Spousal Health Shocks and Physical Activity among Older Adults

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Abstract

Using the 2004-2014 data from Health and Retirement Study, we examined the impact of spousal health shocks (i.e., new diagnosed medical conditions and functional limitations) on older adults' physical activity (PA). In particular, we explored whether individuals *learn* from their spouses' health shocks and adjust their PA. Using fixed-effect two-stage models, we found individuals, especially males and the less educated, increased their PA levels in response to their spousal health shocks directly and indirectly (through the negative impact of spousal health shocks on their own self-reported health). This finding suggests potential beneficial effects of providing health promoting information to both spouses when one spouse develops health problems.

Introduction

Physical activities (PA) are associated with a variety of health benefits. It plays a critical role in the etiology and prevention of many chronic diseases, such as cancer, coronary heart disease, and overweight/obesity (U.S. Department of Health and Human Services, 1996). Policy makers have growing attention on individuals' PA decisions because sedentary lifestyle is the fourth leading causes of deaths in the world (World Health Organization, 2010) and is associated substantial economic costs. For example, according to a worldwide estimate in 2013, it cost $67.5 billion (international $) in healthcare expenditures and lost productivity due to the morbidity and premature mortality related to physical inactivity (Ding et al., 2016). It is, therefore, important to promote regular PA.

Family context is one of the important factors to consider in health promotion because of the similarity in health behaviors among couples (Li, Cardinal, & Acock, 2013). The spousal concordance in health behaviors may be explained by assortative mating, shared resource hypothesis (i.e., physical environment, financial and time resources), and/or social control (i.e., partners monitoring and shaping the behaviors of each other) (Li et al., 2013). Considering the mutual influence of spouses in PA, both theoretical predictions and an empirical evidence have agreed on the effectiveness of couple-focused interventions over individual-focused interventions in PA (Arden-Close & McGrath, 2017; Martire, Schulz, Helgeson, Small, & Saghafi, 2010).

When one spouse suffers a health shock, the other spouse may change his/her health behaviors. For example, McGeary (2015) found that women are more likely to stop smoking if their spouses suffer from a health shock compared to men. A few studies further investigated various channels through which health shocks affect one's smoking behaviors (Clark & Etilé, 2006; Khwaja, Sloan, & Chung, 2006; McGeary, 2015). One channel is that a spouse may reduce smoking because he/she concerns the impact of their smoking behavior on the home environment for the other spouse who has a health shock (i.e., *altruism*). The other channel is that he/she may also reduce smoking because of updated beliefs about the health consequences of smoking when they themselves or their spouses experience health problems (i.e., *learning*) (Clark & Etilé, 2002).

The mechanism through which spousal health shocks affect individuals' PA may be different from that in smoking behaviors. For example, an individual's smoking behavior can directly affect the health of other family members, while PA does not have such a negative externality effect. Compared to smoking behaviors, research on PA is rather limited. Li et al. (2013) examined the impact of having

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functional limitations and diseases (e.g., high blood pressure, diabetes, cancer, or stroke) on the PA trajectories of couples. They found that husbands were more negatively affected by their own and spouses' health problems than wives. This study, however, did not fully explore the underlying mechanism of spousal health shocks on individuals' PA. The knowledge of such mechanism is important because it would shed light on how to better provide health information in PA promotion policies. Therefore, our study attempts to fill the gap.

Using the 2004-2014 data from Health and Retirement Study (HRS), our study examines the effects of spousal health shocks on individuals' PA among older adults. This population is of interest because older couples, especially the retired, face different time constraints compared to younger couples, and the PA decisions of the former group may not be the same as those of other adults. In addition, promoting PA is important among older adults because this age group is the least physically active and regular PA is essential to healthy aging (Office of Disease Prevention and Health Promotion). We are also interested in whether individuals *learn* from their spouses' new health shocks and change their own PA levels. Individuals may update their health beliefs based on the new information and increase PA for its health benefits. However, if individuals value the time they spend together and foresee the shorter time due to spouses' health shock, individuals may be less motivated to invest on health and therefore reduce PA. As a result, whether the learning effects would lead to an increase or decrease in the PA levels of individuals is an empirical question. In addition to the analyses based on the full sample, we will also explore the differences in the effects by individuals' characteristics such as gender, race/ethnicity, and educational attainment.

