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July 22, 2019
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Increasing States' Minimum Wage Rates: Do Increased Opportunity Costs Affect Informal Elder Caregivers?

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Abstract

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By Nolan Sroczynski

Informal elder caregivers—individuals age 18 to 64 who provide care to an individual or individuals age 65 and older—provide a valuable service not only to the recipient, but also the healthcare system through *free* labor. However, these caregivers must optimize their own welfare through labor and leisure activities just as non-caregivers do, and their decision to be employed could impact their decision to provide such informal care and/or how much time they have to spend on themselves if they continue to provide care. If informal caregivers reduce time spent providing such care and it is substituted with formal care, the additional burden will likely be placed on the Medicaid system, which pays for the majority of long-term services and supports.

This study exploits the variation in state minimum wage rates to analyze whether the increased opportunity cost of an increase in the minimum wage rate results in labor market changes and amount of time spent on the personal care of the caregiver. Utilizing the combined American Time Use Survey and Current Population Survey data, a difference-in-difference methodology was applied with controls for state-level, caregiver, and recipient confounders. When minimum wage increases, the likelihood of employment among male informal caregivers also increase. There are no statistically significant employment effects for females, nor any significant effects for males or females on personal care time or sleep time. As localities, states, and federal institutions explore increases in minimum wage, one should consider the potential for unintended consequences in a cost-benefit analysis.

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I. Introduction

In the course of aging, an individual may begin to have difficulties performing activities of daily living (ADLs) and/or instrumental activities of daily living (IADLs). ADLs include tasks such as walking, toileting, bathing, and getting dressed; whereas IADLs involve higher levels of cognition including money management, driving, taking public transportation, and buying groceries. As the focus of this discussion is on aging in the population age 65 years and older, individuals needing assistance in these areas may seek services in the long-term services and supports (*eldercare*) sector of healthcare. This sector is composed of formal and informal care markets, with formal care requiring payment for services through public or private insurance, or out-of-pocket. Typically, informal care is not paid for but if it is, it is either out-of-pocket or with the promise of a future bequest.

While the relationship is modified by certain characteristics—such as level of disability of the care recipient—informal and formal care are considered substitutes.[1-3] In 2016, spending in the long-term services and support (LTSS) market exceeded $286 billion without including Medicare expenditure on post-acute care LTSS—approximately 8% of all healthcare expenditure.[4] Of this, Medicaid and other public services paid for 62% of these services with out-of-pocket expenditure comprising another 20%.[4] By comparison, informal care is *free*. However, it is estimated that the opportunity cost of informal elder caregiving in 2011 and 2012 is $522 billion annually.[5] From the public financing perspective, however, it is estimated that if informal caregivers were replaced by paid unskilled caregivers, it would have an estimated cost of $221 billion annually and a substitution with paid skilled caregivers would cost $642 billion annually.[5] This would represent a 77% to 225% increase in current LTSS expenditure (not including Medicare LTSS), with Medicaid bearing the majority of the increase.

With the potential to nearly double or triple current LTSS expenditure with a change in caregiving behavior, it is essential to understand more about informal caregivers and what may impact their decision to provide caregiving if the recipient has a demand for that modality of care.

While some of the previous literature focuses only on adult children as caregivers, it is important to note that although spouses and relatives are very common, informal elder caregivers can also be friends or neighbors to the recipient. Caregivers can also have children to take care of, or not; live in the same household of the recipient, or not; and be employed, or not. The factor of employment is of primary interest due to the general desire of the government to have working age individuals in the labor force. High rates of labor force participation generates needed revenues through taxation and helps maintain consumer spending in the economy. Additionally, there have been discussion on the local, state, and federal level to increase the minimum wage—thus increasing the potential opportunity cost an informal caregiver faces by not working. On the other hand, informal elder caregivers—as with everyone—have a finite amount of time in a day and may want to alter the amount of time they provide care, work, and/or take care of themselves.

To my knowledge, this will be the first study to analyze the effect minimum wage—a state and federal work policy that incentivizes work—has on informal elder caregivers. In addition to a policy that incentivizes work, a rise in the minimum wage will increase the opportunity cost—the *cost* of not working and making a wage—a caregiver has by providing care instead of working, suggesting that they will increase time spent providing labor and decrease the amount of time providing informal care. This study will exploit the variation in prevailing minimum wage rates across states and over time as states can set a minimum wage rate higher than the federal rate. This is shown in Figure 1 for the study years of 2011 to 2017.

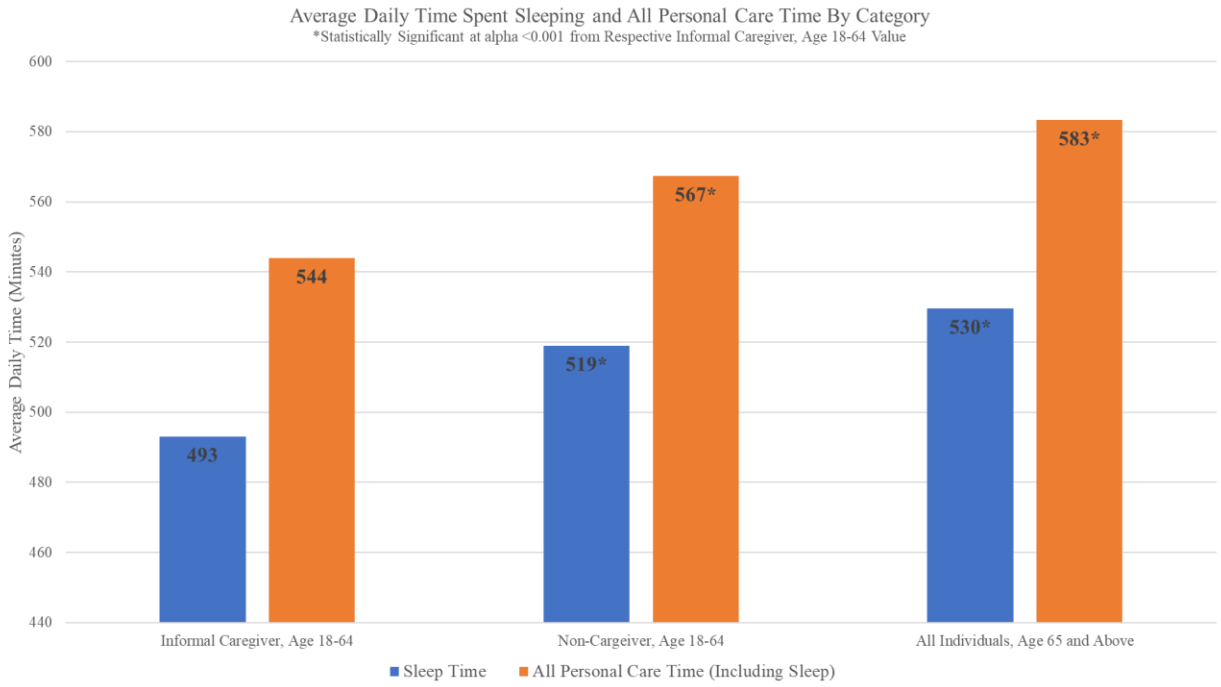
Figure 1

While the availability of datasets with information on informal elder caregivers is limited in the United States, the American Time Use Survey from the United States Census Bureau and Bureau of Labor Statistics began an eldercare questionnaire in 2011.[6] This dataset is also able to be paired with the Current Population Survey allowing for geographic coding by state and the availability of economic indicators.

In addition to labor characteristic information, the American Time Use Survey is fundamentally a time diary dataset. As previously mentioned, informal caregivers may need to shift how much time they spend on certain activities if a rise in the minimum wage incentivizes a greater amount of time spent working. Caregiver burden and subsequent burnout is well documented in the literature and can diminish the health of the caregiver.[7-13] The time diary will be utilized to analyze whether the minimum wage policy alters the amount of time a caregiver spends sleeping and on personal care as a potential proxy for changes in caregiver wellbeing under this change in policy. Figure 2 shows that even without analyzing the effect of this policy,

on average, informal elder caregivers age 18 to 64 spend statistically significant less time sleeping and on all personal care time than those age 18 to 64 who do not provide informal elder care and all individuals age 65 and older. As a disparity is already present, consistent with previous literature,[14] this analysis focuses on whether the policy has a further negative effect on informal elder caregivers.

Figure 2



In all, this study seeks to test six hypotheses on the effect of minimum wage policy on informal elder caregivers between the ages of 18 and 64:

1) A rise in the minimum wage will increase the likelihood of caregivers being employed as the opportunity cost of providing care increases and the likelihood of exceeding an individual's reservation wage also increases.
2) A rise in the minimum wage will increase the likelihood of caregivers being in the labor force following the same reasoning as Hypothesis 1.

3) A rise in the minimum wage will increase the likelihood of caregivers working full-time following the same reasoning as Hypothesis 1.
4) A rise in the minimum wage will increase the number of hours worked per week following the same reasoning as Hypothesis 1.
5) A rise in the minimum wage will decrease the amount of personal care time a caregiver spends on an average day following the expected direction of hypotheses 1 to 4.
6) A rise in the minimum wage will decrease the amount of sleep time a caregiver spends on an average day following the same reasoning as Hypothesis 5.

Due to the nature of this analysis, three frameworks are utilized to model the recipient demanding any care and then specifically informal care, a caregiver providing care, the decision to work by the caregiver, the amount of employed work the caregiver performs, and the amount of time spent on themselves. These frameworks are the Demand for Healthcare Services, Andersen Behavioral Model for Healthcare Utilization, and the Labor-Leisure Model. While previous research has relied on IV regression techniques, these models may still have bias due to weak instruments. This study utilizes a difference-in-difference model from 2011 to 2017 with the difference of the prevailing minimum wage from the federal rate as the independent variable. Additionally, confounders for state, caregiver, and recipient characteristics are included as well as state and time fixed effects. Additional tests were run including the inclusion of a state-specific linear time trend and a falsification study on the model.

II. Literature Review

The eldercare sector of healthcare in the United States is composed of formal and informal care services. There are two primary differences between formal and informal care services: expenditure and services that can be rendered. Formal care can provide medical care that must be provided through licensed individuals such as physical therapy. Formal care also always costs money either through out-of-pocket payments or insurance. Informal care, on the other hand, cannot generally provide medical care, and does not show up as a healthcare expenditure, even if payment does exchange hands.

Formal care services are increasingly costly and are largely financed by public insurance schemes—primarily Medicaid. Informal care services can provide a substitute to formal services, but requires an informal elder caregiver to have the time and capabilities to provide such care. Due to the finite amount of time an individual has in a day, an individual would need to make decisions on how to allocate their time. Thus, providing informal care is potentially antithetical to the desire of governments to maintain or increase the tax base of working individuals to finance government expenditures if the informal caregiver works less in the economy or is not in the workforce. On the other hand, providing informal caregiving could reduce real or potential public expenditure but preventing financial burden on the Medicaid system. To my knowledge, previous literature has not explored the potential effects of minimum wage—a work-incentivizing policy at the state and federal level—on the employment decisions of informal caregivers. Additionally, given the time constraints, the minimum wage may also result in informal elder caregivers reducing the amount of personal time they spend on an average day in order to manage the altered employment and caregiving responsibilities—a potential concern for the wellbeing of the caregiver. As with the employment outcomes, to my knowledge there has been no previous research that considers the potential impact of minimum wage policy on the personal time of the caregiver.

Eldercare in the United States

As with many industrialized nations, the population in the United States is aging.[15] In 2016, there were an estimated 49.2 million individuals 65 or older in the United States—approximately 22.8% of the population—and is projected to rise to 78 million in 2035, exceeding the number of individuals under age 18 (76.4 million).[15]

While there may not be a per se substantial economic burden to this increase[16], it will cause additional strain on publicly-funded programs. In 1999, the Congressional Budget Office estimated that public payers would cover approximately 59% of the $123.1 billion expenditure on long-term services and supports.[17] They projected that in 2020, the total cost of long-term services and supports would total $207.3 billion with public payers covering approximately 60.8% of the expenditure.[17] However, in 2012 the spending on long-term services and supports was $219.9 billion—already exceeding the projections for 2020—with public spending covering 65.7% of the expenditure.[18]

The increased expenditure and high proportion of public spending are primarily the result of two factors. The first is long-term services and supports are expensive with prices growing in nearly every state. Genworth Financial performs an annual survey to estimate the median cost of long-term services and supports at the state and national level. In 2018, the median cost of a private room in a nursing home exceeded $100,000 for the first time.[19] Assisted Living Facilities have a median annual cost of $48,000, similar to the annual cost of homemaker services or a home health aide assuming they work 44 hours per week.[19] It should also be noted that while these are the median costs, there are notable variations between states. A private, one bedroom in an Assisted Living Facility has an annual median cost of $75,600 in Alaska compared to $34,128 in Missouri.[19] For homemaker services—professionals who assist with basic needs such as cleaning and grocery shopping—the median hourly wage ranges from $26 in Alaska and California, compared to $16 in Louisiana.[19]

The second factor primarily impacts the large proportion of public spending for these services. In 2014, only 11% of adults 65 and older had insurance for long-term care services.[20] Research suggests that one explanation for the small proportion those with long-term care services insurance is a desirable product is not currently available on the market, even though long-term care services insurance is generally desirable.[21,22] Thus for many individuals, long-term services and supports must be paid through Medicare, out-of-pocket, and/or Medicaid if they meet certain income and asset requirements. Medicare only covers a minute portion of long-term services and supports which align with medical care rather than custodial care.[23] As previously mentioned, the out-of-pocket cost for long-term services and supports can be rather high, thus being unsustainable for many to afford. The majority of the long-term services and supports expenditure and majority of the public-spending is financed through the Medicaid program which does cover both medical and custodial care. However, qualifying for Medicaid typically requires a low-level of available assets and limited income. Due to the potential for a reduction in family assets, it may incentive a family member to provide informal care to prevent or minimize expenditure in the formal care sector to avoid the reduction/depletion of assets.

Formal Care and Informal Care

The services discussed thus far entail formal care settings—a professional with appropriate credentials being paid by the individual, private insurance, or public insurance. However, a large amount of care provided to individuals 65 and older is provided through informal care—care provided by family, friends, and/or neighbors who are not paid for their services or are not paid through public or private insurance. In 2011, there was an estimated 7.7 million community members age 65 and older who received informal care.[24]

Informal care provides two primary benefits over formal care. While some formal care does occur in the home of the individual, nearly all informal care allows the individuals receiving care to remain in their own home. This aging in home is consistent with the wishes of the

majority of older individuals who desire to age in place.[25-27] The second benefit is to the healthcare system and potentially the individual receiving care. As mentioned, informal care does not entail payment from private or public insurance, and most informal care is free. If the individuals receiving informal care utilized formal care instead, the cost to the system would exceed the current opportunity cost of informal caregivers.[1,5]

Due to the vast number of definitions of caregivers in the literature, it is important for clarity to define what a caregiver is considered for this study early. A caregiver for this study is an informal elder caregiver between the ages of 18 and 64, who may or may not be related to the care recipient, may or may not live in the same household as the recipient, may or may not provide care to more than one individual, and has provided care to an individual who is 65 or older at least twice to in the past 3 months.

Activities of Daily Living and Instrumental Activities of Daily Living

The level of disability an individual has is typically based on their ability to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs).[28] ADLs include eating, getting dressed, toileting, and transferring between areas e.g. from the bed to the bathroom. IADLs include higher cognitive function activities such as managing money, going grocery shopping, cleaning, riding public transit, driving, and cooking. While IADLs require higher cognition, non-professional individuals will likely be capable of assisting with these tasks. Thus, an informal caregiver would be more capable of assisting with IADLs than the more physically demanding ADLs. As the disability level increases, an informal caregiver may find it increasingly difficult to aid in more transfers or helping the individual get dressed. However, an individual who needs more assistance with IADLs may require assistance with grocery shopping and cleaning on top of money management. While this presents an additional time commitment, it is likely well within the capabilities of an informal caregiver.

Government Incentivization of Employment

As with all budgets, state and federal governments require income to provide goods and services. The federal government receives practically all revenue from taxes. In 2017, the two primary revenue sources for the federal government was individual income tax (47.9%) and social insurance tax (35%).[29] State and local governments also receive tax revenue, although it may not be a majority from income or social insurance tax. These two levels of governments also receive revenue through intergovernmental transfers such as federal to state or state to local. Thus, it is necessary for governments to have a sufficient tax base of paid/taxable workers. This is especially true when considering the potential increase in Medicare and Medicaid expenditure in the future and as society reduces the ratio of non-elderly to elderly, there will be an increased need for individuals to work in order to be in the tax base.

Paid work is also necessary for maintaining a stable consumption expenditure in the economy. While government expenditure contributes to the GDP, the majority results from consumption expenditure. In Quarter 3 of 2018, the consumption expenditure contributed 68% of the GDP.[30] Income from work is one of the primary driving forces of the consumption expenditure.

To ensure a strong tax base, a stable economy, and reduce expenditure on social welfare programs for the unemployed, it is in the interest of the government to increase the number of individuals working. There are a few "stick and carrot" incentives that state and federal governments may utilize for this increase to be realized. Some welfare programs such as unemployment insurance and Temporary Assistance for Needy Families (TANF) have a limit on the amount of time an individual may stay in the program and receive benefits. Some also argue that they do not necessarily incentivize work. While this paper focuses on the minimum wage, the model controls for TANF, EITC, and Supplemental Nutrition Assistance Program benefits.

Minimum Wage

The minimum wage provides a statutory hourly wage floor for workers who fall under the Fair Labor and Standards Act. Minimum wage policy can be enacted at the federal, state, and—in some cases—the local level. The prevailing rate is the maximum value amongst those three policies. In 2017, the Bureau of Labor Statistics estimates that 1,824,000 individuals worked at or below the minimum wage.[31] While this is a small proportion of the employed population, a minimum wage increase will directly impact a larger population. An analysis by David Cooper found that a gradual increase in the minimum wage to the oft-mentioned rate of $15 in 2024 would directly increase wages for 22,500,000 individuals.[32]

Minimum wage policies influence the decision to work in several ways. The first is the likelihood of a job paying at the minimum wage level to meet or exceed an individual's reservation wage rate. The reservation wage is the minimum wage that someone is willing to start working based on maximizing their utility function. Any minimum wage increase would increase the number of individuals where the prevailing rate meets or exceeds their reservation wage. The second is a raise in an individual's working wage makes leisure time costlier due to the increase in opportunity cost. The third factor is how minimum wage policy directly impacts the availability of employment opportunities. The research has and continues to be mixed with no clear consensus on how minimum wage policies impact employment opportunities.[33,34]

Theoretical Models

Due to the complex nature of informal caregiving, several theoretical models are necessary to conceptualize the impact of minimum wage policy on the intensity of informal caregiving. To consider the confounders needed for the model, theories are required to hypothesize why an individual receiving care demands informal care, formal care, or no care; why an informal caregiving decides to supply care; whether the informal caregiver is employed and how many hours of week they work for wages; and how the informal caregiver determines time spent performing labor compared to leisure.

The Labor-Leisure Model

The Labor-Leisure model is used in the majority of literature analyzing the impact of informal caregiving on employment or employment on informal caregiving.[35,36] Broadly, this model describes the trade-off an individual faces between paid employment and leisure activities, and based upon their utility function and budget constraint, determines the optimal bundle of labor and leisure.[37] Informal caregiving and personal care time falls under leisure activity as they are not being paid for. The budget constraint includes the hourly wage rate, and income from non-employment sources. This theoretical model is used for informing the relationship between giving informal care, being employed, personal care time, and number of paid employment hours—as well as informal caregiving time if it were measured. Thus, this solely focuses on optimization of the function by the informal caregiver and not the person receiving care.

Van Houtven and Norton utilize an extension of the Grossman Model of Health Demand that is similar to the Labor-Leisure model.[2] The model entails the maximization of utility based upon consumption, leisure, informal caregiving, and the health status of the person receiving care which is dependent on other factors including formal care and informal care. This is subject to a budget constraint of the caregiver which is similar to the budget constraint in the Labor-Leisure model. However, the budget constraint equals the summation of consumption goods and the cost of medical care times the intensity of formal medical care. It is important to note that the Van Houtven and Norton modeling focuses on the informal caregiver being a child of the parent who is receiving informal caregiving. However, for this study, the informal caregiver need not be a dependent of the person receiving care. Thus, the informal caregiver may have no financial incentive to provide informal care rather than having the person receiving care utilize formal services.

The utility function of the informal caregiver that informs the labor-leisure model has various models depending on the research of interest. The traditional model states that the overall

utility formula is a function of the utility of labor activities and utility of leisure activities.[37] Other authors have included additional utility vectors such as Heger who includes the utility of altruism.[35] For the purposes of this paper, the traditional model will be utilized as these additional factors are already included in the utility functions of labor and leisure, just not explicitly shown. Rather than simply adding multiple utility functions of interest, the Andersen model (discussed in a later section) will be utilized to ensure the inclusion of factors that may underlie or alter the utilities.

Grossman and the Theory of Demand for Healthcare Services

Several papers describe the relationship of informal care, formal care, and need of care as an extension of the Grossman Model of Health Demand.[2,38] These frameworks derive a connection between the demand for informal and formal care services with the Labor-Leisure model of the informal caregiver. This model relies on the utility maximization of the child and parent in determining the quantity demanded of informal and formal care. However, there are concerns with this approach. The first is that there is a financial risk or incentive placed on the informal caregiver as they may need to pay for the formal care if they do not provide informal care. While this may be the case for caregivers who are related e.g. spouses and children, it would not necessarily be the case for non-family informal caregivers. To disentangle this relationship and utilize many of the same underlying theories, the Theory of Demand for Healthcare Services will also be used.

Similar to the Van Houtven and Norton, the Theory of Demand for Healthcare Services (TDHS) utilizes the cost of medical care, but also includes the costs of complements and substitutes.[2,39] The Van Houtven and Norton model does not explicitly include insurance status of the individual receiving care, but TDHS does. However, this vector will not be measured for this study. In this case, individuals over 65 have similar insurance characteristics, especially in the long-term services and supports market. While there are variations in state Medicaid policies that

may alter the time and amount an individual must spend down to qualify, these will be controlled for by state-specific fixed effects. A vast majority of individuals 65 and older qualify for Medicare which covers some medical long-term services. Also, most individuals do not have private long-term care insurance. Further, there has not been a consistent trend that would bias the results such as a growing proportion of the population gaining long-term care insurance. Health status of the individual receiving care is included in both models. The TDHS also includes a taste vector which is not explicitly included in the Van Houtven and Norton model, even though it is integrated into the utility function.

Andersen Behavioral Model for Healthcare Utilization

While not specifically used in most literature of informal caregiving, the Andersen Behavioral Model for Healthcare Utilization (Andersen) provides greater insight into the utility functions of informal caregivers and the taste vector of the Theory of Demand for Healthcare Services for individuals receiving care. Several papers also suggest the need to consider factors included in Andersen.[24,36,40,41] While discussed further in the Methods Chapter, Andersen includes categories of predisposing, enabling, and need at both the individual and contextual (macro) level. Thus, this model will also allow for theorizing what controls are necessary at the state and federal level which may alter the utilization or giving of informal care.

Previous Literature

Informal Care in Europe

The previous literature presented within this section is of limited usability when developing hypotheses or comparing results due to the wide differences in healthcare schemes and social/familial expectations. Thus, this section is primarily included to provide a brief overview of what datasets exist elsewhere, as well as the methodological techniques they employ.

There are a few datasets in Europe that have allowed numerous studies to be conducted on informal care in specific countries or across several countries. The first is the Survey of Health, Ageing, and Retirement in Europe (SHARE). SHARE began in 2004 and has currently completed 6 biannual waves.[42] Twenty-eight countries have participated in the survey with over 120,000 respondents age 50 and older. Another commonly used survey is the British Household Panel Survey (BHPS). The BHPS began in 1991 and completed 18 waves of data collection before being discontinued.[43] Less commonly used surveys include the German Socio-Economic Panel and the Quarterly National Household Survey for Ireland. All the surveys use instruments that include some degree of data on socio-economic factors, demographics, and health services utilization.

The first question of interest utilizing the literature on Europe is whether formal care and informal care are substitutes or complements. Bolin and Lundborg (2008) utilized the SHARE dataset with an instrumental variable.[3] They found that these two care services are substitutes for the study population. The following year, Bonsang published a paper also using the SHARE dataset with instrumental variables of proportion of children that are daughters and distance of children from parents.[38] These instruments were chosen partially due to the interest in informal caregivers who are providing care to their parents. Bonsang included level of disability as a moderator and found that if the disability is relatively low, formal care and informal care are substitutes. However, if the level of disability is high, these services are complements. This moderation becomes nullified if the child/informal caregiver co-resides with the parent requiring care.

The second and third questions of interest are similar, but differ in the direction of the question. The second is whether employment impacts the intensity or likelihood of providing informal care. The third is whether informal caregiving impacts the intensity or likelihood of employment. This is an important distinction due to the timing of the events, the mechanism in

the conceptual framework, and the type of regression methodology. This study aligns with the third question with the additional inclusion of how work incentives may factor into that decision. However, the second question is also important as it may point to the impact any change in the employment outcomes will have on informal, and therefore also formal, care.

There are two primary papers that research how employment impacts informal care in Europe. The first study by Carmichael, Charles, and Hulme used 15 waves of the British Household Panel Survey, spanning from 1991 to 2005.[44] They do not utilize an instrument as they view employment status as exogenous if it occurs prior to caring. Multiple regressions are run including binomial, multinomial, and ordered logistics. The results suggest that on average, there is a reduction in the likelihood of becoming an informal caregiver if the individual has been employed previously. They also find that higher wages results in a reduced likelihood of being an informal caregiver in the future compared to those with lower wages. While slightly different, they find similar results between the sexes. These results suggest that an increased tie to the labor force and/or a potential opportunity cost that is known to the individual and high results in a decreased likelihood of providing informal care in the future.

Cost-Font, Karlsson, and Øien use the SHARE dataset from 2004 to 2011 which includes the employment shock due to the Great Recession.[45] The theoretical framework is based on the idea that a recession does not change the demand for eldercare, but may alter employment and the availability of public funds for formal care. These would compound to an increase demand for informal care as a substitute for formal care. They find that the economic downturn resulted in an increase in informal care, however, the majority of this increase is from care provided outside the household. Some possible reasons for this are increased leisure time to provide care to friends or neighbors or out-of-pocket payment being provided to substitute for the formal care. Nevertheless, the result suggests employment, or the lack there of, alters the likelihood and intensity of informal caregiving, especially if it is outside of the household.

