Influence of Spouses' Health Status on the Health Behavior of Older Adults

THESIS

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Abstract

The positive relationship between marriage and health behavior is widely discussed as a key explanation for the benefits of marriage on health. While existing research concentrates on marital status difference in health behavior, an important question remains: is being married to spouses in poor health as beneficial as being married to spouses in good health in terms of promoting good health behavior? Using data from older respondents and spouses in the 1st, 2nd, and 3rd waves of Health and Retirement Survey, the current study explores whether spouses' health status influences respondents' health behavior and whether these influences differ by gender. Spouses' health status is measured with self-reported health and doctor-diagnosed conditions. Four aspects of individuals' health behavior are considered: physical activity, smoking cigarettes, heavy drinking and BMI. Findings indicate inconsistent effects of spouses' health status on respondents' different health behaviors. In comparison with respondents with healthy spouses, both males and females who have spouses in poor health are more likely to smoke cigarettes. Similarly, when spouses have poor health, males and females are less likely to exercise, although the effect is more pronounced for males. When spouses have poor health, females are more likely to be overweight while males are less likely to be overweight. When spouses have poor health, females are less likely to drink heavily and no significant influence is found among males.

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Introduction

Prior studies on marriage and health have concluded that marriage benefits physical health (Ross, Mirowsky & Goldsteen 1990, Hu & Goldman 1990, Waite 1995, Schoenborn 2004, Liu & Umberson 2008). Several processes are thought to explain this association, including economies of scale (Ross, Mirowsky & Goldsteen 1990), expanded support networks (Burman & Margolin 1992, Waite 1995), the selectivity of marriage (Dupre & Meadows 2007, Ellison, Barrett & Moulton 2008) and the strains of marital dissolution (Umberson 1992, Williams & Umberson 2004). One of the most compelling explanations for why marriage benefits individuals' health is that married individuals generally practice better health behavior than unmarried individuals (Umberson 1987, Umberson 1992, Waite 1995, Dupre & Meadows 2007, Ellison et al. 2008, Fuller 2010). Health behavior, also known as health-related behavior, can be seen as "behaviors that are either protective in nature, such as exercise, good nutrition and stress management, or those behaviors seen as negatively impacting health, such as smoking, drinking, and sedentary lifestyle"(Manning 1997, 88). The relationship between health behavior and health outcome (disability, chronic conditions and mortality) has been documented in previous research (Belloc & Breslow 1972, Belloc 1973, Breslow & Enstrom 1980).

Marriage not only provides individuals, especially men, with spouses who monitor their health behavior, but it also encourages self-regulation (Ross 1995, Umberson 1987,

Umberson 1992). Since many researchers contend that health behavior is among the most important factors influencing health and that modifying health behavior is the most cost-effective way to prevent diseases (Adams & Schoenborn 2006), monitoring and promoting health behavior is an important way in which marriage promotes individuals' health and potentially protects them from disease.

Although it is clear that, on average, marriage is associated with better health behavior in many domains (Umberson 1987, Umberson 1992, Waite 1995, Adams & Schoenborn 2006, Umberson et al. 2006), little is known about how conditions within marriage affect this association, both positively and negatively. Spouses' health status is an important condition within marriage. Deterioration in health is a major change in marriage and family life and is especially common among elderly individuals. Does having a spouse who is ill affects the health behavior of older adults within marriage?

The purpose of this study is to examine whether the health behavior of older adults is influenced by their spouses' health status, both cross-sectionally and longitudinally. Because previous research suggests that impact of marriage on health differs for men and women (Hu & Goldman 1990, Umberson 1992, Marks 1996, Williams 2003), I also consider gender differences in the effect of a spouse's health problems on health behavior. These questions are addressed using data from the1st, 2nd and 3rd Waves (1992, 1994 and 1996) of the Health and Retirement Study (HRS), an on-going cohort-based panel survey of a nationally representative sample of individuals over age 50 in 1992 as well as their spouses.

Literature Review

1. Marital Status and Physical Health

Over the past three decades, studies on marital status, health and health behavior have confirmed that marriage conveys numerous health benefits. Using various measures of physical health, including self-reported health, acute conditions, chronic conditions, mortality rates and functional limitations, researchers have concluded that married individuals generally have fewer physical health problems and a lower risk of mortality (Umberson 1987, Umberson 1992, Hu & Goldman 1990, Waite 1995, Schoenborn 2004, Umberson et al. 2006) than their unmarried counterparts.

The literature suggests five possible explanations for the positive association between marriage and health.

One explanation is that spouses are important sources of social support for each other. Marriage provides individuals with a larger network of help and support (Waite 1995). It is well-established that emotionally supportive relationships enhance health in part by facilitating effective coping with stressful situations (Burman & Margolin 1992). Second, marriage increases material well-being, including income, assets and wealth, which can be used to purchase better medical care, better diet, and safer surroundings. This material improvement is especially important for women (Ross, Mirowsky & Goldsteen 1990, Waite 1995). A third explanation lies in the selectivity of marriage and

preexisting differentials between married and unmarried individuals (Hu & Goldman 1990, Dupre & Meadows 2007, Ellison, Barrett & Moulton, 2008). That is, healthy individuals are more likely to enter and stay in marriage than their less healthy counterparts. However, the evidence for selection is often inconclusive (Hu & Goldman 1990) and the best evidence suggests that selection explains some but not all of the positive association between marriage and health (Waldron, Hughes & Brooks 1996, Murray 2000). Fourth, marital status differences in health may also be explained by the strains of marital dissolution. According to this explanation, the married are healthier than the unmarried mainly because marital dissolution undermines health, rather than because marriage benefits health (Umberson 1992, Williams & Umberson 2004). An especially important process through which marriage benefits health that has received comparatively less attention from researchers focuses on the ways in which marriage enhances individuals' health behavior (Umberson 1987, Umberson 1992, Waite 1995, Dupre & Meadows 2007, Ellison et al. 2008, Fuller 2010). This explanation will be discussed in detail in the following section.