Conceptual Framework

Cawley (2004) provided an economic framework to explain individuals' decisions to engage in PA and to eat—a sleeping, leisure, occupation, transportation, and home production (SLOTH) model of time allocation. The model suggests that the time allocation in these five areas affects individuals' utility directly, as well as indirectly through their effects on weight and health. This framework implies that people make their decisions about how to allocate their time and how to divide their consumption between food and other goods to maximize their utility, subject to financial, time, and biological constraints.

Based on Cawley's framework, spousal health shocks may affect one's PA through affecting one or a combination of: time allocation, energy level, weight and health, and preferences. Spousal health shocks may affect the time allocation of individuals in all five areas of SLOTH in several ways. First, when an individual faces a new health shock, the spouse may need more time to provide care for the sick, which may decrease the time spent on paid work, sleeping, and leisure including PA. Second, to compensate for the loss in earnings caused by the sick spouse' reduced working hours, the healthy spouse may need to increase working hours, which may compete for the time on PA. In addition to affecting the time allocation, spousal caregiving can be strenuous for some families, and the caregivers may reduce PA due to fatigue. Caregiving activities are also associated with negative health consequences for caregivers (Schulz & Sherwood, 2008). The decline in their own health due to caregiving may motivate caregivers to engage in more PA for its health benefits (Glanz, Rimer, & Viswanath, 2008; Li et al., 2013). Individuals' PA decisions are also affected by factors such as risk and time preference, and health belief. For example, a future oriented person was found to spend more time on PA (Kosteas, 2015). Individuals may also update their beliefs about the severity of health problems and importance of investing on health by *learning* from their spouse's health shocks. The new information from the health shocks may lead to a change in their PA levels.

In this study, we distinguished two types of learning. One is the change in individuals' PA levels in response to spouses' new health problems (direct effects). The other one is the change in individuals' PA in response to the change in their own perceived health, which is attributed to spouses' new health problems (indirect effects).

Method

Data and Sample

We used the 2004-2014 waves of Health and Retirement Study (HRS) data for this study. Every two years, the survey follows nationally representative samples of six cohorts of more than 22,000 Americans aged 50 or older and their spouses. The survey provides rich information including physical and mental health, insurance coverage, and employment, as well as demographic and socioeconomic characteristics of individuals and their families. We included the data starting from 2004 because HRS has collected the PA information of respondents and spouses consistently since 2004. The final analytical sample includes 16,787 individuals who live with their spouses or partners. Table 1 summarizes their characteristics.

Measures

Following Li et al. (2013), we created one continuous variable to measure the PA level based on its frequency and intensity. We translated weekly frequencies of PA—0 (hardly ever or never), 1 (one to three times a month), 2 (once a week), 3 (more than once a week), and 4 (every day)—to 0, 0.5, 1, 2.5, and 7 times per week. We also weighted the frequencies by their corresponding intensity levels of 9 (vigorous activities), 5 (moderate activities), and 3(mild activities). For our sample, the sum of the products ranges from 17 to 85 with a greater value indicating a higher PA level. The average level of PA was 46.41 (S.D.=17.00).

Our main explanatory variables were the health shocks of spouses in developing (a) new medical conditions such as cancer and diabetes, (b) new functional limitations in Activities of Daily Living (ADLs), and (c) new functional limitations in Instrumental Activities of Daily Living (IADLs). We examined medical conditions, difficulties in performing ADLs and IADLs separately because they describe different dimensions of one's health (Koroukian et al., 2016). We created two types of shock variables—temporal and cumulative health shocks. The first type measured whether there were any new conditions/ADLs/IADLs between two adjacent waves.[1] Our data show that 5.2%, 2.3%, and 2.4% of individuals had spouses who experienced temporal health shocks in new medical conditions, difficulties in performing ADLs and IADLs, respectively (Table 1). The second type—cumulative health shocks—measured the total number of new medical conditions and functional limitations across all the waves.[2] The data showed that the average numbers of cumulative health shocks of spouses were 1.0 (S.D.=1.1) for medical conditions, 0.4 (S.D.=1.0) for limitations in performing ADLs, and 0.4 (S.D.= 1.0) for disabilities in IADLs (Table 1).

