report_jan_web1.pdf

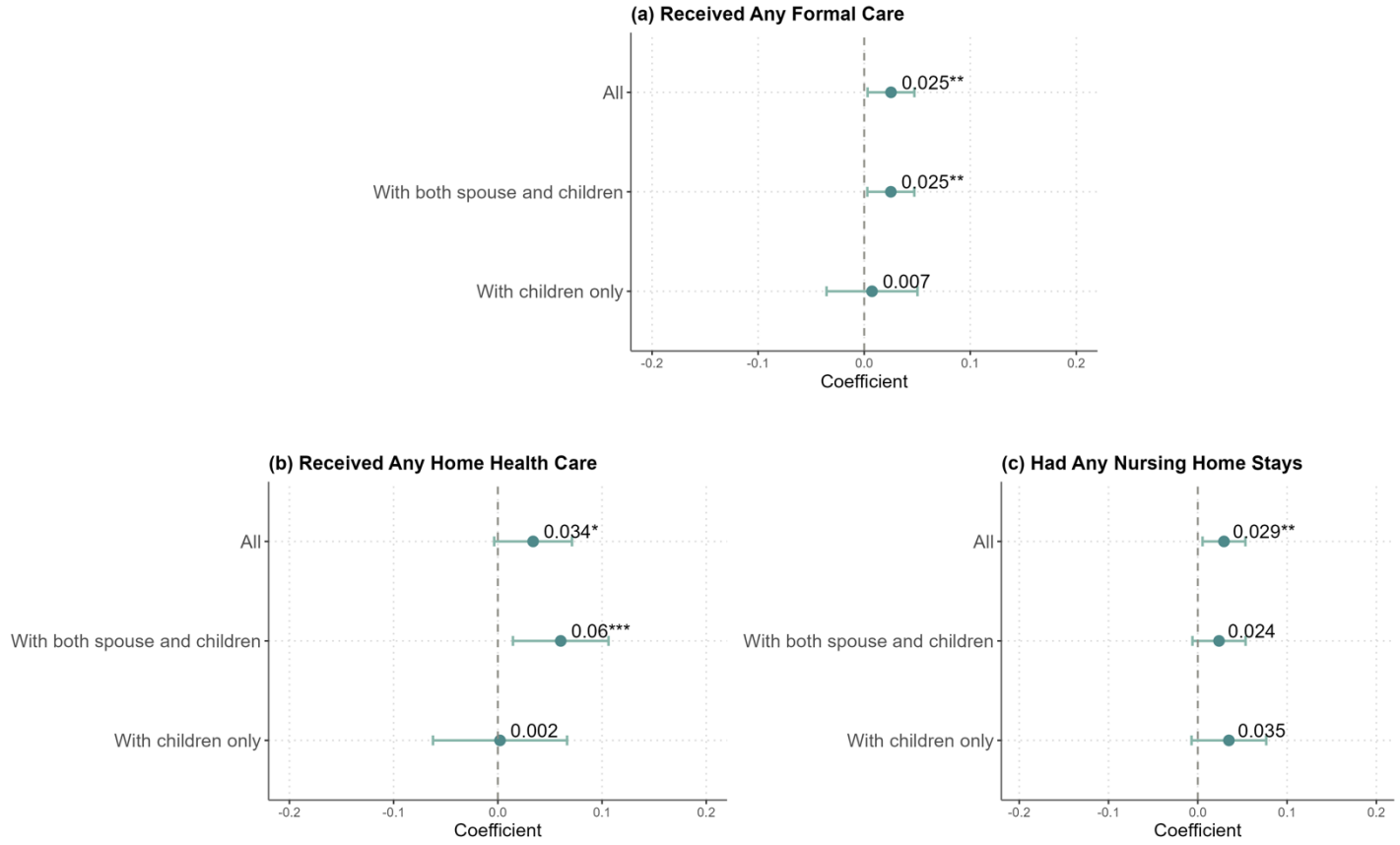
Notes: Rhode Island, which implemented a PFL policy in 2014, is the only other state that implemented a PFL policy during our analysis period (1998-2018), and our sample did not include any respondents from Rhode Island.