2. Marital Status and Health Behavior

Umberson has identified reinforced social control as a mechanism by which marriage affects health behavior which, in turn, influences health outcomes. (Umberson 1987, Umberson 1992). Social control is generally viewed as "an influence over the individual to engage in conventional or nondeviant behavior". Social control is thought to influence behaviors in two important ways: via external influence and via internal influence. Social control of health behavior can be viewed in the same way as social control of other behaviors in general. If health (the absence of illness) is a normative state, behavior that

contributes to better health can be viewed as conventional or nondeviant behavior and behavior that contributes to morbidity and mortality can be viewed as unconventional or deviant. Marriage provides social control of health behaviors by providing informal sanctions for unhealthy/risky behavior and by affecting the internalization of norms for healthful behavior (Umberson 1987).

According to this framework, there are two primary reasons why marriage is associated with healthy behavior. On one hand, spouses have both self-interested and altruistic reasons for wanting their husbands or wives to lead a healthy lifestyle and to reduce risky or unhealthy behavior. Spouses can also monitor their husband or wife's health behavior better than anybody else. On the other hand, marriage further encourages self-regulation, by giving individuals greater feelings of belonging, intimacy, improved sense of self-worth and enhanced sense of obligation to the family (Shumaker & Hill 1991, Umberson 1987, Umberson 1992, Ellison et al. 2008, Fuller 2010).

Although marriage improves many types of health behavior, this influence is not universally positive. Among the health behaviors improved by being in marriage are current cigarette smoking (Umberson 1987, Ross, Mirowsky & Goldsteen 1990, Adams & Schoenborn 2006), problematic drinking (Umberson 1987, Adams & Schoenborn 2006, Ellison et al. 2008), poor diets (Umberson 1987, Hayes & Ross 1987), risk-taking behavior including speeding, fighting, drug use (Umberson 1987, Ross, Mirowsky & Goldsteen 1990). However, some researchers have warned that a few types of healthy behavior are not promoted by marriage. For instance, married individuals, particularly men, are more likely to be overweight, and they are less likely to engage in physical

activity and exercise than the unmarried (Ross, Mirowsky & Goldsteen 1990, Schoenborn 2004, Adams & Schoenborn 2006, Fuller 2010).

3. Spouse's Health Status and Individual's Health Behavior

Prior research on the role of marriage in shaping health behavior has focused almost exclusively on comparing married with unmarried individuals. Yet it is well-established that the contexts in which marriage is experienced have important consequences for its ability to improve health (Williams 2003).

All marriages are not created the same and thus some are likely to have greater advantages for health and health behavior than others. For instance, existing literature suggests that marital quality, compromising several dimensions such as relationship satisfaction, equity, commitment and stability, influences marriage's benefits on health. Marriages of low quality not only are less beneficial than other marriages but may be actually worse than no marriage at all (Burman & Margolin 1992, Ross 1995, Williams 2003, Umberson et al. 2006). Several other studies have shown that the benefits of marriage or the costs of marital dissolution for health and well-being vary considerably by prior mental health (Frech & Williams 2007) the existence (Williams, Sassler & Frech 2011) and age (Williams & Dunne-Bryant 2006) of children.

Far less is known about how contexts within the marital relationships influence individuals' health behavior. An important factor, particularly among older adults, that has received little attention is the health of one's spouse. Most married older adults can expect to experience some level of health decline of themselves and their spouses. Yet the potential toll this takes on the health behaviors of older adults remains largely unexamined.

There are three primary mechanisms through which spouse's health problems may influence older adults' health behaviors –stress, social support and spousal concordance of health behaviors.

Stress. Stress triggers a variety of compulsive behaviors such as overeating, problematic drinking, smoking and sedentary life style (see the review by Pampel, Krueger & Denney 2010). The decline of one's spouse's health is both common and stressful in individual's later life, coinciding with more financial, life and emotional burden, which may undermine the health behavior of individuals. There are stressors that result directly from spouse's health problems. First, a large number of studies indicate that health declines are associated with an erosion of marital quality (see the review by Booth & Johnson 1994). There is also research that suggests that this adverse effect is greater on the marital quality reported by the spouses of persons suffering a decline in health than on that reported by the afflicted individuals (Booth & Johnson 1994). And as stated before, stress associated with low marital quality may result in poor health behavior. Second, decline in health and functional impairment of their spouses increases caregiving burden on individuals. Caregiving is often perceived as stressful for both the caregivers and recipients and the process of stress proliferation is also very common among caregivers (Wright & Aquilino 1998, Pavalko & Woodbury 2000). At the same time, the time and financial investment required in caregiving also limits the healthy behavior of individuals with spouses in poor health.

Social support. Networks of health-oriented family members, relatives, friends and neighbors can promote health behavior, sanction unhealthy behavior and exchange health related information (Pampel et al. 2010). In addition, social support by a spouse helps

individuals cope with stressful situations, which might otherwise lead to unhealthy behavior (Gove 1973, Waite 1995). Decline of health of one spouse may alter finances, division of responsibilities and mutual activities (Burman & Margolin 1992). Support network of the couple is also likely to shrink. Less support may be associated with worse health behavior.

Spousal Concordance in Health Behavior. Research has shown that there exists spousal concordance in smoking, drinking, diet, exercising, obesity and substance use (Bove, Sobal & Rauschenbach 2003, Falba & Sindelar 2008, Pachucki, Jackques & Christakis 2011). There exists initial homogeneity in health behavior among married couples. Further, one spouse's behavior is an important risk factor for the other spouse adopting, continuing or relapsing to poor health behavior (Falba & Sindelar 2008), in terms of body weight status (Christakis & Fowler 2007), smoking cigarettes (Dollar, Homish, Kozlowski & Leonard 2009) and drinking alcohol (Rosenquist, Murabito, Fowler & Christakis 2010). When a spouse has health problems, he or she is likely to reduce some health behavior such as regular diet and exercising and that, in turn, is likely to influence the other spouse's health behavior.