Following Cawley (2004)'s model, we included an extensive set of control variables to capture the biological and time constraints, and preferences of individuals. We controlled for respondents' health status including self-reported current health status, medical conditions, and difficulties in performing ADLs and IADLs (biological constraints). We included respondents' employment status, the percentage contribution of their earnings to total household income, number of living adult children, and number of spouses' living siblings (time constraints). The percentage contribution of respondents' earnings to total household income captures the value of their time. When spouses experience health shocks, the individuals who contribute a large portion to the household income through employment may be less likely to quit their jobs to care for their spouses. Unless their spouses have adult children or siblings who are willing and able to provide the care, these individuals may be left with less time for PA after they prioritize time on caregiving and employment. We also controlled for health behaviors including current smoking status, alcohol consumption, and Body Mass Index (time and risk preferences).[3]

Other controls included the year and month of interview, census region, and the interaction between month and region to capture seasonal and regional trends. We also controlled for basic demographic and socioeconomic status of respondents and their families including age and age-squared, household income, net worth, and homeownership[4]

Analysis

To examine the effects of spousal health shock on individuals' PA, we conducted fixed effects regression models with the PA level of the respondent as the dependent variable (PA_{it}). With the full sample, we specified the baseline model as follows:

$$PA_{it} = \beta_0 + \beta_1 SH_{it} + \beta_2 X_{it} + \beta_3 TC_{it} + \beta_4 BC_{it} + \beta_5 P_{it} + i_i + y_y + m_m + r_r + m_m * r_r \quad (1)$$

where SH_{it} denotes spousal health shocks including temporal and cumulative shocks. X_{it} includes time-variant characteristics of individuals and households. TC_{it}, BC_{it}, and P_{it} denote time constraints, biological constraints, and time and risk preferences respectively. i_i, y_y, m_m, and r_r stand for individual-, year-, month-, and region-specific fixed effects respectively.

To test both the direct and indirect effects of spousal health shocks on individuals' PA, we estimated a two-stage model. In the first stage, we estimated a random effects ordered probit model with clustered standard errors by individuals. The first stage model is specified as,

$$prob(Chg\ Hlth_{it}) = \alpha_0 + \alpha_1 SH_{it} + \alpha_2 X_{it} + \alpha_3 TC_{it} + \alpha_4 BC_{it} + \alpha_5 P_{it} + i_i + y_y + m_m + r_r + m_m * r_r \quad (2)$$

where $Chg\ Hlth_{it}$ denotes the change in respondents' self-reported health status between *t-1* and *t* with three categories—having worse, better, or the same health as the previous wave. We calculated the predicted probabilities of having worse and better health than that in the previous wave ($Ch\hat{g}Hlth_{it}$) from equation (2)[5] and included them as independent variables in the second stage as follows,

$$PA_{it} = \gamma_0 + \gamma_1 Ch\hat{g}Hlth_{it} + \gamma_2 SH_{it} + \gamma_3 X_{it} + \gamma_4 TC_{it} + \gamma_5 BC_{it} + \gamma_6 P_{it} + i_i + y_y + m_m + r_r + m_m * r_r \quad (3)$$

The estimates of interest are $\hat{\gamma}_1$ and $\hat{\gamma}_2$, which indicate the estimated indirect and direct effects of spousal health shocks on respondents' PA levels respectively.

Whether and how individuals' PA responds to the change in their own self-reported health status may depend on their initial health status. If an unhealthy individual perceived a decline in health attributed to the spouses' health shocks, he/she would probably reduce PA due to the physical strain. On the other hand, if a healthy individual's perceived health worsened, he/she may increase the PA level to improve their health if health problems do not prohibit them from engaging in PA. To allow for the potential differential effects due to the initial health status of the respondents, we partitioned our sample into two groups: unhealthy (reported in poor or fair health) and healthy (reported in good, very good, excellent health) individuals.

We also partitioned the full sample by time-invariant individual characteristics such as gender, race/ethnicity, and educational attainment and estimated the same models in equation (1), (2), and (3).

