# Support between Parents and Adult Children in the Face of Declines in Health: The Case of Diabetes


## ABSTRACT

Exchanges between parents and adult children represent a major source of support for both. An important question is how assistance between parents and adult children relates to declines in health. We explore relationships between diabetes, a common, costly condition with major health complications, and financial and instrumental assistance between parents and children. Using the Panel Study of Income Dynamics, a national longitudinal dataset from the United States, we estimated survey-adjusted logistic regressions for the probabilities of receiving or giving support to or from adult children. The main explanatory variables were measures of diabetes of the household head or spouse, specifically having diabetes, duration with diabetes, and diabetes-related limitations. After adjusting for social and economic characteristics and other health conditions, households in which the head or wife had diabetes were less likely to give money to adult children compared to household without diabetes; they were also more likely to receive time assistance from adult children. It was not the diabetes diagnosis itself, but the presence of related limitations, that was associated with patterns of exchanges. Chronic health conditions that affect activities of daily living, such as diabetes, can have relational and economic implications for families.



**Key words:** United States; Chronic Disease; Family; Transfers; Assistance; Intergenerational

## INTRODUCTION

Intergenerational exchanges between older adults and their adult children represent a major source of support for both parties. The financial dependence of adult children is greater than in the past (Billari & Liefbroer, 2010; Furstenberg, 2010; Stone et al., 2011; U.S. Census Bureau, 2010; U.S. Census Bureau Population Division, 2008), and parents may have more years in later life during which they provide substantial support for their adult children (Settersten & Ray, 2010). In turn, rising life expectancies may imply more years lived with disease and disability, extending the need for intergenerational support. Studies have shown that intergenerational exchanges provide material, instrumental, and emotional support across the life course, with parents being providers at most stages but also relying on assistance from adult children, especially at the oldest ages (Brandt et al., 2008; Cunningham et al., 2013; Hurd et al., 2007; Roan & Raley, 1996; Yount et al., 2012). When parents experience widowhood or declines in health, adult children increase contact, co-residence, and support, and become less dependent on the living parent (Jung-Hwa et al., 2006; Lin & Wu, 2011; Umberson, 2006).

An important question is how financial and instrumental assistance given by parents and adult children to each other relate to declines in health. Studies have shown that parents who receive support from adult children have fewer depressive symptoms, fewer functional limitations, and lesser declines in mental health (Ajrouch, 2007; Buber & Engelhardt, 2008; Li et al., 2005; Zunzunegui et al., 2004). Findings from the few existing longitudinal studies suggest that support from adult children may vary with the type of decline in parents' health, with some conditions, for example, depressive symptoms, being associated with decreasing support (Cong & Silverstein, 2011).

We explore this question using the case of diabetes, a common, potentially debilitating, and costly condition that affects over 29 million people in the United States (American Diabetes

Association, 2013; Centers for Disease Control and Prevention, 2015; Geiss et al., 2014; Gregg et al., 2016; Murray et al., 2006). People with diabetes are at risk of developing major health complications, such as blindness, organ failure, and amputations (Gregg et al., 2016). Therefore, we expect that when a person is diagnosed with diabetes, he or she will expect major declines in health. As a result, the newly diagnosed person and his or her spouse may feel that they are not in a position to provide financial or instrumental help to their adult children and to their parents, in light of their own newly anticipated needs. At the same time, the adult children and parents of the diagnosed person may feel responsibility to provide financial resources and instrumental help in response to this decline in health.

A related consideration is the timing of responses in financial and instrumental assistance. The diagnosis itself may be received as a shock, as the patient and his or her family learn that diabetes can affect their mobility, employment, health care expenses and need for care. Thus, financial and instrumental support to and from family members could be guided not by observed changes in current health, but by expectation about future health and needs. On the other hand, because the co-morbidities associated with diabetes take time to set in, exchanges may evolve over time, as families experience the emerging consequences of diabetes. Thus, patterns of giving and receiving of intergenerational support could relate to duration since diagnosis or to the emergence of observed limitations in activities of daily living. To explore relationships between diabetes and financial and instrumental assistance given by parents and adult children to each other, we use a national longitudinal dataset with information on participants' diabetes status over 15 years and one-time information on giving and receiving of money, loans, gifts, and help from parents and from adult children. We compare patterns of giving in families without diabetes, with newly-diagnosed diabetes, with long-, medium, and short-term duration of diabetes and with diabetes-related

limitations in daily activities.