4. Variation by Gender

Gender difference in the health benefits of marriage has long been noted. Some researchers have stated explicitly that the health benefits of marriage are greater for men than for women (Gove 1973, Ross et al. 1990, Hu & Goldman 1990, Umberson 1992, Marks 1996). Other researchers are skeptical about whether benefits of marriage are due to a variety of specific factors within marriage (Liu & Umberson 2008, Simon 2002, Williams 2003). Some literature indicates that for men, marriage offers health-buffering

effects (Berkman & Breslow 1982, Burman & Margolin 1992, Shumaker & Hill 1991) and that women are more likely to experience health-related problems if the marriage is distressed. Some literature suggests that marital status is more important to psychological well-being for men than for women but that marital quality is more important to well-being for women than for men (Williams 2003).

As for health behavior, there is research suggesting that married men do experience more social control concerning their health behavior than do unmarried men, while for women the likelihood of experiencing social control attempts does not vary by marital status. The possible explanation is that compared with men, women are more likely than men to report social control attempts by a parent or a child: usually a mother or daughter (Umberson 1992).

The gender role in domestic work and informal caregiving could contribute to a gender difference in the relationship among spouses' health status, individuals' health behavior and individuals' health. Women usually felt more responsible for and spend more time on domestic work (Poortman & ven der Lippe 2009) compared with men. Women also spend more time giving care than men do (Gerstel & Gallagher 2001).

The consequences of greater caregiving responsibilities among women have been examined. Previous research has found that in general female caregivers report having had more negative caregiving experiences than male caregivers and that wife caregivers were least likely to report positive experiences (Lin, Fee & Wu 2012). Wife caregivers are more likely to retire for caregiving (Dentinger & Clarkberg 2002) and report lower caregiver's esteem than husband caregivers (Kim, Loscalzo, Wellisch & Spillers 2006)

Caregiving damages the health of informal caregivers and the risks for female caregivers are higher due to greater intensity of caregiver burden. (Larranaga et.al 2008)

Taken together, prior research clearly suggests that it is important to consider gender differences when examine the relationship between spouses' health status and individuals' health behavior. However, the countervailing evidence doesn't suggest clear hypotheses. On one hand, "women putting more social control on their husbands' health behaviors" suggests that men's health behavior will be more influenced when their wives' health deteriorates and cannot monitor husbands' behavior as much. On the other hand, "women suffering more from caregiving burden" suggests that women's health behavior will be more influenced when their husbands' health declines and caregiving burden becomes more intensive.

Research Questions.

This paper examines the relationship between spouses' health status and older adults' health behavior with an aim to improve our understanding of the ways in which context within marriage shapes the health and well-being of older adults. Specially, I determine whether the health behavior of older married adults is influenced by their spouses' health status and whether changes in spouses' health status are associated with change in health behavior over time, with attention to potential gender differences in these processes.

Data

Data come from the Health and Retirement Study (HRS), a national panel survey of individuals and their spouses for the study of retirement and health among the elderly in the United States. The HRS data are especially suitable to this research for two reasons. First, this survey elicits extraordinarily rich and complex information about health, health behavior and socio-demographic characteristics. Second, both spouses of married couples were interviewed. The most obvious limitation of using HRS data is that respondents and spouses in the sample are mostly elderly individuals and thus the conclusions cannot be readily generalized to larger populations.

The HRS is primarily sponsored by the National Institute of Aging (NIA) and administered by the Institute for Social Research (ISR) at the University of Michigan. Data collection began in 1992 and was conducted subsequently every two years. The RAND HRS data file (Version J) is a user-friendly version of a subset of the HRS. It contains "cleaned and processed variables with consistent and intuitive naming conventions, model-based imputations and imputation flags, and spousal counterparts of most individual-level variables, with special attention to comparability of variables across survey waves". Data of 1st to 9th Waves are available in RAND HRS data file (Version J) (Clair et al. 2010, 2).

This study uses data from the first three waves (1992, 1994 and 1996), as later waves have larger proportions of missing values in key variables. For instance, the missing value in raw BMI index is 0%, 1.04%, 1.37%, 8.84%, 14.30%, 18.57%, 22.35%, 26.30%, 30.00% in 1st Wave to 9th Wave. Moreover, the large proportion of missing values in later waves might come from selective attrition due to mortality, an important potential source of bias in health studies of elderly individuals.

The total sample size of RAND version HRS data is n=30,548. Respondents are included in my analytic sample if they live in couple households (defined as married, partnered or there are two respondents in households) and if they are married to the same spouses in all three waves.

10,279 respondents live in couple households in the 1st wave; 9,023 of these 1,0279 respondents live in couple households in the 2nd wave; and 7,981 of these 9,023 respondents live in couple households in the 3rd wave. Out of these 7,981 respondents, 7,673 respondents are married. 7,662 respondents are married to the same spouses. The sample sizes for different regression models vary from 7,133 to 7,499, due to missing values in variables included in different models, as is shown in Table 2, 3, 4 and 5.

Variables

1. Dependent Variables

Dependent variables are four dimensions of the respondent's health behavior: physical activity or exercise, smoking cigarettes, body weight status and heavy drinking. All the variables are measured at the 1st, 2nd and 3rd Wave.

Physical activity or exercise is measured by a dichotomous variable from the HRS questionnaire: whether the respondent participates in vigorous physical activities 3 or more times a week (0= "no" and 1= "yes").

Smoking cigarettes is measured by a dichotomous variable: whether the respondent currently smokes when the interview takes place (0= "no" and 1= "yes").