The literature on whether the provision of informal care impacts the likelihood and/or intensity of formal employment in European countries is wider than the reverse relationship. In 2018, Walsh and Murphy published a cross-sectional analysis using the Ireland Quarterly National Household Survey for the third quarter in 2009.[46] They found no feasible instrument and since this is cross-sectional, any regression would be biased. To avoid this issue, they use propensity score matching and find that for individuals providing 15 hours or more of informal care per week, there is a higher likelihood they are outside the labor force compared to a non-caregiver. There were no significant differences seen if the amount of care provided is less than 15 hours per week. While they suggest that their propensity scoring is an acceptable methodology of removing the bias, additional countries, time, and amount of time should be analyzed with this methodology for consistency. As with any cross-sectional analysis, there cannot be a causal inference made, rather they are useful for hypothesis or mechanism generating.

Another cross-sectional analysis by Gautun and Bratt in 2017 utilized a single survey of employees in Norway.[47] Several categorizations were made about the type and intensity of care one or both parents of those surveyed currently needed. Of primary interest, the authors find a significantly higher workplace attendance if the individual needing care is in a formal care setting such as an assisted living facility or nursing home. This finding is amplified if the would-be caregiver is female. However, they do not find this effect if the formal care is provided within the home, suggesting that formal care in the home does not have the same intensity compared to a formal setting, thus requiring additional caregiving by the informal caregiver (child).

In 2004, Henz used a multivariate logit model with the Great Britain Family and Working Lives Matter survey of 1994/1995.[48] The results are along the lines of Walsh and Murphy, but find a difference between part-time and full-time workers. When an informal caregiver starts providing care, they find part-time workers are more likely to reduce their hours of work compared to full-time workers. Additionally, approximately one-third of the informal caregivers

were not employed prior to caregiving. These results suggest part-time workers may not be as attached to the labor force compared to full-time workers.

Due to the potential for bias with this relationship, several authors utilize an instrumental variable approach. However, there are differences in what authors use as their instrumental variable. Carmichael and Charles use the predicted or actual wage rate as an instrument;[36] Meng uses an instrument composed of several characteristics of the individual receiving care;[49] while Heger uses a parental change in health interacted with the country group—defined as either a formal care country or a family care country.[35] There is some difficulty in determining the strength of these instruments quantitatively, so the rationale is primarily qualitative. Parental health has a potential temporal issue. While a decrease in parental health may increase informal caregiving and thus determine the impact on employment, the amount of employment and/or informal caregiving prior to the change in health could have altered the health status. The instrument used by Carmichael and Charles is closest to the minimum wage measure as it is considering the opportunity cost an informal caregiver faces by providing care rather than working.

Meng utilized the German Socio-Economic Panel from 2001 to 2007 and limited the analysis to informal caregivers who co-reside with the individual receiving care.[49] With the instrumental variable, there was an estimated decrease of 35 minutes of work per week for a 10 hour increase in providing care in females, and a 48 minute decrease for males. While co-residential caregiving captures many family members providing care, it may unnecessarily focus on spousal caregivers. While other literature find no impact if informal care provided was less than 15 hours,[46] these results are lower than the literature mentioned thus far, however, it may also be the result of a majority of workers in the dataset being employed full-time.[48]

The second instrumental variable paper mentioned is Heger who used three waves of the SHARE dataset—2004/2005, 2006/2007, and 2011/2012. In additional to the instrument, they

also include fixed effects in the model. Heger differentiates countries in the SHARE dataset by the amount of money spent on formal long-term services and supports. If the amount exceeds a set threshold, the country is deemed a formal care country, while those that fall under the threshold are family care countries. It is interesting to note that the United States would be considered a formal care country even though there are several issues with access as mentioned previously. The primary result of interest is that informal caregiving decreases employment rates in family care countries by 34 to 60 percentage points. This result is expected as a family care country likely does not have the infrastructure to support formal care, ergo the informal caregiver would become the sole caregiver to the individual in need in the face of no or limited substitutes. The magnitude of the decrease is rather substantial, but such rate would likely not be seen in formal care countries.

Carmichael and Charles perform a cross-sectional analysis of the 1990 United Kingdom General Household Survey.[36] The sample was split between working age males and females who are able to be employed and used actual or predicted wage as the instrument which may still lead to biased results. Similar to Walsh and Murphy, Carmichael and Charles found no impact on the likelihood of employment if providing informal care less than 10 hours per week.[46] However, providing less than 10 hours of informal care did result, on average, a decrease in earnings for women, but no significant impact on men. When providing greater than 10 hours of care, the likelihood of being employed was reduced for both sexes and both earn less. Further analysis, however, suggests that only females have a direct wage impact on caring due to the magnitude of decrease in employment and in earnings. As mentioned, these results may be biased as the instrument does not control some of the endogeneity issues well. Additionally, there were limited to no controls for other factors such as price of substitutes or accessibility of formal care services. Since this is cross-sectional, it is mainly useful for hypothesis generating, however, as their primary analysis relates to wages of the informal caregiver, it is closely aligned to this study.

Informal Care in the United States

Similar to the literature on European countries, this literature section will begin with the previous research on whether formal and informal care are substitutes or compliments. The next section will include literature on how employment impacts informal caregiving, and lastly, the literature on the impact of informal caregiving on employment will be discussed. The most common survey seen used in the United States for this specific scope of research is the Health and Retirement Survey (HRS) through the University of Michigan which is similar to SHARE in Europe. The first wave of the longitudinal, biannual survey was in 1992, and had a population pool of non-institutionalized adults between the ages of 51 and 61.[50] Questions related to socio-economics, demographics, and health are included. The other survey worth mentioning is the Survey of Income and Program Participation (SIPP) as it is somewhat similar to the Current Population Survey used in this study. This is another longitudinal survey that focuses more directly on socio-economics as it is through the United States Census Bureau. Each panel lasts for four years with several waves which includes a core questionnaire, and some may have a supplemental questionnaire. Questions pertaining to informal caregiving are generally only asked once per panel.

The European literature found that in general, formal and informal care are substitutes, although this may be modified by the level of disability the person receiving care has. Similar results have been found in literature about the United States, although a few rely more heavily on theory and previous research rather than providing new evidence. Two papers use the framework of formal and informal care being perfect substitutes to estimate the cost to the system if formal care were used instead of informal care.[1,5]

Tennstedt et al. published a paper in 1993 to analyze the impact of females increasing their labor force participation and whether that would result in an increase utilization of formal care.[51] The study utilized several waves of the Massachusetts Elder Health Project and found

formal care was not being substituted due to an increase in female labor force participation. This paper will be discussed further in the context of the impact of employment on informal caregiving, however, it does suggest that either formal and informal care are not perfect substitutes or employment did not alter informal caregiving behavior.

In contrast, Van Houtven and Norton performed a study utilizing the 1998 HRS and 1995 Assets and Health Dynamics of the Oldest Old panels with an instrumental variable regression technique to study whether informal caregiving by a child is a substitute or complement to several formal care services.[2] Using instruments of the number of children in the family and whether the first born was a daughter, the authors find that informal care is a substitute for home health care, nursing home care, hospital stays, and physician visits. The only find that informal care is a complement to outpatient surgery, however, the overall result is that informal care is a substitute for formal care.

There are four primary papers of interest looking at how employment impacts informal caregiving in the United States. The first has already been mentioned previously, but will be expanded on further here. Tennstedt, Crawford, and McKinlay begin the paper with the concern that family caregiving is being substituted partially due to changing family roles/size and partially due to the increase in female labor force participation. They use the Massachusetts Elder Health Project for 1984/1985, 1988/1989, 1990/1991, and 1991 to see if formal care is being substituted for informal care. They find that overall, there is not widespread substitution, even with more women entering the labor force. Thus, these findings suggest that while the type of informal care changes, informal care remains relatively stable with an increase in employment. As previously mentioned, however, it could also be the case that the formal and informal services are not perfect substitutes.

Using 4 waves of the HRS from 2004 to 2010, Arora and Wolf use a sample of adult informal caregivers who provide care to a parent or parents.[52] First, they find that as need of the

person receiving care increases, the number of caregiving hours increases. While this may be unsurprising, it does suggest that even if higher levels of disabilities make informal caregiving a complement to formal caregiving, informal caregiving remains the same or increases. The authors find no statistically significant impact of wage on informal caregiving. They note similar results in this respect to Nizalova (discussed in the next paragraph). They also note that areas of higher wages may have similarly higher wages for formal caregiving, increasing the price of those services.

Nizalova performed a cross-sectional analysis of the 1998 wave of the HRS with an instrumental variable regression technique to determine the elasticity of wage and informal caregiving.[53] The instruments used are the state unemployment rate, state industry structure, and the interaction of those variables with the education level of the individual. The sample focuses on those age 45 to 64 who are currently employed as this analysis uses the actual wages of the individual, in contrast to Arora and Wolf who used actual wages and imputed wages if the individual was not working. The results are separated by sex and find that a 10% increase in wages results in a 18% decrease in the average time of informal care provided by males, compared to a 10% increase in wage resulting in a 36% decrease in informal caregiving in females. Due to potential omitted variable bias, Nizalova suggests that these are biased upwards. It should also be noted that the instruments were considered weak quantitatively, so these results are likely still biased. It also raises the concern of using instruments for these types of analyses.

Rather than the HRS dataset, He and McHenry use the SIPP panels from 1996, 2001, and 2004 for their analysis.[54,55] Similar to Nizalova, the authors use an instrumental variable regression, with the unemployment rate as the instrument.[53] The primary research question was whether work promoting policies would have a negative impact on informal caregiving. They find that working 10% more hours per week results in a 2-percentage point reduction in the likelihood of providing informal care.

For the first paper in this section on the impact of informal caregiving on employment utilizes two cross-sectional surveys. de Moor et al. analyze the Medical Expenditure Panel Survey Experiences with Cancer Survivorship Survey and the 2012 LIVESTRONG Survey for People Affected by Cancer.[56] These are surveyed individuals who may have received informal care. Of those reporting they received informal care, 25-29% reported that their caregiver made an employment change while caregiving, with 8% reporting their caregivers took off 2 or more months. No causal relations can be inferred from these results, but it does provide a sense of directionality, with results similar to literature in Europe.

Rather than looking at employment solely during caregiving, Skira used 8 waves of the HRS starting from the original 1992 wave.[57] The sample was restricted to females between 42 and 70 whose spouse or themselves were in the original wave. Skira finds friction in the labor market if caregivers try to return after caregiving. The results also suggest that a woman in her mid-50s who is an informal caregiver has a total cost of care of $164,726 over a two-year period, substantially higher than previous literature. This is due to not only including foregone wages, but other impacts such as the friction returning to work. This study suggests that not only does informal caregiving have impact during the caregiving period, but also afterwards. The costs are high to the individual; however, it is important to note that this will likely not be internalized by the individual, resulting in more individuals providing informal care even if it is truly so costly.

Two other papers use the HRS, with Barczyk and Kredler using waves from 2000 to 2010,[58] and Van Houtven et al using 9 waves from 1992 to 2008.[59] While the methods and magnitudes differ, these papers have similar results: on average, those that provide informal caregiving to their parents have a lower income. However, using an instrumental variable approach, Van Houtven et al. find that only men who assist with ADLs are less likely to be employed and find that a female caregiver who focuses on chores (IADLs) rather than ADLs

drive the income decrease.[59] They also find an annual foregone income of $5,000 per year in this population combining the income reduction and hours worked reduction.

Overall, the literature is consistent that providing informal care has some impact on employment, although there are moderators such as type of care provided, gender of the caregiver, and whether an individual is currently in the labor force that alter this relationship. Further, studies that used wage as an instrument suggests there are differences in earnings and effect by sex.

The Effect of Caregiving and Work on Personal Care Time

Previous literature suggests that providing informal caregiving can have a negative impact on psychological health, likely resulting in a future decrease in physical health.[12,60] There is also substantial literature demonstrating the high levels of burden informal caregivers have, as well as the potential or realized effect it has on caregiver burnout.[7-11,13,60] There are several theorized and tested mechanisms that may alter this relationship, however, this review will focus on amount of time spent exercising and sleep quality in informal caregivers.

Gallant and Connell focused on spousal caregivers with an age range of 30 to 72 years who cared for an individual with dementia.[61] The majority of caregivers reported good or above health status, although there was a statistically significant difference with more females reporting worse health. The most pertinent results from this paper is half of caregivers reported sleeping less than 7 hours per night with the women, on average, sleeping less. Additionally, nearly half of the female respondents are active less than one time per week during their free time. As this paper categorizes outcomes, it is difficult to have specific results, however, caregivers reported being less active and sleeping less since they began providing care.

On the other hand, Lim et al. conducted a random survey of all adults 65 and older in New South Wales.[62] They did not exclusively sample informal caregivers as Gallant and Connell

had done in their study. They find similarly that females were less likely to exercise, however, they did not find a significant difference by caregiver status, suggesting that such changes in exercise may be a natural course of life.

Fredman et al. followed a similar approach to Lim et al. by including caregivers and non-caregivers in their study.[63] While they do find a statistically significant reduction in leisure-time exercise for informal caregivers compared to non-caregivers, they also run a model with "overall physical activity" that includes exercise obtained during caregiving activities. When this is included in the model, there is not a significant difference between caregivers and non-caregivers.

A paper by Arora and Wolf was mentioned in the previous employment section, but in addition to the employment outcomes, they also include an exercise time measure to the study.[52] This study focused primarily on the effect the level of care need of a recipient had on the tested caregiver outcomes for a sample of caregivers providing care to their parents. They do not find a strong association with the health needs of the parent and the amount of physical activity. It is important to note they use the Health and Retirement Study which has the potential for a recall bias, however, these results appear consistent with Fredman et al. and Lim et al.

In 2016, Byun et al. published a meta-analysis of the effect of informal caregiving to a family member on various sleep characteristics including sleep disturbances, sleep duration, daytime sleepiness, and general sleep quality.[14] In all, the researchers find 76% of all informal caregivers report poor sleep quality, but shows a greater burden on female caregivers than males when split by sex. These sleep characteristics were moderated by recipient confounders and caregiver confounders. The moderators are not surprising as individuals in the general population have differentiations in sleep quality due to similar reasons including physical and mental health. The authors note that the majority of studies in the meta-analysis were cross-sectional and may not have used objective sleep measures.

The previous literature suggests that caregivers may either alter sleep behavior when they become a caregiver, or have a sleep behavior that is different, on average, from non-caregivers in the population. The results of time spent exercising suggests caregivers may not alter some aspects of personal time when they become a caregiver. However, exercise is a task that can occur concurrently with caregiving, whereas other tasks, such as sleeping, are mutually exclusive. Thus, it is important to consider which of these buckets an activity falls into when considering the potential effect of caregiving.

The Effect of Minimum Wage on Employment

The effect of minimum wage on employment has a wide range of literature in the United States as well as from some other countries. However, there is a notable lack of consensus amongst papers as to the effect, directionality, and magnitude the policy has on employment. Two of the most well-known meta-analyses on this topic are by Doucouliagos and Stanley, and Neumark and Wascher. On the one hand, Neumark and Wascher had an analysis comprising of 102 papers for analyses in the United States and internationally.[33] They find that on average, minimum wage policy has disemployment effects when focusing on unskilled workers who would be most impacted by the policy. Once the study population moves beyond the unskilled workers, then the authors find that, on average, there is null or positive employment effects with an increase in the minimum wage. On the other hand, Doucouliagos and Stanley used 64, United States specific studies—comprising of 1,474 minimum wage elasticities—and found that, on average, the removal of publication bias for the studies resulted in a null or positive effect only with an increase in the minimum wage rate.[34] In both cases, the studies rely on the equilibrium of the neoclassical labor market model which will be discussed further in the Methods Section. As the population of interest in this study is not per se unskilled, nor does the caregiver age include teenagers, they will likely not conform to the standard hypothesis that results from the labor model. Thus, the primary focus is on the labor-leisure model which only considers the supply side

of the labor model. The literature does, however, suggest that as the population of caregivers moves away from the typical minimum wage population i.e. unskilled laborers and teenagers, there will be null or positive employment effects.

Gaps in the Literature

There are several overarching themes that are missing or problematic in the current literature. The first is the type of data and datasets currently being used for studies on the United States. Second, and related to datasets, are many studies in the United States have sample selection limitations such as only having caregivers age 50 and older, or only including informal care given within the household.[2,52,53,57-59,61,62] The third and fourth are related as the mechanism and methodology of previous literature are not fully controlling for bias in the wages, nor are they analyzing specific policy changes that may impact the employment outcomes for informal caregivers.[53-55] Fifth, to my knowledge, there are no studies that consider how a macro-level policy, such as minimum wage, may impact how much time an informal elder caregiver spends on personal care activities. Previous literature has shown a reduction in sleep time, but not through the lens of competing incentives in the labor-leisure model.[14,52]

The Survey of Income and Program Participation (SIPP) and Health and Retirement Study (HRS) are two of the dataset used in the most similar literature this study.[52-55] The HRS does contain substantially more information on the health of the person receiving care, but the survey is biannual. While it is feasible to run the regressions without annual data, it will lose some of the nuance as many state-level policies. The HRS is a quasi-mirror to the American Time Use Survey (ATUS) as the focus of the HRS is the recipient of care with limited to no information on the caregiver, whereas the ATUS focuses on the caregiver with limited information on the recipient(s). As such, the HRS does not provide enough pertinent data for this study unless one is focusing on child caregivers.

SIPP is longitudinal in nature; however, this aspect is not able to be exploited for the analysis as questions regarding informal caregiving are only asked once each panel. For example, the questions were asked for one panel in 2003, the next panel was asked in 2006, and the next panel was asked in 2011.[64] This would require the dataset to be used as a repeating cross-section unless one would assume the response in that one wave was consistent across all waves. Additionally, for the core panels, informal care is focused on care provided within the household, limiting sample of informal caregivers to be studied.

Other datasets such as the National Health and Aging Trends Study (NHATS) and the child National Study of Caregiving (NSOC) have similar problems where the informal caregiving and/or employment questions are only asked every few panels. The NSOC would provide information on informal caregiving hours and employment characteristics, but was only administered in 2011, 2015, and 2017. In all cases, these surveys do not utilize a time diary which is considered the gold standard for informal caregiving measuring, and in this case, personal care time of the caregiver.[65]

The American Time Use Survey (ATUS) and the Current Population Survey (the parent survey) contain similar socio-economic, demographic, and informal caregiving variables, while also utilizing a time diary. Also, the specific eldercare questions have been consistently asked from 2011 to 2017. The recent data is also important for this analysis as the minimum wage has been decreasing in economic effectiveness over time which may result in a significant finding for earlier years, but insignificant findings today.

This study analyzes the effect of a policy change related to the minimum wage rather than using the specific wages of an individual. This will provide two benefits to the study. The first is that even though several authors attempt to control for bias through instrumental variables, the results are still likely biased as several unmeasurable variables can alter employment characteristics and the ability to manage employment and informal caregiving.[53-55] By using the

minimum wage policy change, different methodology—a difference-in-difference model—can be used to reduce the bias further than many of the instruments used previously.[66] The second benefit to this approach is the impact of the minimum wage policy can be analyzed which has not been done in the context of informal caregiving. This will provide new information to the field and analyze if there are unintentional consequences of the minimum wage policy that could negatively impact the expenditure of the long-term services and supports sector.

Conclusion

While there is a wide breadth of literature about the interaction of employment and informal care in the United States and Europe, no studies address the impact of the minimum wage policy on employment outcomes for this population, utilize a time diary survey to understand the potential impact on caregiver burden, nor account for a few or a multitude of biases that could impact the results. The American Time Use Survey attached to the data from the Current Population Survey will allow an analysis with an annually repeating cross-section dataset that also includes time diary data. Using the minimum wage rather than individual level instrumental variables will serve two purposes. The first is it will reduce the bias in many of the current literature as income becomes exogenous. Second, and of greater importance for expanding the current field, the minimum wage measure will be useful in understanding how the minimum wage impacts an informal elder caregiver. Additionally, this study will be the first, to my knowledge, that will analyze whether the minimum wage policy has an impact on the personal care time of an informal elder caregiver. While this only captures one aspect of caregiver health, it will provide an indication as to whether there may be an unintended consequence from minimum wage policy in this population.

III. Methods

Theoretical Framework

There are three theoretical models underlying the relationship between state minimum wage policies and employment outcomes of informal elder caregivers, as well as personal time of the caregivers. This relationship combines the demand of informal care by the person receiving care and the supply of the informal elder caregiver, and the tradeoff for the informal elder caregiver between providing eldercare and being employed. The Demand for Healthcare Services and Andersen Behavioral Model for Healthcare Utilization will be utilized to define the first portion of the relationship; with the second portion explained using the Labor-Leisure Model.

Demand for Healthcare Services

The equation for the demand of healthcare services is a function of six variables:

$$D(healthcare) = f(P, P_s, P_C, I, HS, T).$$

The first variable, P, is the price of eldercare; the second variable, P_s, is the price of substitute services; the third variable, P_C, is the price of complementary goods; the fourth variable is income; the fifth variable is health status; and the sixth variable is taste and preferences.[39]

The two categories of eldercare are informal care and formal care. As the focus of this paper is on informal care, it is important to dissect the relationship between these categories and how they interact in the Demand model. Some research suggests that these are substitutes, [2,3,67] whereas other research finds these services to be complements.[68,69] Ultimately, the health status of the person receiving care may determine whether these services are substitutes or complements.[38]

If an individual has a lower-level of care needs such as assistance with cleaning, shopping, and/or transportation—primarily IADL assistance—informal care is more likely to be a substitute. Realistically, there is no additional training or knowledge the informal caregiver would need to obtain for these caregiving activities. Rather, the primary cost is the time commitment. If the individual has a higher-level of healthcare needs such as assistance with a feeding tube,

bathing, and/or dressing—ADL assistance—additional knowledge and training may be required. In this case, informal care and formal care may be complements; the cost—including training, time, and physical demands—of the care is too high for the informal caregiver and is passed on to a formal caregiver who has the requisite training.

The price of formal care matters in two aspects. When informal care and formal care are substitutes, the individual will choose the option that has the maximum utility per dollar cost. When they are complements, there is some corresponding quantity of informal care demanded per unit of formal care demanded.

Health status alters the demand for eldercare in two ways. The first was previously mentioned, with research suggesting that health status determines whether informal care and formal care are complements or substitutes. The second is whether an individual has a need for the eldercare and what intensity of services are required. If an individual is relatively healthy such that they are able to fulfill their activities of daily living independently, then there is no need for assistance. If assistance is required there are varying levels of what that assistance will look like and who is capable of providing such intensity of care.

Insurance for the study population is relatively uniform. In this study, the persons receiving care are 65 or older thus they are nearly all covered by Medicare. There are some differentiations in the Medicare market such as Medigap and Medicare Advantage plans as opposed to, or in addition to, traditional Medicare. However, the coverage for home health—the closest substitute to informal care—will be relatively stable across the population. Until 2019, Medicare Advantage plans nor Medigap plans could cover custodial LTSS. While there are private LTSS insurance plans in traditional and hybrid formats, they are not per se common in this population. In 2015, only 7.5 million individuals had such insurance.[70] Even in the unlikely scenario that every policy was held by those 65 and older, this would represent less than 16% of that population. One caveat, however, is State Medicaid programs vary in eligibility criteria,

which may alter the need to spend down assets prior to qualifying for the program. There may also be variation in the cost of care by state that alters the length someone could afford formal care paying out of pocket.

Income, including assets, may also determine whether informal care or formal care is demanded and at what intensity. Informal care typically does not require direct payments to the caregiver whereas formal caregivers are paid for out-of-pocket or through insurance if coverage is available.

The final variable is taste and preference. Under economic theory, this variable is broad and difficult to define. It is also unable to be directly measured solely using this definition. To identify correlated constructs within this variable, the Andersen Behavioral Model for Healthcare Utilization will be utilized [71].

Andersen Behavioral Model for Healthcare Utilization

The Andersen Model includes categories of predisposing, enabling, and need.[71] The predisposing category includes characteristics that are biological or social in nature and impact the behavior in seeking to utilize eldercare, and also whether someone provides informal eldercare. The enabling category includes characteristics that allow an individual to access formal and/or informal care in order to utilize them. The need category suggests that a perceived or evaluated need is necessary for the caregiving service. Contextual level characteristics are defined as characteristics existing at the macro-level such as the community or state. The individual level characteristics entail the same categories but are specific to a person.

In addition to deriving confounders, the Andersen framework is also useful for creating a pictorial representation of the conceptual framework. The specifics of this Model will be discussed further in the Measures section.

Labor-Leisure Model

The labor-leisure model has been covered extensively in labor economic textbooks. This explanation of the model is derived from George Borjas.[37] Caregivers face a tradeoff when deciding to provide informal care to someone. One of the limited resources individuals face is the amount of time they have in a day. An individual may divide this time according to the function

$$(1) \quad T = h + l$$

where *T* is the number of hours in a day (24), *h* is number of hours spent performing labor during a day, and *l* is the hours of leisure time available. Labor is defined in this model as performing measurable economic activity, primarily working for an employer. According to the neoclassical theory of labor-leisure, an individual has a set of indifference curves based upon their utility function:

$$(2) \quad U = f(C, L)$$

The utility of an individual is a function of consumption (*C*) and leisure (*L*). These indifference curves are limited by the budget constraint. Based on hourly wage (*w*) and non-wage income (*n*), this function (3) is the maximum amount that may be spent on goods.

$$(3) \quad C = wh + n$$

Combining Equations (1) and (3) results in the budget line:

$$(4) \quad C = (wT + n) - wl$$

Equation (4) shows the slope of the budget line is a negative hourly wage rate and has a y-intercept of the maximum income available to the individual assuming they worked the entire day without any time for leisure.

As with other consumption bundles the consumer attempts to maximize, the optimal consumer bundle for the individual is where the slope of the indifference curve and slope of the

budget line are equal. Taking the derivative of Equation (2) and setting equal to the derivative of Equation (4), the result is Equation (5).