## METHODS

### Data Source and Population

We used data on a long-term well-characterized cohort, the Panel Study of Income Dynamics (PSID). The PSID began in 1968 with a nationally representative sample of over 18,000 individuals living in 5,000 families in the United States. Information on these individuals and their descendants has been collected continuously, including employment, income, wealth, expenditures, health, marriage, childbearing, child development, philanthropy, and education. The number of households included increased over time as children in the study grow up and form new household. The PSID includes information on social and economic characteristics and health conditions, including diabetes. The 2013 Family Roster and Transfer Modules collected information about transfers and assistance between respondents and their parents and children.

There were 9,063 households participating in the 2013 waves of the PSID and the Family Roster and Transfer Modules. For analysis, we excluded households that had neither adult children nor living parents (n=302), households living outside the U.S. (n=50), and an additional 11 households missing information on covariates, resulting in an analytic sample of 8,700 households. For analyses of giving and receiving between the household and adult children, we included households that had adult children (n=4,248); for analyses of giving and receiving between the household and parents (of the head of household or his wife), we included households with any living parents (n=6,942).

### Variables

In the PSID, a woman is considered household head only if she does not have a co-residing partner, so all household heads who are women are single. Therefore, we will refer to household heads' partners as wives, following PSID terminology.

In the Family Roster and Transfer Modules, household heads were asked, for themselves and their wife, about their exchanges with their parents and their adult children in 2012: "Did you or your wife give any money, loans or gifts of $100 or more to your parent(s)"; "Did your or your wife's parent(s) give you or your wife any money, loans or gifts of $100 or more"; "Did your or your wife's parents spend any time helping you or your wife" and "Did you or your wife spend any time helping your or your wife's parents". The same four questions were asked about the exchanges between the household head and wife and their adult children.

Based on these questions, we created four variables pertaining to households' *patterns of giving* in the previous year: gave money to parent, gave money to adult child, spent time helping parent, spent time helping adult child; and four variables pertaining to households' *receipt patterns*: received money from parent, received money from adult child, received assistance from parent, received assistance from adult child. In robustness checks, we combined having given or received assistance into four variables: received money or assistance from parent; received money or assistance from adult child; gave money or assistance to parent; gave money or assistance to adult child.

Each household head was asked whether he or his wife had been diagnosed with diabetes using the following questions: "Has a doctor ever told you/your wife that you/she have/has or had diabetes or high blood sugar?" "How old were you when you were first diagnosed with diabetes?"; "Did this condition get much worse for a month or longer in the past 12 months?" "How much does this (condition/problem) limit your normal daily activities?" The responses were used to create three diabetes exposure variables. We created an indicator of *prevalent diabetes,* which is a dummy variable coded 1 at each wave if the household head reported that he and/or his wife had been diagnosed. We created a categorical variable of *diabetes duration* based on the year a diagnosis was first reported for either spouse: never diagnosed with diabetes; recent diagnosis (within the last 2

years), intermediate duration (3-5 years) and long duration (more than 5 years). These cutoffs were selected to mirror clinical evaluations of extent of exposure to diabetes. *Diabetes with limitations* was created as a categorical variable: never diagnosed with diabetes; diagnosed with diabetes but reporting no related limitations; diagnosed with diabetes and experiencing some or a lot of diabetes-related limitations in daily activities.

Analytic models included other characteristics expected, based on the literature, to be associated with intergenerational exchanges. Household structure characteristics were whether the household head has a co-residing wife, number of living children, and number of living parents. Other characteristics of the household were: age of head (under 35; 35-39; 40-44; 45-49; 50-54; 55-59; 60-64; 65-69; 70+), race of head (white; other race), and whether the household head or wife had other major chronic condition (yes if at least one from among stroke, cancer, heart attack, heart disease, psychological problems, or memory loss); employment status of the head (yes; no) and co-residing wife (yes; no), income ($10,000 increments), urban residence (yes; no); region of residence (Northeast; North-Central; South; West).