Heavy drinking is defined as consuming an average of more than 2 drinks per day for males or consuming an average of more than 1 drink per day for females by Centers for Disease Control and Prevention (CDC 2012). In the following analyses, heavy drinking is defined as having more than 7 drinks per week for female respondents or having more than 14 drinks per week for male respondents and is measured by a dichotomous variable (0="no" and 1= "yes").

Body weight status is measured by Body Mass Index (BMI), weight (in kilograms) divided by square of height (in meters). Although BMI is not a behavior, body weight status is associated with a variety of health behaviors, such as physical activities,

cigarettes smoking, alcohol drinking and balanced meals (Kent & Worsley 2009). Moreover, it is an important indicator of overall health risk (Billington et al. 2000). The World Health Organization (WHO) recommends using cutoffs of 18.5, 25 and 30 to classify underweight, normal, overweight and obesity in adults (WHO 2000), and this set of cutoffs are widely accepted. Since relatively few respondents are underweight or obese (1.4% and 21.58% respectively in 1st Wave), and to simplify the analyses, I collapse BMI into a dichotomous variable "whether the respondent is overweight/obese" using 25 as a cutoff (0= "no" and 1= "yes").

2. Independent Variables

The independent variables are the health status of respondents' spouses. Health status is measured using two indicators that tap into both subjective and objective dimensions of spouse health status: spouses' self-reported health and spouses' doctor-diagnosed conditions.

Previous research has shown that although it may be modified by age and culture, self-reported health (or global self-ratings of health) is a valid measure of overall health status (Jylha 2009). Especially, self-reported health is a reliable predictor of mortality, even when controlling for numerous specific health status indicators and other relevant covariates (see a review by Idler & Benyamini 1997). Doctor-diagnosed conditions is also a widely used indicator of health status, providing information about both the incidence and the severity of a particular disease (Kalton 2006). Self-reported health and doctor-diagnosed conditions are moderately associated (Ferraro & Farmer 1999) and supplement each other to provide an overall assessment of general health status. Both

indicators are measured at the 1st, 2nd and 3rd Wave, and the changes between waves are assessed.

Spouses' self-reported health, and changes across time. In the first waves, spouses' self-reported general health status is measured using a 5-degree scale (1= "Excellent", 2= "Very good", 3= "Good", 4= "Fair" and 5= "Poor"). In the following analyses, this variable is collapsed into a dichotomous variable: 0= "Good self-reported health", including "Excellent", "Very good" and "Good" in the original answer; while 1= "Poor self-reported health", including "Fair" and "Poor" in the original answer.

The change of spouses' self-reported health between the 1st and 2nd Waves is measured by four dichotomous variables: (1) consistently good self-reported health (good health at 1st Wave and good health at 2nd Wave), (2) declining self-reported health (good health at 1st Wave and poor health at 2nd Wave), (3) improved self-reported health (poor health at 1st Wave and good health at 2nd Wave), and (4) consistently poor self-reported health (poor health at 1st Wave and poor health at 2nd Wave) (0= "no" and 1= "yes"). Respondents whose spouses consistent report good health are the reference group. The change of spouses' self-reported health between 1st and 3rd Wave are also measured in this way.

Spouse's doctor-diagnosed conditions, and changes across time. Doctor-diagnosed condition is a construct measured by number of conditions the spouse reports ever having. It is the sum of eight dichotomous variables, each indicating whether or not a doctor has ever told the spouse that he/she had an individual condition, since every single condition relates only to a small proportion of the sample (Kalton 2006). The conditions are 1) high blood pressure or hypertension; 2) diabetes or high blood sugar; 3)

cancer or a malignant tumor of any kind except skin cancer; 4) chronic lung disease except asthma such as chronic bronchitis or emphysema; 5) heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems; 6) stroke or transient ischemic attack; 7) emotional, nervous, or psychiatric problems; and 8)arthritis or rheumatism. Missing values here are treated as not having had the condition (Clair et al. 2010).

The change in spouses' doctor-diagnosed conditions between the 1st and 2nd Waves is measured by conditions ever had at the 1st Wave minus conditions ever had at the 2nd Wave. A negative value on the difference indicates an error in reporting and a missing value is assigned. The change between the 1st and 3rd Waves is also measured in this way.

3. Control Variables

Control variables contain the basic social demographic information of respondents. In cross-sectional regression models and lagged dependent variable regression models, only the values at the 1st Wave are included.

Gender of respondents. One of the goals of this research is to examine the role that gender plays in the relationship between spouses' health status and respondent's health behavior. The variable gender (0= "male respondent" and 1= "female respondent") and its interactions with both independent variables are included in regression models.

Race/ethnicity of respondents. Race and ethnicity is broken into four categories: non-Hispanic White, non-Hispanic Black, Hispanic or other race/ethnicity. "Non-Hispanic White" is the reference group in the analyses.

Age of respondents. Following the convention in health studies of adding age and age squared to regression models, analyses in this article include these two terms, where age is a continuous variable measured in years.

Socioeconomic status of respondents, including respondent's education, income and wealth, is also included in the analyses. Respondent's education is measured by a categorical variable: having accomplished less than high school, GED, high school, some college, college and above. Respondents with education of "less than high school" are the reference group. Income is measured by total household income in nominal dollars (respondent and spouse only) the year before the interview. Wealth is measured by the net value of total wealth in nominal dollars (excluding second home), which is calculated as the sum of all wealth components less all debt.

Descriptive statistics for the independent, dependent and control variables are shown in Table 1.