Results

Table 2 presents the results from our baseline model using the pooled sample and partitioned samples by sex, race/ethnicity, and educational attainment. With the pooled sample (column I), we found that individuals increased their PA level by 50.29% when their spouses experienced temporal health shocks of any medical conditions. We also observed slightly larger effects among White individuals in response to spouses' new medical conditions (column IV). When their spouses experienced any new difficulties in performing ADLs, however, females decreased their PA substantially (114.27% in column III). The finding is consistent with the primary caregiver role that women often take on at home (National Alliance for Caregiving & AARP Public Policy Institute, 2015). Spousal caregiving can be time-consuming and therefore leaves little time for females to engage in PA.

The two-stage model allows us to explore the underlying *learning* effects, and Table 3 and 4 present the results. In the first stage, we found that individuals reported worse health compared to the previous wave when their spouses experienced more health shocks in the difficulties to perform ADLs over the years (column I in Table 3). In the second stage, we found differential effects of the estimated change in self-reported health on PA by individuals' health status. Unhealthy individuals decreased their PA levels, whereas healthy individuals increased their PA levels when their predicted probabilities of having worse health increased (column II and III in Table 3). The PA levels of unhealthy individuals are probably limited by their health conditions. Therefore, we focus on the healthy individuals who are not biologically constrained. We found that healthy individuals increased their PA levels when their perceived health declined, which could be an evidence of *learning* from their own health change. The negative effects of health change on PA preclude the argument that the association is due to the unobserved characteristics such as health consciousness which affect both one's health and PA levels.

We also observed positive direct effects of spousal temporal shocks in ADLs and IADLs on individuals' PA levels. It is possible that these individuals update their health beliefs by *learning* from the health problems development of their spouses and therefore engage in more PA. For cumulative health shocks, however, the direct effects were negative. The negative effects may be explained by the diminishing marginal effect of *learning* (i.e., the change in PA decreases in response to an additional health shock). It is also possible that individuals with multiple health shocks need more time for care, which squeezes out their spouses' time on PA. This effect might not be well captured by our time constraint variables.
When we partitioned the full sample by characteristics such as sex and educational attainment, similarly, we found both direct and indirect effects among males and the less educated. Interestingly, however, we did not find significant results among females. One possible reason is that women and men often engage in different types and intensity levels of PA. Older women are more likely engage in domestic activities with light intensity level, whereas older men are more likely to engage in sports with moderate-vigorous intensity (Amagasa et al., 2017; Lee, 2005; Moschny, Platen, Klaaßen-Mielke, Trampisch, & Hinrichs, 2011). When husbands developed health problems, wives as the primary caregivers may engage in the same amount of domestic activities, and therefore, we do not observe an impact of husbands' health shocks on wives' PA. Also, lower intensity and sporadic PA is difficult to recall in questionnaire surveys (Washburn, 2000). It is possible that women changed their PA levels after their husbands' health shocks but their low intensity PA was underreported in the questionnaire.

Conclusion

Using 2004-2014 data from Health and Retirement Study, we identified a positive effect of spouses' health shocks (new medical conditions) on individuals' PA. We also found that individuals, especially males and less educated individuals, increased their PA in response to their spousal health shocks directly and indirectly through updating to their own perceived health due to the spousal health shocks. The existence of *learning* suggests potential beneficial effects of providing health promoting information to both spouses when one spouse develops health problems. Health promotion programs may also consider subgroup differences in response to new information and design corresponding strategies to promote PA among older adults.

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Table 1. Basic Characteristics of the Sample (N= 16,787)