**Statistical Analyses**

We first examined the completeness and distribution of each variable. We then estimated bivariate associations to assess potential problems of collinearity among the covariates and unadjusted associations of the covariates and outcomes. We compared households where the household head or wife had been diagnosed with diabetes with households where neither had been diagnosed. The analytic strategy for examining support patterns associated with a diabetes diagnosis was to estimate the probability of receiving or giving support to or from adult children or parents for those who did and did not have diabetes. We used survey-adjusted logistic regression to estimate multivariate models for each outcome. The main explanatory variable in each model was one of the three measures of diabetes *(s)*: prevalent diabetes, diabetes duration, and diabetes with limitations. Control

variables were vectors of household characteristics *(P)* and aggregate characteristics of family structure *(C)*. Models took the following general form:

$$Ln\left(\frac{G_{j,t}}{1-G_{j,t}}\right) = \beta_{0j} + \beta_{1j}s + \beta_{2j}P + \beta_{3j}C,$$

where *Gj,t* denotes the probability of each type of giving or receiving (j = 1, . . . , 8) to/from any adult child or living parent in 2012, explained by diabetes, household characteristics, and household structure characteristics at time t-x, where x ranges across models from 0 to 6.

## RESULTS

Table 1 shows characteristics of households in which the household head or wife had diabetes, those in which neither had diabetes, and the differences between them. Importantly, there were large differences in age: in households with diabetes, the household head and wife were older than in households without diabetes (61.4 years vs. 49.4 years for the head and 57.9 years vs. 48.1 years for the wife). The heads of households with diabetes were more often male, white, and had other chronic conditions. They were also different financially: households with diabetes less often had an employed household head (40.7% vs. 67.1%) or wife (47.2% vs. 59.1%) and had lower family incomes, (average of $68,728 compared with $77,304 in households without diabetes). Household structure was different on all dimensions: in households with diabetes, the head more often had a co-residing wife and had more living children but fewer living parents.

TABLE 1 HERE

Giving of time and money to parents did not significantly differ according to the households' diabetes status, giving to children differed somewhat; specifically, households with diabetes less often gave money to their adult children than households without diabetes (41.1% vs. 48.6%).

Households with diabetes less often received both money and time assistance from parents than households without diabetes, but more often received from adult children.

Table 2 shows odds of households giving to and receiving from parents and adult children, adjusting for the age of the household head, whether the head was working, had a co-residing wife and employment of the wife and whether either had other chronic conditions, household income, number of living children and parents, urbanity and census region. Households in which the head or wife had diabetes were less likely than households without diabetes to give money to their adult children (OR=0.79, $p<0.05$). They were generally more likely to receive time help from their adult children (OR=1.25, $p<0.05$). Thee were no statistical differences in exchanges with parents.

TABLE 2 HERE

Panel A of Table 3 shows patterns of exchanges in terms of duration of exposure to diabetes: new exposure (diagnosed within the previous 2 years), intermediate exposure (3-5 years before), and long duration of exposure (more than 5 years ago), compared with those in which the household head and wife had never been diagnosed with diabetes. Those with a new exposure to diabetes were half as likely to give money to their adult children (OR: 0.47, $p<0.01$) but were marginally more likely to spend time helping a parent. Households with long duration of exposure were less likely to give financial help to their adult children than households without diabetes and were more likely to receive time help from their adult children (OR: 1.29 $p<0.05$).

TABLE 3 HERE

Panel B of Table 3 shows associations between householders' giving and receiving with their parents and adult children and their reported diabetes-related limitations. Compared with households with no diabetes, those with diabetes but no related limitations were less likely to give money to their adult children but more likely to give money to their parents; these patterns were marginally

significant at the 10% level. They were not significantly different from households with no diabetes in their receipt of assistance. Compared with households with no diabetes, households with diabetes-related limitations were less likely to provide money to their adult children (OR=0.74; $p<0.05$). They had 47% higher odds of adult children spending time helping them than did people with no diabetes ($p<0.01$).