19.32%, 21.72% and 52% of the respondents in the total analytical sample participate in vigorous physical activities at least three times every week at the 1st, 2nd and 3rd waves, respectively; 23.62%, 21.00% and 18.69% of the respondents smoke cigarette at the time of the 1st, 2nd and 3rd waves, respectively; 8.33%, 7.3% and 6.51% of the respondents drink heavily at the 1st, 2nd and 3rd waves, respectively; 63.56%, 63.78% and 64.43% of the respondents are overweight or obese at the 1st, and or 3rd waves, respectively. In general, it seems that the respondents' health behaviors improve over time: more respondents are participating in physical activities and fewer respondents are smoking cigarette or drinking heavily; except that more respondents are overweight or obese. Also, it seems that female respondents perform better health behaviors than male

respondents: more female respondents participate in physical activities; fewer female respondents smoke cigarette and fewer female respondents are overweight or obese; except that more females drink heavily, probably as a result of the different definitions of heavy drinking for males and for females.

16.76%, 18.61% and 19.15% of the spouses in the total analytical sample report poor health at the 1st, 2nd and 3rd waves, respectively. Between the 1st and 2nd waves, 73.35% of the spouses report consistently good health; 6.96% of the spouses report declining health; 5.05% of the spouses report improved health and 11.59% of the spouses report consistently poor health. Between the 1st and 3rd waves, 71.76% of the spouses report consistently good health; 8.25% of the spouses report declining health; 5.96% of the spouses report improved health and 10.6% of the spouses report consistently poor health. The average number of doctor-diagnosed conditions is 0.9535, 1.1279 and 1.2916 at the 1st, 2nd and 3rd waves, respectively. The average number of newly-diagnosed conditions between the 1st and 2nd waves is 0.1659 and the average number of newly-diagnosed conditions between 1st and 3rd waves is 0.3405. In general, both indicators (self-reported health and doctor-diagnosed conditions) show a declining health over time among this sample of older adults. And the wives of male respondents report better health and have fewer conditions than husbands of female respondents.

Method

The four aspects of respondent's health behavior: physical activity, smoking cigarettes, heavy drinking and body weight status are analyzed separately. This section uses analyses of respondent's physical activity as an example.

1. Cross sectional logistic regression using data from 1st Wave.

The purpose of cross sectional analyses is to straightforwardly show the picture of relationships between respondents' health behavior and two indicators of spouses' health status at a single point in time, i.e. whether the relationships exist and whether the relationships are different for male and female respondents.

Four logistic regression models are estimated using the 1st Wave (1992) data. The dependent variable in these four models is whether the respondent participates in vigorous activity more than 3 times per week. The first model includes spouses' self-reported health as the independent variable and all of the control variables; the second model includes all of the regressors in the first model and also an interaction term of respondents' gender and spouses' self reported health; the third model includes spouses' doctor diagnosed conditions as the independent variable and all of the control variables; the fourth model includes all regressors in the third model and also an interaction term of respondents' gender and spouses' doctor diagnosed conditions.

2. Lagged dependent variables logistic regression using data from 1st, 2nd and 3rd Wave.

Using cross sectional data, it is impossible to determine whether significant associations between spouses' health status and respondents' health behavior reflect the influence of spouses' health status on respondents' health behavior (the central hypothesis of this study) or the reverse causal order. To address this limitation, I analyze longitudinal data from the 1st, 2nd and 3rd Waves of the HRS. The lagged dependent variable models explore the influence of spouses' baseline health status and of changes in health status between waves on respondents' health behavior at later waves. Separate regressions are estimated using data from Wave1 to Wave 2 and from Wave 1 to Wave 3 to explore whether these influences persist, increase, or attenuate with time.

Regressions on spouses' health status at baseline (The 1st Wave) predicting respondent health behavior at Wave 2 or Wave 3. Four logistic regression models are estimated using the 1st and 2nd Waves. The dependent variable in these four models is whether the respondent participates in vigorous activity more than 3 times per week at the 2nd Wave. The first model includes respondents' vigorous activity at the 1st Wave as a lagged control variable, spouses' self reported health at the 1st Wave as the primary independent variable, and all the control variables at the 1st Wave. The second model includes all regressors in the first model and also an interaction term of respondents' gender and spouses' self reported health at the 1st Wave. The third model includes respondent's vigorous activity at the 1st wave as a lagged control variable, spouses' doctor diagnosed conditions at 1st Wave as the primary independent variable, and all control variables at the 1st Wave. The fourth model includes all the regressors in the third

model and also an interaction term of respondents' gender and spouses' doctor diagnosed conditions at 1st Wave. The same analyses are applied to data from the 1st Wave and 3rd Wave with the only difference being the timing of measurement of the dependent variable (at Wave 3 instead of Wave 2).

Regressions on changes in spouses' health status. Four logistic regression models are estimated using data from the 1st and 2nd Wave. The rationale of these models is that it might be changes in spouses' health status, not health status itself, that cause the changes in health behavior of the respondents. The dependent variable in these four models is whether the respondent participates in vigorous activity more than 3 times per week at the 2nd Wave. The first model includes respondents' vigorous activity at 1st Wave as a lagged term, change in spouses' self reported health between 1st Wave and 2nd Wave as independent variable, and all the control variables at 1st Wave. The second model includes all regressors in the first model and an interaction term of respondents' gender and change in spouses' self reported health. The third model includes respondent's vigorous activity at 1st wave as a lagged term, change in spouses' doctor diagnosed conditions between 1st Wave and 2nd Wave as independent variable, and all control variables at 1st Wave. The fourth model includes all the regressors in the third model and also an interaction term of respondent's gender and change in spouses' doctor diagnosed conditions. The same analyses are applied to data from 1st Wave and 3rd Wave.

Results

1. Physical Activity

Table 2 summarizes the results of separate models estimating the effect of four indicators of spouse's health: spouse's self-reported health (Panel A), change in spouse's self-reported health (Panel B), spouse's doctor diagnosed conditions (Panel C), and change in spouse's doctor diagnosed conditions (Panel D) on the respondent's physical activity/exercise. Separate analyses assess the cross-sectional association (Wave 1) and associations unfolded across different waves (Wave 2 and Wave 3) for 3 subsamples (male respondents, female respondents and the total sample of all respondents).

