Intra-Household Dependencies in Health:
Evidence from Spousal Mortality and Severe Health Shocks

Preliminary Summary

Itzik Fadlon
UCSD and NBER

Torben Heien Nielsen
University of Copenhagen

Analyzing households as economic units, economists have traditionally focused on household members' linkages through the sharing of financial resources and consumption, coordination in work activities, and joint investments in public "goods" such as children.[1] There are, however, potentially important linkages across household members in other key dimensions of economic life. In particular, there can be intra-household dependencies in health, both as a consumption and as an investment good, which can result from either the emotional connections or the pooling of resources and information within the household.[2]

In this paper, we study intra-household health dependencies by analyzing how spousal mortality and severe health shocks affect individuals' health-care utilization, health, and well-being. We begin by estimating the causal of effects of these shocks, and then investigate the potential mechanisms through which these effects may operate.

To estimate the causal impact of spousal shocks we focus on households that experienced a shock at some point in our data period, and identify the treatment effect from the timing of the shock. We follow a new method that we develop in Fadlon and Nielsen (2015) to construct counterfactuals to affected households using households that experienced a similar shock but a few years in the future, and recover the causal treatment effect by performing event studies that compare these experimental groups.

We conduct the analysis by exploiting long panels of administrative data on the entire Danish population (roughly from 1980-2011). On the health side, these data include death records with cause of death and provide comprehensive information on health-care utilization– including hospital discharge records, any contact with primary care professionals or medical specialists, and any transaction of drug prescriptions. In addition, the data include administrative registers of income, wealth, and labor earnings with spousal and household linkages. The advantage of the Danish context for our purposes lies in the opportunities to link couples, to study a wide range of health outcomes, and to analyze the potential role of economic conditions in the effects of spousal shocks. As there is near-complete universal health-care coverage in Denmark, our analysis allows us to analyze effects that are not cofounded by the availability of health insurance, similar to the case of the Medicare population.

Focusing on the extreme shock of the death of a spouse, we find significant increases in health-care utilization of survivors at all levels of medical care: visits to primary care professionals or medical specialists (Figure 1.a); visits to hospitals (Figure 1.b); and drug

[1] Starting with Becker (1973; 1974; 1991) and followed by many others, see a review in Browning et al. (2014).

[2] These ideas have been raised and investigated primarily by the disciplines of public health, sociology, and medical research, which studied the time patterns of morbidity and mortality following spousal illnesses or death. See, e.g., Parkes and Fitzgerald (1969); Clipp and George (1993); Schaefer et al. (1995); Martikainen and Valkonen (1996); Shaw et al. (1997); Dunkin and Anderson-Hanley (1998); Schulz and Beach (1999); Schulz et al. (2003); Christakis and Iwashyna (2003); Subramanian et al. (2008); Elwert and Christakis (2008a,b); Christakis and Allison (2009); and Jin and Christakis (2009).

prescriptions (Figure 1.c). We investigate the composition of these health effects by separately analyzing measures of physical health, using an indicator for the presence of chronic conditions and analyzing mortality, and a measure of mental health, using the prescription rate for drugs that treat depression, anxiety, or stress. In line with findings suggested by previous literature, but using our research design, we find significant increases in the mortality risk of widowed spouses compared to the counterfactual. As for mental health, we find very large increases in the prescription rate for antidepressants, from 0.26 to 0.46, in the year the spouse dies (Figure 2.a). We also show that the largest effect is apparent in the month just after spousal death (Figure 2.c), suggesting--more broadly--that changes in health can be immediate. Additionally, we find a small increase in antidepressant utilization in the year prior to the shock. The latter effect disappears when focusing on deaths that are more likely to come as a surprise, supporting the hypothesis that it is driven by spouses' illness or adverse health that may precede their death (Figure 2.b).