These findings are robust to alternative specifications. When we combine financial and instrumental support, those with diabetes had similar patterns of giving to other families, but they were more likely to receive help from their adult children. Those who had long-term exposure to diabetes or suffered from diabetes-related limitations were more likely to receive assistance from adult children, while there were no significant differences in patterns of giving or receiving between those with no diabetes and those with shorter duration of diabetes or no diabetes-related complications (available upon request).

## DISCUSSION

Understanding whether intergenerational support is motivated by declines in health is particularly important in the context of increasing prevalence of chronic conditions. This paper examines how patterns of intergenerational exchanges relate to declines in health by exploring the case of diabetes, a health condition that may be particularly relevant to decisions about exchanges because its management requires major lifestyle changes in behaviors that may affect family interactions, such as meals and activities. Diabetes is also a family concern because it affects financial wellbeing and independent living in the long-term. We found that, when the household head or wife had diabetes, they were less likely to provide financial support to their adult children and they were more likely to receive instrumental assistance from their adult children compared with similar couples without diabetes. These differences increased with duration of having diabetes and

with the emergence of limitations in activities of daily living. Patterns of giving to and receiving from parents were generally not associated with diabetes after controlling for other characteristics, moist importantly age.

We found support for several a priori expectations. One proposition was that a diabetes diagnosis will be received by the patient and his or her family with major worries for future health, mobility, employment, health care costs and care needs, and that consequently the newly diagnosed person and his or her spouse may reconsider their ability to provide help to their adult children and parents, and reduce these transfers. Indeed, we found that householders with diabetes were less likely to give financial support to their adult children during the first two years after being diagnosed than householders without diabetes. Secondly, we proposed that the adult children and parents of a newly diagnosed person may feel a new responsibility to help by providing additional financial resources and instrumental help to the person with diabetes. We did find that householders with diabetes were somewhat more likely to receive time help from their adult children, though not significantly so during the first years after a diagnosis. We expected that a diabetes diagnosis would come as a shock, with changes in giving and receiving being guided not by immediate changes in health, but by changes in worry and anticipated need. Our findings are consistent with this expectation, as, for the first 2 years after being diagnosed, people were half as likely to give money to their adult children as household with no diabetes diagnosis. Finally, we proposed that the implications of the disease materialize with time, as co-morbidities and limitations accumulate, and that giving behaviors would change with the emergence of these limitations. Indeed, we found that people who had been diagnosed for over five years, and especially those who reported having diabetes-related limitations, were significantly less likely to give money to adult children and significantly more likely to receive time help from adult children compared with households without diabetes.

The findings corroborate theories and previous evidence that family exchanges respond to declines in health (Jung-Hwa et al., 2006; Lin & Wu, 2011; Umberson, 2006). They suggest that parents consider their own health in the assistance they provide to their adult children, and that adult children collectively are responsive to declines in their parent's health.

In some settings, previous studies have indicated that intergenerational relations tend to center on the needs of adult children, not those of parents (Hurd et al., 2007; Yount et al., 2012). Here, with the health shock being diabetes, we found that transfers from adult children to their parents were not associated with the child's health; nor were transfers from parents to adult children associated with the child's health; these patterns suggesting that these exchanges are less linked with the adult child's health than with a parent's.

The social implications of chronic diseases have not been sufficiently studied, in part because most datasets do not make such analyses possible. This analysis drew on a high-quality national dataset, the PSID, with panel data on diabetes, together with data on recent financial and instrumental assistance given and received among parents and adult children. The analyses did not distinguish between men and women, who may have different relations with their parents and adult children. The analysis was conducted at the household unit, assuming that each spouse's health status is equally relevant. This approach is realistic, given that many couples share their resources, and indeed the questions about exchanges were asked about the couple as a unit. We did not map all transfers, their magnitudes, or frequencies. The relative value to family members of the magnitude and frequency of transfer could be a useful area for future research. The PSID questions do not distinguish between type 1 and type 2 diabetes, but type 1 cases only account for 5% of all new adult cases nationally (Centers for Disease Control and Prevention, 2017). Both types of diabetes can progress into severe co-morbidities and complications, and these are addressed in the analyses of duration of diabetes and related limitations.