Self-reported health. The cross-sectional Wave 1 association of spouse's self-reported health with the odds of participating in physical activities is not significant for the sample of all respondents. However, the influence of spouses' poor self-reported health in the 1st wave becomes pronounced as time goes by. Respondents whose spouses report poor health at the 1st wave are 24.42% less likely to regularly participate in physical activities at the 2nd wave, and they are 27.96% less likely to participate in physical activities at the 3rd wave, controlling for their Wave 1 physical activity. The influence of having a spouse in poor self-reported health in the 1st wave on physical activity in the 2nd wave is stronger for males than for females. Male respondents whose wives report poor health in the 1st wave are 37.37% less likely to participate in physical

activities in the 2nd wave compared with male respondents whose wives report good health, while female respondents whose husbands report poor health in the first wave are 11.75% less likely to participate in physical activities in the 2nd wave compared with female respondents whose husbands report good health. Such gender difference becomes smaller and insignificant when the effect of spouses' poor self-reported health in the 1st wave on respondents' physical activities in the 3rd wave is examined.

Changes in self-reported health. Compared with individuals whose spouses report good health in both the 1st and 2nd waves, individuals whose spouses report poor health in both waves are 26.29% less likely to participate in physical activities at Wave 2. This difference persists when change between Wave 1 and Wave 3 is assessed. Compared with respondents whose spouses report good health in both 1st and 3rd waves, respondents whose spouses report poor health in both waves are 35.47% less likely to participate in physical activities at Wave 3. No significant gender differences are observed.

Although changes in spouses' self-reported health between Wave 1 to Wave 2 are not significantly associated with physical activity at Wave 2, differences emerge when examining change between Wave 1 to Wave 3. Those whose spouses report either improvements or declines in self-reported health between Wave 1 and Wave 3 report lower odds of physical activity at Wave 3 compared to those whose spouses report consistently good health. Taken together, results suggest that short term declines in spouse health are not immediately associated with lower levels of physical activity but rather it may take some time for effects to emerge. However, recovery from declines in physical health after a spouse's health later improves may also take time, as evidenced by

the continued lower levels of physical activity among those who report improvements in spouse health.

Doctor-diagnosed conditions. The influence of spouses' conditions in the 1st wave on respondents' physical activity also becomes pronounced later in the 2nd and 3rd waves. This association is not statistically significant in the cross-sectional Wave 1 analysis. However, each additional doctor-diagnosed condition of a spouse in the 1st wave is associated with a 12.45% and 7.78% decrease in the respondent's likelihood of participating in physical activities in the 2nd and 3rd waves, respectively. The influence on respondents' physical activities in the 2nd wave is greater for males than for females. When their spouses have one additional condition in the 1st wave, male respondents are 21.73% less likely to participate in regularly physical activities while female respondents are 6.67% less likely to participate in physical activities.

Changes in doctor-diagnosed conditions. The last row of Table 2 shows the influence of new conditions between the 1st and 2nd waves as well as new conditions between 1st and 3rd waves. When their spouses' have one more new condition between 1st and 3rd waves, the respondents are 10.33% less likely to participate in physical activities in the 3rd wave, controlling for their levels of physical activities in the 1st wave. That significant associations are not observed between the 1st and 2nd wave indicates that this process may take some time to unfold. No significant gender differences are observed.

In general, the conclusion about influences of spouses' health on respondents' physical activities is similar whether self-reported health or doctor-diagnosed conditions is examined. When their spouses report poor health or have additional conditions in the

1st wave, respondents are less likely to participate in physical activities. This influence is greater for male respondents then for female respondents and takes long term to emerge.

2. Smoking Cigarettes

Table 3 summarizes the results of separate models estimating the effect of four indicators of spouse's health: spouse's self-reported health (Panel A), change in spouse's self-reported health (Panel B), spouse's doctor diagnosed conditions (Panel C), and change in spouse's doctor diagnosed conditions (Panel D) on whether the respondent smokes cigarettes. Separate analyses assess the cross-sectional association (Wave 1) and associations unfolded across different waves (Wave 2 and Wave 3) for 3 subsamples (male respondents, female respondents and the total sample of all respondents).

Self-reported health. Compared with respondents whose spouses report good health at the 1st wave, respondents whose spouses report poor health are 42.76% more likely to smoke cigarette at wave 1. This influence seems larger for males (57.78%) than for females (29.30%), but this gender difference is not significant. The odds ratios for 2nd and 3rd waves are close to 1 and insignificant.

Changes in self-reported health. Compared with respondents whose spouses report good health in both 1st and 2nd waves, respondents whose spouses report poor health in both waves are 41.48% more likely to smoke cigarettes in the 2nd wave. The odd ratios between respondents whose spouses report improved health and respondents whose spouses report consistently good health are not significant. This suggests a recovery process in which those whose spouses experience an improvement from poor do not continue to experience higher rates of smoking than those whose spouses have had good health throughout the observation period. Interestingly, however, there are no significant

differences in smoking behavior between respondents whose spouses report declining health and those whose spouses always report good health, suggesting that short term declines in spouse health are not immediately associated with a greater likelihood of smoking, but rather it may take some time for effects to emerge. Taken together, the results suggest that the tendency for poor spouse health to be associated with increased likelihood of smoking is a long-term process that unfolds over time, particularly for prolonged health problems of the spouse.

Doctor-diagnosed conditions. When their spouses have one more doctor-diagnosed condition at the1st wave, respondents are 6.08% more likely to smoke cigarettes at the 1st wave. This influence is not significantly different for males and for females. Influences of spouses' conditions in the 1st wave on odds for smoking cigarettes in later waves are not significant.

Changes in doctor-diagnosed conditions. Whether their spouses have new conditions between the 1st and the 2nd waves does not have significant influence on whether respondents smoke cigarettes in the 2nd wave. Similarly, whether their spouses have new conditions between the 1st and the 3rd waves does not have significant influence on whether respondents smoke cigarettes in the 3rd wave.