Fig. A.1. TWFE Estimates of the Impact of Paid Family Leave on Informal Care Receipt and Living Arrangements among Middle-Aged and Older Adults with Disabilities



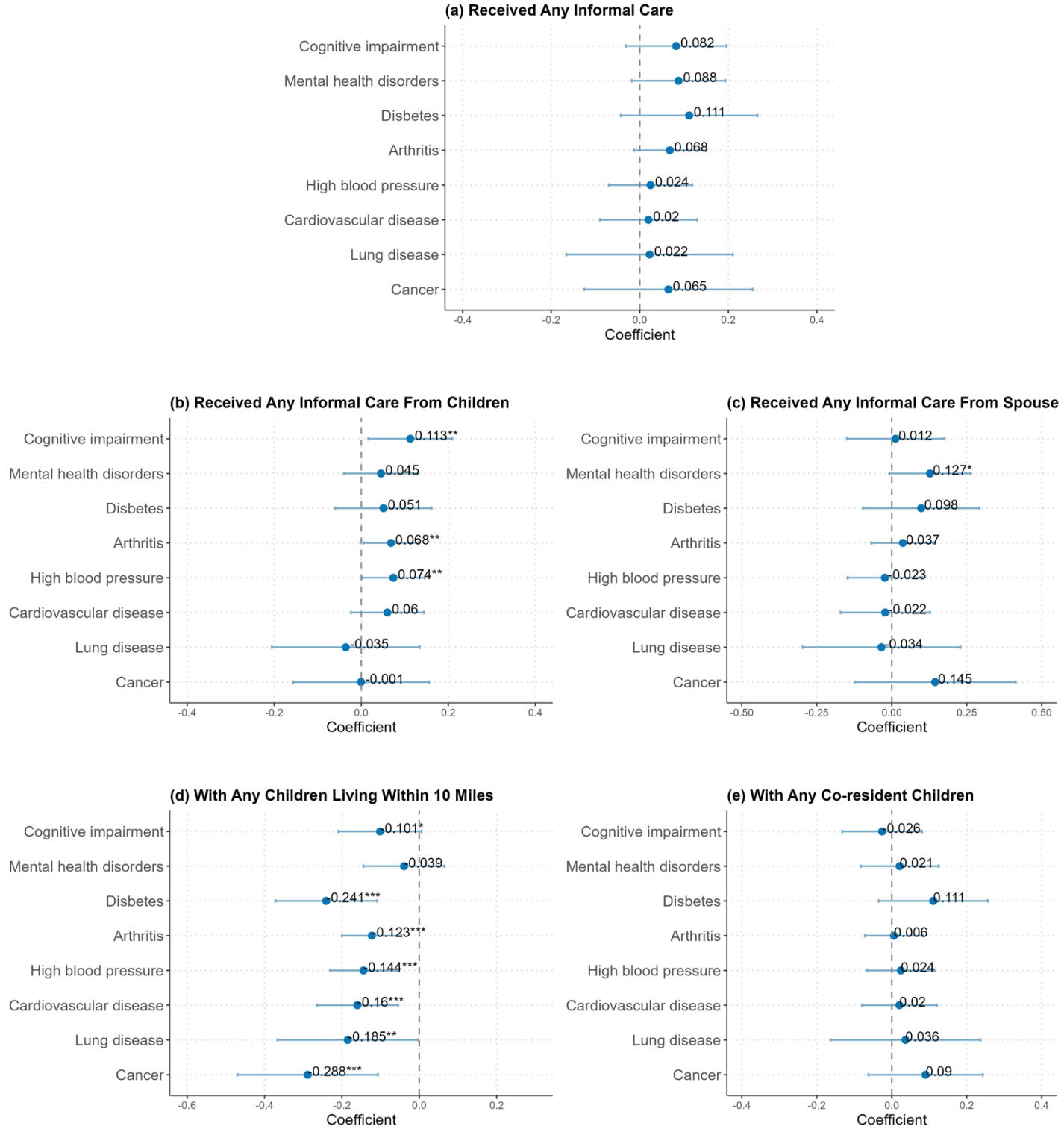
Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from estimating equation (1) for informal care receipt and living arrangements outcomes. These analyses include the entire analysis sample and sub-groups of the following individuals: those with a spouse (married or partnered) and children, and those with children only. Standard errors are clustered at the individual level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Abbreviations: TWFE, two-way fixed effects.