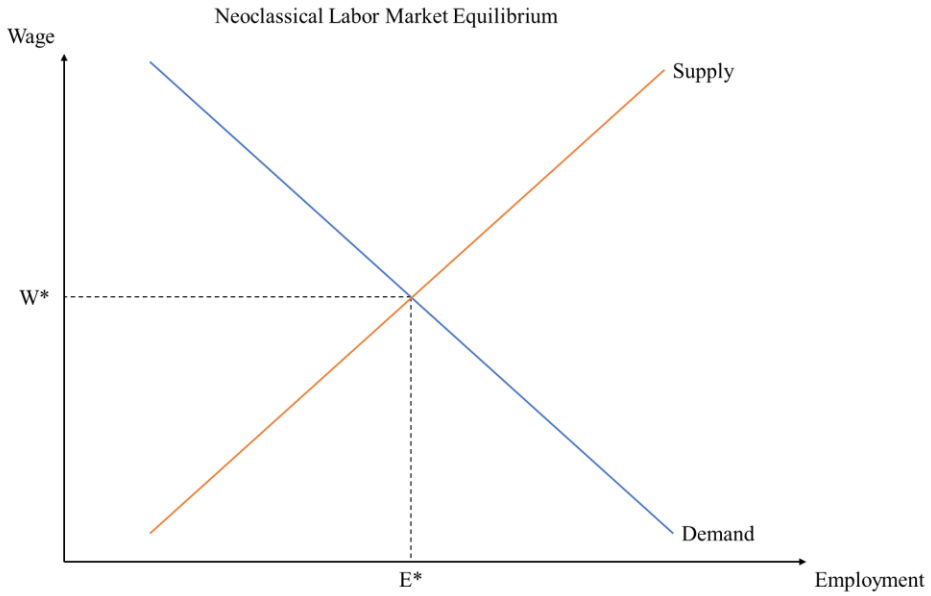
$$(5)\quad \frac{MU_L}{MU_C} = w$$

Due to the structure of Equation (4), an increase in the hourly wage rate rotates the budget line such that the y-intercept will be higher, and the slope of the curve will be steeper. However, one cannot accurately predict how the higher wages will impact the number of hours an individual works. The consumer would be on a higher indifference curve, but the optimal bundle may entail more or less work hours.

Informal caregiving requires some amount of leisure time to perform the tasks. While one cannot accurately predict whether an individual will work more with an increase in hourly wage, there are two ways that minimum wage will likely impact the decision to provide informal care. First is incentivizing more individuals to work. Every individual in the labor force has a minimum wage they are willing to work for—the reservation wage. Below that wage, the individual gains greater utility by not working. By increasing the legislative minimum wage, the likelihood of the new wage being equal to or exceeding the reservation wage of an individual is higher than the previous minimum wage level. Second, Equation (5) shows that higher wages make leisure activities more expensive to engage in. Thus, specific leisure activities will also need to maximize utility which may result in a decrease in time spent on certain activities with this leisure category.

Figure 3 represents the market equilibrium in a neoclassical labor market. The labor-leisure model is the supply function in this market. The demand function is similar but is the optimized function for firms.

FIGURE 3



From a theoretical standpoint, this model suggests that a binding statutory wage floor—such that the minimum wage is set above the equilibrium—will result in disemployment. However, if the floor is non-binding, there will be no change in the market equilibrium. This, however, is overly simplistic. As minimum wage primarily effects unskilled workers, it may be true that in such market, there is disemployment effects. However, that demand for labor may simply be shifted into a different market. If a worker is suddenly more costly, the firm may desire someone above the unskilled level that will produce greater returns than the initial unskilled individual. Since this labor of informal caregivers is not per se unskilled, there is a greater likelihood of null or positive employment effects than disemployment effects.

Research Design

Overview

This study will be a quasi-experimental, cross-sectional analysis utilizing difference-in-difference methodology. While the federal minimum wage presents a blanket policy across the entire population of the United States, state policies differ across time and place. There may be

underlying reasons a minimum wage policy is passed in one state and not in another, however, informal or formal caregivers do not cause a sudden change in policy. Thus, we are able to exploit this natural variation with a difference-in-difference analysis.

The primary threat to internal validity with this design is if the parallel trend assumption (in the dependent variable) fails, any estimated effects will be biased.[66] It is also difficult to generalize these findings beyond the research dataset. For example, it would be unwise to consider minimum wage increases outside of the range included in the analysis i.e. a minimum wage increase to $15 an hour. A further concern with this analysis is the relatively small sample size of informal elder caregivers in the dataset.

Datasets

Data for this analysis are primarily from four datasets. The American Time Use Survey (ATUS) and the Current Population Survey (CPS) are both conducted by the United States Census Bureau in partnership with the Bureau of Labor Statistics. Individuals who are randomly surveyed for the ATUS have also completed all eight waves of the CPS interviews. All individual-level variables for the informal caregiver and the person receiving care are captured in these datasets. The dataset from the University of Kentucky Center for Poverty Research provides the majority of state-level variables.[72] In cases where this dataset had not been updated to 2017, the data was retrieved from the same source as the dataset used for previous years. This will be noted in Table 3 where applicable. Additionally, the Genworth Cost of Care Survey provides median cost for formal LTSS by state and year.[19]

The four datasets are described in greater detail in the subsections that follow. As there are benefits and limitations to all datasets, it is useful to compare the ATUS to the Health and Retirement Study (HRS) managed by the University of Michigan.[50] There are limited surveys on informal caregivers in the United States, with the HRS being commonly used by researchers. While the survey design would allow greater control for the person receiving informal care, there

are several limitations regarding the potential sample of informal caregivers. First, the HRS is representative of individuals age 50 and over in the United States. While age 50 to 64 is included in the working age adult definition for this analysis, it only represents a small proportion of the 18 to 64 range considered. There would also be substantially less representation of prime working age adults—age 25 to 54—in this dataset. Additionally, the informal caregivers surveyed are generally relatives to the cohort member, eliminating possible informal caregivers who are friends and neighbors.

Current Population Survey

All information contained in this section has been pulled from the United States Department of Labor and the United States Department of Commerce technical guide of the Current Population Survey, released in 2006.[73] The Current Population Survey (CPS) began in 1940 and currently interviews approximately 60,000 households each month. An individual is randomly selected and answers questions regarding the entire household. To be eligible, the individual must be at least 15 years old, non-institutionalized, and a civilian. As the survey is utilized by the Bureau of Labor Statistics, many of the questions relate to employment and economic activity.

The monthly interviews gather information applicable the week prior to the interview. For example, if someone in the household was unemployed last week, they would be listed as unemployed even if they became employed the day prior to the interview. Individuals remain in the survey pool for a total of 16 months. Interviews are conducted the first 4 months, and then there is an 8-month break where there are no inquires. The interviews are then conducted for the last 4 months.

CPS non-response rates are considered low compared to similar surveys. From July 2015 to June 2017, the non-response rate was less than 16%.[74] It is important to note that some values are imputed. These values, however, are checked for logic and based on other responses.

American Time Use Survey

All information contained in this section has been pulled from the Bureau of Labor Statistics technical guide of the American Time Use Survey, released in 2018.[75] The American Time Use Survey (ATUS) began in 2003. There have been a few modifications and changes in supplemental modules. In 2011, travel questions were removed and replaced with questions pertaining to eldercare. Individuals are randomly selected to complete the ATUS from the pool of individuals who have completed all 16 months (eight waves) of the Current Population Survey (CPS). This allows data integration between the two surveys.

Since ATUS uses the same pool of individuals as those completing the CPS, individuals must be at least 15 years old, non-institutionalized, and a civilian. Two-months after completing the last CPS interview, an individual becomes eligible for ATUS. ATUS utilizes a slightly different sample design than the CPS. For example, ATUS does not oversample based on state population as the CPS does, but it does oversample Hispanic households, non-Hispanic black households, and households with children. Due to the natural constraint of a restricted sample, the other categories are under-sampled e.g. households without children. Due to these changes, the weights of the ATUS differ from the weights of the CPS. Additionally, the weights for individuals are based on the day the interview was conducted for more accurate time estimation. For example, a dairy day on the weekend would more likely under-estimate time spent working compared to a dairy day during the week. The individual selected to complete the ATUS is not necessarily the same individual who completed the CPS. Anyone in a household who is at least 15 has an equal probability of being selected. All questions on the amount of time spent on tasks are for the day prior to the interview.

Activities are divided by broad categories as well as sub-categories. One important factor of this survey is reliability of coding these activities. Notably, the ATUS is the only survey conducted by the Census Bureau where personnel are responsible for interviewing and coding.

This is one way of reducing errors in the activity coding. Additionally, a double-coding system is utilized where two staff members code the activity based on the information provided. If the codes are the same, then that survey is closed. If the codes differ, it is sent to a third staff member, such as a supervisor, who decides the correct code. Staff members are expected to maintain an error rate less than 10% and may be placed under supervision before it reaches that high of level.

Since the data from the CPS and ATUS can be combined, some questions may be duplicative, and others may only exist in one survey. In cases where the questions are duplicative, the ATUS is more recent and should be utilized.

The annual sample size of the ATUS is approximately 26,400 compared to 60,000 households for the CPS.[76] Non-response rates for the ATUS are higher than the CPS, however, they are still lower than some similar surveys. Table 1 provides the response rates from 2011 to 2017. As with many surveys, the sample rate has been declining over time potentially due to a rise in robocalls bearing similar call characteristics to the survey, concern over privacy or the survey being illegitimate, and individuals wanting to spend time on other activities requiring their attention.[77,78]

Table 1

Year	**ATUS Response Rate (%)**
2011	54.6
2012	53.2
2013	49.9
2014	51.0
2015	48.5

2016	46.8
2017	45.6

As previously mentioned, some data are imputed by staff members. Additionally, there are some missing data values in the sections of interest. Table 2 provides the percentage of data that are imputed or left missing. The percentages are relatively low and do not suggest a systematic issue with the underlying survey design or data.

Table 2

Survey Section	**Missing (%)**	**Imputed (%)**
Employment Status	0	1
Eldercare Recipient	0	1 to 4
Eldercare Respondent (Caregiver)	1 to 3	0

University of Kentucky Center for Poverty Research

The University of Kentucky Center for Poverty Research provides a dataset of state and federal policies from 1980 to 2017.[72] These data are retrieved from respective government agencies as well as from well-regarded think-tanks such as the Urban Institute and updated annually. A few data points were randomly selected to corroborate with the original source and were found to be accurate. The one missing data piece from this database is 2017 values for the Temporary Assistance for Needy Families program. These values were retrieved from the same source as previous years in the dataset, the Welfare Rules Database at the Urban Institute.

Genworth Cost of Care Survey

The 2018 Cost of Care Survey marked fifteen years of the survey.[19] This work is completed by randomly selecting providers in their network of providers and asking questions dependent on the type of care, to determine the median state-wide cost of a homemaker, home health aide, adult day center, assisted living, and nursing home care.[19] Genworth sells LTSS private insurance, however, the median annual cost data has been used by other sources such as the US Department of Health and Human Services on their long-term care webpage.[79]

Measures

Focal Relationship

The focal relationship of this conceptual framework is State Minimum Wage Policy and employment outcomes of informal elder caregivers. Informal elder caregivers have, outside of a paying job, provided care more than once in the past three months to at least one individual age 65 and older who required assistance. The caregiver and person receiving care do not need to be related nor do they need to live in the same household. Services provided by the caregiver may range from cleaning the house, preparing meals, and running errands, to assisting with tube feedings, bathing, and lifting.

Wage is defined as the prevailing hourly dollar amount that an employee receives from their employer for labor performed. Minimum wage policy provides a statutory minimum wage floor for hourly wage workers and has a direct impact on income for those covered by the Fair Labor and Standards Act. Prevailing wage is used as in some cases a state or federal minimum wage will exceed the other. In these cases, the higher wage of the two is the prevailing rate. Some localities have set minimum wage rates above the federal and state, however, those rates will not be included in this analysis due to the sample size of the dataset, inability to analyze geographical units below state, and most importantly, uncertainty determining whether someone would fall

under the local rate based only on survey address data—generally a home address. The minimum wage measure for this measurement is equal to the *prevailing state wage subtracted by the baseline of the Federal Minimum Wage*.

The employment outcomes are whether the individual is *employed*, is *in the labor force*, works *full-time*, and *hours worked per week across all jobs*. Someone is employed if they work full- or part-time. Individuals are still considered employed if they were absent from their job for an agreed upon period. Being in the labor force requires an individual to be currently employed or actively seeking a job. Full-time employment is defined as working at least 35 hours per week during a normal week. Hours worked per week is a unit measure for all paid jobs.

A secondary focal relationship for this analysis is State Minimum Wage Policy and the time informal elder caregivers spend on personal care and sleep. *Personal care time* is defined as the number of minutes daily an individual spends on sleeping (sleeping and sleeplessness), grooming, health-related self care, personal activities, and personal care activities on average. *Sleep time* only includes the number of minutes daily an individual spends sleeping on average.

Confounders

As mentioned previously, the confounders for this conceptual framework come from the Theory of Demand for Healthcare Services, Andersen Model, and Labor-Leisure Model. For a visual representation of the confounders and the expected pathway and relationship between variables in the focal relationship, see Figure 4 at the end of this section.

Theory of Demand for Healthcare Services

The confounders in this Theory focus specifically on the person receiving care as well as some state-level confounders. The first three variables of the Theory are the price of eldercare, the price of substitutes, and the price of complements. Pricing is primarily based on the cost of formal care in the area which is modified by geographic location[80] (*metropolitan status*) and

consists of the *median wage of a home health aide*. A metropolitan is an area designated as such according to the 2000 US Census definition. A home health aide is someone who provides personal-care to an individual, but does not necessarily require a nursing licensure. The home health aide is employed by a licensed agency, but that agency is not necessarily approved by Medicare for this measure.[19]

Income of the person receiving care, as a percent of the federal poverty line for 2017, will not be measured in this analysis. *Health status of the person receiving care* impacts whether formal care should be considered a substitute or a complement and may also change the likelihood of someone providing informal care to the individual.[38] Generally, health status can be defined as evaluated or perceived. Evaluated health status includes patient-level evidence such as blood pressure readings, pain levels, and current diagnoses. Perceived health status is how an individual defines their own health and typically includes all dimensions of well-being in the past and present. The American Time Use Survey does not allow one to directly measure evaluated or perceived health status.

The taste vector is unable to be directly measured when using this Theory. The Andersen Model will provide more specific measures to proxy for the taste vector.

Andersen Model

Predisposing personal characteristics for the caregiver include general demographic characteristics: *age*, *race*, *sex*, and *education*. Age is defined as the number of years someone has been alive since birth, rounded to the most recent year i.e. someone who is 84 years, 3 months, and 6 days old is 84. Due to the nature of publicly available datasets and the need maintain privacy, age is typically top coded where everyone above a certain age is marked as the maximum coded year. Age presents several quandaries in predicting the likelihood of someone being an informal caregiver and working. For example, someone who is young may have more time on their hands and stamina to assist but have greater difficulty to enter the job market due to

experience. Someone slightly older will likely have those physical characteristics still but may have competing responsibilities such as taking care of children as well. When an individual becomes older than that point, they may not be able to readily enter the workforce again as shown by previous literature.

Race includes ethnicity and is based on self-reporting. Self-reporting allows this measure to be based on numerous factors such as appearance, societal identification, or cultural identity. Sex is also self-reported but will only include the categories of male and female. There is substantial literature suggesting that the propensity to provide care and the impact on labor is significantly different between males and females.[36,81,82] Education is defined as the number of years an individual has attended school and what standard levels of achievement they have completed, such as high school or college graduation. Education largely impacts the type of job an individual may obtain and the likelihood that a minimum wage policy will impact them.

Regarding the person receiving care, there are two predisposing and two enabling individual-level characteristics. The predisposing is *age*, with the same definition as the informal caregiver. In this case, age impacts the likelihood of someone having a need for informal caregiving and what the level of need is. The second predisposing is the *willingness of an individual to receive informal care*. This will remain unmeasured for the analysis; however, it should still be noted. There may be less hesitation asking an untrained family member or friend to shop than asking them for assistance in getting dressed.

The first enabling characteristic is whether the informal caregiver and person receiving care *reside in the same household*. By residing in the same household, there is a decreased likelihood that the care could be passed to a different informal caregiver and hence, the caregiver is less likely to be able to work. This may also relate to the level of need the recipient has if they reside in the same house due to being unable to live alone. The second enabling characteristic is

the *relationship to the caregiver*. If the person receiving care and the caregiver are relatives there is a different relationship dynamic compared to the caregiver being a non-relative.

Labor-Leisure Model

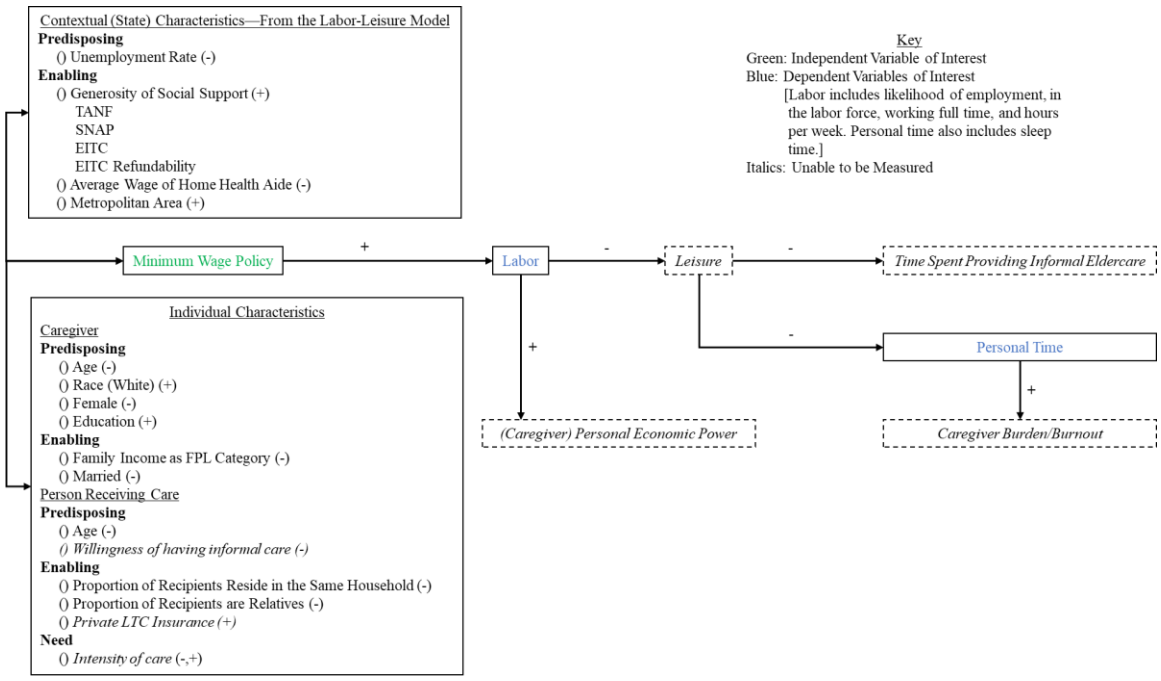
The labor-leisure model rests on an assumed budget constraint specific to the decision maker. However, the specific wage and income of the individual will not be directly measured. Rather, there are other factors that will alter the decision of an individual to work more or have more leisure. The first is *family income as a percent of the federal poverty line*. For those caregivers with family income, the individual can still have a positive budget without working, or an expanded budget line compared to only having an individual income. This will alter the incentive to work initially and the number of hours to work. An additional enabling characteristic for the informal elder caregiver is *marital status* which may alter the ability an individual has to provide care while still being able to have family income.

As the labor-leisure model includes non-work income, it is also important to include state-level confounders that alter this income amount. This includes the *minimum wage* focal variable, the *state TANF policy*, *state SNAP policy*, *state EITC refund rate*, and whether the *state EITC is refundable*. These policies primarily target low-income workers such as those receiving the minimum wage. They provide additional income benefits to the receiver and vary by generosity across state-years. These values are adjusted for inflation as a yearly increase may be negated if the value of the dollar is reduced. While any amount received may be included in the family income measure already included, these are still included in the model as they are alternatives that could incentivize a caregiver towards a different decision path i.e. to work or not to work.

There are also macro-economic factors that may impact the decision of an individual to be in the labor market or have the ability to become employed. The *unemployment rate* will provide a proxy to the job market for a state-year. The unemployment rate will be measured as

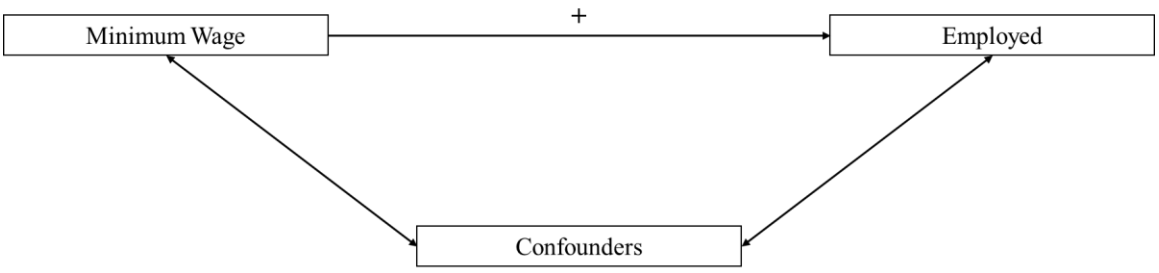
the U-3, commonly referred to as the official unemployment rate. This is a measure of the unemployed as a percentage of the civilian labor force. These statistics are derived monthly and will be averaged to annual rates.

Figure 4

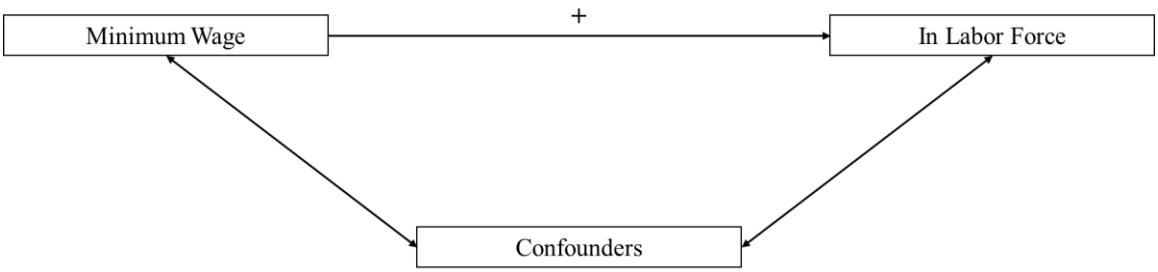


Hypotheses

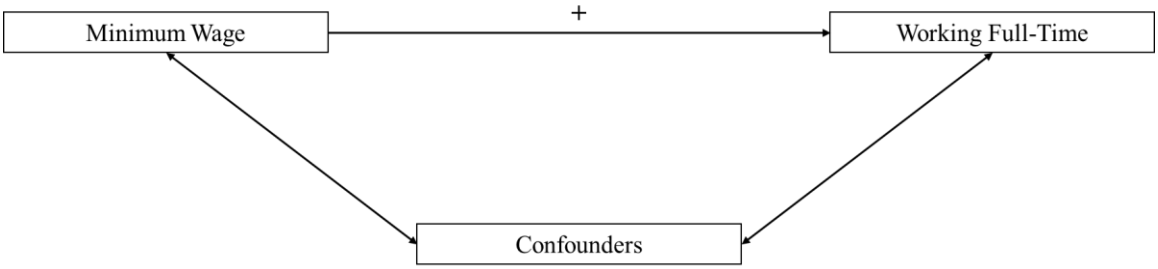
H1: There is an increase in the likelihood that an informal elder caregiver is employed as the prevailing minimum wage increases.



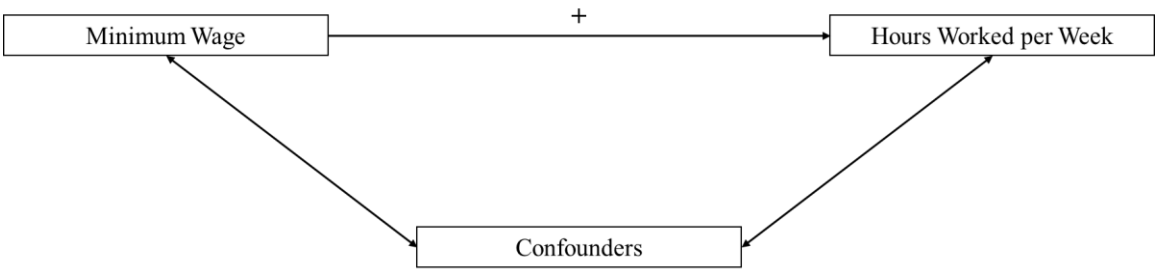
H2: There is an increase in the likelihood that an informal elder caregiver is in the labor force as the prevailing minimum wage increases.



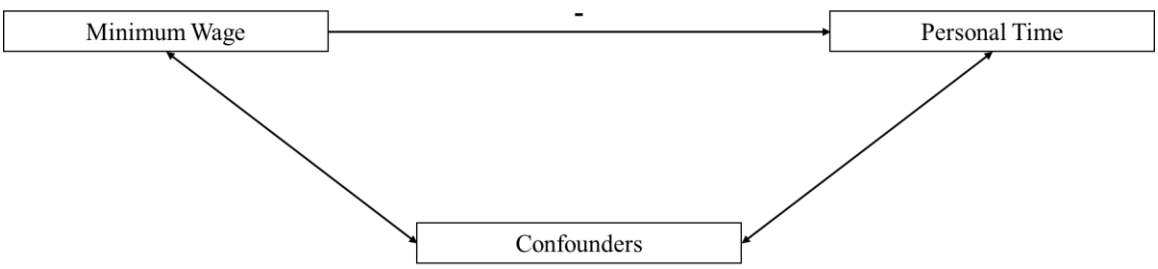
H3: There is an increase in the likelihood that an informal elder caregiver works full-time as the prevailing minimum wage increases.



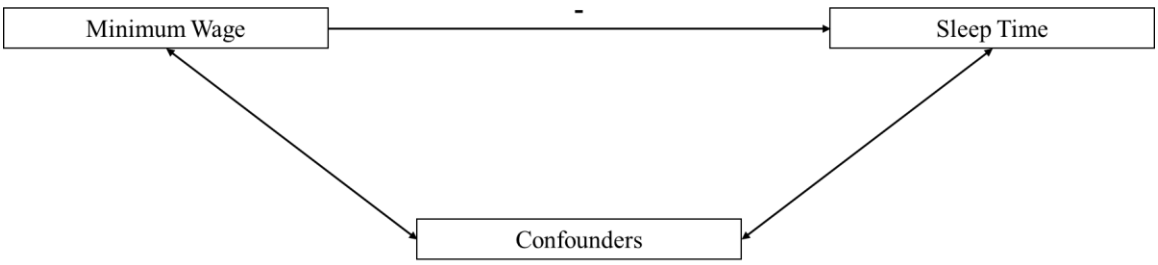
H4: There is an increase in the number of hours an informal elder caregiver works across all jobs as the prevailing minimum wage increases.



H5: There is a decrease in the amount of personal time of an informal elder caregiver as the prevailing minimum wage increases.



H5: There is a decrease in the amount of time an informal elder caregiver sleeps as the prevailing minimum wage increases.