In general, when their spouses are in poor health in the 1st wave, whether self-reported health or doctor-diagnosed conditions is considered, respondents are more likely to smoke cigarette in time of the 1st wave. This influence is of short term and does not persist in later waves. This influence is not different for male respondents and for female respondents.

3. BMI

Table 4 summarizes the results of separate models estimating the effect of four indicators of spouse's health: spouse's self-reported health (Panel A), change in spouse's self-reported health (Panel B), spouse's doctor diagnosed conditions (Panel C), and change in spouse's doctor diagnosed conditions (Panel D) on whether the respondent is overweight/ obese. Separate analyses assess the cross-sectional association (Wave 1) and associations unfolded across different waves (Wave 2 and Wave 3) for 3 subsamples (male respondents, female respondents and the total sample of all respondents).

Self-reported health. Although the odds ratios are not significantly different from 1 for the total sample, they are significantly different from 1 when examined by gender and these odds ratios are significantly different for males and females. For males, compared with husbands whose wives report good health in the 1st wave, husbands whose wives report poor health in the 1st wave are 21.34%, 28.47% and 27.09% less likely to be overweight /obese in the 1st, 2nd and 3rd waves, respectively. However, the influence on females is in the other direction. Compared with wives whose husbands report good health in the 1st wave, wives whose husbands report poor health in 1st wave are 34.58% more likely to be overweight /obese in the 1st waves. The influences of husbands' poor self-reported health in the 1st wave on wives' odds of being overweight/ obese in the 2nd and 3rd waves are not significant.

Changes in self-reported health. Changes in spouses' self-reported health do not have significant influences on respondents' body weight status. None of the odds ratios for the three groups (respondents whose spouses report consistently poor health, respondents whose spouses report declining health and respondents whose spouses report

improved health poor health) relative to the reference group (respondents whose spouses report consistently good health) is significant, except that male respondents whose wives report poor health in both the 1st and the 3rd waves are 30.30% less likely to participate in physical activities than male respondents whose wives report good health in both waves. Although they are not significant, the odds ratios of the respondents whose spouses report consistently poor health relative to respondents whose spouses report consistently good health are significantly different for male respondents and for female respondents.

Doctor-diagnosed conditions. When their spouses have one more conditions in 1st wave, the respondents are 14.57% more likely to be overweight in the 1st wave. But the influence is greater for female respondents than for male respondents. When their spouses report one more condition in 1st wave, males are 7.79% more likely to be overweight while females are 20.20% more likely to be overweight. The influences of spouses' conditions in the first wave on respondents' odds of being overweight in the 2nd and 3rd waves are not significant.

Changes in doctor-diagnosed conditions. Spouses' new conditions have complicated influences on respondents' body weight status. When their spouses have one more new condition between 1st and 2nd waves, the respondents are 19.27% less likely to be overweight and the difference between male respondents and female respondents is not significant. When their spouses have one more new condition between 1st and 3rd waves, the influences on male respondents' odds of being overweight and on female respondents' odds of being overweight are significantly different. However, the odds ratios themselves are not significantly different from 1.

In general, the conclusions based on two indicators of health are quite different. When examining influences of self-reported health, male respondents whose wives report poor health in the 1st wave are less likely to be overweight in the 1st wave and in later waves while female respondents whose husbands report poor health in the 1st wave are more likely to be overweight in the 1st wave. This influence persists in long terms for males but not for females. When examining influences of doctor-diagnosed conditions, respondents whose spouses have more medical conditions are more likely to be overweight and this influence is stronger for female respondents than for male respondents.

4. Heavy Drinking

Table 5 summarizes the results of separate models estimating the effect of four indicators of spouse's health: spouse's self-reported health (Panel A), change in spouse's self-reported health (Panel B), spouse's doctor diagnosed conditions (Panel C), and change in spouse's doctor diagnosed conditions (Panel D) on the respondent's heavy drinking behavior. Separate analyses assess the cross-sectional association (Wave 1) and associations unfolded across different waves (Wave 2 and Wave 3) for 3 subsamples (male respondents, female respondents and the total sample of all respondents).

Self-reported health. Although the odds ratios are not significant for the whole sample, odds ratios for female respondents are significant in all three waves. Compared with female respondents whose husbands report good health in the 1st wave, female respondents whose husbands report poor health in the 1st wave are 49.84%, 48.93% and 49.89% less likely to drink heavily in Wave 1, Wave 2 and Wave 3, respectively. Also

the differences between odds ratios for males and for females are significant, suggesting that this association exists only among females and not among males.

Changes of self-reported health. For female respondents, when their husbands consistently report poor health, they are 46.69% and 71.46% less likely to drink alcohol heavily than females whose husbands consistently report good health. The odds ratios for females whose husbands report declining health or improved health are not significant. For male respondents, none of the odds ratios for the three groups (respondents whose wives report consistently poor health, respondents whose wives report declining health and respondents whose wives report improved health poor health) relative to the reference group (respondents whose wives report consistently good health) is significant.

Doctor-diagnosed conditions. For female respondents, whether their husbands are diagnosed with medical conditions in the 1st wave is associated with their heavy drinking behavior in none of the three waves. For male respondents, each additional condition with which their wife has been diagnosed in the 1st wave is associated with a16.53% increase in the likelihood in drinking heavily at the 2nd wave. The odds ratios for the 1st and 3rd waves are not significantly different from 1. There is no significant gender difference.

Changes in doctor-diagnosed conditions. Whether their spouses have new conditions between 1st and 2nd waves does not have a significant influence on respondents' heavy drinking in the 2nd wave. Whether their spouses have new conditions between 1st and 3rd waves doesn't have significant influence on respondents' heavy drinking behavior in the 3rd wave, either. No significant difference exists between odds ratios for male respondents and odds for female respondents.