Parents are an important source of financial support for many young adults (Billari & Liefbroer, 2010; Furstenberg, 2010; Stone et al., 2011; U.S. Census Bureau, 2010; U.S. Census Bureau Population Division, 2008), and the finding that parents with diabetes are less likely to provide financial help to their adult children entails that people whose parents have diabetes are also financially affected, perhaps reducing their access to this important source of informal insurance. These financial implications may increase inequalities across generations, as people whose parents have diabetes are more likely to develop diabetes themselves (Hemminki et al., 2010). Thus, adults whose parents have diabetes may be financially disadvantaged, are more likely to spend time providing instrumental assistance to parents, and are likely to be in worse health themselves than their peers whose parents do not have diabetes.

People with diabetes are more likely to receive support from their adult children, especially in terms of instrumental assistance. This is even more the case for people who are experiencing diabetes-related limitations. These patterns of receipt could lessen the burden of declining health, and future studies could explicitly explore this possibility. The time spent by adult children helping their parents may also create opportunities for contact and emotional support.

Overall, thee findings highlight that the onset of a chronic health condition affects not only an individual's own health and financial wellbeing, but it also has implications for their adult children, for family relations, time allocation, and financial resources. These broader implications of chronic disease may perpetuate health and economic inequalities across generations.

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**Table 1: Characteristics of U.S. households with or without a head and/or wife with diabetes, 2013**

| | Neither household head nor wife has diabetes (n=7,129) | | Household head or wife has diabetes[a] (n= 1,571) | | T-test |
|---|---|---|---|---|---|
| | % or Mean | SE | % or Mean | SE | p-value |
| **Household characteristics** | | | | | |
| Male household head (%) | 68.0 | 0.8 | 72.0 | 1.6 | 0.020 |
| Household head age (years) | 49.4 | 0.3 | 61.4 | 0.5 | <0.001 |
| White household head (%) | 56.0 | 0.8 | 62.7 | 1.6 | <0.001 |
| Head has co-residing wife[a] (%) | 47.2 | 0.8 | 60.4 | 1.7 | <0.001 |
| Wife age (years)[b] | 48.1 | 0.3 | 57.9 | 0.5 | <0.001 |
| Number of living children[d] | 1.3 | 0.0 | 2.3 | 0.1 | <0.001 |
| Number of living parents[e] | 1.3 | 0.0 | 0.7 | 0.0 | <0.001 |
| **Economic characteristics** | | | | | |
| Urban residence (%) | 66.0 | 0.7 | 65.1 | 1.5 | 0.610 |
| Family income (mean $) | 77,304 | 1941 | 68,728 | 291 | 0.014 |
| Head is working (%) | 67.1 | 0.8 | 40.7 | 1.9 | <0.001 |
| Wife is working (%) | 59.1 | 1.0 | 47.2 | 2.4 | <0.001 |
| **Household health** | | | | | |
| Either has another chronic condition[c] (%) | 40.9 | 0.8 | 66.1 | 1.5 | <0.001 |
| **Intergenerational support given (% for those with at least one adult child/parent)** | | | | | |
| Gives time or money to help parents[e] | 55.6 | 0.8 | 54.9 | 2.1 | 0.751 |
| Time | 48.8 | 0.9 | 47.1 | 2.1 | 0.477 |
| Money | 19.0 | 0.7 | 21.1 | 1.8 | 0.265 |
| Gives time or money to help adult children[d] | 66.1 | 1.1 | 61.3 | 1.8 | 0.023 |
| Time | 46.3 | 1.2 | 45.0 | 1.8 | 0.533 |
| Money | 48.6 | 1.2 | 41.1 | 1.8 | 0.001 |
| **Intergenerational support received** | | | | | |
| Received time or money help from parents[e] | 46.3 | 0.9 | 31.3 | 1.9 | <0.001 |
| Time | 33.8 | 0.8 | 20.2 | 1.6 | <0.001 |
| Money | 26.5 | 0.8 | 17.8 | 1.6 | <0.001 |
| Received time or money help from adult children[d] | 40.5 | 1.2 | 44.5 | 1.8 | 0.069 |
| Time | 35.7 | 1.1 | 38.8 | 1.8 | 0.139 |
| Money | 12.0 | 0.8 | 14.7 | 1.4 | 0.090 |