Analytical Strategy

Institutional Review Board Review

The research proposal was submitted to the Institutional Review Board at Emory University (IRB) for consideration. Since the dataset is publicly available and does not contain any protected health information identifiers, it was determined by the IRB that this research did not need to be reviewed further, nor receive approval from the IRB.

Difference-in-Difference Model

The difference-in-difference model for the primary analyses based on previous literature[83,84] is:

$$Y_{irst} = \beta_0 + \beta_1 MW_{st} + \beta_2 A_{it} + \beta_3 C_{st} + \beta_4 G_{rt} + \omega_s + \delta_t + \varepsilon_{irst}$$

where Y_{irst} is an indicator for the employment outcome for an informal elder caregiver between the ages of 18 and 64 i, taking care of recipient(s) r, residing in state s, during year t; MW_{st} is the difference in the prevailing minimum wage rate from the baseline (federal) in a given state s, during year t; A_{it} includes informal elder caregiver confounders listed later in this section; C_{st} includes state confounders listed later in this section; G_{rt} includes confounders for informal eldercare recipient(s), also listed later in this section; ω is time-invariant state effects; δ is state-invariant year effects; and ε_{irst} is the error term. The coefficient of interest is β_1 which is the average treatment effect. As MW_{st} is calculated by subtracting the federal-year minimum wage (the baseline) from a state-year minimum wage, the control group is any state-year that is equal to zero, and the treatment is any state-year that is greater than zero. Out of 357 possible state-year combinations, there are 171 with MW_{st} greater than zero, and 96 state-year combinations that have a change in the MW_{st} value.

Assumptions of a Difference-in-Difference Analysis

Three components are required for a causal inference: exchangeability, positivity, and stable unit treatment value (SUTVA).[85] Exchangeability suggests that had the control group received the treatment, they would have had the same results as those in the experimental treatment group. Positivity ensures that there is some likelihood that an individual could be assigned to the treatment group and some likelihood that the individual could be assigned the control group. These do not have to be per se equal, just non-zero. SUTVA that everyone in the treatment group receives the same treatment and that the outcome of an individual should not be impacted by which treatment category others were assigned to.

The difference-in-difference model requires the additional assumption that the treatment and control groups have parallel trends prior to the treatment.[86] This will be tested by rerunning all models with a state-specific linear time trend coefficient according to the model:

$$Y_{irst} = \beta_0 + \beta_1 MW_{st} + \beta_2 A_{it} + \beta_3 C_{st} + \beta_4 G_{rt} + \omega_s * t + \delta_t + \varepsilon_{irst}$$

where t is the linear time trend calculated by subtracting 2011 from the year, similar to previous literature.[84,87,88]

Additionally, the model will be run for a falsification test by having an outcome of the likelihood having ever served in the armed forces. While this is not an ideal variable for the falsification test, it should be functional as it is a decision made in the past, rather than the present. The resultant coefficient should be zero and not statistically significant if the model is not picking up trends outside of the focal relationship. Due to the complexity of minimum wage and labor outcomes, this is preferred to developing a difference-in-difference-in-difference approach.[66,89]

Data Analysis

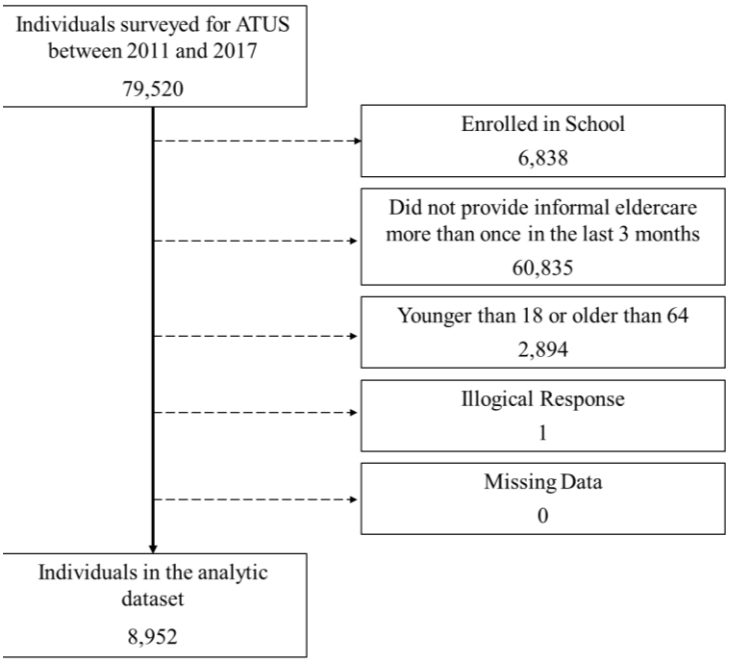
The timeframe for this analysis is from 2011 to 2017. During this time there were 79,520 individuals interviewed for the American Time Use Survey, 96 changes in state-year minimum wage policies, and no changes to the Federal Minimum Wage.[6,72] All analyses will be run in STATA, version 15.1.[90]

In order to create the analytic dataset, those reporting school enrollment will be excluded as the potential to be in the labor force is altered. This removed 6,838 individuals from the initial sample size of 79,520. Next, individuals who do not meet the criteria of an informal elder caregiver will be removed. There are two requirements for an individual to be considered an informal elder caregiver. First, an individual must have provided age-related assistance to someone—outside of a paying job—more than once in the past 3 to 4 months depending on the

date of the ATUS interview. Second, individuals responding in the affirmative to the first requirement are able to respond with 1 to 5 people who they have provided this care to. Individuals who are below age 65 are then removed from the dataset. Thus, an informal caregiver must give care to at least one individual over age 65 to meet the second criteria. The sample size was reduced by 60,835 following this exclusion.

Individuals must not have had any missing data in the pertinent confounders or dependent variables. No data imputations were conducted for individual level data beyond those performed by staff at the United States Census Bureau. Largely due to the nature of the survey design, no individuals were removed from the dataset due to missing data. One individual was removed for illogical responses as they claimed to have provided care to an individual for more years than the age of the care recipient. Figure 2 provides a visual representation of the exclusion and inclusion criteria.

Figure 5



Imputing Missing State Data

Out of all the state-level confounders, there was one state-year missing value—the median hourly wage of a home health aide. As the preceding and proceeding data were available, the missing value was simply the average of those two values.

Creating Federal Poverty Level Categories

The American Time Use Survey, as well as some other federal level surveys, do not provide an exact income figure. Rather, the survey will provide a bracket in which an individual's income falls into. While controlling for income this way would be relatively simplistic, it would not account for variation in family size or cost of living in Alaska and Hawaii. Thus, only using income brackets would bias the confounder. Instead, the income confounder will be based off the federal poverty level in 2017.

The federal poverty level (FPL) is based on income, family size, and geographic location. Three FPL categories were created: from 0 to 100% FPL, >100% to 200% FPL, and above 200% FPL. Due to the nature of the bracketed income, these categories were not adjusted for inflation. Given the time frame of the analysis, however, this should not bias the categorization process. The income brackets do not perfectly align with the FPL amounts so for example, it may be determined that the value of 100% FPL for a family of size *q*, not living in Hawaii or Alaska, falls within bracket *i*. It is easy to determine that all individuals with family size *q*, not living in Hawaii or Alaska, and in a bracket less than *i* falls in the 0 to 100% FPL category. However, it is impossible to know specifically which individuals with family size *q*, not living in Alaska or Hawaii, and in bracket *i* should be categorized between 0 and 10% FPL, and which should be in the >100 to 200% FPL category.

To circumvent this analytical quandary, a random sample of individuals meeting the requirement based on where the FPL value falls within the income bracket will be taken

according to the following methodology. For a resultant FPL value (*f*) falling within bracket *i*, a percent (*g*) is calculated according to Equation (6):

$$(6)\ g = \frac{f - \min[i]}{\max[i] - \min[i]}$$

for family size *q*, not living in Alaska or Hawaii. Values of FPL were calculated for family sizes 1 to 15 for those not living in Alaska or Hawaii, those living in Alaska, and those living in Hawaii. Once the percentage of the income bracket was calculated according to Equation (6), the number of individuals (*d*) meeting the family size, location, and income level was calculated. Next, the size of the random sample was calculated by multiplying *d* and *g*. If an individual was randomly selected from the pool, they would be placed in that income category. Those who were in the bracket and not randomly selected would then be categorized in the next FPL category.

Regression Analysis

All analyses are difference-in-difference (DD) with state and year fixed effects. For the likelihood outcomes (employment, in the labor force, and full-time) a linear probability model (LPM) was used. To ensure there was no unusual result from the LPM, logistic models were also run, with the marginal effects compared to the LPM. Time outcomes (hours worked per week across all jobs, personal care time, and sleep time) with be run as ordinary least squares regressions. All models also have robust standard errors clustered at the state to control for within-state serial correlation. Additionally, an alpha-level of 0.05 will be used to test for significance.

For the analysis, the analytic dataset will be tested with all informal elder caregivers and separated by sex with the analyses rerun due to previous literature showing differential employment outcomes for male and female informal elder caregivers. The models will first be run unweighted, then with the survey weights added. Next the state-specific linear time trends will be added into each of those models. As ATUS is a repeated cross-sectional dataset, the

survey weights are an important consideration. They are also necessary for proper time estimates due to the different days individuals are interviewed i.e. weekdays and weekends.

Variables Operationalized

The following Table (Table 3) provides how the variables will be categorized in the analysis. These are based on the definitions found in the Measures section.

Table 3

Construct	**Measure—In the Dataset Documentation**	**Measure—Operationalized**	**Hypothesized Relationship with the Dependent Variable**
Dependent Variables			
Employment Status	TELFS "Labor force status" (ATUS)	0=Not Employed (3, 4) 1=Employed (1, 2)	NA
Labor Force Status	TELFS "Labor force status" (ATUS)	0=Not in civilian labor force (5) 1=In civilian labor force (1, 2, 3, 4)	NA
Work Full-time	TRDPFTPT "Full time or part time employment status of respondent" (ATUS)	0=Part-time (2) or not employed 1=Full-time (1)	NA

Hours Worked per Week Across All Jobs	TEHRUSLT "Edited: total hours usually worked per week (sum of TEHRUSL1 and TEHRUSL2) (ATUS)	Continuous 0-120	NA
All Personal Care Time (in Minutes)	t01* (ATUS)	Continuous 0-1440	NA
Sleep Time (in Minutes)	t010101 (ATUS)	Continuous 0-1433	NA
Independent Variable			
Difference of Prevailing Minimum Wage from Baseline (Federal)	State Minimum Wage (UKCPR) Adjusted for Inflation	Continuous $0-$4.34	As the difference between the prevailing wage and baseline increases, there will be an increase in the employment characteristics. At the same time, there will be a decrease in the time outcomes.

State-Level Confounders			
State Unemployment Rate	Unemployment Rate (UKCPR)	Continuous 2.4-13.0	As state unemployment increases, the employment outcomes will decrease. There will also be an increase in the time outcomes.
Metropolitan Status	GTMETSTA "Metropolitan Status based on MSA definitions from the 2000 census"	0=Not metropolitan (2 "non-metropolitan" and 3 "not identified" 1=Metropolitan (1)	Metropolitan status will increase the likelihood of the employment outcomes and increase the time measures.
State TANF Policy	AFDC/TANF Benefit for 3-person family (UKCPR) Note: 2017 data was not included in UKCPR. Data obtained from Welfare Rules Database through the Urban Institute Adjusted for Inflation	Continuous $170-$1021 per month	As the generosity of TANF benefits increases, the employment outcomes will decrease. There will also be an increase in the time outcomes.

State SNAP Policy	FS/SNAP Benefit for 3-person family (UKCPR) Adjusted for Inflation	Continuous $497-$931 per month	SNAP has the same hypothesized relationship as TANF. As the generosity of benefits increases, the employment outcomes will decrease, and the time outcomes will increase.
State EITC Rate	State EITC Rate (UKCPR) Verified and corrected using state policies if necessary	Continuous 0-0.44	EITC is slightly complicated due to the phase in and out requirements. However, the hypothesized relationship is that employment outcomes will increase and the time outcomes will decrease.
State EITC Refundable	Refundable State EITC (UKCPR) Verified and corrected using state policies if necessary	1=Yes 0=No	If the EITC is refundable, employment outcomes will increase, and time outcomes will decrease.

Median Hourly Wage of Home Health Aide	Hourly Wage by State and Year (Genworth Survey) Adjusted for Inflation	Continuous $15 to $29.43	As the hourly wage of this substitute increases, employment outcomes will decrease, and time outcomes will also decrease
Individual-Level Confounders of the Caregiver			
Sex	PESEX "Sex" (ATUS-CPS)	0=Male (1) 1=Female (2)	If the individual is female, their employment outcomes will decrease and personal time will also decrease.
Age	TEAGE "Age" (ATUS)	Continuous from 18 to 64	As the age of the caregiver increases, the employment outcomes will decrease, and personal time will increase.
Education	PEEDUCA "What is the highest level of school you have completed…" (ATUS-CPS)	1=Eighth Grade or Less (31, 32, 33, 34) 2=Some High School (35, 36, 37, 38)	As the independent variable is minimum wage, those with a high school diploma or less will have an increase in

		3=High School Graduate (39) 4=Some College (40) 5=Associate or Bachelors Degree (41, 42, 43) 6=Advanced Degree (44, 45, 46)	employment outcomes compared to those with a higher degree. Time outcomes have an unknown relationship.
Race	PEHSPNON "are you Spanish, Hispanic, or Latino" PTDTRACE "Race (topcoded)" (ATUS-CPS)	1=Hispanic (PEHSPNON=1) 2=White only (PTDTRACE=1) 3=Black only (2) 4=Asian only (4) 5=Other/multiple (3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26)	Race has an unknown relationship with either outcome.

Income Categorized as a Percent of the Federal Poverty Level	HEFAMINC "Family Income" (ATUS-CPS)	Categories are 0 to 100% FPL, >100-200% FPL, and Above 200% FPL. These are based on the income categories in the dataset and then a randomizer is used when there is not a clean break between the FPL amount and the category cutoff.	With higher levels of family income, the employment outcomes will not change or decrease, and the time outcomes will increase.
Individual-Level Confounders of the Person(s) Receiving Care			
Proportion of Individuals That Receive Care Living in the Same House as the Caregiver	TRELHH "Eldercare recipient is a household member"	0=Recipient is not a household member 1=Recipient is a household member	As the proportion increases, the employment outcomes will decrease, and the time outcomes will also decrease.
Proportion of Individuals That Receive Care Who Are	TEELWHO "Who did you give this care to?" (Note: all values 30 or less are people	0=Non-relative (28, 29, 30, 43, 44, 56) 1=Relative/Family (20, 21, 22, 23, 24, 25, 26, 27, 33, 34, 35, 36, 37,	As the proportion increases, the employment outcomes will decrease, and the

Relatives of the Caregiver	living in the household)	38, 39, 40, 41, 42, 47, 48, 49)	time outcomes will also decrease.
Average Age of All Individuals Who Receive Care from the Caregiver	TEAGE_EC "Age of eldercare recipient" (ATUS)	Continuous from 0 to 85 (top-coded) (Top-coded where those 85 and over are listed as 85, and those 80-84 are listed as 80)	As the average age increases, the employment outcomes and time outcomes will decrease.
Average Duration of Care for All Individuals Who Receive Care from the Caregiver	TEELDUR "How long have you provided care to [Name]?"	Continuous Amount of Time in Years 0.21 to 60	As the average duration increases, the employment and time outcomes will decrease.
Intensity of Care	*NA*	*NA*	*As the intensity of care increases, there can be two possible impacts on the outcomes. The first is the caregiver continues to care for the individual in which case employment and personal outcomes will diminish. The second*

			possibility is the intensity exceeds the capabilities of the caregiver and formal care is substituted. In this case, the employment and time outcomes will increase.
Willingness to utilize informal care	*NA*	*NA*	*As willingness increases, employment and time outcomes of the caregiver will decrease as more demand is placed on the caregiver.*
Exclusion/Inclusion Criteria			
Provided Eldercare At Least Twice in the Last 3 Months	TUELDER "Not including financial assistance or help you provided as part of your paid job, since the first of [REF_MONTH], have you provided	Exclude: No (2) Include: Yes (1)	NA

	any care of assistance for an adult who needed help because of a condition related to aging?"		
Not Enrolled in School	TESCHENR "Last week, were you enrolled in a high school, college, or university?" (ATUS)	Include: No (2) Exclude: Yes (1)	NA
Age	TEAGE "Age" (ATUS)	Include: 18 to 64 Exclude: Less than 18 and greater than 64	NA

IV. Results

As previously mentioned, state minimum wage policies changed 96 times during the study period. The federal rate did not change, and the average difference between the two policies went from $0.25 in 2011 to $1.12 in 2017. Demographic statistics are presented in Table 4 and use the survey weights with robust standard errors clustered at the state. Unweighted demographic statistics were also calculated and resulted in similar coefficients, but smaller standard errors. Note that all of the following regressions have full result tables available in the Appendix.

Table 4

Informal Elder Caregivers Between 18 and 64—All States and Years (% of the sample unless otherwise specified)		**Weighted**		
		Minimum Wage Above the Federal	Minimum Wage at or Below Federal	p-value (Wald Test)
Sum of Weights (Persons multiplied by number of days)		35,775,829,221	36,740,032,529	NA
Weighted Sample—Average Number of Individuals per Year		14,002,282	14,379,661	NA
Unweighted Sample Size		4271	4681	NA
Employment Dependent Variables				
Labor	In Labor Force	80.77	79.44	0.305
	Employed (In and Out of the Labor Force)	75.49	74.65	0.573

	Full Time (In and Out of the Labor Force)	60.38	61.26	0.561
	Hours Worked Per Week Across All Jobs (In and Out of the Labor Force)	28.69	28.33	0.581
Time Dependent Variables				
Time Use	All Personal Time- Including Sleep (Minutes)	543.38	544.56	0.807
	Sleep Time (Minutes)	492.06	494.10	0.617
Individual-Level Confounders of the Caregiver				
Age (years)		47.59	47.11	0.262
Female		57.01	54.57	0.095*
Race/ Ethnicity	Hispanic	11.70	7.62	0.383
	White	74.55	74.77	0.970
	Black	8.12	14.85	0.004***
	Asian	4.06	1.15	0.061*
	Other/Multiple	1.57	1.60	0.933
Education	Elementary	1.30	1.08	0.620
	HS, No Grad	3.69	5.57	0.007***

	HS Grad	27.10	31.24	0.086*
	Some College	16.78	16.92	0.905
	College Degree	36.19	32.23	0.024**
	Graduate Degree	14.93	12.96	0.089*
FPL	0-100% FPL	10.42	11.45	0.411
	>100-200% FPL	15.44	17.04	0.272
	Above 200% FPL	74.14	71.51	0.175
Married—Spouse in Household		59.45	62.08	0.187
Live in Metropolitan Area		86.99	76.33	0.005***
Number of Children in House		0.59	0.64	0.154
Individual-Level Confounders of the Person(s) Receiving Care				
Average Age (Years)		78.43	77.90	0.014**
Average Duration (Years)		4.09	4.14	0.692
Proportion of Recipients Living in the Same House as the Caregiver		0.14	0.11	0.059*
Proportion of Recipients That Are Relatives of the Caregiver		0.84	0.83	0.357
State-Level Confounders				
Unemployment Rate		6.47	6.30	0.644

Maximum Monthly TANF Benefit ($ 2017 USD, Family of Three)	542.48	375.23	0.004***
Maximum Monthly SNAP Benefit ($ 2017 USD, Family of Three)	535.23	542.62	0.020**
Median Hourly Wage of Home Health Aide ($ 2017 USD)	22.49	20.29	<0.001***
State EITC Refundable	0.56	0.34	0.120
State EITC Rate	0.12	0.06	0.020**
SE Clustered by State *p<0.1 **p<0.05 ***p<0.01			

The demographic characteristics suggest that on average, informal elder caregivers between 18 and 64 in states with a minimum wage above the federal rate were slightly more likely to be female, Asian, and have a college or graduate degree than those caregivers who live in states with a minimum wage at or below the federal. They were significantly more likely to live in a metropolitan area, and significantly less likely to be black. There were no statistically significant differences in the employment or time dependent variables.

There are also a few statistically significant differences in states with minimum wage above the federal for state confounders and confounders for person(s) receiving care. States with minimum wage above the federal are significantly more likely to have higher TANF benefits, lower SNAP benefits, have a higher EITC rate, and a higher median hourly wage for home health aides. In states with minimum wage above the federal, informal elder caregivers between 18 and

64 are significantly more likely to take care of an older individual, and have a slightly higher likelihood of having a higher proportion of care recipients living in the same household compared to caregivers in states where the minimum wage us at or below the federal.

The results for the employment dependent variables are shown in Table 5. All models have state-clustered standard errors, weighted using the survey weights, and with state and year fixed effects. Regression (5a) is the weighted LPM regression. Regression (5b) is the marginal effects from a logistic regression. Regression (5c) is the same LPM as Regression (5a), but with the state-specific linear time trend included in the model.

Table 5

$1 Increase in the Minimum Wage Over the Baseline (Federal)		(5a) Weighted	(5b) Weighted-Logistic Model (Marginal Effects)	(5c) Weighted-With Linear Time
All Informal Elder Caregivers	Employment	0.026**	0.027**	0.062**
		(0.013)	(0.013)	(0.028)
	In the Labor Force	0.016	0.014	0.051**
		(0.013)	(0.015)	(0.021)
	Full Time	0.012	0.011	0.048
		(0.015)	(0.015)	(0.039)
	Hours Worked Per Week Across All Jobs	1.175	-	2.942
		(0.747)		(1.841)

Female Informal Elder Caregivers	Employment	0.015 (0.018)	0.017 (0.020)	0.006 (0.042)
	In the Labor Force	0.012 (0.017)	0.011 (0.018)	0.029 (0.030)
	Full Time	-0.009 (0.022)	-0.010 (0.022)	-0.020 (0.053)
	Hours Worked Per Week Across All Jobs	0.759 (1.018)	-	0.946 (2.692)
Male Informal Elder Caregivers	Employment	0.029** (0.013)	0.030** (0.013)	0.104*** (0.030)
	In the Labor Force	0.011 (0.016)	0.011 (0.016)	0.058** (0.025)
	Full Time	0.031 (0.019)	0.032* (0.018)	0.097** (0.047)
	Hours Worked Per Week Across All Jobs	1.664 (1.130)	-	3.575 (2.282)
State, Caregiver, and Recipient Controls?		Yes	Yes	Yes
State FE?		Yes	Yes	Yes

Year FE?	Yes	Yes	Yes
State Specific Linear Time Trend?	No	No	Yes
SE Clustered by State SE in Parentheses *p<0.1 **p<0.05 ***p<0.01			

The results demonstrate consistency across the models. The only statistically significant effect for all informal elder caregivers between 18 and 64 is the likelihood of being employed. Regression (5a) suggests that for a $1 increase in state minimum wage over the federal, on average, an informal elder caregiver between 18 and 64 is 2.6 percentage points more likely to be employed, ceteris paribus. This is statistically significant at the 0.05 alpha-level.

By separating females and males, the effect of minimum wage policy is clearly seen among only the male population. Regression (5a) suggests that for a $1 increase in state minimum wage over the federal, on average, a male informal elder caregiver between 18 and 64 is 2.8 percentage points more likely to be employed, ceteris paribus. This is statistically significant at the 0.05 alpha-level. This result remains statistically significant and in the same direction with the state-specific linear time trend added into the regression (Regression (5c)).

Regression (5b) and Regression (5c) show statistical significance for the likelihood of male informal elder caregivers between 18 and 64 working full-time. Regression (5a) had a similar result to Regression (5b), but the statistical significance teeters around 0.10, falling just below for Regression (5b) and just above for Regression (5a). This result should thus be interpreted cautiously. It, however, suggests that for a $1 increase in state minimum wage over

the federal, on average, a male informal elder caregiver between 18 and 64 is 3.1 percentage points more likely to work full-time, ceteris paribus.

The results for the time outcomes are presented in Table 6. Regression (6b) is the same LPM model as Regression (6a), but with the state-specific linear time trend included. None of the coefficients are statistically significant, suggesting that the minimum wage does not impact the average time spent per day on personal care, nor time spent sleeping. If one would hypothetically consider that these results were statistically significant, the largest effect would be female caregivers amount of time spent sleeping. This coefficient suggests that for a $1 increase in state minimum wage over the federal, on average, a female informal elder caregiver between 18 and 64 spends 4.42 minutes less on sleep per day, ceteris paribus. However, it must be restated that this is not statistically significant.

Table 6

$1 Increase in the Minimum Wage Over the Baseline (Federal)		(6a) Weighted	(6b) Weighted-With Linear Time
All Informal Elder Caregivers	Minutes of Personal Care Time (Including Sleep)	-0.737 (4.176)	-11.222 (7.506)
	Minutes of Sleep	-1.864 (4.280)	-8.808 (8.810)
Female Informal Elder Caregivers	Minutes of Personal Care Time (Including Sleep)	-2.420 (4.783)	-7.822 (8.462)
	Minutes of Sleep	-4.602 (4.890)	-7.913 (9.627)

Male Informal Elder Caregivers	Minutes of Personal Care Time (Including Sleep)	-0.205 (7.960)	-13.710 (13.453)
	Minutes of Sleep	-0.615 (8.644)	-7.053 (14.751)
State, Caregiver, and Recipient Controls?		Yes	Yes
State FE?		Yes	Yes
Year FE?		Yes	Yes
State Specific Linear Time Trend?		No	Yes
SE Clustered by State SE in Parentheses *p<0.1 **p<0.05 ***p<0.01			

The results of the falsification study are presented in Table 7. Similar to the previous table, Regression (7b) is the same LPM model as Regression (7a), but also includes the state-specific linear time trend. None of the coefficients are statistically significant. Additionally, for the populations studied—except the female subpopulation—the addition of the state-specific linear time trend resulted in a coefficient closer to zero. This suggests that the likelihood that the results seen in the preceding tables were the result of the difference-in-difference model picking up a trend outside the scope of the research question is low as the same outside trend did not appear with this falsification model.

Table 7

$1 Increase in the Minimum Wage Over the Baseline (Federal)		(7a) Weighted	(7b) Weighted-With Linear Time Trend
All	Having Ever Served in the Armed Forces	-0.007 (0.008)	-0.000 (0.010)
Female	Having Ever Served in the Armed Forces	0.002 (0.007)	0.009 (0.007)
Male	Having Ever Served in the Armed Forces	-0.017 (0.014)	-0.010 (0.027)
State, Caregiver, and Recipient Controls?		Yes	Yes
State FE?		Yes	Yes
Year FE?		Yes	Yes
State Specific Linear Time Trend?		No	Yes
SE Clustered by State SE in Parentheses *p<0.1 **p<0.05 ***p<0.01			

V. Discussion

This study analyzed whether minimum wage policy had an impact on the likelihood that an informal elder caregiver between 18 and 64 would be employed, work full-time, or be in the labor force. It was hypothesized that as minimum wage increased, all three measures would increase. It was also hypothesized that as minimum wage increased, this study population would increase the number of hours worked per week across all jobs, decrease personal care time, and decrease sleep time. The results suggest that minimum wage policy does increase the likelihood of being employed for male informal elder caregivers age 18 to 64. There were, however, no statistically significant impacts on the remaining male employment outcomes, any female employment outcomes, nor on personal care time or sleep time for either sex.

