# Data and Methods

## Overview of Analysis

Our analysis has two parts. In the first part of the analysis, we examine the relationship between informal caregiver availability and older people’s care receipt from different informal and paid sources. To capture differences in informal caregiver availability, we use information on the employment status and residential proximity of a selected “focal” non-spouse helper for each sample person in NHATS (we describe the procedure for selecting focal helpers below). We have two hypotheses related to the first part of the analysis:

: Focal helpers who are ostensibly less available (as indicated by being employed or not co-residing with the care recipient) will provide fewer hours of care compared to focal helpers who are ostensibly more available (as indicated by not working or co-residing with the care recipient).

: Care received from non-focal informal and paid sources will compensate for any reduction in care receipt due to older people having an ostensibly less available focal helper.

While most recent studies point to compensatory processes among care network members, they disagree about whether such compensation is partial or complete, and therefore we do not have precise expectations about the extent of compensation. In this part of the analysis we also include statistical interactions in some of our models to examine how the amount of care received from non-focal informal and paid sources varies according to structural aspects of older people’s care networks in order to disentangle the relative impact of “structural deficits” (i.e., the lack of network members) and “coordination problems” (i.e., little or no compensation from existing network members) on the extent of compensation by non-focal informal and paid helpers.

In the second part of the analysis, we examine the relationship between informal caregiver availability and indicators of older people’s unmet needs for assistance with daily activities, including the roles of overall care receipt and the balance between informal and paid care in mediating this relationship. We hypothesize that reduced caregiver availability will be associated with greater unmet needs for care () and that this relationship will be largely mediated by overall care receipt ().

## Data

Secondary analysis of NHATS and NSOC I and II was approved by the School of Social and Political Science Research Office at the University of Edinburgh. NHATS uses a renewing panel design to gather information from older Medicare enrollees living in the contiguous United States. The initial sample of Medicare enrollees ages 65 and older has been re-interviewed on an annual basis since they were first interviewed in 2011 (round 1). Replenishment of the sample to maintain its representativeness of the older Medicare population was undertaken in 2015 (round 5). In 2011 and 2015 interviews were also conducted with informal helpers of NHATS sample persons (SPs) as part of NSOC I (2011) and II (2015). The analysis draws on both information on SPs from rounds 1 and 5 of NHATS as well as information on a “focal” non-spousal (usually child) helper for each SP from NSOC I and II.

The analysis is based on the subset of SPs who, at the time of round 1 and/or round 5, met three conditions: (1) they were living in the community or residential care settings other than nursing homes; (2) they received help with mobility-related, self-care or household activities in the last month; and (3) they had at least one informal helper who was interviewed in NSOC. There were 817 SPs who met these conditions in round 1 only, 892 SPs who met these conditions in round 5 only, and 241 SPs who met these conditions in both rounds, which resulted in a total of 1,950 SPs who contributed 2,191 “person-years” to the analysis.

Of the 8,621 NSOC-eligible non-spousal helpers of non-institutionalized SPs receiving help with mobility-related, self-care or household activities (i.e., SPs meeting conditions 1 and 2 above), 3,318 helpers (38 percent) were actually interviewed in NSOC. According to the NSOC status variable in the NSOC other person tracker files, the most common reason that NSOC-eligible helpers were not interviewed is that the SP refused to provide contact information for the eligible helper.

It was necessary to restrict the analysis to SPs with at least one helper who was actually interviewed in NSOC (condition 3 above), because we only had information on certain helper characteristics from NSOC for this subsample. Table 1 compares SPs with an NSOC-interviewed non-spousal helper (the analysis sample), SPs without an NSOC-interviewed non-spousal helper (the excluded sample), and the combined sample. Table 1 shows that the analysis and excluded samples substantially differ from each other with respect to hours of care received, marital status, racial ancestry, age, dementia status, and household income. To deal with potential bias due to helper nonresponse to NSOC, we adjusted the NHATS analytical weights using post-stratification in Stata so that the analysis sample resembled the combined sample with respect to the characteristics in Table 1.