To directly study the potential mental health effects of spousal illnesses, we analyze households in which a spouse experienced a heart attack, a stroke, or was diagnosed with cancer. Consistent with the care-giver burden hypothesis, we find that non-fatal health shocks lead to declines in the spouse's mental health (see Figure 2.d for heart attacks and strokes). This effect is much smaller compared to the effect we find in the case of spousal death, and is larger throughout the sickness period whenever the spouse dies sooner after a health shock. This result is in line with the conjecture that more severe shocks, measured by ex-post mortality, lead to larger declines in spousal mental health.

Besides direct changes in survivors' health following spousal death, there are different additional hypotheses regarding what may underlie health-care utilization effects and regarding the conditions that can mitigate or worsen survivors' adverse health effects.

To investigate some of these different hypotheses, we first study whether part of the utilization effect can be attributable to behavioral responses due to, e.g., more available information on health risks or increased salience of health issues (i.e., a health-related "wake-up call") upon spousal shocks. We find evidence consistent with this hypothesis when studying differential responses by the spouse's cause of death. Specifically, we find increased utilization of statins (drugs taken to lower cholesterol that are widely used to prevent cardiovascular diseases) when a spouse dies of a heart attack or a stroke, as compared to death of any other cause; as well as increased visits to diagnostic radiology experts when a spouse dies of cancer, as compared to deaths of other causes. We also find increased vaccination rates for survivors, an increase in hospital contacts for suspected conditions that are ruled out upon discharge, and other outcomes that are consistent with higher vigilance with respect to one's own health status following spousal mortality.

Second, we investigate the role of financial distress imposed by spousal death. Accounting for a rich set of control variables, we find consistent evidence that income losses due to a spouse's death--or, similarly, the deceased being the primary earner--are strongly correlated with the declines in survivors' mental health just after the shock and with their risk of mortality in the following years.[3]

Our analysis identifies survivors as a population with particularly high risk of adverse health and mortality. A natural inquiry that follows is whether there are ways to help mitigate the health effects of spousal death by directing government resources to survivors. The finding that

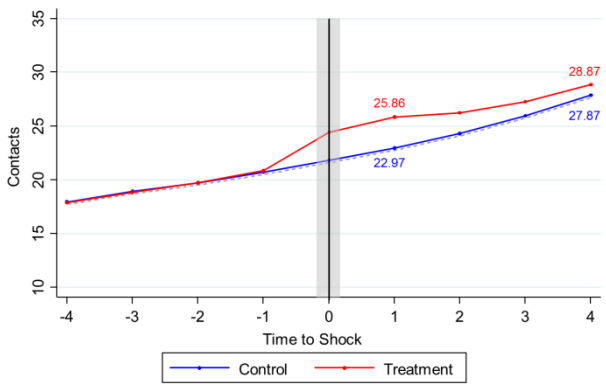
[3] Lastly, we show that although surviving spouses exhibit higher migration rates across municipalities, they do not move to higher health-care utilization areas, so that this specific type of potential "supply-side" utilization dimension cannot explain our results.

higher income losses due to spousal death are associated with worse health calls for future work on studying whether alleviating the financial distress of survivors through social insurance program can causally improve their health and reduce their mortality risk. With recent evidence that higher medical-care spending can improve one's health (Doyle 2011; Doyle et al. 2015; Finkelstein et al. 2016), another route of action could be to allocate additional resources to survivors in the form of more intense medical care (e.g., through supervision, diagnoses, or treatments). However, it is unclear whether this evidence that pertains to the population at large is applicable to the specific sub-population of widowed spouses. We, therefore, conclude our analysis by following Finkelstein et al. (2015; 2016) to study the potential impacts of higher health-care spending on health using migrations, but focusing on survivors. Consistent with this recent literature, we find in the Danish context that migrations of widowed spouses to higher utilization areas are associated with more health-care utilization and with lower mortality risk following the move, suggesting that there is scope for health-care related policies that target survivors.