There are limitations in comparing these results to current literature as to my knowledge, this is the first paper to use minimum wage policy in the informal caregiving population. However, given that this population is not per se unskilled nor are they unskilled, the null and positive employment effects are similar to the results found by Neumark and Wascher in their meta-analysis.[33] Even without considering the skillset of the study population, these results fall in line with the meta-analysis by Doucouliagos and Stanley.[34]

Arora and Wolf found no change in leisure exercise time due to changes in parental health needs, nor a significant effect of wage on caregiving time.[52] Additionally, they did not find an effect of parental care needs on leisure exercise time. These results are similar to the results of this study as for many outcomes, there was not a significant effect on employment and there was no significant change in personal care time or sleep time in the face of a higher wage floor. This study contrasts research by Nizalova who found that as wage of an individual increases, there was a reduction in the amount of time spent providing caregiving.[53] While this study did not directly measure caregiving time, the minimum wage policy did not result in a significant increase in work hours, and increased employment only in males. If minimum wage had a similar effect, we would expect changes in hours of work that would then result in a labor-leisure optimization

change resulting in the reduction of caregiving time. However, Nizalova used wages of the caregiver rather than the minimum wage which would typically be higher than minimum wage. Thus, it may be necessary for the minimum wage variation to be greater from the federal than analyzed in this study for such effect to be seen.

One interesting trend in the results is that while there was a significant result in males with employment, there were no significant results for female caregivers. This contrasts the results found by Nizalova who found a greater reduction in caregiver time as wage increased compared to males.[53] As previously stated, however, Nizalova used actual wages which may explain some of this difference if labor force attachment is stronger than labor force entry in regards to wage incentives. This would not be unfounded as previous research by Blau and Kahn found that compared to other OECD countries, females in the United States were less likely to participate in the labor force, but when they do, it is more likely to be full-time work at a higher level position.[91] Historically, females are also more likely to be caregivers compared to males,[92-94] and may have difficulty finding employment due to 1) friction in returning to employment as Skira found,[57] and/or 2) taking care of individuals with a higher level of need than males, limiting the amount of time they can spend away from the care recipient.[93,95,96]

Study Strengths and Limitations

There are a few limitations to this study, largely due to the dataset. First, the sample size is relatively small, which made analyzing smaller subpopulations relatively infeasible. Being able to break the analytic sample further may have assisted in further testing the results by taking a subsample only of those with a high school degree or less as they would be the most likely to be impacted by a change in the minimum wage. However, given the consistency of the results throughout the models and the results of the falsification study, such tests appear unnecessary. It is thus probable that for the subpopulation of high school degree or less, these results would be a lower bound.

A second limitation is the healthcare needs of the recipient was also unable to be measured/controlled for in the model. Such measure, however, may not have provided further information than the proportion of recipients living in the same household due to the complicated nature of caregiving decisions.

A third limitation is other time components, such as amount of time spent providing informal eldercare, could not be measured due to sample size limitations. This is not per se problematic to the analyses performed; however, it does leave open the question whether individuals will alter other leisure activities to provide the same amount of eldercare once they are employed.

A fourth limitation is this was only minimum wage levels at the state level and does not include any local minimum wage policies. If there was a high proportion of individuals living in cities with local minimum wages above the state, this may skew the results. However, there are a relatively few number of local policies and there are several methodological concerns in determining who to include as a *treatment* group with the local level policies.

The last limitation I will mention here is this is a repeated cross-sectional dataset and not a panel/longitudinal dataset. This raises concerns that people may alter behavior that may cause non-true results. The primary concern, for example, is individuals may drop informal caregiving once they gain employment. To check for this possibility, two analyses were run. The first was a simple proportion test of informal elder caregivers to non-caregivers in the dataset which resulted in no significant difference between years. Further, a similar difference-in-difference model was run with informal caregiving as the outcome and there were no significant results. Thus, while such behavior changes are unable to be controlled for possibility, it does not appear to have affected these analyses.

Even though there were limitations, this study provides new insights to the impact of minimum wage policy on the informal elder caregiver. To my knowledge, this is the first study to

analyze the effect of minimum wage policy on employment effects and time use in this population. This has two benefits over previous work. First, there is a direct policy implication from these findings. Second, this methodology allows potential income to be exogenous, reducing bias further than an instrumental variable technique. Additionally, by using the time diary portion of the American Time Use Survey, the time estimates are also less biased than time estimates from the Health and Retirement Study which has the risk of recall bias. The population studied was also more representative of all informal caregivers as it included those between 18 and 64 and non-family members.

Implications of the Study Results

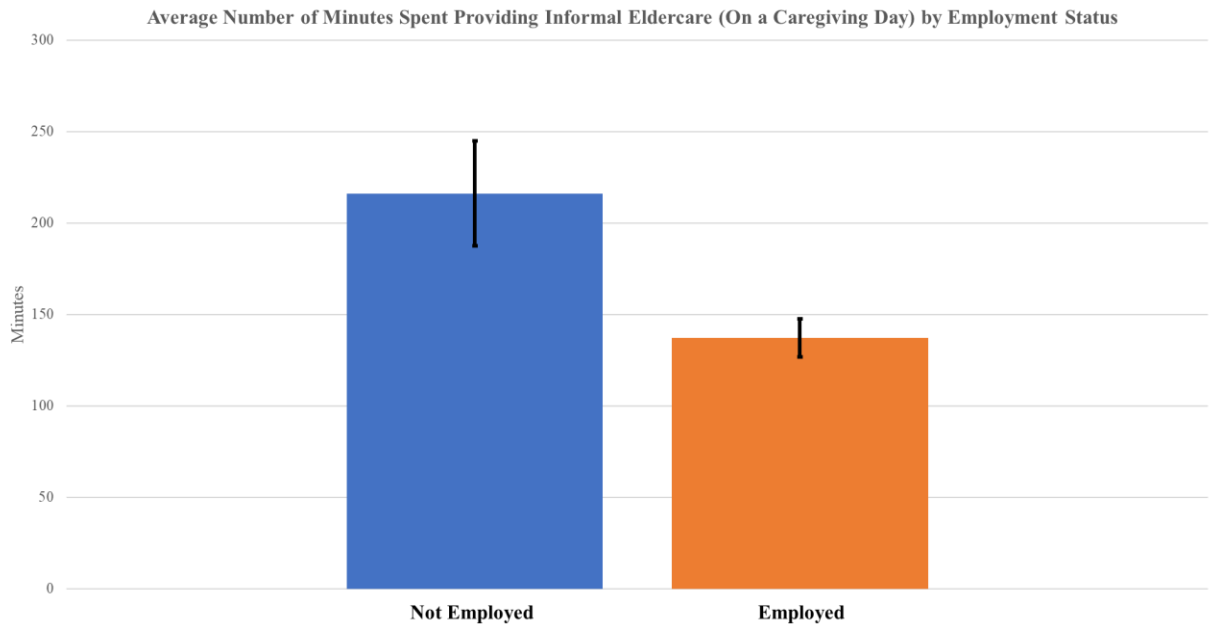
Due to the complex nature of informal elder caregiving and the various parties involved, the implications for these results vary by the healthcare system, labor market, as well as the caregiver. The healthcare system had a LTSS expenditure in 2016 of $286 billion (not including Medicare expenditure).[4] If all informal care were substituted for unskilled formal care, it would cost the healthcare system an additional $221 billion annually.[5] As the majority of LTSS expenditure is publicly financed, it is essential to understand how policy may affect the utilization and availability of informal caregiving. It is not known, however, whether there would be any savings in other publicly financed systems that would be offset by informal caregivers working instead of providing informal care—such as with *welfare* programs.

With the rise of Home and Community Based Services (HCBS) in Medicaid systems, it is also important to touch on potential implications and how such programs may alter the decision of informal caregivers. HCBS are implemented through a waiver or a state plan and allow individuals requiring long-term services and supports to remain outside of a facility setting.[97] The primary difference between the two methods of having a HCBS program is waivers allow a state to limit the number of individuals and set criteria for how an individual qualifies for services under the program, whereas the plan is open to all Medicaid enrollees.[97] In some cases, care

recipients who qualify for HCBS are able to hire a caregiver, including a family member or friend.[98] Generally, this payment is less than what a formal care provider would be paid, and may be equal to or just above minimum wage. A study by Newcomer, Kang, and Doty found that such familial care in the California HCBS system did not have any disadvantages, and may have provided some advantages compared to not allowing familial caregivers in the program.[99] Research will need to be performed, however, on the interplay between HCBS payments and the employment decision of informal caregivers. This would be especially pertinent with this research for HCBS caregiving wages that fall inline with the minimum wage rate as it may incentivize individuals to remain in providing care rather than seeking employment elsewhere.

Figure 6 shows the average number of minutes providing informal elder care on an average caregiving day (a day where someone provided eldercare rather than an average day which may have had no caregiving time) by employment status.

Figure 6



Note: The error bars are the respective 95% confidence intervals

There is a statistically significant difference between the number of minutes provided from an unemployed informal caregiver and an employed caregiver. There are a few reasonable explanations for this such as caregivers who provide more intensive care are less likely to be employed generally. It may also suggest, however, that recipients may need supplemental assistance or eventually substitute all care if their informal caregiver becomes employed—a potential burden on the healthcare and publicly financed healthcare systems.

On the other hand, informal caregivers have an estimated annual opportunity cost of $522 billion by providing informal care rather than working.[5] As the economy relies on production and consumption in addition to the government needing a tax base to maintain revenue, this opportunity cost is relatively substantial in these markets. Additionally, as previously suggested, it is possible that a rise in the minimum wage will result in employers looking for labor beyond the *traditional* minimum wage labor market. Male informal caregivers, while more likely to meet the unskilled labor definition than female sample, they would likely have more experience than other unskilled labor in the minimum wage market i.e. teenagers and young adults. As the cost of the labor is higher, a firm would need greater return to suffice the added expenditure. Thus, informal caregivers becoming employed through this policy mechanism may be good for firms and for the market generally, although the magnitude of the results show limited potential benefits.

The caregivers themselves are the key stakeholder in this study and framework. One positive is this study did not find a reduction in sleep or personal time as a result of the minimum wage policy since they already have significantly less time in these categories than non-caregivers. The employment outcomes tested in this study would potentially allow a change in current or future economic security for the informal caregiver. However, the minimum wage policy may still be too low in many states to incentivize a shift to employment, and/or the employment rate is at a natural rate for this population.

The overall purpose of this study was to analyze potential consequences—positive or negative—of the work-incentivizing minimum wage policy in the informal elder caregiver population. Overall, the only effect seen was a positive employment likelihood in male informal caregivers. As this study was unable to measure the effect of caregiving time due to this change in unemployment, it is unknown whether there were potential present or future ramifications for the healthcare and publicly financed healthcare systems. However, the employment outcomes may be beneficial to the labor market and increase the economic security of the informal caregiver.

Recommendations for Future Research

To my knowledge, this paper was the first to study the effects of minimum wage policy on the employment outcomes and personal care time of informal elder caregivers. The American Time Use Survey allowed for studying a wide age range of informal caregivers, relative and non-relative caregivers, and pair time diary data with eldercare and economic indicators. However, there were limitations with this study due to the relatively small sample size of informal caregivers in the dataset when it was broken down to the state level. To exploit state policy differences, there should be an attempt to ensure a larger sample size of informal elder caregivers in the American Time Use Survey (ATUS) or a similar survey.

As this study was unable to study some outcomes such as time spent providing care, future research could avoid the sample size issue by creating a synthetic control model and following the same methodology. This would be particularly useful as a handful of cities will reach higher minimum wage levels, such as $15 per hour, prior to states reaching that same level. One other methodology that future research should approach is creating a measure of care intensity based on time spent providing certain categories of care identified in the ATUS. This would be beneficial to all study designs—including this study—as the ATUS does not allow for control health or care needs of the recipient. This would entail categorizing care activities into

ADLs, IADLs, and other to create a proportion and then determining what levels would follow under high, medium, and low intensity care.

While the work-incentivizing policy tested in this study is minimum wage, future research should consider analyzing Earned Income Tax Credits and Child Tax Credits following a similar framework. By studying specific policies rather than caregiver attributes, research can further understand if there are unintended consequences to these policies that may need additional policy solutions. Additionally, future research should consider other caregiver health and well-being measures to study beyond personal care and sleep time along with these work-incentive policies.

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VII. Appendix

Appendix Table 1: All Informal Caregivers—Unweighted, Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.027***	0.019*	0.011	1.645***
	(0.010)	(0.011)	(0.013)	(0.484)
Unemployment rate	-0.002	0.005	-0.004	-0.037
	(0.007)	(0.007)	(0.009)	(0.322)
TANF Benefit for 3 persons	0.000	0.000	-0.000	0.012
	(0.000)	(0.000)	(0.000)	(0.017)
SNAP Benefit for 3 persons	-0.001**	-0.001***	-0.000	0.006
	(0.000)	(0.000)	(0.000)	(0.012)
Adjusted HH Aide Hourly	-0.008	0.003	0.004	-0.173
	(0.008)	(0.008)	(0.010)	(0.546)
Refundable State EITC (1=Yes)	-0.031	-0.026	-0.005	-0.563
	(0.031)	(0.020)	(0.032)	(1.592)
State EITC Rate	-0.076	0.027	0.045	-2.286
	(0.094)	(0.077)	(0.122)	(5.194)
Metropolitan	-0.017	-0.007	-0.024*	-0.777
	(0.015)	(0.012)	(0.014)	(0.692)
Female	-0.112***	-0.108***	-0.202***	-8.853***
	(0.008)	(0.008)	(0.011)	(0.482)
Age	-0.006***	-0.007***	-0.005***	-0.251***
	(0.000)	(0.000)	(0.001)	(0.021)
Spanish, Hispanic, or	0.022	0.033**	0.014	-0.462

Latino	(0.016)	(0.014)	(0.028)	(0.832)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	-0.001	0.036***	0.021	-0.074
	(0.014)	(0.013)	(0.017)	(0.723)
Race: Asian	0.004	0.010	0.024	-0.757
	(0.025)	(0.025)	(0.031)	(1.341)
Race: Multiple or	-0.040	-0.003	-0.002	-2.778*
Other	(0.032)	(0.032)	(0.029)	(1.445)
Edu:	-0.202***	-0.198***	-0.168**	-7.733***
Elementary/Middle	(0.065)	(0.068)	(0.071)	(2.852)
Edu: Some HS, No	-0.152***	-0.096***	-0.177***	-8.804***
deg	(0.034)	(0.029)	(0.033)	(1.712)
Edu: HS Grad	-0.080***	-0.073***	-0.082***	-4.228***
	(0.012)	(0.012)	(0.016)	(0.643)
Edu: Some College,	-0.035***	-0.028***	-0.054***	-2.259***
No deg	(0.011)	(0.011)	(0.013)	(0.600)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]
Edu:	0.051***	0.044***	0.046***	3.359***
Graduate/Professional	(0.012)	(0.011)	(0.015)	(0.560)
Degree				
0 to 100% FPL	-0.315***	-0.252***	-0.376***	-15.813***
	(0.015)	(0.015)	(0.018)	(0.944)
>100 to 200% FPL	-0.136***	-0.116***	-0.187***	-8.144***

	(0.015)	(0.014)	(0.017)	(0.760)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	0.005 (0.005)	0.003 (0.004)	-0.001 (0.006)	0.356 (0.258)
Married	-0.028*** (0.010)	-0.047*** (0.007)	-0.054*** (0.013)	-1.841*** (0.520)
Average Age of Caregiver Recipient(s)	-0.001 (0.001)	-0.001* (0.001)	-0.003*** (0.001)	-0.082** (0.036)
Average Duration of Providing Informal Care to Recipient(s)	0.002** (0.001)	0.002* (0.001)	0.003*** (0.001)	0.133*** (0.046)
Proportion of recipients that live in household	-0.102*** (0.016)	-0.078*** (0.020)	-0.108*** (0.016)	-4.206*** (0.835)
Proportion of recipients that are relatives	0.028** (0.011)	0.021** (0.009)	0.069*** (0.014)	1.819*** (0.635)
R^2 Adjusted R^2 Observations	0.1456 0.1376 8952	0.1343 0.1262 8952	0.1695 0.1617 8952	0.1631 0.1553 8952
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included				

Appendix Table 2: Female Informal Caregivers—Unweighted, Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.028**	0.029**	0.013	1.589**
	(0.011)	(0.013)	(0.017)	(0.711)
Unemployment rate	-0.003	0.005	0.005	-0.287
	(0.009)	(0.009)	(0.011)	(0.440)
TANF Benefit for 3 persons	0.000	-0.000	-0.000	0.007
	(0.000)	(0.000)	(0.001)	(0.022)
SNAP Benefit for 3 persons	-0.002***	-0.002***	-0.001***	-0.071***
	(0.001)	(0.001)	(0.000)	(0.010)
Adjusted HH Aide Hourly	0.007	0.014	0.017	-0.019
	(0.012)	(0.012)	(0.013)	(0.602)
Refundable State EITC (1=Yes)	-0.023	-0.013	-0.010	-0.700
	(0.042)	(0.031)	(0.052)	(2.402)
State EITC Rate	-0.116	-0.045	0.072	-3.529
	(0.114)	(0.104)	(0.151)	(6.500)
Metropolitan	-0.013	-0.001	-0.020	-0.261
	(0.019)	(0.017)	(0.020)	(0.954)
Age	-0.007***	-0.008***	-0.006***	-0.291***
	(0.001)	(0.001)	(0.001)	(0.026)
Spanish, Hispanic, or Latino	0.056**	0.048**	0.039	1.062
	(0.027)	(0.021)	(0.037)	(1.099)
Race: White	[REF]	[REF]	[REF]	[REF]

Race: Black	0.023	0.056***	0.055**	0.764
	(0.019)	(0.016)	(0.021)	(0.837)
Race: Asian	0.012	0.028	0.034	-0.581
	(0.043)	(0.058)	(0.052)	(1.832)
Race: Multiple or Other	-0.019	-0.003	0.036	0.844
	(0.046)	(0.052)	(0.044)	(2.299)
Edu: Elementary/Middle	-0.325***	-0.312***	-0.241***	-11.036**
	(0.100)	(0.096)	(0.080)	(4.228)
Edu: Some HS, No deg	-0.191***	-0.134**	-0.188***	-7.699***
	(0.055)	(0.054)	(0.043)	(2.018)
Edu: HS Grad	-0.105***	-0.104***	-0.106***	-4.270***
	(0.020)	(0.017)	(0.026)	(0.901)
Edu: Some College, No deg	-0.040**	-0.035**	-0.077***	-2.146***
	(0.016)	(0.014)	(0.017)	(0.766)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	0.066***	0.058***	0.065***	4.195***
	(0.016)	(0.015)	(0.020)	(0.813)
0 to 100% FPL	-0.311***	-0.250***	-0.354***	-14.951***
	(0.023)	(0.022)	(0.025)	(1.198)
>100 to 200% FPL	-0.122***	-0.104***	-0.161***	-6.813***
	(0.021)	(0.019)	(0.020)	(0.853)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]

Number of household children < 18	-0.013* (0.007)	-0.014** (0.006)	-0.039*** (0.009)	-1.240*** (0.328)
Married	-0.086*** (0.014)	-0.103*** (0.009)	-0.143*** (0.019)	-5.660*** (0.703)
Average Age of Caregiver Recipient(s)	-0.001 (0.001)	-0.001 (0.001)	-0.003*** (0.001)	-0.116*** (0.038)
Average Duration of Providing Informal Care to Recipient(s)	0.002 (0.001)	0.001 (0.001)	0.003* (0.002)	0.101* (0.058)
Proportion of recipients that live in household	-0.090*** (0.022)	-0.062** (0.023)	-0.088*** (0.021)	-3.303*** (1.124)
Proportion of recipients that are relatives	0.031* (0.016)	0.024* (0.014)	0.092*** (0.018)	2.352*** (0.751)
R^2	0.1390	0.1337	0.1492	0.1439
Adjusted R^2	0.1256	0.1203	0.1360	0.1306
Observations	5350	5350	5350	5350
*** p<0.01, ** p<0.05, * p<0.1				
State and Time FE				
Controls for State, Caregiver, and Recipient Included				

Appendix Table 3: Male Informal Caregivers—Unweighted, Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.025**	0.003	0.013	1.949**
	(0.012)	(0.014)	(0.014)	(0.734)
Unemployment rate	0.003	0.010	-0.009	0.695
	(0.008)	(0.010)	(0.011)	(0.653)
TANF Benefit for 3 persons	0.000*	0.000	-0.000	0.003
	(0.000)	(0.000)	(0.000)	(0.020)
SNAP Benefit for 3 persons	0.000	0.000	0.001***	0.121***
	(0.001)	(0.000)	(0.000)	(0.031)
Adjusted HH Aide Hourly	-0.033***	-0.015	-0.021	-0.518
	(0.011)	(0.011)	(0.014)	(0.854)
Refundable State EITC (1=Yes)	-0.045	-0.055*	0.012	0.108
	(0.036)	(0.032)	(0.060)	(2.676)
State EITC Rate	-0.023	0.142	-0.045	-2.808
	(0.125)	(0.122)	(0.197)	(9.414)
Metropolitan	-0.017	-0.011	-0.017	-1.356
	(0.016)	(0.013)	(0.017)	(1.002)
Age	-0.005***	-0.007***	-0.005***	-0.274***
	(0.001)	(0.001)	(0.001)	(0.037)
Spanish, Hispanic, or Latino	-0.026	0.011	-0.024	-2.627**
	(0.020)	(0.014)	(0.029)	(1.050)
Race: White	[REF]	[REF]	[REF]	[REF]

Race: Black	-0.063***	-0.021	-0.073***	-2.783**
	(0.023)	(0.020)	(0.026)	(1.208)
Race: Asian	0.005	-0.003	0.013	-0.650
	(0.052)	(0.043)	(0.031)	(1.634)
Race: Multiple or Other	-0.073	-0.003	-0.047	-7.321***
	(0.051)	(0.039)	(0.050)	(2.211)
Edu: Elementary/Middle	-0.008	-0.023	-0.038	-2.063
	(0.075)	(0.073)	(0.081)	(3.585)
Edu: Some HS, No deg	-0.088**	-0.031	-0.126***	-8.498***
	(0.035)	(0.029)	(0.041)	(2.350)
Edu: HS Grad	-0.034**	-0.017	-0.030*	-3.300***
	(0.013)	(0.012)	(0.016)	(0.952)
Edu: Some College, No deg	-0.017	-0.006	0.000	-1.853*
	(0.018)	(0.015)	(0.019)	(0.993)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	0.021	0.018	0.010	2.060**
	(0.019)	(0.016)	(0.020)	(1.009)
0 to 100% FPL	-0.310***	-0.242***	-0.391***	-16.694***
	(0.025)	(0.023)	(0.029)	(1.695)
>100 to 200% FPL	-0.149***	-0.123***	-0.208***	-9.470***
	(0.020)	(0.017)	(0.022)	(1.160)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]

Number of household children < 18	0.021*** (0.006)	0.019*** (0.005)	0.036*** (0.007)	1.952*** (0.420)
Married	0.064*** (0.014)	0.043*** (0.012)	0.086*** (0.017)	3.896*** (0.819)
Average Age of Caregiver Recipient(s)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.038 (0.063)
Average Duration of Providing Informal Care to Recipient(s)	0.003*** (0.001)	0.002** (0.001)	0.004*** (0.001)	0.163** (0.065)
Proportion of recipients that live in household	-0.106*** (0.033)	-0.090** (0.036)	-0.111*** (0.027)	-4.394*** (1.235)
Proportion of recipients that are relatives	0.017 (0.017)	0.015 (0.014)	0.031 (0.019)	0.884 (1.083)
R^2	0.1810	0.1601	0.2076	0.1845
Adjusted R^2	0.1619	0.1405	0.1892	0.1655
Observations	3602	3602	3602	3602
*** p<0.01, ** p<0.05, * p<0.1				
State and Time FE				
Controls for State, Caregiver, and Recipient Included				

Appendix Table 4: All Informal Caregivers Using Logistic Regression (Marginal Effects)—Unweighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time
Adjusted Wage Above Fed	0.029***	0.019	0.011
	(0.011)	(0.012)	(0.013)
Unemployment rate	-0.001	0.006	-0.004
	(0.007)	(0.008)	(0.009)
TANF Benefits for 3	0.000	0.000	-0.000
Persons	(0.000)	(0.000)	(0.000)
SNAP Benefits for 3	-0.001***	-0.001***	-0.000
Persons	(0.000)	(0.000)	(0.000)
Adjusted HH Aide Hourly	-0.009	0.003	0.004
	(0.008)	(0.009)	(0.010)
Refundable State EITC	-0.030	-0.028	-0.006
(1=Yes)	(0.028)	(0.020)	(0.032)
State EITC Rate	-0.072	0.040	0.053
	(0.089)	(0.078)	(0.122)
Metropolitan	-0.016	-0.007	-0.024*
	(0.014)	(0.012)	(0.014)
Female=1	-0.115***	-0.112***	-0.201***
	(0.008)	(0.009)	(0.010)
Age	-0.006***	-0.007***	-0.005***
	(0.000)	(0.001)	(0.001)

Spanish, Hispanic, or Latino	0.018 (0.016)	0.031** (0.015)	0.012 (0.028)
Race: White	[REF]	[REF]	[REF]
Race: Black	-0.001 (0.013)	0.033** (0.013)	0.020 (0.017)
Race: Asian	0.006 (0.027)	0.016 (0.029)	0.026 (0.033)
Race: Multiple or Other	-0.041 (0.028)	-0.005 (0.029)	-0.002 (0.029)
Edu: Elementary/Middle	-0.157*** (0.049)	-0.139*** (0.046)	-0.168** (0.078)
Edu: Some HS, No deg	-0.129*** (0.026)	-0.085*** (0.022)	-0.174*** (0.033)
Edu: HS Grad	-0.073*** (0.011)	-0.064*** (0.010)	-0.078*** (0.015)
Edu: Some College, No deg	-0.034*** (0.011)	-0.027*** (0.010)	-0.051*** (0.013)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	0.060*** (0.016)	0.051*** (0.015)	0.045*** (0.015)
0 to 100% FPL	-0.252*** (0.012)	-0.204*** (0.011)	-0.347*** (0.016)
>100 to 200% FPL	-0.122***	-0.105***	-0.169***