Estimates are survey-adjusted.

[a] Wife is defined as a co-residing wife or female partner: in 4,164 households the head lived alone.

[b] In 121 households both the head and the wife had diabetes.

[c] Other chronic conditions were stroke, cancer, heart attack, heart disease, psychological problems, and memory loss.

[d] 4,248 households - 3,016 (42.3%) households without diabetes and 1,232 (78.4%) households with diabetes had at least one adult child.

[e] 6,942 households - 6,024 (84.4%) households without diabetes and 924 (58.8%) households with diabetes had at least one living parent.

**Table 2: Diabetes and probability of giving to and receiving from parents and adult children: Odds ratios from multivariate logistic regression models**

| | From household to parent or adult child | | | | From parent or adult child to household | | | |
|---|---|---|---|---|---|---|---|---|
| VARIABLES | (1) Spent time helping parent[a] | (2) Gave money to parent[a] | (3) Spent time helping adult child[b] | (4) Gave money to adult child[b] | (5) Got time help from parent[a] | (6) Got money from parent[a] | (7) Got time help from adult child[b] | (8) Got money from adult child[b] |
| Diabetes in the household | 0.96 | 1.14 | 1.11 | 0.79* | 0.99 | 0.84 | 1.25* | 1.13 |
| *(Ref: No diabetes in the household)* | (0.09) | (0.14) | (0.10) | (0.08) | (0.12) | (0.11) | (0.12) | (0.16) |
| Male household head | 1.32** | 1.28+ | 0.50** | 1.02 | 0.69** | 1.08 | 0.28** | 0.21** |
| *(Ref: female head)* | (0.14) | (0.17) | (0.08) | (0.15) | (0.08) | (0.13) | (0.05) | (0.06) |
| Household head age categorical *(Ref: <35 years of age)* | | | | | | | | |
| 35-39 years of age | 0.89 | 1.26+ | 2.00 | 1.99 | 0.94 | 0.64** | 2.01 | 1.51 |
| | (0.10) | (0.17) | (0.99) | (0.95) | (0.10) | (0.08) | (1.02) | (1.32) |
| 40-44 years of age | 0.91 | 1.05 | 1.23 | 1.22 | 0.53** | 0.62** | 1.33 | 1.33 |
| | (0.11) | (0.17) | (0.56) | (0.55) | (0.06) | (0.08) | (0.64) | (1.09) |
| 45-49 | 1.06 | 1.25 | 1.00 | 1.47 | 0.36** | 0.47** | 1.77 | 1.51 |
| | (0.14) | (0.20) | (0.45) | (0.65) | (0.05) | (0.07) | (0.83) | (1.21) |
| 50-54 | 1.10 | 1.11 | 0.98 | 1.32 | 0.24** | 0.49** | 1.86 | 1.56 |
| | (0.15) | (0.20) | (0.44) | (0.59) | (0.04) | (0.09) | (0.87) | (1.23) |
| 55-59 | 1.46* | 1.34 | 1.06 | 1.36 | 0.09** | 0.58** | 1.36 | 2.14 |
| | (0.22) | (0.27) | (0.48) | (0.60) | (0.02) | (0.11) | (0.64) | (1.69) |
| 60-64 | 1.93** | 1.31 | 0.81 | 1.23 | 0.09** | 0.61* | 1.04 | 2.80 |
| | (0.34) | (0.29) | (0.37) | (0.55) | (0.03) | (0.13) | (0.50) | (2.22) |
| 65-69 | 2.00** | 1.04 | 0.55 | 1.02 | 0.04** | 0.39** | 1.14 | 1.47 |
| | (0.46) | (0.33) | (0.26) | (0.47) | (0.02) | (0.13) | (0.56) | (1.19) |
| 70+ | 2.08* | 1.38 | 0.25** | 1.15 | 0.06** | 0.29** | 1.83 | 1.94 |