In the analysis we examine the relationship between “focal” non-spousal helpers’ availability and older people’s receipt of informal and formal care. Helpers providing the most hours of care to the SP among non-spousal helpers interviewed in NSOC were chosen to be the “focal” helper. We selected the non-spousal helper providing the most hours of care to the SP when possible (i.e., ## percent of the time), because changes in the availability of these helpers is likely to be more consequential for older people’s overall care receipt and unmet need. Focal helpers provide 15 hours of care per week (Table 2), which constitutes almost two-fifths (38 percent) of the 40 hours of care per week that SPs receive from all sources combined (Table 1). 63 percent of focal helpers are a child of the SP, 26 percent are an “other” family member (e.g., sibling), and 11 percent are an “other” informal helper (e.g., neighbor) (Table 2). With regard to employment status, 31 percent of focal helpers are employed full-time, 16 percent are employed part-time, and 53 percent are not working (Table 2). With regard to residential proximity, 37 percent are co-resident helpers, 48 percent live 1-29 minutes away, and 15 percent live 30+ minutes away (Table 2).

Missingness on the covariates was not a serious problem except for SPs’ household income (24 percent (*n* = 516) did not report a precise income value or an income bracket) and focal helpers’ age (35 percent (*n* = 770) had missing information). We use the imputations of household income provided with the data (DeMatteis, Freedman, & Kasper, 2016), which were generated for SPs who had no income information (24 percent, *n* = 516) or who reported an income bracket (21 percent, *n* = 451). For SPs with a reported bracketed value, the imputations are constrained to be within the bracketed value. We use imputation with chained equations to impute missing values on the remaining variables that had missing data including focal helpers’ age (White, Royston, & Wood, 2011).

The dependent variables include care network variables capturing hours of care received from different sources (i.e., focal non-spousal helpers, non-focal non-spousal helpers, spousal helpers, formal helpers, and all sources combined) and variables capturing unmet need. In rounds 1 and 5 information on hours of care received from individual helpers can be obtained from both NHATS and NSOC. However, because formal (i.e., paid, unrelated) helpers were ineligible for NSOC, we rely on NHATS participants’ (i.e., the SP or a proxy) reports in NHATS.

In the helpers (HL) section of the NHATS instrument, NHATS participants are asked about hours of care receipt for each helper who assisted a SP with mobility or self-care activities; carried out household or medical care activities with or for a SP; or gave rides to a SP. First, NHATS participants are asked how many days per week or how many days in the last month each helper provided assistance to the SP. Second, they are asked for the days on which the helper provided assistance about how many hours on average was provided. We use NHATS participants’ responses to these two questions to calculate hours of care received *in the past week* from each helper. We use Stata code written by Freedman, Spillman, and Kasper (2014) for dealing with cases with missing days and/or hours; cases in which the NHATS participant reported less than 1 hour of care receipt on days when the helper provided assistance; and cases (in round 5 only) in which the NHATS participant reported zero days for the helper.

With regard to the unmet need dependent variables, NHATS participants were asked about adverse consequences of unmet need for assistance with mobility-related, self-care, and household activities. For mobility activities, specific adverse consequences about which NHATS participants were asked included having to remain inside, not moving around inside the home, and having to stay in bed; for self-care activities, they included going without eating, going without showering/taking a bath/washing up, having wet or soiled clothes, and going without getting dressed; and for household activities, they included going without clean laundry, going without groceries or personal items, going without a hot meal, and making a mistake in taking prescribed medication. We created two binary variables to capture whether SPs experienced any adverse consequences of unmet need for assistance with (1) mobility or self-care activities and (2) household activities.

## Statistical Models

We estimate generalized linear models to examine the relationship between focal non-spousal helpers’ availability, as indicated by employment status and residential proximity, and older people’s care receipt and unmet need. We include controls for several focal helper characteristics (i.e., relationship to SP, gender, age, self-reported health) and SP characteristics (i.e., gender, racial ancestry, age, marital status, number of children, number of self-care and mobility activity limitations, number of household activity limitations, dementia status, Medicaid coverage, household income, residence type) in our models. We use “seemingly unrelated estimation” to take into account that equations for the four sources of care may be interdependent and are estimated on the same sample (giving rise to cross-equation covariance in the error terms), and we compute robust (clustered sandwich) standard errors, which takes into account correlation of the error terms across time for the same individual.