	(0.013)	(0.012)	(0.015)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	0.004 (0.005)	-0.002 (0.004)	-0.002 (0.006)
Married	-0.028*** (0.009)	-0.048*** (0.006)	-0.054*** (0.013)
Average Age of Eldercare Recipient(s)	-0.001* (0.001)	-0.001* (0.001)	-0.003*** (0.001)
Average Duration of Providing Care to Recipient(s)	0.003** (0.001)	0.002** (0.001)	0.004*** (0.001)
Proportion of recipients that live in household	-0.087*** (0.013)	-0.064*** (0.015)	-0.103*** (0.015)
Proportion of recipients that are relatives	0.026** (0.010)	0.020** (0.008)	0.067*** (0.013)
R^2 Adjusted R^2 Observations	8952	8952	8952
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included			

Appendix Table 5: Female Informal Caregivers Using Logistic Regression (Marginal Effects)—Unweighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time
Adjusted Wage Above Fed	0.031**	0.030**	0.013
	(0.013)	(0.013)	(0.017)
Unemployment rate	-0.002	0.004	0.005
	(0.010)	(0.009)	(0.011)
TANF Benefits for 3	0.000	-0.000	-0.000
Persons	(0.000)	(0.000)	(0.001)
SNAP Benefits for 3	-0.002***	-0.002***	-0.002***
Persons	(0.001)	(0.000)	(0.000)
Adjusted HH Aide Hourly	0.007	0.015	0.017
	(0.013)	(0.013)	(0.013)
Refundable State EITC	-0.028	-0.018	-0.009
(1=Yes)	(0.041)	(0.030)	(0.053)
State EITC Rate	-0.105	-0.029	0.075
	(0.114)	(0.102)	(0.151)
Metropolitan	-0.011	0.000	-0.019
	(0.018)	(0.016)	(0.020)
Age	-0.007***	-0.009***	-0.006***
	(0.001)	(0.001)	(0.001)
Spanish, Hispanic, or Latino	0.059**	0.053**	0.039
	(0.027)	(0.021)	(0.038)

Race: White	[REF]	[REF]	[REF]
Race: Black	0.0244	0.0593***	0.0572***
	(0.019)	(0.017)	(0.022)
Race: Asian	0.0128	0.0302	0.0369
	(0.042)	(0.060)	(0.051)
Race: Multiple or Other	-0.0152	0.0025	0.0439
	(0.041)	(0.047)	(0.045)
Edu: Elementary/Middle	-0.2799***	-0.2353***	-0.3082**
	(0.098)	(0.075)	(0.140)
Edu: Some HS, No deg	-0.1644***	-0.1167***	-0.1931***
	(0.045)	(0.041)	(0.047)
Edu: HS Grad	-0.0946***	-0.0916***	-0.1010***
	(0.018)	(0.015)	(0.025)
Edu: Some College, No deg	-0.0402***	-0.0353***	-0.0740***
	(0.015)	(0.013)	(0.016)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional	0.0785***	0.0700***	0.0643***
Degree	(0.019)	(0.020)	(0.020)
0 to 100% FPL	-0.2708***	-0.2207***	-0.3567***
	(0.019)	(0.018)	(0.025)
>100 to 200% FPL	-0.1130***	-0.0973***	-0.1521***
	(0.019)	(0.016)	(0.019)
Above 200% FPL	[REF]	[REF]	[REF]

Number of household children < 18	-0.017** (0.007)	-0.022*** (0.006)	-0.041*** (0.010)
Married	-0.088*** (0.014)	-0.106*** (0.009)	-0.143*** (0.019)
Average Age of Eldercare Recipient(s)	-0.001 (0.001)	-0.001 (0.001)	-0.003*** (0.001)
Average Duration of Providing Care to Recipient(s)	0.002 (0.001)	0.001 (0.001)	0.003* (0.002)
Proportion of recipients that live in household	-0.082*** (0.019)	-0.056*** (0.020)	-0.089*** (0.021)
Proportion of recipients that are relatives	0.032** (0.015)	0.027** (0.013)	0.093*** (0.019)
R^2			
Adjusted R^2			
Observations	5350	5350	5350
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 6: Male Informal Caregivers Using Logistic Regression (Marginal Effects)—Unweighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time
Adjusted Wage Above Fed	0.0278**	0.0039	0.0122
	(0.013)	(0.014)	(0.013)
Unemployment rate	0.0052	0.0129	-0.0080
	(0.007)	(0.010)	(0.011)
TANF Benefits for 3	0.0005	0.0001	-0.0002
Persons	(0.000)	(0.000)	(0.000)
SNAP Benefits for 3	0.0005	0.0004	0.0020**
Persons	(0.001)	(0.001)	(0.001)
Adjusted HH Aide Hourly	-0.0317***	-0.0127	-0.0206
	(0.011)	(0.011)	(0.014)
Refundable State EITC	-0.0417	-0.0497*	0.0175
(1=Yes)	(0.033)	(0.028)	(0.059)
State EITC Rate	-0.0304	0.1509	-0.0491
	(0.114)	(0.108)	(0.191)
Metropolitan	-0.0173	-0.0126	-0.0170
	(0.017)	(0.013)	(0.018)
Age	-0.0048***	-0.0068***	-0.0050***
	(0.001)	(0.001)	(0.001)

Spanish, Hispanic, or Latino	-0.0356**	-0.0054	-0.0275
	(0.017)	(0.012)	(0.025)
Race: White	[REF]	[REF]	[REF]
Race: Black	-0.0499***	-0.0161	-0.0629***
	(0.017)	(0.015)	(0.021)
Race: Asian	0.0010	-0.0001	0.0073
	(0.063)	(0.053)	(0.033)
Race: Multiple or Other	-0.0818**	-0.0156	-0.0538
	(0.039)	(0.034)	(0.044)
Edu: Elementary/Middle	-0.0041	-0.0061	-0.0322
	(0.045)	(0.042)	(0.059)
Edu: Some HS, No deg	-0.0618**	-0.0170	-0.1026***
	(0.025)	(0.022)	(0.034)
Edu: HS Grad	-0.0313**	-0.0125	-0.0285**
	(0.013)	(0.012)	(0.014)
Edu: Some College, No deg	-0.0148	0.0002	0.0013
	(0.018)	(0.015)	(0.019)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional	0.026	0.018	0.010
Degree	(0.024)	(0.019)	(0.021)
0 to 100% FPL	-0.214***	-0.167***	-0.300***
	(0.014)	(0.012)	(0.020)
>100 to 200% FPL	-0.124***	-0.102***	-0.171***

	(0.015)	(0.012)	(0.017)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	0.027*** (0.008)	0.027*** (0.008)	0.043*** (0.009)
Married	0.057*** (0.012)	0.035*** (0.011)	0.077*** (0.015)
Average Age of Eldercare Recipient(s)	-0.0010 (0.001)	0.0003 (0.001)	-0.001 (0.001)
Average Duration of Providing Care to Recipient(s)	0.003** (0.001)	0.002** (0.001)	0.004*** (0.001)
Proportion of recipients that live in household	-0.071*** (0.021)	-0.058*** (0.020)	-0.085*** (0.021)
Proportion of recipients that are relatives	0.014 (0.015)	0.009 (0.012)	0.028* (0.017)
R^2			
Adjusted R^2			
Observations	3583	3574	3602
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 7: All Informal Caregivers with Linear Time Trend—Unweighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.042**	0.028	0.015	1.698
	(0.020)	(0.020)	(0.025)	(1.287)
Unemployment rate	0.007	0.005	0.007	0.848
	(0.018)	(0.016)	(0.017)	(0.892)
TANF Benefits for 3 Persons	0.001	0.001***	0.000	0.048*
	(0.001)	(0.000)	(0.001)	(0.025)
SNAP Benefits for 3 Persons	-0.000	-0.001***	0.001**	0.072***
	(0.000)	(0.000)	(0.000)	(0.018)
Adjusted HH Aide Hourly	-0.004	0.005	0.006	-0.420
	(0.009)	(0.010)	(0.010)	(0.587)
Refundable State EITC (1=Yes)	-0.056	-0.130***	-0.007	-3.230
	(0.039)	(0.031)	(0.053)	(2.654)
State EITC Rate	0.089	0.274**	0.164	6.338
	(0.141)	(0.115)	(0.172)	(7.958)
Metropolitan	-0.018	-0.010	-0.026*	-0.860
	(0.015)	(0.012)	(0.014)	(0.716)
Female=1	-0.112***	-0.108***	-0.203***	-8.886***
	(0.008)	(0.008)	(0.011)	(0.487)
Age	-0.006***	-0.007***	-0.005***	-0.249***
	(0.000)	(0.000)	(0.001)	(0.022)

Spanish, Hispanic, or Latino	0.022 (0.016)	0.034** (0.014)	0.012 (0.028)	-0.539 (0.842)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	0.000 (0.014)	0.037*** (0.014)	0.023 (0.017)	-0.055 (0.720)
Race: Asian	-0.001 (0.025)	0.006 (0.026)	0.017 (0.033)	-1.001 (1.378)
Race: Multiple or Other	-0.041 (0.033)	-0.005 (0.033)	-0.002 (0.029)	-2.879* (1.441)
Edu: Elementary/Middle	-0.205*** (0.066)	-0.201*** (0.070)	-0.171** (0.069)	-7.926*** (2.800)
Edu: Some HS, No deg	-0.152*** (0.034)	-0.097*** (0.030)	-0.178*** (0.034)	-8.798*** (1.712)
Edu: HS Grad	-0.080*** (0.012)	-0.072*** (0.012)	-0.082*** (0.015)	-4.192*** (0.641)
Edu: Some College, No deg	-0.036*** (0.011)	-0.030*** (0.011)	-0.053*** (0.013)	-2.231*** (0.611)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	0.051*** (0.012)	0.044*** (0.011)	0.046*** (0.015)	3.391*** (0.563)
0 to 100% FPL	-0.316*** (0.015)	-0.252*** (0.015)	-0.377*** (0.018)	-15.826*** (0.966)

>100 to 200% FPL	-0.136***	-0.116***	-0.187***	-8.110***
	(0.015)	(0.014)	(0.017)	(0.758)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	0.006	0.004	-0.002	0.344
	(0.005)	(0.004)	(0.006)	(0.262)
Married	-0.028***	-0.046***	-0.053***	-1.781***
	(0.010)	(0.007)	(0.013)	(0.522)
Average Age of Eldercare Recipient(s)	-0.001	-0.001*	-0.003***	-0.088**
	(0.001)	(0.001)	(0.001)	(0.037)
Average Duration of Providing Care to Recipient(s)	0.002**	0.001*	0.003***	0.130***
	(0.001)	(0.001)	(0.001)	(0.046)
Proportion of recipients that live in household	-0.102***	-0.079***	-0.108***	-4.220***
	(0.016)	(0.020)	(0.016)	(0.844)
Proportion of recipients that are relatives	0.029**	0.023**	0.071***	1.863***
	(0.011)	(0.009)	(0.014)	(0.649)
R^2	0.1495	0.1399	0.1744	0.1670
Adjusted R^2	0.1366	0.1269	0.1619	0.1545
Observations	8952	8952	8952	8952
*** p<0.01, ** p<0.05, * p<0.1				
State and Time FE				

Controls for State, Caregiver, and Recipient Included

Appendix Table 8: Female Informal Caregivers with Linear Time Trend—Unweighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.031	0.027	-0.003	1.441
	(0.029)	(0.029)	(0.035)	(1.930)
Unemployment rate	-0.002	0.001	0.015	0.400
	(0.024)	(0.022)	(0.026)	(1.040)
TANF Benefits for 3 Persons	0.001	0.001*	-0.000	0.029
	(0.001)	(0.001)	(0.001)	(0.034)
SNAP Benefits for 3 Persons	-0.001***	-0.001***	-0.000	-0.040***
	(0.000)	(0.000)	(0.000)	(0.015)
Adjusted HH Aide Hourly	0.013	0.013	0.019	-0.083
	(0.013)	(0.014)	(0.012)	(0.672)
Refundable State EITC (1=Yes)	0.026	-0.046	0.102	1.302
	(0.041)	(0.045)	(0.074)	(1.593)
State EITC Rate	-0.097	0.062	-0.092	-7.302
	(0.154)	(0.163)	(0.207)	(7.071)
Metropolitan	-0.016	-0.004	-0.023	-0.390
	(0.019)	(0.017)	(0.020)	(0.968)
Age	-0.007***	-0.008***	-0.006***	-0.290***

	(0.001)	(0.001)	(0.001)	(0.027)
Spanish, Hispanic, or Latino	0.053* (0.027)	0.047** (0.021)	0.037 (0.038)	0.944 (1.114)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	0.023 (0.019)	0.056*** (0.016)	0.056** (0.021)	0.697 (0.833)
Race: Asian	0.006 (0.045)	0.024 (0.060)	0.027 (0.054)	-0.826 (1.884)
Race: Multiple or Other	-0.019 (0.046)	-0.007 (0.054)	0.045 (0.043)	0.939 (2.319)
Edu: Elementary/Middle	-0.325*** (0.102)	-0.311*** (0.099)	-0.236*** (0.080)	-11.125** (4.232)
Edu: Some HS, No deg	-0.187*** (0.057)	-0.129** (0.055)	-0.183*** (0.043)	-7.667*** (2.013)
Edu: HS Grad	-0.103*** (0.021)	-0.102*** (0.018)	-0.104*** (0.026)	-4.172*** (0.903)
Edu: Some College, No deg	-0.039** (0.016)	-0.035** (0.014)	-0.076*** (0.017)	-2.041** (0.781)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	0.065*** (0.016)	0.059*** (0.016)	0.063*** (0.021)	4.143*** (0.829)
0 to 100% FPL	-0.312***	-0.249***	-0.354***	-14.988***

	(0.023)	(0.023)	(0.026)	(1.220)
>100 to 200% FPL	-0.124***	-0.106***	-0.163***	-6.860***
	(0.021)	(0.019)	(0.020)	(0.859)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	-0.012*	-0.014**	-0.039***	-1.267***
	(0.007)	(0.006)	(0.009)	(0.344)
Married	-0.086***	-0.102***	-0.142***	-5.656***
	(0.014)	(0.009)	(0.019)	(0.710)
Average Age of Eldercare Recipient(s)	-0.001	-0.001	-0.003***	-0.128***
	(0.001)	(0.001)	(0.001)	(0.039)
Average Duration of Providing Care to Recipient(s)	0.002	0.001	0.003*	0.104*
	(0.001)	(0.001)	(0.002)	(0.058)
Proportion of recipients that live in household	-0.089***	-0.063**	-0.087***	-3.236***
	(0.022)	(0.024)	(0.022)	(1.126)
Proportion of recipients that are relatives	0.034**	0.026*	0.094***	2.456***
	(0.016)	(0.014)	(0.018)	(0.759)
R^2	0.1449	0.1411	0.1577	0.1511
Adjusted R^2	0.1232	0.1194	0.1364	0.1296
Observations	5350	5350	5350	5350

*** p<0.01, ** p<0.05, * p<0.1
State and Time FE
Controls for State, Caregiver, and Recipient Included

Appendix Table 9: Male Informal Caregivers with Linear Time Trend—Unweighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.052**	0.023	0.036	1.458
	(0.025)	(0.025)	(0.027)	(1.552)
Unemployment rate	0.025	0.012	-0.002	1.681
	(0.024)	(0.020)	(0.028)	(1.497)
TANF Benefits for 3 Persons	0.000	0.001	0.000	0.057
	(0.001)	(0.000)	(0.001)	(0.040)
SNAP Benefits for 3 Persons	0.001**	0.000	0.002***	0.228***
	(0.000)	(0.000)	(0.001)	(0.021)
Adjusted HH Aide Hourly	-0.032**	-0.012	-0.020	-0.866
	(0.013)	(0.012)	(0.020)	(0.952)
Refundable State EITC (1=Yes)	-0.169**	-0.257***	-0.131	-9.449*
	(0.076)	(0.062)	(0.087)	(5.344)
State EITC Rate	0.279	0.527**	0.344	22.070
	(0.245)	(0.201)	(0.312)	(16.356)
Metropolitan	-0.017	-0.012	-0.014	-1.314

	(0.017)	(0.014)	(0.017)	(1.051)
Age	-0.005***	-0.007***	-0.005***	-0.271***
	(0.001)	(0.001)	(0.001)	(0.038)
Spanish, Hispanic, or	-0.022	0.017	-0.023	-2.734**
Latino	(0.021)	(0.014)	(0.030)	(1.080)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	-0.061**	-0.019	-0.070**	-2.627**
	(0.023)	(0.020)	(0.027)	(1.210)
Race: Asian	0.005	-0.002	0.009	-0.865
	(0.054)	(0.044)	(0.032)	(1.654)
Race: Multiple or	-0.065	0.012	-0.050	-7.245***
Other	(0.052)	(0.041)	(0.052)	(2.252)
Edu:	-0.018	-0.032	-0.050	-2.217
Elementary/Middle	(0.078)	(0.076)	(0.082)	(3.617)
Edu: Some HS, No	-0.093**	-0.037	-0.132***	-8.376***
deg	(0.036)	(0.029)	(0.041)	(2.376)
Edu: HS Grad	-0.037**	-0.019	-0.032**	-3.416***
	(0.014)	(0.013)	(0.016)	(0.941)
Edu: Some College,	-0.018	-0.008	0.001	-1.795*
No deg	(0.019)	(0.015)	(0.020)	(1.020)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]
Edu:	0.023	0.019	0.009	2.145**
Graduate/Professional	(0.019)	(0.016)	(0.019)	(1.030)

Degree				
0 to 100% FPL	-0.311***	-0.242***	-0.391***	-16.703***
	(0.025)	(0.023)	(0.030)	(1.743)
>100 to 200% FPL	-0.146***	-0.120***	-0.206***	-9.192***
	(0.021)	(0.017)	(0.022)	(1.147)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	0.021***	0.019***	0.036***	1.938***
	(0.006)	(0.005)	(0.008)	(0.423)
Married	0.064***	0.042***	0.086***	4.025***
	(0.014)	(0.012)	(0.017)	(0.846)
Average Age of Eldercare Recipient(s)	-0.001	0.000	-0.001	0.035
	(0.001)	(0.001)	(0.001)	(0.064)
Average Duration of Providing Care to Recipient(s)	0.003***	0.002**	0.004***	0.160**
	(0.001)	(0.001)	(0.001)	(0.066)
Proportion of recipients that live in household	-0.108***	-0.093**	-0.112***	-4.529***
	(0.033)	(0.037)	(0.028)	(1.292)
Proportion of recipients that are relatives	0.015	0.015	0.029	0.809
	(0.018)	(0.015)	(0.020)	(1.103)
R^2	0.1884	0.1731	0.2150	0.1958
Adjusted R^2	0.1575	0.1416	0.1852	0.1652

Observations	3602	3602	3602	3602
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included				

Appendix Table 10: All Informal Caregivers—Survey Weighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.026**	0.016	0.012	1.175
	(0.013)	(0.013)	(0.015)	(0.747)
Unemployment rate	-0.009	0.008	-0.023**	-0.527
	(0.011)	(0.010)	(0.011)	(0.504)
TANF Benefits for 3 Persons	0.001	0.000	0.000	0.018
	(0.000)	(0.000)	(0.000)	(0.018)
SNAP Benefits for 3 Persons	-0.001***	-0.001***	-0.001**	-0.020
	(0.000)	(0.000)	(0.000)	(0.014)
Adjusted HH Aide Hourly	-0.001	0.004	0.003	-0.088
	(0.010)	(0.010)	(0.012)	(0.759)
Refundable State EITC (1=Yes)	-0.051	-0.086**	-0.015	-0.318
	(0.040)	(0.035)	(0.060)	(2.104)
State EITC Rate	-0.110	0.120	-0.084	-5.307
	(0.139)	(0.115)	(0.174)	(7.485)
Metropolitan	-0.025	-0.019	-0.037*	-1.169

	(0.020)	(0.017)	(0.018)	(0.981)
Female=1	-0.132***	-0.122***	-0.221***	-9.579***
	(0.011)	(0.012)	(0.013)	(0.658)
Age	-0.004***	-0.006***	-0.002**	-0.161***
	(0.001)	(0.001)	(0.001)	(0.033)
Spanish, Hispanic, or	0.021	0.018	0.016	-0.749
Latino	(0.032)	(0.027)	(0.039)	(1.467)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	0.004	0.042**	0.017	-0.182
	(0.020)	(0.021)	(0.025)	(1.136)
Race: Asian	-0.026	-0.028	0.009	-2.086*
	(0.033)	(0.020)	(0.027)	(1.237)
Race: Multiple or	-0.061	-0.032	-0.035	-5.173**
Other	(0.050)	(0.043)	(0.046)	(2.121)
Edu:	-0.150*	-0.131	-0.143	-8.108**
Elementary/Middle	(0.078)	(0.091)	(0.086)	(3.408)
Edu: Some HS, No	-0.200***	-0.127***	-0.268***	-11.008***
deg	(0.032)	(0.032)	(0.024)	(1.414)
Edu: HS Grad	-0.075***	-0.069***	-0.085***	-4.340***
	(0.015)	(0.014)	(0.017)	(0.745)
Edu: Some College,	-0.028*	-0.026**	-0.049***	-1.621**
No deg	(0.014)	(0.011)	(0.016)	(0.758)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]

Edu: Graduate/Professional Degree	0.054*** (0.014)	0.048*** (0.015)	0.047*** (0.016)	3.304*** (0.639)
0 to 100% FPL	-0.283*** (0.024)	-0.241*** (0.023)	-0.290*** (0.023)	-13.749*** (1.071)
>100 to 200% FPL	-0.127*** (0.016)	-0.116*** (0.014)	-0.158*** (0.018)	-6.904*** (0.907)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	0.005 (0.007)	0.003 (0.006)	0.007 (0.007)	0.629* (0.314)
Married	0.001 (0.013)	-0.024*** (0.009)	-0.016 (0.014)	0.046 (0.593)
Average Age of Eldercare Recipient(s)	-0.002** (0.001)	-0.002* (0.001)	-0.004*** (0.001)	-0.158*** (0.038)
Average Duration of Providing Care to Recipient(s)	0.001 (0.001)	0.001 (0.001)	0.003** (0.001)	0.125* (0.065)
Proportion of recipients that live in household	-0.113*** (0.024)	-0.079*** (0.028)	-0.123*** (0.031)	-4.387*** (1.184)
Proportion of recipients that are relatives	0.047*** (0.017)	0.039*** (0.013)	0.072*** (0.017)	1.649** (0.802)

R^2	0.1439	0.1395	0.1549	0.1571
Adjusted R^2	0.1359	0.1315	0.1470	0.1492
*** p<0.01, ** p<0.05, * p<0.1				
State and Time FE				
Controls for State, Caregiver, and Recipient Included				

Appendix Table 11: Female Informal Caregivers—Survey Weighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.015	0.012	-0.009	0.759
	(0.018)	(0.017)	(0.022)	(1.018)
Unemployment rate	-0.004	0.011	-0.014	-0.887
	(0.013)	(0.014)	(0.014)	(0.601)
TANF Benefits for 3 Persons	0.000	0.000	-0.000	0.004
	(0.001)	(0.000)	(0.001)	(0.027)
SNAP Benefits for 3 Persons	-0.003***	-0.002***	-0.002***	-0.097***
	(0.001)	(0.001)	(0.000)	(0.014)
Adjusted HH Aide Hourly	0.004	0.011	0.011	-0.186
	(0.015)	(0.016)	(0.015)	(0.750)
Refundable State EITC (1=Yes)	-0.041	-0.069	-0.015	-2.862
	(0.049)	(0.052)	(0.084)	(2.482)
State EITC Rate	-0.055	0.147	0.149	3.432

	(0.174)	(0.181)	(0.242)	(9.054)
Metropolitan	-0.025	-0.008	-0.028	-1.121
	(0.025)	(0.025)	(0.024)	(1.245)
Age	-0.005***	-0.006***	-0.002**	-0.181***
	(0.001)	(0.001)	(0.001)	(0.037)
Spanish, Hispanic, or	0.066	0.032	0.046	1.111
Latino	(0.045)	(0.034)	(0.055)	(2.068)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	0.023	0.067**	0.065**	0.521
	(0.022)	(0.025)	(0.027)	(1.323)
Race: Asian	0.025	0.027	0.047	-0.264
	(0.033)	(0.045)	(0.039)	(1.352)
Race: Multiple or	-0.033	-0.024	0.042	1.356
Other	(0.072)	(0.075)	(0.064)	(2.977)
Edu:	-0.340***	-0.299**	-0.259**	-12.933**
Elementary/Middle	(0.117)	(0.129)	(0.098)	(4.832)
Edu: Some HS, No	-0.242***	-0.187***	-0.267***	-10.250***
deg	(0.061)	(0.066)	(0.049)	(2.250)
Edu: HS Grad	-0.104***	-0.091***	-0.108***	-4.199***
	(0.031)	(0.024)	(0.032)	(1.273)
Edu: Some College,	-0.015	-0.020	-0.066***	-0.866
No deg	(0.020)	(0.017)	(0.023)	(1.006)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]

Edu: Graduate/Professional Degree	0.084*** (0.019)	0.079*** (0.020)	0.078*** (0.024)	5.132*** (1.057)
0 to 100% FPL	-0.292*** (0.035)	-0.249*** (0.030)	-0.294*** (0.030)	-13.515*** (1.568)
>100 to 200% FPL	-0.109*** (0.024)	-0.096*** (0.021)	-0.123*** (0.021)	-5.069*** (1.075)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	-0.010 (0.009)	-0.014* (0.008)	-0.027*** (0.010)	-0.784** (0.310)
Married	-0.073*** (0.017)	-0.092*** (0.012)	-0.127*** (0.021)	-4.426*** (0.884)
Average Age of Eldercare Recipient(s)	-0.002 (0.001)	-0.002 (0.002)	-0.004*** (0.001)	-0.159*** (0.048)
Average Duration of Providing Care to Recipient(s)	0.001 (0.002)	0.000 (0.002)	0.002 (0.002)	0.095 (0.087)
Proportion of recipients that live in household	-0.126*** (0.030)	-0.084*** (0.031)	-0.122*** (0.029)	-4.022*** (1.394)
Proportion of recipients that are relatives	0.071*** (0.024)	0.058*** (0.021)	0.103*** (0.026)	2.971*** (0.991)