Fig. A.2. TWFE Estimates of the Impact of Paid Family Leave on Formal Care Receipt among Middle-Aged and Older Adults with Disabilities



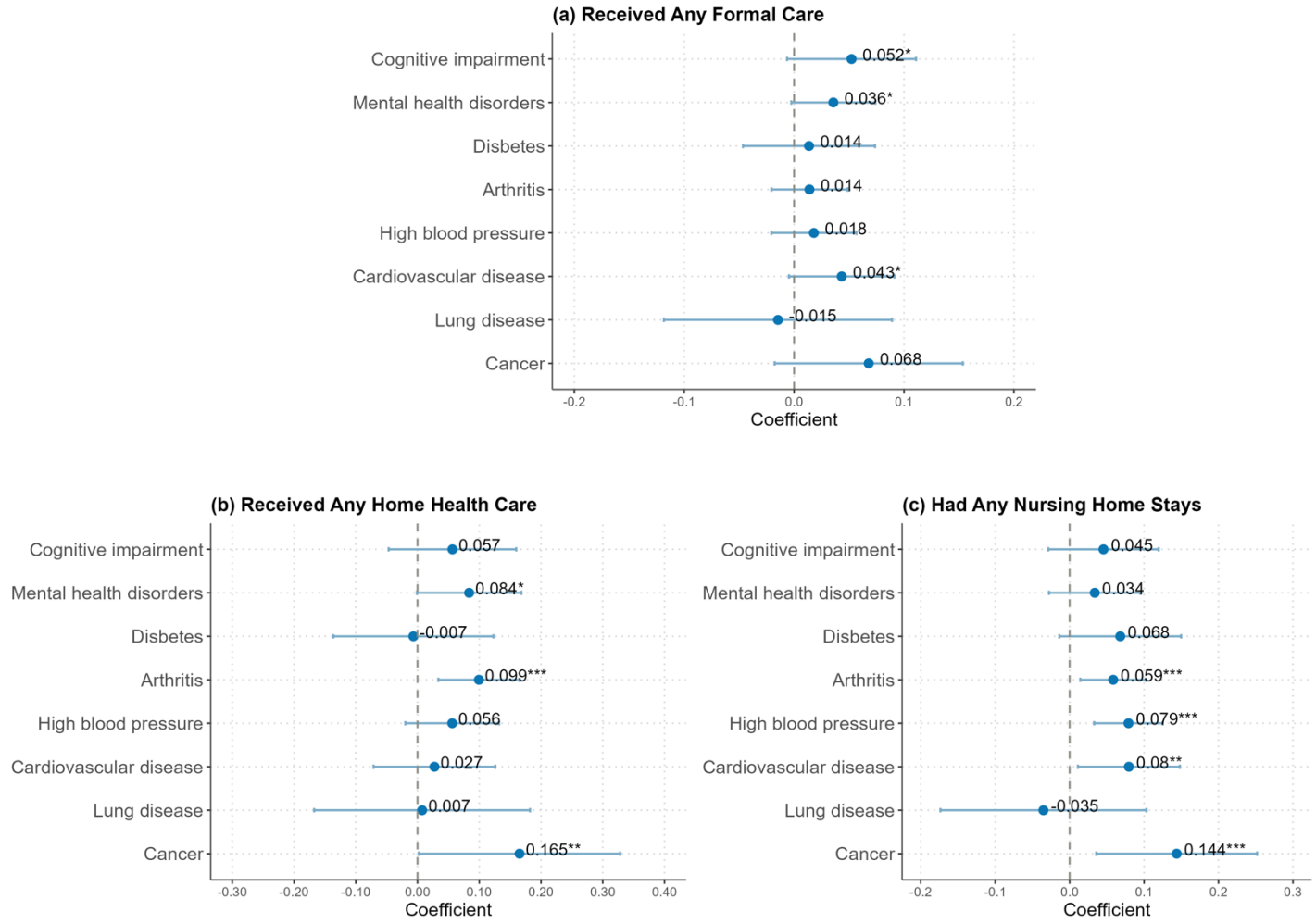
Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from estimating equation (1) for formal care receipt outcomes. These analyses include the entire analysis sample and sub-groups of the following individuals: those with a spouse (married or partnered) and children, and those with children only. Standard errors are clustered at the individual level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Abbreviations: TWFE, two-way fixed effects.

Fig. A.3. The Aggregate Impact of Paid Family Leave on Informal Care Receipt and Living Arrangements among Middle-Aged and Older Adults with Disabilities, by Chronic Conditions



Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from Sun and Abraham (2021) estimates of Eq. (1) for informal care receipt and living arrangements outcomes, estimated separately for each sub-group with a chronic condition described on the vertical axes. Standard errors are clustered at the individual level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Fig. A.4. The Aggregate Impact of Paid Family Leave on Formal Care Receipt among Middle-Aged and Older Adults with Disabilities, by Chronic Conditions



Source: Authors' estimates from the Health and Retirement Study (HRS) data covering the years 1998-2016.
Notes: These figures plot coefficients of interest and 95% confidence intervals from Sun and Abraham (2021) estimates of Eq. (1) for formal care receipt outcomes, estimated separately for each sub-group with a chronic condition described on the vertical axes. Standard errors are clustered at the individual level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.