Variables	%	Variables	%	Variables	%	Variables	%
Age	64.5	R has difficulties with …		Sex		Census region	
	(10.1)	Walking	3.8	Male	48.6	Northeast	14.2
R's health status		Dressing	6.5	Female	51.5	Midwest	24.9
Poor	5.2	Bathing/taking a shower	3.5	Educational attainment		South	40.0
Fair	16.3	Eating	1.8	HS dropout	14.1	West	20.8
Good	32.3	Going out/in bed	3.9	HS	33.9	Other	0.2
Very good	34.0	Using toilet	3.2	SC	24.8	Own health insurance	
Excellent	12.2	Using a map	9.9	BA+	27.3	Yes	80.4
S's health status		Using a phone	2.5	HH income (in 2014 $)		Own home	
Poor	6.2	Managing money	3.8	Mean (S.D.)	99,363	Yes	98.3
Fair	17.0	Taking meds.	2.2		(245,185)	Smoking status	
Good	32.2	Shopping	5.4	Net worth (in 2014 $)		Smoker	12.0
Very good	32.7	Preparing meals	3.6	Mean	638,698	No. of drinks /week	
Excellent	12.0	S has difficulties with …		(S.D.)	(1,352,148)	Mean	2.9
R has conditions:		Walking	4.4	Employment status		(S.D.)	6.4
High blood pressure	54.6	Dressing	7.5	Not employed	9.7	Weight status	
Diabetes	19.8	Bathing/taking a shower	4.2	Employed	37.8	Underweight	1.0
Cancer	13.5	Eating	2.2	Retired	52.5	Normal	26.6
Lung problem	7.8	Going out/in bed	4.5	% earnings to total income		Overweight	38.9
Heart problem	21.6	Using toilet	3.7	Mean	0.2	Obese	33.6
Stroke	4.9	Using a map	9.8	(S.D.)	(0.3)	Physical activity	
Arthritis	53.8	Using a phone	3.1	No. of living children		Mean	46.4
Psychological problem	14.1	Managing money	4.5	Mean	3.3	(S.D.)	(17.0)
S's conditions:		Taking meds.	2.6	(S.D.)	(2.0)	S's cumulative shocks	
High blood pressure	54.5	Shopping	6.3	No. of S's living brothers		1) Medical conditions	
Diabetes	20.2	Preparing meals	4.3	Mean	1.4	Mean	1.0
Cancer	13.7	Spouse' temporal shocks		(S.D.)	(1.5)	(S.D.)	(1.1)
		Conditions	5.2				
Lung problem	8.2	ADLs	2.3	No. of S's living sisters		2) ADLs	
Heart problem	22.5	3) IADLs	2.5	Mean	1.5	Mean	0.4
Stroke	5.4	Race/ethnicity		(S.D.)	(1.5)	(S.D.)	(1.0)
Arthritis	53.6	White	78.1	R's changes in health		3) IADLs	
Psychological problem	14.6	Black	11.9	Worse	21.5	Mean	0.4
		Hispanic	6.8	Same	67.6	(S.D.)	(1.0)
		Other	3.1	Better	10.9		

Note. All summary statistics are unweighted, 2004-2014 HRS

Table 2. Multivariate Results from Baseline Models

	I Pooled Coef. (S.E.)	II Male Coef. (S.E.)	III Female Coef. (S.E.)	IV White Coef. (S.E.)	V Non-White Coef. (S.E.)	VI Low edu Coef. (S.E.)	VI High edu Coef. (S.E.)
Spouse's temporal health shock							
Medical condition	0.5029 (0.1868)**	0.3396 (0.2800)	0.6132 (0.2510)*	0.5427 (0.2079)**	0.3298 (0.4583)	0.3889 (0.2758)	0.5816 (0.2540)*
ADLs	-0.5627 (0.3068)	0.0961 (0.4529)	-1.1427 (0.4184)**	-0.0969 (0.3510)	-1.4714 (0.6905)*	-0.9270 (0.4284)*	-0.2260 (0.4438)
IADLs	0.2318 (0.2887)	0.3671 (0.4200)	0.0662 (0.3993)	0.1424 (0.3400)	0.5941 (0.6173)	0.1910 (0.3953)	0.3544 (0.4286)
Spouse's cumulative health shock							
Medical condition	-0.2143 (0.1509)	-0.3562 (0.2313)	-0.0779 (0.1994)	-0.3540 (0.1707)*	0.2477 (0.3526)	-0.1292 (0.2219)	-0.2404 (0.2063)
ADLs	-0.0232 (0.1587)	-0.0481 (0.2413)	-0.0035 (0.2110)	-0.3282 (0.1844)	0.7242 (0.3425)*	0.2184 (0.2186)	-0.2327 (0.2341)
IADLs	-0.3407 (0.1601)*	-0.3519 (0.2475)	-0.3270 (0.2103)	-0.3352 (0.1841)	-0.6095 (0.3592)	-0.4048 (0.2233)	-0.2573 (0.2325)
R-squared	0.0620	0.0705	0.0600	0.0719	0.0550	0.0685	0.0659
Obs.	52,921	25,693	27,228	41,813	11,108	25,366	27,555
N	16,787	8,287	8,500	12,649	4,138	8,588	8,199