R^2	0.1401	0.1424	0.1282	0.1315
Adjusted R^2	0.1267	0.1290	0.1147	0.1180
*** p<0.01, ** p<0.05, * p<0.1				
State and Time FE				
Controls for State, Caregiver, and Recipient Included				

Appendix Table 12: Male Informal Caregivers—Survey Weighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage	0.029**	0.011	0.031	1.664
Above Fed	(0.013)	(0.016)	(0.019)	(1.130)
Unemployment rate	-0.018	0.001	-0.028	0.107
	(0.014)	(0.014)	(0.018)	(0.909)
TANF Benefits for 3	0.001***	0.000	0.001*	0.033
Persons	(0.000)	(0.000)	(0.000)	(0.024)
SNAP Benefits for 3	0.001	0.001***	0.002***	0.113***
Persons	(0.000)	(0.000)	(0.001)	(0.041)
Adjusted HH Aide	-0.015	-0.011	-0.015	-0.155
Hourly	(0.014)	(0.013)	(0.018)	(1.143)
Refundable State	-0.085	-0.119**	0.009	3.607
EITC (1=Yes)	(0.073)	(0.059)	(0.078)	(3.857)
State EITC Rate	-0.156	0.096	-0.444	-19.422
	(0.262)	(0.221)	(0.298)	(14.938)

Metropolitan	-0.020	-0.028	-0.034	-1.145
	(0.025)	(0.019)	(0.028)	(1.592)
Age	-0.004***	-0.006***	-0.003**	-0.193***
	(0.001)	(0.001)	(0.001)	(0.053)
Spanish, Hispanic, or	-0.036	-0.002	-0.018	-3.210**
Latino	(0.026)	(0.025)	(0.039)	(1.521)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	-0.041	-0.013	-0.075*	-2.169
	(0.033)	(0.028)	(0.037)	(1.484)
Race: Asian	-0.085	-0.093	-0.048	-4.978**
	(0.064)	(0.060)	(0.043)	(2.121)
Race: Multiple or	-0.102	-0.050	-0.116*	-11.186***
Other	(0.072)	(0.058)	(0.069)	(2.566)
Edu:	0.047	0.041	-0.010	-2.882
Elementary/Middle	(0.080)	(0.074)	(0.103)	(4.318)
Edu: Some HS, No	-0.148***	-0.057*	-0.240***	-10.847***
deg	(0.034)	(0.032)	(0.034)	(2.127)
Edu: HS Grad	-0.036*	-0.032	-0.039	-3.756***
	(0.020)	(0.019)	(0.024)	(1.330)
Edu: Some College,	-0.039	-0.024	-0.017	-2.317
No deg	(0.026)	(0.019)	(0.029)	(1.399)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]
Edu:	0.004	-0.002	-0.007	0.592

Graduate/Professional Degree	(0.025)	(0.019)	(0.026)	(1.034)
0 to 100% FPL	-0.260***	-0.216***	-0.275***	-13.954***
	(0.032)	(0.031)	(0.037)	(1.801)
>100 to 200% FPL	-0.143***	-0.134***	-0.187***	-8.650***
	(0.031)	(0.022)	(0.032)	(1.414)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	0.019***	0.019**	0.041***	2.103***
	(0.007)	(0.007)	(0.009)	(0.529)
Married	0.099***	0.064***	0.131***	5.580***
	(0.017)	(0.014)	(0.026)	(0.922)
Average Age of Eldercare Recipient(s)	-0.002	-0.000	-0.003	-0.092
	(0.002)	(0.001)	(0.002)	(0.079)
Average Duration of Providing Care to Recipient(s)	0.002	0.002	0.004*	0.166
	(0.002)	(0.001)	(0.002)	(0.100)
Proportion of recipients that live in household	-0.095**	-0.071*	-0.104**	-4.067**
	(0.039)	(0.042)	(0.044)	(1.662)
Proportion of recipients that are relatives	0.018	0.013	0.034*	0.032
	(0.019)	(0.017)	(0.020)	(1.123)
R^2	0.1712	0.1600	0.1929	0.1789

Adjusted R^2	0.1519	0.1404	0.1741	0.1597
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included				

Appendix Table 13: All Informal Caregivers with Linear Time Trend—Weighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.062**	0.051**	0.048	2.942
	(0.028)	(0.021)	(0.039)	(1.841)
Unemployment rate	0.020	0.035*	-0.007	0.637
	(0.022)	(0.020)	(0.022)	(1.169)
TANF Benefits for 3 Persons	0.001	0.001*	0.001	0.041*
	(0.001)	(0.001)	(0.001)	(0.023)
SNAP Benefits for 3 Persons	-0.002***	-0.002***	-0.001*	0.009
	(0.000)	(0.000)	(0.000)	(0.026)
Adjusted HH Aide Hourly	-0.002	0.002	0.002	-0.534
	(0.011)	(0.012)	(0.015)	(0.760)
Refundable State EITC (1=Yes)	-0.080	-0.181***	-0.112	-3.902
	(0.078)	(0.051)	(0.076)	(3.805)
State EITC Rate	0.099	0.218	0.292	11.271
	(0.293)	(0.167)	(0.254)	(12.471)

Metropolitan	-0.027	-0.021	-0.037**	-1.238
	(0.020)	(0.017)	(0.018)	(1.013)
Female=1	-0.132***	-0.121***	-0.221***	-9.612***
	(0.011)	(0.012)	(0.013)	(0.662)
Age	-0.004***	-0.006***	-0.002**	-0.156***
	(0.001)	(0.001)	(0.001)	(0.034)
Spanish, Hispanic, or	0.020	0.018	0.013	-0.901
Latino	(0.032)	(0.027)	(0.040)	(1.501)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	0.005	0.042*	0.018	-0.138
	(0.020)	(0.021)	(0.025)	(1.146)
Race: Asian	-0.034	-0.032	0.000	-2.560*
	(0.034)	(0.022)	(0.028)	(1.307)
Race: Multiple or	-0.060	-0.031	-0.036	-5.156**
Other	(0.050)	(0.043)	(0.047)	(2.063)
Edu:	-0.151*	-0.132	-0.145	-8.358**
Elementary/Middle	(0.080)	(0.093)	(0.089)	(3.536)
Edu: Some HS, No	-0.196***	-0.122***	-0.263***	-10.762***
deg	(0.032)	(0.033)	(0.025)	(1.426)
Edu: HS Grad	-0.077***	-0.069***	-0.085***	-4.363***
	(0.015)	(0.014)	(0.017)	(0.746)
Edu: Some College,	-0.030**	-0.029**	-0.051***	-1.680**
No deg	(0.014)	(0.011)	(0.016)	(0.752)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]

Edu: Graduate/Professional Degree	0.053*** (0.014)	0.047*** (0.015)	0.047*** (0.016)	3.274*** (0.639)
0 to 100% FPL	-0.284*** (0.023)	-0.239*** (0.023)	-0.289*** (0.023)	-13.752*** (1.056)
>100 to 200% FPL	-0.127*** (0.016)	-0.116*** (0.014)	-0.159*** (0.018)	-6.892*** (0.906)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	0.006 (0.007)	0.003 (0.006)	0.007 (0.007)	0.653** (0.324)
Married	0.001 (0.013)	-0.024*** (0.009)	-0.015 (0.014)	0.096 (0.599)
Average Age of Eldercare Recipient(s)	-0.002** (0.001)	-0.002* (0.001)	-0.004*** (0.001)	-0.160*** (0.039)
Average Duration of Providing Care to Recipient(s)	0.001 (0.001)	0.001 (0.001)	0.003** (0.001)	0.124* (0.064)
Proportion of recipients that live in household	-0.113*** (0.024)	-0.081*** (0.027)	-0.125*** (0.031)	-4.412*** (1.213)
Proportion of recipients that are	0.048*** (0.017)	0.039*** (0.013)	0.071*** (0.017)	1.610* (0.825)

relatives				
R^2	0.1491	0.1467	0.1610	0.1629
Adjusted R^2	0.1362	0.1339	0.1483	0.1503
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included				

Appendix Table 14: Female Informal Caregivers with Linear Time Trend—Weighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.006	0.029	-0.020	0.946
	(0.042)	(0.030)	(0.053)	(2.692)
Unemployment rate	0.009	0.046	-0.001	0.024
	(0.030)	(0.031)	(0.030)	(1.339)
TANF Benefits for 3 Persons	0.001	0.001*	0.000	0.037
	(0.001)	(0.001)	(0.001)	(0.043)
SNAP Benefits for 3 Persons	-0.004***	-0.004***	-0.002***	-0.137***
	(0.000)	(0.000)	(0.000)	(0.015)
Adjusted HH Aide Hourly	0.011	0.007	0.013	-0.320
	(0.015)	(0.018)	(0.019)	(0.856)
Refundable State EITC (1=Yes)	-0.000	-0.089	-0.041	-1.831
	(0.102)	(0.092)	(0.115)	(3.882)

State EITC Rate	0.064	0.090	0.282	3.517
	(0.344)	(0.270)	(0.377)	(14.671)
Metropolitan	-0.027	-0.011	-0.030	-1.248
	(0.026)	(0.025)	(0.024)	(1.248)
Age	-0.005***	-0.006***	-0.002**	-0.177***
	(0.001)	(0.001)	(0.001)	(0.038)
Spanish, Hispanic, or	0.063	0.031	0.044	1.055
Latino	(0.046)	(0.035)	(0.057)	(2.130)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	0.021	0.064**	0.062**	0.486
	(0.022)	(0.025)	(0.027)	(1.314)
Race: Asian	0.015	0.022	0.035	-0.621
	(0.038)	(0.050)	(0.042)	(1.488)
Race: Multiple or	-0.040	-0.028	0.040	0.672
Other	(0.072)	(0.078)	(0.065)	(2.829)
Edu:	-0.344***	-0.301**	-0.258**	-13.258**
Elementary/Middle	(0.121)	(0.130)	(0.100)	(5.000)
Edu: Some HS, No	-0.236***	-0.180**	-0.253***	-10.009***
deg	(0.064)	(0.069)	(0.051)	(2.299)
Edu: HS Grad	-0.104***	-0.090***	-0.110***	-4.314***
	(0.031)	(0.025)	(0.032)	(1.292)
Edu: Some College,	-0.018	-0.025	-0.071***	-0.975
No deg	(0.021)	(0.017)	(0.023)	(1.028)
Edu: College degree	[REF]	[REF]	[REF]	[REF]

Edu: Graduate/Professional Degree	0.081*** (0.021)	0.079*** (0.020)	0.076*** (0.025)	4.964*** (1.074)
0 to 100% FPL	-0.291*** (0.035)	-0.246*** (0.030)	-0.289*** (0.030)	-13.506*** (1.575)
>100 to 200% FPL	-0.106*** (0.024)	-0.094*** (0.021)	-0.121*** (0.021)	-4.882*** (1.084)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	-0.010 (0.009)	-0.014* (0.008)	-0.028*** (0.010)	-0.788** (0.334)
Married	-0.075*** (0.018)	-0.093*** (0.012)	-0.125*** (0.021)	-4.405*** (0.895)
Average Age of Eldercare Recipient(s)	-0.002 (0.001)	-0.002 (0.002)	-0.004*** (0.001)	-0.161*** (0.046)
Average Duration of Providing Care to Recipient(s)	0.001 (0.002)	0.000 (0.002)	0.002 (0.002)	0.098 (0.086)
Proportion of recipients that live in household	-0.126*** (0.030)	-0.085*** (0.032)	-0.124*** (0.029)	-4.089*** (1.419)
Proportion of recipients that are	0.072*** (0.024)	0.059*** (0.020)	0.108*** (0.026)	3.054*** (1.008)

relatives				
R^2	0.1489	0.1549	0.1395	0.1407
Adjusted R^2	0.1274	0.1335	0.1177	0.1189
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included				

Appendix Table 15: Male Informal Caregivers with Linear Time Trend—Weighted Employment Outcomes

	(1) Employed	(2) In the Labor Force	(3) Full-Time	(4) Hours Worked Per Week
Adjusted Wage Above Fed	0.104***	0.058**	0.097**	3.575
	(0.030)	(0.025)	(0.047)	(2.282)
Unemployment rate	0.027	0.019	-0.021	1.028
	(0.031)	(0.027)	(0.035)	(1.878)
TANF Benefits for 3 Persons	0.000	0.001	0.001*	0.071
	(0.001)	(0.001)	(0.001)	(0.046)
SNAP Benefits for 3 Persons	0.001**	0.001*	0.001*	0.210***
	(0.001)	(0.000)	(0.001)	(0.034)
Adjusted HH Aide Hourly	-0.032*	-0.013	-0.026	-0.934
	(0.018)	(0.017)	(0.025)	(1.161)
Refundable State EITC (1=Yes)	-0.262	-0.385**	-0.226	-11.845
	(0.172)	(0.145)	(0.145)	(9.735)

State EITC Rate	0.300 (0.557)	0.580 (0.439)	0.242 (0.578)	27.987 (30.758)
Metropolitan	-0.022 (0.026)	-0.031 (0.020)	-0.032 (0.028)	-1.063 (1.713)
Age	-0.004*** (0.001)	-0.006*** (0.001)	-0.003** (0.001)	-0.197*** (0.056)
Spanish, Hispanic, or Latino	-0.034 (0.025)	0.001 (0.023)	-0.024 (0.040)	-3.546** (1.532)
Race: White	[REF]	[REF]	[REF]	[REF]
Race: Black	-0.041 (0.034)	-0.013 (0.029)	-0.076* (0.038)	-2.180 (1.482)
Race: Asian	-0.086 (0.071)	-0.093 (0.063)	-0.057 (0.046)	-5.650** (2.318)
Race: Multiple or Other	-0.089 (0.075)	-0.038 (0.059)	-0.119 (0.072)	-10.663*** (2.657)
Edu: Elementary/Middle	0.052 (0.088)	0.044 (0.081)	-0.016 (0.110)	-2.598 (4.697)
Edu: Some HS, No deg	-0.143*** (0.034)	-0.051* (0.030)	-0.242*** (0.035)	-10.445*** (2.154)
Edu: HS Grad	-0.039* (0.021)	-0.033* (0.020)	-0.041 (0.025)	-3.814*** (1.316)
Edu: Some College, No deg	-0.041 (0.026)	-0.026 (0.019)	-0.020 (0.029)	-2.376* (1.409)
Edu: College Degree	[REF]	[REF]	[REF]	[REF]

Edu: Graduate/Professional Degree	0.005 (0.024)	-0.002 (0.018)	-0.011 (0.026)	0.674 (1.014)
0 to 100% FPL	-0.259*** (0.034)	-0.214*** (0.032)	-0.276*** (0.039)	-13.860*** (1.837)
>100 to 200% FPL	-0.143*** (0.032)	-0.132*** (0.022)	-0.188*** (0.032)	-8.593*** (1.384)
Above 200% FPL	[REF]	[REF]	[REF]	[REF]
Number of household children < 18	0.021*** (0.007)	0.020*** (0.007)	0.040*** (0.009)	2.129*** (0.551)
Married	0.099*** (0.017)	0.063*** (0.015)	0.134*** (0.026)	5.657*** (0.938)
Average Age of Eldercare Recipient(s)	-0.002 (0.002)	-0.000 (0.001)	-0.003 (0.002)	-0.081 (0.079)
Average Duration of Providing Care to Recipient(s)	0.002 (0.002)	0.002 (0.001)	0.004* (0.002)	0.168* (0.100)
Proportion of recipients that live in household	-0.092** (0.039)	-0.073* (0.042)	-0.100** (0.044)	-3.857** (1.710)
Proportion of recipients that are	0.018 (0.019)	0.014 (0.017)	0.028 (0.020)	-0.040 (1.139)

relatives				
R^2	0.1823	0.1721	0.2049	0.1937
Adjusted R^2	0.1512	0.1406	0.1747	0.1630
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included				

Appendix Table 16: All Personal Time in Minutes—Unweighted

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	1.254 (2.572)	2.351 (3.993)	-1.157 (5.274)
Unemployment rate	2.538 (1.933)	3.232 (2.913)	1.379 (3.331)
TANF Benefits for 3 Persons	-0.101 (0.098)	-0.091 (0.138)	-0.136 (0.134)
SNAP Benefits for 3 Persons	0.082 (0.102)	0.111 (0.115)	-0.003 (0.166)
Adjusted HH Aide Hourly	4.337* (2.302)	4.527* (2.574)	4.512 (4.642)
Refundable State EITC (1=Yes)	5.075 (8.987)	17.131 (10.545)	-19.123 (20.751)
State EITC Rate	0.276 (28.931)	-20.537 (35.462)	48.261 (58.047)
Metropolitan	6.142**	4.752	8.507

	(2.644)	(4.643)	(5.120)
Female=1	28.417***	NA	NA
	(3.293)		
Age	-0.818***	-0.913***	-0.682***
	(0.134)	(0.184)	(0.201)
Spanish, Hispanic, or Latino	20.963***	14.348*	29.877***
	(5.156)	(7.239)	(7.915)
Race: White	[REF]	[REF]	[REF]
Race: Black	13.219**	17.423***	3.474
	(5.119)	(6.229)	(7.863)
Race: Asian	1.510	6.200	-7.851
	(10.625)	(15.746)	(10.911)
Race: Multiple or Other	-6.786	-9.376	-3.085
	(9.760)	(15.826)	(15.488)
Edu: Elementary/Middle	28.016	60.274**	-15.850
	(17.395)	(28.872)	(30.029)
Edu: Some HS, No deg	21.482***	16.721	27.100***
	(7.510)	(10.035)	(9.677)
Edu: HS Grad	7.760*	4.686	12.758*
	(4.272)	(5.603)	(6.542)
Edu: Some College, No deg	5.902	3.828	9.958
	(3.737)	(4.477)	(6.005)
Edu: College Degree	[REF]	[REF]	[REF]

Edu: Graduate/Professional Degree	-8.151*	-10.808**	-3.263
	(4.594)	(5.323)	(6.359)
0 to 100% FPL	19.136***	22.790***	15.450*
	(4.654)	(6.309)	(7.890)
>100 to 200% FPL	7.275*	9.435	3.793
	(4.156)	(5.946)	(5.545)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-11.333***	-13.043***	-9.103***
	(1.551)	(1.918)	(2.700)
Married	-4.163	-3.095	-5.761
	(2.631)	(3.822)	(4.075)
Average Age of Eldercare	0.187	0.130	0.213
Recipient(s)	(0.261)	(0.334)	(0.337)
Average Duration of Providing Care	-0.364	-0.229	-0.546*
to Recipient(s)	(0.363)	(0.598)	(0.324)
Proportion of recipients that live in	-1.224	-8.147	10.255
household	(5.642)	(7.046)	(7.873)
Proportion of recipients that are	2.662	7.561	-4.801
relatives	(3.634)	(5.685)	(5.020)
R^2	0.0461	0.0432	0.0433
Adjusted R^2	0.0372	0.0283	0.0210
Observations	8952	5350	3602
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			

Controls for State, Caregiver, and Recipient Included

Appendix Table 17: All Personal Time in Minutes—Unweighted with Linear Time Trend

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	-6.153	-2.791	-9.860
	(6.164)	(7.672)	(7.774)
Unemployment rate	0.360	-1.536	2.424
	(4.029)	(6.490)	(6.499)
TANF Benefits for 3 Persons	0.028	0.089	-0.194
	(0.269)	(0.366)	(0.288)
SNAP Benefits for 3 Persons	0.308**	0.226**	0.283
	(0.142)	(0.109)	(0.181)
Adjusted HH Aide Hourly	7.315**	5.328	10.120
	(3.092)	(3.495)	(6.807)
Refundable State EITC (1=Yes)	31.281*	46.702***	15.046
	(15.615)	(15.406)	(21.051)
State EITC Rate	-43.081	-121.021**	58.723
	(54.460)	(56.470)	(78.013)
Metropolitan	6.283**	5.691	7.923
	(2.664)	(4.734)	(5.379)
Female=1	28.464***	NA	NA
	(3.344)		
Age	-0.802***	-0.903***	-0.668***

	(0.135)	(0.183)	(0.207)
Spanish, Hispanic, or Latino	21.335***	15.033**	29.519***
	(5.202)	(7.265)	(8.016)
Race: White	[REF]	[REF]	[REF]
Race: Black	13.226**	17.563***	3.114
	(5.177)	(6.256)	(7.889)
Race: Asian	1.201	6.556	-9.538
	(10.626)	(15.968)	(11.154)
Race: Multiple or Other	-6.367	-8.461	-5.958
	(9.698)	(16.043)	(16.042)
Edu: Elementary/Middle	27.712	58.893**	-15.663
	(17.557)	(29.257)	(30.664)
Edu: Some HS, No deg	21.277***	17.495*	25.362**
	(7.587)	(9.938)	(9.864)
Edu: HS Grad	7.650*	4.440	11.689*
	(4.262)	(5.742)	(6.656)
Edu: Some College, No deg	5.808	3.487	9.396
	(3.761)	(4.554)	(6.035)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-8.501*	-11.286**	-3.451
	(4.701)	(5.488)	(6.535)
0 to 100% FPL	19.033***	22.915***	15.378*
	(4.756)	(6.363)	(7.937)

>100 to 200% FPL	7.344*	9.146	4.326
	(4.194)	(6.030)	(5.792)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-11.274***	-12.980***	-9.156***
	(1.582)	(1.974)	(2.724)
Married	-4.267	-3.595	-5.786
	(2.658)	(3.889)	(4.210)
Average Age of Eldercare	0.175	0.171	0.165
Recipient(s)	(0.265)	(0.342)	(0.335)
Average Duration of Providing Care	-0.342	-0.203	-0.529
to Recipient(s)	(0.362)	(0.604)	(0.328)
Proportion of recipients that live in	-1.818	-8.424	10.246
household	(5.765)	(7.150)	(8.170)
Proportion of recipients that are	2.721	7.881	-4.556
relatives	(3.671)	(5.737)	(5.113)
R^2	0.0490	0.0487	0.0511
Adjusted R^2	0.0347	0.0247	0.0150
Observations	8952	5350	3602
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 18: All Personal Time in Minutes—Weighted

	(1) All EC	(2) Female	(3) Male
Adjusted Wage Above Fed	-0.737	-2.420	-0.205
	(4.176)	(4.783)	(7.960)
Unemployment rate	3.885	6.764*	-0.274
	(2.561)	(3.619)	(4.268)
TANF Benefits for 3 Persons	-0.051	-0.127	0.044
	(0.132)	(0.168)	(0.149)
SNAP Benefits for 3 Persons	-0.042	-0.210***	0.189
	(0.096)	(0.068)	(0.193)
Adjusted HH Aide Hourly	7.016*	4.738	11.610**
	(3.711)	(3.913)	(5.746)
Refundable State EITC (1=Yes)	-15.697**	16.241	-60.329***
	(7.540)	(13.223)	(18.822)
State EITC Rate	43.909*	-3.540	117.018*
	(25.853)	(40.311)	(61.560)
Metropolitan	7.822**	8.113	8.574
	(3.290)	(5.201)	(6.950)
Female=1	27.747***	NA	NA
	(4.256)		
Age	-1.041***	-1.056***	-0.929***
	(0.205)	(0.231)	(0.272)
Spanish, Hispanic, or Latino	21.412***	15.981	28.323**
	(6.863)	(10.637)	(12.292)

Race: White	[REF]	[REF]	[REF]
Race: Black	18.677**	28.313***	4.315
	(7.528)	(8.575)	(9.879)
Race: Asian	-3.427	12.230	-20.516*
	(12.747)	(20.389)	(11.213)
Race: Multiple or Other	2.754	-4.170	9.572
	(14.075)	(17.949)	(20.582)
Edu: Elementary/Middle	16.537	51.877*	-12.586
	(16.226)	(28.585)	(26.833)
Edu: Some HS, No deg	30.353***	21.007**	44.110***
	(8.764)	(9.274)	(12.370)
Edu: HS Grad	9.503**	1.283	19.231**
	(4.324)	(4.982)	(7.534)
Edu: Some College, No deg	7.048*	0.465	17.530**
	(4.175)	(5.514)	(6.730)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-9.931**	-13.072**	-3.683
	(4.776)	(5.820)	(6.969)
0 to 100% FPL	19.072***	20.186***	20.196*
	(6.288)	(7.040)	(11.194)
>100 to 200% FPL	4.124	7.644	-1.526
	(5.264)	(5.396)	(7.792)
Above 200% FPL	[REF]	[REF]	[REF]

Number of household children < 18	-9.998***	-12.264***	-6.908**
	(1.884)	(2.522)	(2.989)
Married	-5.720	-1.593	-9.724
	(3.959)	(4.451)	(5.849)
Average Age of Eldercare	0.346	0.059	0.529
Recipient(s)	(0.352)	(0.377)	(0.494)
Average Duration of Providing Care	-0.258	-0.075	-0.408
to Recipient(s)	(0.364)	(0.551)	(0.473)
Proportion of recipients that live in	5.773	-4.491	16.718
household	(6.734)	(6.167)	(10.735)
Proportion of recipients that are	1.136	3.665	-1.375
relatives	(4.460)	(5.951)	(6.667)
R^2	0.0594	0.0564	0.0766
Adjusted R^2	0.0506	0.0417	0.0551
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 19: All Personal Time in Minutes—Weighted with Linear Time Trend

	(1)	(2)	(3)
	All EC	Female EC	Male EC
Adjusted Wage Above Fed	-11.222	-7.822	-13.710
	(7.506)	(8.462)	(13.453)
Unemployment rate	-5.592	-6.273	-8.963

	(5.335)	(7.353)	(9.634)
TANF Benefits for 3 Persons	0.020	-0.024	0.025
	(0.288)	(0.340)	(0.345)
SNAP Benefits for 3 Persons	0.365**	-0.042	0.724**
	(0.181)	(0.133)	(0.295)
Adjusted HH Aide Hourly	10.461**	5.013	17.662**
	(5.077)	(5.600)	(7.846)
Refundable State EITC (1=Yes)	-1.055	31.990*	-35.909
	(17.436)	(18.609)	(26.066)
State EITC Rate	22.782	-68.203	137.608
	(54.391)	(60.951)	(82.690)
Metropolitan	7.967**	9.310*	8.341
	(3.353)	(5.391)	(7.209)
Female=1	27.810***	NA	NA
	(4.332)		
Age	-1.023***	-1.064***	-0.884***
	(0.203)	(0.226)	(0.267)
Spanish, Hispanic, or Latino	21.744***	17.181	27.527**
	(6.867)	(10.663)	(12.158)
Race: White	[REF]	[REF]	[REF]
Race: Black	18.669**	27.981***	4.402
	(7.550)	(8.589)	(9.361)
Race: Asian	-4.614	12.836	-24.463**
	(12.764)	(21.228)	(11.799)