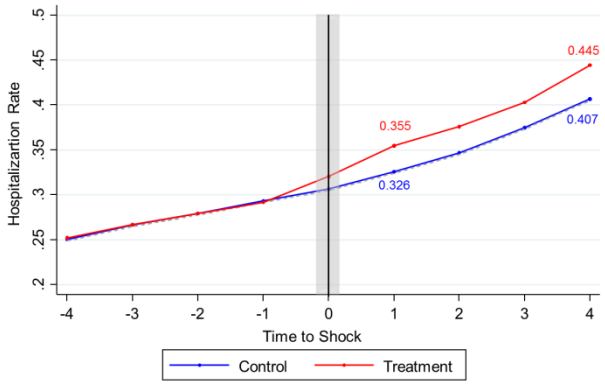
Overall, our findings of how intra-household dependencies translate to effects on individuals' health have several implications. The analysis suggests that we may want to amend canonical models of health, such as Grossman's (1972a,b) human capital model, to analyze the household's, rather than the individual's, behavior--allowing the evolution of health, health behaviors, and health investments to depend on spousal health and timing of death. Consequentially, our results have implications for the design of (private or social) health-insurance products, which are commonly marketed at the household level. In particular, the evidence demonstrates the cross-member dependence in the demand for medical care and identifies circumstances of increased demand for coverage from the consumer's perspective.

Figure 1:
The Effects of Spousal Mortality on Overall Health-Care Utilization

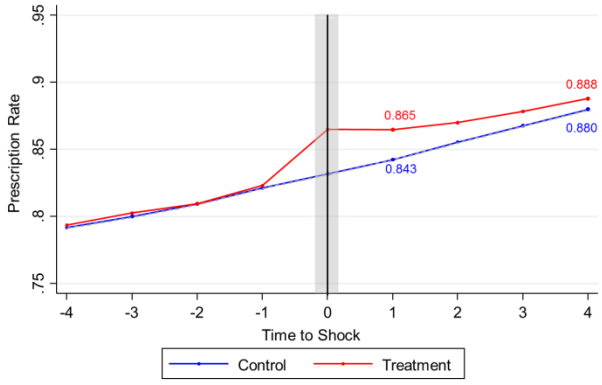
A. Visits to Primary Care Professionals and Medical-Care Specialists



B. Hospitalizations and Hospital Visits



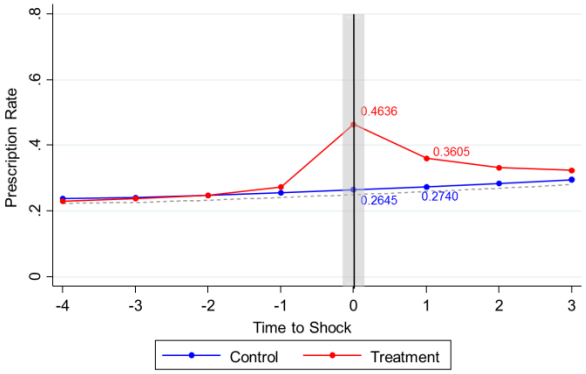
C. Prescriptions for Any Drug



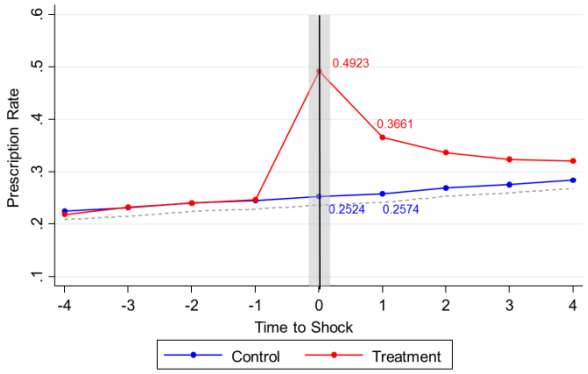
Notes: These figures plot the health-care utilization responses of survivors to the death of their spouse. The sample includes individuals whose spouses died between ages 45 and 80 from 1980 to 2011. Panel A depicts the number of visits to primary care professionals and medical-care specialists; Panel B depicts an indicator for any hospital contact within a year (for inpatient or outpatient departments); Panel C depicts an indicator for whether the surviving spouse purchased any drug prescribed by a health-care professional. Due to data availability, Panel C includes only years 1995-2011 and survivors born between 1930 and 1950. The x-axis denotes time with respect to the shock, normalized to period 0. For the treatment group, period 0 is when the actual shock occurs; for the control group period 0 is when a "placebo shock" occurs (while their actual shock occurs in period 5). The dashed gray line plots the behavior of the control group. To ease the comparison of trends, we normalize the level of the control group's outcome to the pre-shock level of the treatment group's outcome. This normalized counterfactual is displayed by the blue line. The red line plots the behavior of the treatment group.