| | (0.69) | (0.58) | (0.12) | (0.53) | (0.04) | (0.14) | (0.89) | (1.56) |
| White household head*(Ref: Other race)* | 1.04 | 0.64** | 1.12 | 0.99 | 1.18+ | 1.04 | 1.14 | 0.73* |
| | (0.08) | (0.06) | (0.11) | (0.10) | (0.10) | (0.09) | (0.12) | (0.11) |
| Household head is working | 1.06 | 1.53** | 1.08 | 1.02 | 0.89 | 0.95 | 0.87 | 1.00 |
| | (0.09) | (0.18) | (0.11) | (0.11) | (0.09) | (0.09) | (0.09) | (0.16) |
| Household head has co-residing wife | 0.51** | 1.00 | 2.16** | 1.07 | 1.13 | 0.71* | 1.03 | 2.36** |
| | (0.06) | (0.15) | (0.35) | (0.17) | (0.15) | (0.10) | (0.18) | (0.72) |
| Co-residing wife is working | 1.21* | 0.81+ | 0.94 | 0.97 | 1.12 | 0.99 | 1.64** | 0.95 |
| | (0.11) | (0.09) | (0.11) | (0.12) | (0.11) | (0.11) | (0.20) | (0.19) |
| Number of living children | 0.92* | 1.03 | 0.96 | 0.89** | 0.75** | 0.86** | 1.01 | 1.04 |
| | (0.03) | (0.04) | (0.03) | (0.03) | (0.04) | (0.04) | (0.03) | (0.04) |
| Number of living parents | 1.04 | 0.90+ | 0.94 | 0.96 | 0.91+ | 1.02 | 0.99 | 0.67** |
| | 0.92* | 1.03 | 0.96 | 0.89** | 0.75** | 0.86** | 1.01 | 1.04 |
| Household income | 1.00 | 1.01* | 1.01 | 1.08** | 1.00* | 1.00 | 1.00 | 1.00 |
| (10,000 increments) | (0.00) | (0.00) | (0.01) | (0.01) | (0.00) | (0.00) | (0.00) | (0.01) |
| Either has another chronic disease[c] | 1.04 | 0.93 | 1.00 | 1.07 | 1.03 | 1.23* | 1.44** | 1.12 |
| | (0.07) | (0.08) | (0.09) | (0.10) | (0.08) | (0.10) | (0.13) | (0.15) |
| Urban residence | 0.91 | 1.46** | 0.98 | 1.21* | 0.76** | 1.21* | 0.83* | 1.32+ |
| | (0.06) | (0.13) | (0.09) | (0.11) | (0.06) | (0.10) | (0.08) | (0.19) |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Census region *(ref: Northeast)* | | | | | | | | |
| North Central | 0.80* | 0.82 | 0.92 | 1.03 | 0.82+ | 0.85 | 1.18 | 0.59** |
| | (0.08) | (0.11) | (0.13) | (0.14) | (0.10) | (0.10) | (0.16) | (0.12) |
| South | 0.74** | 1.29* | 0.71** | 1.01 | 0.75* | 0.82+ | 0.81 | 0.77 |
| | (0.07) | (0.16) | (0.09) | (0.13) | (0.08) | (0.09) | (0.11) | (0.14) |
| West | 0.60** | 1.30* | 0.80 | 1.13 | 0.71** | 0.74* | 0.92 | 0.73 |
| | (0.07) | (0.17) | (0.12) | (0.16) | (0.09) | (0.09) | (0.14) | (0.15) |
| Constant | 1.24 | 0.13** | 1.55 | 0.48 | 2.35** | 0.62** | 0.66 | 0.17* |
| | (0.20) | (0.03) | (0.73) | (0.23) | (0.41) | (0.11) | (0.32) | (0.14) |
| Observations | 6,942 | 6,942 | 4,248 | 4,248 | 6,942 | 6,942 | 4,248 | 4,248 |

SE in parentheses. Estimates are survey-adjusted. [a] Only estimated for those under age 80 years with at least 1 living parent (includes parents of the household head and the wife)

[b] Only estimated for households with at least 1 living adult child over age 18 (includes adult children of the household head and the wife)

[c] Other chronic diseases were stroke, cancer, heart attack, heart disease, psychological problems, and memory loss.