Notes. In all specifications, we used fixed effects regression models. We controlled for individuals' biological and time constraints, and time and risk preferences, individuals' socio-demographic characteristics, year-, month-, region-, and individual-specific fixed effects and interactions between month and region indicators. Individuals who only received high school degrees were categorized as those with low education, and individuals who completed at least some college degrees were categorized as those with high education.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3. Multivariate Results from Two-stage Models (Pooled/Partitioned Samples by Sex)

	1st stage	2nd stage					
		Pooled		Male		Female	
	I	II	III	IV	V	VI	VII
	Pooled	Unhealthy	Healthy	Unhealthy	Healthy	Unhealthy	Healthy
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)	(S.E.)
Probability of changes in health status (same)							
Prob (worse health)		-21.7053	107.7372	-37.0981	134.7218	-7.1709	75.7863
		(9.1519)*	(36.5241)**	(14.5881)*	(55.2415)*	(11.6775)	(49.4649)
Prob (better health)		-36.1434	-120.1392	-61.0524	-142.1858	-4.5724	-94.1505
		(33.6493)	(36.6302)**	(50.1390)	(54.6009)**	(45.7247)	(50.2507)
Spouse's temporal health shock							
Medical condition	-0.0131	0.3889	-0.0790	-0.0270	-0.3721	0.8060	0.1727
	(0.0177)	(0.4794)	(0.2760)	(0.7206)	(0.4170)	(0.6442)	(0.3718)
ADLs	0.0426	-1.5423	1.5836	-0.7523	2.9325	-1.9824	0.3239
	(0.0290)	(0.6604)*	(0.6855)*	(0.9996)	(1.0259)**	(0.8843)*	(0.9358)
IADLs	0.0154	-0.0459	1.2334	0.0779	1.4914	-0.2426	0.9228
	(0.0278)	(0.6005)	(0.4092)**	(0.9084)	(0.5984)*	(0.8018)	(0.5667)
Spouse's cumulative health shock							
Medical condition	-0.0133	0.3726	-0.7873	-0.0938	-0.8206	0.6955	-0.6820
	(0.0075)	(0.3802)	(0.2505)**	(0.5893)	(0.3822)*	(0.4974)	(0.3352)*
ADLs	-0.0278	0.2581	-1.5094	0.4017	-1.9341	-0.0018	-1.0660
	(0.0095)**	(0.3436)	(0.4264)***	(0.5632)	(0.6402)**	(0.4320)	(0.5802)
IADLs	0.0165	-0.2810	0.3060	-0.4949	0.5187	-0.0647	0.0915
	(0.0104)	(0.3472)	(0.2961)	(0.5509)	(0.4532)	(0.4453)	(0.3969)
R-squared		0.1081	0.0419	0.1387	0.0465	0.1232	0.0446
Obs.	52,921	11,385	41,536	5,903	19,790	5,482	21,746
N	16,787	6,322	13,955	3,310	6,833	3,012	7,122

Notes. In the second stage, we used fixed effects regression models. We controlled for individuals' biological and time constraints, and time and risk preferences, individuals' socio-demographic characteristics, year-, month-, region-, and individual-specific fixed effects and interactions between month and region indicators.
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Multivariate Results from Two-stage Models by Subgroups (Partitioned Samples by Race and Educational Attainment)