Race: Multiple or Other	-0.147	-4.286	3.987
	(14.076)	(18.326)	(21.076)
Edu: Elementary/Middle	16.355	50.109*	-13.169
	(16.636)	(28.351)	(28.014)
Edu: Some HS, No deg	29.699***	21.989**	42.759***
	(8.762)	(9.209)	(12.866)
Edu: HS Grad	9.278**	0.447	18.872**
	(4.398)	(5.199)	(7.604)
Edu: Some College, No deg	7.244*	-0.290	17.980***
	(4.240)	(5.604)	(6.571)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-10.392**	-12.890**	-4.939
	(4.838)	(5.964)	(6.976)
0 to 100% FPL	18.807***	21.786***	17.714
	(6.262)	(7.033)	(10.800)
>100 to 200% FPL	4.211	6.884	-1.173
	(5.303)	(5.362)	(7.904)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-9.936***	-12.206***	-7.061**
	(1.918)	(2.602)	(2.982)
Married	-6.135	-2.159	-10.535*
	(3.877)	(4.474)	(5.814)
Average Age of Eldercare	0.337	0.091	0.458

Recipient(s)	(0.356)	(0.382)	(0.494)
Average Duration of Providing Care to Recipient(s)	-0.249 (0.361)	-0.087 (0.557)	-0.388 (0.483)
Proportion of recipients that live in household	4.433 (6.972)	-6.259 (6.515)	14.904 (10.942)
Proportion of recipients that are relatives	1.324 (4.453)	4.231 (5.911)	-0.607 (6.933)
R^2 Adjusted R^2	0.0656 0.0515	0.0656 0.0419	0.0917 0.0572
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included			

Appendix Table 20: Sleep Time in Minutes—Unweighted

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	0.374 (2.720)	1.391 (4.115)	-2.165 (5.951)
Unemployment rate	1.698 (1.927)	2.647 (2.670)	-0.109 (3.788)
TANF Benefits for 3 Persons	-0.021 (0.106)	-0.014 (0.140)	-0.037 (0.147)
SNAP Benefits for 3 Persons	-0.013 (0.131)	-0.026 (0.167)	0.011 (0.187)
Adjusted HH Aide Hourly	3.817*	3.564	4.671

	(2.057)	(2.615)	(3.874)
Refundable State EITC (1=Yes)	2.812	16.465*	-23.761
	(6.563)	(9.771)	(20.290)
State EITC Rate	-6.394	-21.608	30.962
	(23.476)	(32.016)	(58.933)
Metropolitan	5.114	4.411	6.850
	(3.058)	(4.998)	(4.918)
Female=1	11.743***	NA	NA
	(2.756)		
Age	-1.017***	-1.167***	-0.781***
	(0.121)	(0.164)	(0.195)
Spanish, Hispanic, or Latino	15.852***	7.096	27.912***
	(4.071)	(5.536)	(7.590)
Race: White	[REF]	[REF]	[REF]
Race: Black	1.235	4.290	-6.108
	(4.600)	(5.387)	(7.564)
Race: Asian	-6.607	-0.693	-16.379
	(9.226)	(14.558)	(10.891)
Race: Multiple or Other	-15.642	-20.106	-8.336
	(10.485)	(15.101)	(15.370)
Edu: Elementary/Middle	12.322	32.421	-14.379
	(20.485)	(25.506)	(30.827)
Edu: Some HS, No deg	22.813***	18.728**	27.824***
	(7.062)	(8.541)	(10.188)

Edu: HS Grad	7.616*	6.643	9.830
	(3.838)	(5.284)	(6.586)
Edu: Some College, No deg	3.172	-0.187	8.750
	(3.750)	(4.345)	(5.954)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-5.978	-5.786	-5.530
	(3.991)	(4.804)	(5.906)
0 to 100% FPL	20.878***	22.954***	19.113**
	(4.419)	(6.288)	(8.740)
>100 to 200% FPL	9.924**	12.790**	4.981
	(4.504)	(6.042)	(5.574)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-9.383***	-10.485***	-8.021***
	(1.321)	(1.631)	(2.242)
Married	-1.751	-0.469	-3.955
	(2.219)	(3.099)	(4.223)
Average Age of Eldercare Recipient(s)	0.139	0.076	0.162
	(0.233)	(0.328)	(0.354)
Average Duration of Providing Care to Recipient(s)	-0.569*	-0.374	-0.778**
	(0.322)	(0.494)	(0.354)
Proportion of recipients that live in household	5.256	2.653	9.834
	(5.237)	(6.948)	(8.134)
Proportion of recipients that are	1.696	7.286	-6.959

relatives	(3.796)	(5.088)	(5.388)
R^2	0.0313	0.0322	0.0413
Adjusted R^2	0.0222	0.0171	0.0189
Observations	8952	5350	3602
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 21: Sleep Time in Minutes—Unweighted with Linear Time Trend

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	-5.590	-2.610	-7.923
	(7.161)	(9.023)	(8.342)
Unemployment rate	-2.908	-4.263	-2.751
	(3.818)	(6.465)	(5.134)
TANF Benefits for 3 Persons	0.074	0.166	-0.166
	(0.243)	(0.337)	(0.259)
SNAP Benefits for 3 Persons	0.165	-0.015	0.305
	(0.137)	(0.125)	(0.201)
Adjusted HH Aide Hourly	7.700***	5.351	11.563**
	(2.788)	(3.620)	(5.644)
Refundable State EITC (1=Yes)	36.022**	49.108**	24.774
	(14.019)	(20.210)	(17.122)
State EITC Rate	-57.663	-113.899*	7.654
	(50.258)	(63.794)	(65.454)

Metropolitan	5.176 (3.094)	5.109 (5.134)	6.311 (5.188)
Female=1	11.738*** (2.772)	NA	NA
Age	-1.005*** (0.121)	-1.167*** (0.164)	-0.777*** (0.201)
Spanish, Hispanic, or Latino	16.313*** (4.198)	7.714 (5.518)	28.447*** (7.595)
Race: White	[REF]	[REF]	[REF]
Race: Black	1.495 (4.702)	4.741 (5.456)	-6.251 (7.669)
Race: Asian	-7.028 (9.235)	-0.497 (14.744)	-18.118 (11.304)
Race: Multiple or Other	-15.563 (10.442)	-20.770 (15.245)	-10.592 (15.593)
Edu: Elementary/Middle	12.136 (20.752)	31.186 (25.844)	-14.779 (31.189)
Edu: Some HS, No deg	22.144*** (7.150)	19.545** (8.481)	25.252** (10.294)
Edu: HS Grad	7.289* (3.837)	6.330 (5.411)	8.585 (6.717)
Edu: Some College, No deg	2.988 (3.771)	-0.522 (4.388)	8.022 (6.000)
Edu: College Degree	[REF]	[REF]	[REF]

Edu: Graduate/Professional Degree	-6.363 (4.102)	-6.137 (4.954)	-5.736 (6.049)
0 to 100% FPL	20.849*** (4.523)	23.183*** (6.264)	19.168** (8.838)
>100 to 200% FPL	9.926** (4.497)	12.580** (6.086)	5.312 (5.767)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-9.293*** (1.327)	-10.393*** (1.672)	-8.057*** (2.260)
Married	-1.743 (2.289)	-0.676 (3.191)	-3.857 (4.318)
Average Age of Eldercare Recipient(s)	0.136 (0.237)	0.112 (0.334)	0.137 (0.348)
Average Duration of Providing Care to Recipient(s)	-0.563* (0.322)	-0.371 (0.503)	-0.765** (0.357)
Proportion of recipients that live in household	4.931 (5.338)	2.419 (7.044)	9.383 (8.512)
Proportion of recipients that are relatives	1.801 (3.837)	7.494 (5.158)	-6.464 (5.495)
R^2 Adjusted R^2 Observations	0.0347 0.0201 8952	0.0376 0.0133 5350	0.0516 0.0155 3602
*** p<0.01, ** p<0.05, * p<0.1			

State and Time FE Controls for State, Caregiver, and Recipient Included

Appendix Table 22: Sleep Time in Minutes—Weighted

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	-1.864 (4.280)	-4.602 (4.890)	-0.615 (8.644)
Unemployment rate	0.895 (2.869)	3.308 (3.769)	-3.176 (4.826)
TANF Benefits for 3 Persons	0.037 (0.132)	-0.028 (0.174)	0.131 (0.145)
SNAP Benefits for 3 Persons	-0.279** (0.108)	-0.526*** (0.075)	0.102 (0.222)
Adjusted HH Aide Hourly	5.174 (3.124)	2.396 (4.010)	9.881** (4.738)
Refundable State EITC (1=Yes)	-18.987*** (6.359)	8.078 (12.168)	-55.664*** (19.192)
State EITC Rate	24.172 (24.494)	-3.964 (39.409)	68.960 (67.938)
Metropolitan	7.368** (3.365)	9.125* (5.366)	6.669 (6.729)
Female=1	12.216*** (4.026)	NA	NA

Age	-1.217***	-1.310***	-1.044***
	(0.214)	(0.236)	(0.287)
Spanish, Hispanic, or Latino	13.190**	3.820	25.620**
	(6.558)	(9.359)	(12.417)
Race: White	[REF]	[REF]	[REF]
Race: Black	6.727	14.610	-5.027
	(7.223)	(8.881)	(9.657)
Race: Asian	-9.773	6.017	-26.094**
	(10.727)	(18.617)	(12.657)
Race: Multiple or Other	-4.142	-15.676	7.104
	(15.687)	(20.388)	(20.880)
Edu: Elementary/Middle	14.253	44.335*	-12.005
	(21.600)	(23.362)	(29.764)
Edu: Some HS, No deg	30.835***	22.757**	42.872***
	(7.884)	(9.674)	(11.650)
Edu: HS Grad	9.530**	4.388	15.908**
	(4.092)	(4.825)	(7.396)
Edu: Some College, No deg	6.259	-0.310	16.003**
	(4.338)	(5.254)	(6.808)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-7.872*	-8.839	-5.015
	(4.442)	(5.375)	(7.495)
0 to 100% FPL	23.255***	22.565***	25.822**

	(6.310)	(6.848)	(11.677)
>100 to 200% FPL	6.837	11.463**	-0.700
	(5.110)	(5.275)	(7.696)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-8.668***	-10.256***	-6.642***
	(1.419)	(2.110)	(2.257)
Married	-2.722	2.016	-8.395
	(4.091)	(4.525)	(6.027)
Average Age of Eldercare	0.417	0.251	0.477
Recipient(s)	(0.342)	(0.428)	(0.476)
Average Duration of Providing Care	-0.448	-0.198	-0.676
to Recipient(s)	(0.390)	(0.513)	(0.494)
Proportion of recipients that live in	10.952	8.240	13.177
household	(6.779)	(6.636)	(11.027)
Proportion of recipients that are	-0.713	3.346	-5.351
relatives	(4.547)	(5.467)	(7.034)
R^2	0.0502	0.0500	0.0800
Adjusted R^2	0.0413	0.0352	0.0586
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 23: Sleep Time in Minutes—Weighted with Linear Time Trend

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	-8.808	-7.913	-7.053
	(8.810)	(9.627)	(14.751)
Unemployment rate	-12.161**	-12.525*	-15.432*
	(4.712)	(6.626)	(7.889)
TANF Benefits for 3 Persons	0.030	0.038	-0.013
	(0.235)	(0.296)	(0.278)
SNAP Benefits for 3 Persons	0.147	-0.345***	0.681**
	(0.191)	(0.118)	(0.337)
Adjusted HH Aide Hourly	9.675**	3.917	17.252**
	(4.668)	(6.088)	(6.657)
Refundable State EITC (1=Yes)	8.804	32.445*	-11.103
	(15.624)	(19.211)	(23.760)
State EITC Rate	-18.362	-57.551	17.736
	(48.458)	(57.973)	(80.127)
Metropolitan	7.554**	10.053*	6.283
	(3.449)	(5.546)	(6.926)
Female=1	12.348***	NA	NA
	(4.102)		
Age	-1.203***	-1.315***	-1.023***
	(0.213)	(0.232)	(0.289)
Spanish, Hispanic, or Latino	13.580*	4.918	25.518**
	(6.781)	(9.420)	(12.363)

Race: White	[REF]	[REF]	[REF]
Race: Black	6.863	14.517	-4.814
	(7.249)	(8.910)	(9.199)
Race: Asian	-11.450	5.529	-29.684**
	(10.569)	(18.767)	(13.871)
Race: Multiple or Other	-7.115	-17.284	2.688
	(15.427)	(20.866)	(20.640)
Edu: Elementary/Middle	13.535	41.725*	-15.322
	(22.056)	(23.468)	(31.173)
Edu: Some HS, No deg	29.846***	23.689**	40.929***
	(7.934)	(9.714)	(11.755)
Edu: HS Grad	8.934**	3.226	15.222**
	(4.081)	(4.773)	(7.471)
Edu: Some College, No deg	6.075	-1.613	16.403**
	(4.320)	(5.214)	(6.649)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-8.432*	-8.792	-6.259
	(4.459)	(5.374)	(7.419)
0 to 100% FPL	23.029***	24.333***	23.586**
	(6.279)	(6.887)	(11.352)
>100 to 200% FPL	6.837	10.964**	-0.526
	(5.101)	(5.198)	(7.670)
Above 200% FPL	[REF]	[REF]	[REF]

Number of household children < 18	-8.564***	-10.045***	-6.893***
	(1.445)	(2.197)	(2.286)
Married	-2.847	1.978	-8.971
	(4.016)	(4.550)	(6.027)
Average Age of Eldercare	0.424	0.271	0.435
Recipient(s)	(0.347)	(0.431)	(0.476)
Average Duration of Providing Care	-0.462	-0.220	-0.699
to Recipient(s)	(0.383)	(0.518)	(0.503)
Proportion of recipients that live in	10.001	6.221	11.332
household	(6.987)	(6.880)	(11.236)
Proportion of recipients that are	-0.466	3.681	-4.188
relatives	(4.567)	(5.409)	(7.242)
R^2	0.0580	0.0617	0.0981
Adjusted R^2	0.0438	0.0380	0.0638
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 24: Falsification Study—Unweighted

	(1)	(2)	(3)
	All EC	Female EC	Male EC
Adjusted Wage Above Fed	-0.000	0.002	-0.004
	(0.006)	(0.006)	(0.013)
Unemployment rate	-0.004	0.002	-0.011

	(0.003)	(0.004)	(0.009)
TANF Benefits for 3 Persons	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
SNAP Benefits for 3 Persons	0.000***	0.000***	0.001*
	(0.000)	(0.000)	(0.000)
Adjusted HH Aide Hourly	-0.001	-0.004	0.002
	(0.005)	(0.003)	(0.011)
Refundable State EITC (1=Yes)	-0.013	0.010	-0.061
	(0.012)	(0.010)	(0.051)
State EITC Rate	0.027	-0.034	0.192
	(0.036)	(0.033)	(0.124)
Metropolitan	-0.014	-0.002	-0.032*
	(0.009)	(0.005)	(0.018)
Female=1	-0.105***	NA	NA
	(0.008)		
Age	0.002***	0.000**	0.005***
	(0.000)	(0.000)	(0.001)
Spanish, Hispanic, or Latino	0.000	0.002	0.004
	(0.010)	(0.007)	(0.021)
Race: White	[REF]	[REF]	[REF]
Race: Black	0.028***	0.006	0.066***
	(0.009)	(0.007)	(0.019)
Race: Asian	-0.017	-0.010***	-0.022
	(0.012)	(0.003)	(0.028)

Race: Multiple or Other	0.095***	0.044*	0.157***
	(0.021)	(0.024)	(0.045)
Edu: Elementary/Middle	-0.055***	-0.022***	-0.092***
	(0.014)	(0.005)	(0.033)
Edu: Some HS, No deg	-0.047***	-0.015***	-0.087***
	(0.010)	(0.004)	(0.020)
Edu: HS Grad	-0.002	-0.007	0.003
	(0.007)	(0.004)	(0.013)
Edu: Some College, No deg	0.022**	0.010	0.038**
	(0.008)	(0.007)	(0.017)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-0.009	0.004	-0.035**
	(0.007)	(0.005)	(0.015)
0 to 100% FPL	-0.008	-0.005	-0.026
	(0.007)	(0.005)	(0.019)
>100 to 200% FPL	0.004	0.005	0.010
	(0.007)	(0.006)	(0.015)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-0.004**	0.000	-0.013***
	(0.002)	(0.002)	(0.004)
Married	-0.004	-0.007	-0.002
	(0.006)	(0.004)	(0.013)
Average Age of Eldercare Recipient(s)	-0.001***	-0.000	-0.003***

	(0.000)	(0.000)	(0.001)
Average Duration of Providing Care to Recipient(s)	-0.001 (0.001)	-0.000 (0.000)	-0.001 (0.001)
Proportion of recipients that live in household	0.005 (0.009)	0.001 (0.008)	0.020 (0.018)
Proportion of recipients that are relatives	-0.015* (0.008)	-0.008 (0.006)	-0.025 (0.018)
R^2 Adjusted R^2 Observations	0.0799 0.0713 8952	0.0191 0.0038 5350	0.0865 0.0652 3602
*** p<0.01, ** p<0.05, * p<0.1 State and Time FE Controls for State, Caregiver, and Recipient Included			

Appendix Table 25: Falsification Study—Unweighted with Linear Time Trend

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	0.002 (0.012)	0.011 (0.010)	-0.008 (0.029)
Unemployment rate	0.003 (0.008)	0.006 (0.007)	-0.007 (0.019)
TANF Benefits for 3 Persons	0.000 (0.000)	-0.000 (0.000)	0.001 (0.001)
SNAP Benefits for 3 Persons	0.000 (0.000)	0.000*** (0.000)	-0.000 (0.000)

Adjusted HH Aide Hourly	-0.001 (0.006)	-0.004 (0.003)	-0.002 (0.014)
Refundable State EITC (1=Yes)	0.012 (0.014)	0.011 (0.020)	-0.005 (0.034)
State EITC Rate	-0.004 (0.058)	0.001 (0.064)	0.061 (0.116)
Metropolitan	-0.014 (0.009)	-0.002 (0.005)	-0.030* (0.017)
Female=1	-0.104*** (0.008)	NA	NA
Age	0.002*** (0.000)	0.000*** (0.000)	0.005*** (0.001)
Spanish, Hispanic, or Latino	-0.001 (0.010)	0.002 (0.007)	0.001 (0.021)
Race: White	[REF]	[REF]	[REF]
Race: Black	0.028*** (0.009)	0.005 (0.007)	0.067*** (0.020)
Race: Asian	-0.019 (0.012)	-0.011*** (0.003)	-0.025 (0.029)
Race: Multiple or Other	0.096*** (0.021)	0.044* (0.025)	0.152*** (0.045)
Edu: Elementary/Middle	-0.054*** (0.014)	-0.022*** (0.005)	-0.092*** (0.034)
Edu: Some HS, No deg	-0.048***	-0.013***	-0.088***

	(0.010)	(0.004)	(0.021)
Edu: HS Grad	-0.001	-0.007	0.005
	(0.007)	(0.004)	(0.013)
Edu: Some College, No deg	0.022***	0.011	0.038**
	(0.008)	(0.007)	(0.018)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-0.009	0.004	-0.034**
	(0.007)	(0.006)	(0.015)
0 to 100% FPL	-0.008	-0.005	-0.024
	(0.007)	(0.005)	(0.020)
>100 to 200% FPL	0.005	0.005	0.012
	(0.007)	(0.006)	(0.014)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-0.004**	0.000	-0.013***
	(0.002)	(0.002)	(0.004)
Married	-0.003	-0.007	-0.002
	(0.006)	(0.004)	(0.013)
Average Age of Eldercare Recipient(s)	-0.001***	-0.000	-0.003***
	(0.000)	(0.000)	(0.001)
Average Duration of Providing Care to Recipient(s)	-0.001	-0.000	-0.001
	(0.001)	(0.000)	(0.001)
Proportion of recipients that live in household	0.005	0.001	0.017
	(0.009)	(0.008)	(0.018)

Proportion of recipients that are relatives	-0.015*	-0.008	-0.024
	(0.008)	(0.006)	(0.018)
R^2	0.0847	0.0292	0.1000
Adjusted R^2	0.0709	0.0047	0.0657
Observations	8952	5350	3602
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			

Appendix Table 26: Falsification Study—Weighted

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	-0.007	0.002	-0.017
	(0.008)	(0.007)	(0.014)
Unemployment rate	-0.006	0.004	-0.017
	(0.005)	(0.005)	(0.011)
TANF Benefits for 3 Persons	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
SNAP Benefits for 3 Persons	0.000	0.000**	-0.000
	(0.000)	(0.000)	(0.001)
Adjusted HH Aide Hourly	-0.008	-0.004	-0.012
	(0.006)	(0.004)	(0.012)
Refundable State EITC (1=Yes)	0.028*	0.012	0.033
	(0.015)	(0.011)	(0.053)
State EITC Rate	0.001	-0.048	0.146

	(0.057)	(0.040)	(0.159)
Metropolitan	-0.005	-0.001	-0.011
	(0.010)	(0.009)	(0.019)
Female=1	-0.096***	NA	NA
	(0.008)		
Age	0.002***	0.000***	0.005***
	(0.000)	(0.000)	(0.000)
Spanish, Hispanic, or Latino	0.010	0.004	0.014
	(0.014)	(0.008)	(0.026)
Race: White	[REF]	[REF]	[REF]
Race: Black	0.027***	0.002	0.054***
	(0.010)	(0.008)	(0.019)
Race: Asian	-0.005	-0.008***	0.003
	(0.013)	(0.003)	(0.033)
Race: Multiple or Other	0.101***	0.023	0.169***
	(0.031)	(0.018)	(0.060)
Edu: Elementary/Middle	-0.060***	-0.020***	-0.092***
	(0.014)	(0.005)	(0.027)
Edu: Some HS, No deg	-0.037***	-0.017**	-0.063**
	(0.012)	(0.008)	(0.026)
Edu: HS Grad	-0.003	-0.013**	0.014
	(0.007)	(0.006)	(0.013)
Edu: Some College, No deg	0.013	0.005	0.024
	(0.009)	(0.009)	(0.017)

Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-0.008 (0.009)	0.002 (0.008)	-0.016 (0.019)
0 to 100% FPL	-0.013 (0.009)	-0.007 (0.005)	-0.030 (0.022)
>100 to 200% FPL	0.003 (0.007)	-0.001 (0.005)	0.012 (0.014)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-0.003 (0.002)	0.001 (0.002)	-0.011** (0.005)
Married	-0.000 (0.007)	-0.008 (0.005)	0.003 (0.015)
Average Age of Eldercare Recipient(s)	-0.001 (0.001)	0.000 (0.000)	-0.002** (0.001)
Average Duration of Providing Care to Recipient(s)	-0.001 (0.001)	-0.001* (0.000)	-0.001 (0.001)
Proportion of recipients that live in household	-0.013 (0.009)	-0.002 (0.006)	-0.021 (0.017)
Proportion of recipients that are relatives	-0.012 (0.009)	-0.001 (0.004)	-0.024 (0.021)
R^2 Adjusted R^2	0.0765 0.0678	0.0244 0.0092	0.0877 0.0665
*** p<0.01, ** p<0.05, * p<0.1			

State and Time FE Controls for State, Caregiver, and Recipient Included

Appendix Table 27: Falsification Study—Weighted with Linear Time Trend

	(1) All EC	(2) Female EC	(3) Male EC
Adjusted Wage Above Fed	-0.000 (0.010)	0.009 (0.007)	-0.010 (0.027)
Unemployment rate	-0.009 (0.013)	0.004 (0.010)	-0.030 (0.025)
TANF Benefits for 3 Persons	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
SNAP Benefits for 3 Persons	-0.000 (0.000)	0.000*** (0.000)	-0.001 (0.001)
Adjusted HH Aide Hourly	-0.005 (0.008)	-0.002 (0.004)	-0.013 (0.017)
Refundable State EITC (1=Yes)	0.035 (0.021)	0.014 (0.018)	0.033 (0.064)
State EITC Rate	0.020 (0.067)	-0.019 (0.060)	0.139 (0.202)
Metropolitan	-0.004 (0.010)	-0.003 (0.008)	-0.006 (0.019)
Female=1	-0.095*** (0.008)	NA	NA

Age	0.002***	0.000***	0.005***
	(0.000)	(0.000)	(0.000)
Spanish, Hispanic, or Latino	0.010	0.004	0.012
	(0.013)	(0.008)	(0.026)
Race: White	[REF]	[REF]	[REF]
Race: Black	0.027***	0.003	0.053***
	(0.010)	(0.007)	(0.020)
Race: Asian	-0.005	-0.009***	0.001
	(0.013)	(0.003)	(0.034)
Race: Multiple or Other	0.099***	0.024	0.168***
	(0.031)	(0.018)	(0.060)
Edu: Elementary/Middle	-0.061***	-0.018***	-0.092***
	(0.014)	(0.006)	(0.027)
Edu: Some HS, No deg	-0.036***	-0.013*	-0.061**
	(0.012)	(0.007)	(0.027)
Edu: HS Grad	-0.002	-0.014**	0.018
	(0.007)	(0.006)	(0.013)
Edu: Some College, No deg	0.015*	0.006	0.027
	(0.008)	(0.009)	(0.017)
Edu: College Degree	[REF]	[REF]	[REF]
Edu: Graduate/Professional Degree	-0.007	0.001	-0.014
	(0.009)	(0.008)	(0.018)
0 to 100% FPL	-0.013	-0.007	-0.031

	(0.009)	(0.006)	(0.022)
>100 to 200% FPL	0.003	-0.002	0.013
	(0.007)	(0.006)	(0.014)
Above 200% FPL	[REF]	[REF]	[REF]
Number of household children < 18	-0.003	0.001	-0.012**
	(0.002)	(0.002)	(0.005)
Married	-0.000	-0.007	0.002
	(0.007)	(0.005)	(0.015)
Average Age of Eldercare Recipient(s)	-0.001	0.000	-0.002**
	(0.001)	(0.000)	(0.001)
Average Duration of Providing Care to	-0.001	-0.001	-0.001
Recipient(s)	(0.001)	(0.000)	(0.001)
Proportion of recipients that live in	-0.014	-0.003	-0.023
household	(0.009)	(0.006)	(0.017)
Proportion of recipients that are	-0.013	-0.001	-0.028
relatives	(0.009)	(0.004)	(0.022)
R^2	0.0832	0.0427	0.1018
Adjusted R^2	0.0694	0.0185	0.0677
*** p<0.01, ** p<0.05, * p<0.1			
State and Time FE			
Controls for State, Caregiver, and Recipient Included			