** p<0.01, * p<0.05, + p<0.1

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**Table 3: Exchanges between parents and adult children by duration of diabetes exposure and diabetes-related limitations: Odds ratios from multivariate logistic regression models**

| VARIABLES | (1) Spent time helping parent[a] | (2) Gave money to parent[a] | (3) Spent time helping adult child[b] | (4) Gave money to adult child[b] | (5) Got time help from parent[a] | (6) Got money from parent[a] | (7) Got time help from adult child[b] | (8) Got money from adult child[b] |
|---|---|---|---|---|---|---|---|---|
| *A. Duration of diabetes in 2012 (Ref: No diagnosed diabetes in head or wife)[c]* | | | | | | | | |
| 0-2 years | 1.62+ | 1.12 | 1.20 | 0.47** | 1.14 | 0.72 | 1.15 | 1.55 |
| | (0.41) | (0.36) | (0.37) | (0.13) | (0.33) | (0.27) | (0.35) | (0.63) |
| 3-5 years | 1.16 | 1.21 | 0.94 | 0.92 | 0.83 | 1.10 | 1.16 | 1.31 |
| | (0.24) | (0.31) | (0.18) | (0.18) | (0.22) | (0.28) | (0.25) | (0.40) |
| > 5 years | 0.85 | 1.13 | 1.14 | 0.81* | 1.02 | 0.80 | 1.29* | 1.05 |
| | (0.10) | (0.16) | (0.12) | (0.09) | (0.15) | (0.12) | (0.14) | (0.16) |
| *B. Diabetes and related limitations in 2012 (Ref: No diagnosed diabetes in head or wife)[d]* | | | | | | | | |
| Diabetes with no limitations | 0.99 | 1.28+ | 1.11 | 0.83+ | 0.92 | 0.80 | 1.14 | 1.00 |
| | (0.11) | (0.17) | (0.12) | (0.09) | (0.12) | (0.12) | (0.13) | (0.18) |
| Diabetes with limitations | 0.88 | 0.79 | 1.11 | 0.74* | 1.25 | 0.96 | 1.47** | 1.33 |
| | (0.15) | (0.19) | (0.15) | (0.11) | (0.30) | (0.21) | (0.21) | (0.25) |

SE in parentheses. Estimates are survey-adjusted. The generalized models are adjusted for age and race of the household head, presence of a co-residing wife, employment status of head and wife, other chronic condition of the head or wife, household's urban residency, census region, number of living children, number of parents and income.

[a] 6,942 households - 6,018 (84.4%) households without diabetes and 924 (58.8%) households with diabetes had living parents.

[b] 4,248 households - 3,016 (42.3%) households without diabetes and 1,232 (78.4%) households with diabetes had living adult children

[c] Duration: For exchanges with parents: 6,018 households never had diagnosed diabetes, 656 had diabetes for more than 5 years, 162 had diabetes for between 3-5 years, and 106 had diabetes for less than 2 years. For exchanges with adult children: 3016 households never had diagnosed diabetes, 952 had diabetes for more than 5 years, 188 had diabetes for between 3-5 years, and 92 had diabetes for less than 2 years.

[d] Diabetes with limitations: For exchanges with parents: 6018 households never had diagnosed diabetes, 655 had diabetes without limitations, 269 had diabetes with limitations. For exchanges with adult children: 3016 households never had diabetes, 734 had diabetes without limitations, 498 had diabetes with limitations.

** p<0.01, * p<0.05, + p<0.1