White			Non-White		Low edu		High edu	
	I	II	III	IV	V	VI	VI	VII
	Unhealthy	Healthy	Unhealthy	Healthy	Unhealthy	Healthy	Unhealthy	Healthy
	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)	Coef. (S.E.)
Probability of changes in health status (same)								
Prob (worse health)	-18.7194	60.9191	12.8067	63.6910	-14.3725	178.3932	-32.7022	36.9518
	(12.2862)	(52.5017)	(23.2343)	(110.2907)	(12.0067)	(59.2078)**	(16.4866)*	(48.2077)
	111.5009	-59.3188	-56.3942	-68.3580	-10.0228	-187.4450	-53.4140	-46.7058
Prob (better health)	(82.4585)	(57.1586)	(47.6280)	(96.3045)	(36.7834)	(57.9169)**	(100.4311)	(49.4742)
Spouse's temporal health shock								
Medical condition	0.6214	0.1570	-0.8959	0.3672	0.5082	-0.4341	0.2574	0.2721
	(0.5793)	(0.3508)	(0.9777)	(0.7463)	(0.5877)	(0.4372)	(0.8559)	(0.3624)
ADLs	-0.8519	0.8189	-1.7775	0.7768	-1.8761	2.6394	-1.3425	0.3060
	(0.8349)	(0.9509)	(1.2625)	(1.8489)	(0.7927)*	(1.0749)*	(1.2478)	(0.9203)
IADLs	0.1699	0.8615	0.6562	1.0916	-0.3593	1.7554	0.4690	0.7451
	(0.7745)	(0.5044)	(1.1514)	(1.0169)	(0.7101)	(0.6200)**	(1.1690)	(0.5559)
Spouse's cumulative health shock								
Medical condition	-0.1163	-0.5695	1.0205	-0.2310	0.2647	-1.0725	0.4135	-0.4291
	(0.4737)	(0.3286)	(0.7533)	(0.6908)	(0.4629)	(0.4000)**	(0.6888)	(0.3287)
ADLs	-0.0517	-1.1102	0.3109	-0.5049	0.2692	-2.0318	0.1582	-0.8603
	(0.4578)	(0.6018)	(0.6299)	(1.1561)	(0.4158)	(0.6675)**	(0.6368)	(0.5749)
IADLs	-0.1109	-0.0849	-0.3748	0.1586	-0.1410	0.4466	-0.6061	0.1287
	(0.4493)	(0.3944)	(0.6623)	(0.7920)	(0.4153)	(0.4659)	(0.6654)	(0.3934)
R-squared	0.149	0.0464	0.111	0.0496	0.1123	0.0495	0.1635	0.0459
Obs.	7,041	32,577	3,447	7,661	7,529	17,837	3,856	23,699
N	3,880	10,206	1,945	3,154	4,100	6,585	2,222	7,370

Notes. In the second stage, we used fixed effects regression models. We controlled for individuals' biological and time constraints, and time and risk preferences, individuals' socio-demographic characteristics, year-, month-, region-, and individual-specific fixed effects and interactions between month and region indicators. Individuals who only received high school degrees were categorized as those with low education, and individuals who completed at least some college degrees were categorized as those with high education.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes

[1] We define "new" health problems as medical conditions/ADLs/IADLs reported in the current wave for the first time but not in the previous wave.

[2] HRS asked about whether a doctor has ever told respondents/spouses that they have ever had a particular disease including high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, psychiatric problems, and arthritis. Questions about ADLs asked about whether one has difficulty in walking, dressing, bathing/showering, eating, getting in/out of bed, and using the toilet. Questions about IADLs asked about whether one has difficulty using a map, using a telephone, managing money, taking medications, shopping for grocery, and preparing hot meals. Since there are eight medical conditions, six ADLs, and six IADLs asked in HRS, spouses can have up to eight medical conditions, six ADLs, and six IADLs over the five waves we investigated in 2004-2014.

[3] Alcohol consumption was measured using the natural logarithm of the number of drinks per week. Following suggestions by the Centers for Disease Control and Prevention (CDC), we categorized

individuals as being underweight (below 18.5), normal (18.5-24.9), overweight (25.0-29.9), and obese (30.0 and above) based on the Body Mass index.

[4] We used natural log of household income and inverse hyperbolic sine of net worth. Transforming net worth using the inverse hyperbolic sine is appropriate because we do not need to discard nonpositive values (Pence, 2004).

[5] We excluded the predicted probability of having the same health as the previous wave to avoid multicollinearity of including all three probabilities in the same model.