Figure 2:
The Effects of Spousal Mortality and Health Shocks on Mental Health

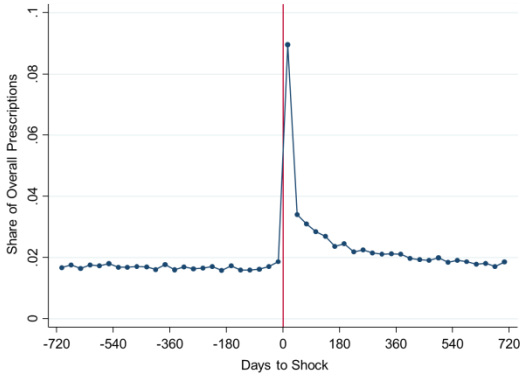
A. Spousal Death of Any Cause



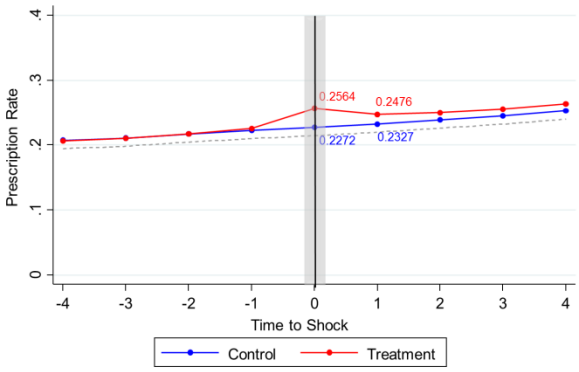
B. Spousal Death Following a Heart Attack or a Stroke (Annually)



C. Spousal Death of a Heart Attack (Monthly)



D. Non-Fatal Spousal Heart Attack or Stroke



Notes: These figures plot a measure of spouses' mental health—specifically, an indicator for whether an individual purchased a prescribed drug for treatment of depression, anxiety, or stress. These drugs include Psycholeptics (medication which produces a calming effect; ATC code N05) and Psychoanaleptics (medication that produces an arousing effect; ATC code N06). The sample includes individuals born between 1930 and 1950 whose spouses experienced a specific shock between ages 45 and 80, for years 1995-2011. Panel A depicts annually the outcome's behavior in response to spousal death of any cause; Panel B depicts the same annual outcome but for survivors whose spouses experienced a heart attack or a stroke and died within that year; Panel C depicts, for the treatment group only, the share of survivors' prescriptions in any given time unit out of the entire pool of prescriptions to survivors within the plotted time window, where the time units are months; Panel D depicts the annual outcome but for survivors whose spouses experienced a non-fatal heart attack or stroke and survived for at least four years. The x-axis denotes time with respect to the shock, normalized to period 0. For the treatment group, period 0 is when the actual shock occurs; for the control groups in Panels A, B, and D period 0 is when a "placebo shock" occurs (while their actual shock occurs in period 5). The dashed gray line plots the behavior of the control group. To ease the comparison of trends, we normalize in Panels A, B, and D the level of the control group's outcome to the pre-shock level of the treatment group's outcome. This normalized counterfactual is displayed by the blue line. The red line plots the behavior of the treatment group.

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