In general, the conclusions based on two indicators of spouses' health are different. When examining the influence of spouses' self-reported health, female respondents whose husbands report poor health in the 1st wave are less likely to drink heavily and this influence persists in the long term, while such influences do not exist among male respondents. When examining the influence of spouses' doctor-diagnosed conditions, male respondents whose wives are diagnosed with more conditions in the 1st waves are more likely to drink heavily in the 2nd waves while such influence does not exist among female respondents.

Conclusion

Although it has long been noticed that being married enhances individual's health behavior and thus improves individual's health, existing research has not examined whether being married to spouses in poor health is as beneficial as being married to spouses in good health in terms of health behavior. This article explores the relationship between spouses' health status and individuals' health behavior, using data from the 1st, 2nd, and 3rd waves of Health and Retirement Study (1992, 1994 and 1996). The analyses concentrate on two aspects of spouses' health status (spouses' self-reported health and number of doctor-diagnosed conditions) and four types of health behavior (physical activity, currently smoking cigarettes, BMI and heavy drinking).

There are four central findings. First, when their spouses are in poor health, both males and females are less likely to regularly participate in physical activities, but this influence is greater for males than for females. The decline in physical activities might be explained by a combination of increased caregiving burden, proliferated stress (Wright & Aquilino 1998, Pavalko & Woodbury 2000) and a lack of spousal concordance (Falba & Sindelar 2008) when their spouses are sick. The gender difference also agrees with the previous research which indicates that wives are more likely to monitor and put control on their husbands' health behaviors than husbands do on their wives' (Umberson 1992).

The second general finding is that when their spouses are in poor health, both males and females are more likely to smoke cigarettes. This influence might be a result of increased stress along with the poor health of spouses, as stress has been documented to trigger a variety of unhealthy behaviors including cigarette smoking (see the review by Pampel, Krueger & Denney 2010). However, there might exist reverse causality, as some medical conditions as well as the overall health status of the spouses might be a result from respondents' lifelong smoking behavior.

Third, the relationship between spouses' health status and respondents' body weight status depends on which indicator of health status is used. In terms of self-reported health, when their spouses are in poor health, females are more likely to be overweight while males are less likely to be overweight. In terms of doctor-diagnosed conditions, when their spouses have more conditions, both males and females are more likely to be overweight but the influence is greater for females. The negative association between husbands' BMI and wives' poor self-reported health is not explained by more physical activities. It could be a result of changed diet pattern, lifestyle and domestic work assignment when their wives are sick.

Finally, when their spouses are in poor health, females are less likely to drink heavily while the influences on males are not significant. Such negative association between husbands' poor self-reported health and wives' heavy drinking cannot be explained using the stress framework. It might be a result of increased "internal regulation" (Umberson 1992): when their husbands are sick, the caregiving responsibility and enhanced sense of obligation might keep wives from drinking heavily.

According to these results, we cannot say generally whether being married to a spouse in poor health undermines or improves older adults' health behavior. The answer depends on which specific aspect of health behavior is being examined. When examining physical activities and smoking cigarette, older adults who are married to sick spouses show poorer health behavior than those who are married to healthy spouses. When examining body weight status, with sick spouses females are more likely to be overweight (worse health behavior) while males are more likely to maintain normal weight (better health behavior). When examining heavy drinking, with sick husbands, females are less likely to drink heavily (better health behavior). Similarly, according to these results we cannot say generally whether males' or females' health behavior suffers more from poor spousal health status. Still, the answer depends on which specific aspect of health behavior is being examined. In terms of physical activities, males suffer more from their wives' poor health status then females suffer from their husbands' poor health status. In terms of smoking cigarette, there is no significant difference between males and females. In terms of body weight status, males' body weight actually benefits from their wives' poor health status while females' body weight suffers from their husbands' poor health status. In terms of heavy drinking, females' drinking behavior benefits from their husbands' poor health status while the influence on males' drinking behavior is not determined.

These variations in the relationship among spouses' health status, respondents' health behavior and gender are in agreement with the notation that health behaviors are multidimensional and that different aspects of health behavior are not mutually

reinforcing (Steele & McBroom 1972). There are two aspects of health behavior which are improved when spouses are in poor health: BMI of males and heavy drinking of females. In particular, the relationship between marriage and males' BMI is distinct from other aspects of health behavior or females' health behavior, which has been noted in prior research (Ross et al. 1990, Schoenborn 2004, Fuller 2010).

When we examine the results under Umberson's social control framework of health behavior, we can explain these mixed results with her external influence versus internal influence explanation. According to Umberson, marriage provides social control of health behaviors through informal sanctions for unhealthy/risky behavior and through the internalization of norms for healthful behavior (Umberson 1987). On one hand, when they are in poor health, spouses' roles in informal sanctions for unhealthy behavior might become weaker, and weaker external regulation is associated with deterioration in some aspects of respondents' health behavior. Declining physical activities and increased smoking behavior among both males and females when their spouses are in poor health could provide evidence for this argument. On the other hand, when their spouses are in poor health, respondents' self-regulation in health behavior might improve, as a result of improved health consensus and enhanced sense of obligation to the family, and stronger self-regulation is associated with improvement in other aspects of respondents' health behavior. Decrease odds of being overweight/ obese among males and decreased odds of drinking heavily when their spouses are in poor health might be evidence for this argument. To examine whether these explanations are valid, we need more knowledge

about the role of external regulation and internal regulation in different aspects of health behavior.

This article uses two health status indicators: spouse's self-reported health and doctor-diagnosed conditions. In most cases, analyses of these two indicators generate similar conclusions about the relationship between spouses' health status and individuals' health behavior. The influences of spouses' self-reported health are usually larger in magnitude, significant in a systemic way and easy to understand, showing that health assessment process is reasonable and self-reported health provides a good overall summary of the state of human body and mind (Jylha 2009).

Regression on changes in self-reported health shows that there are difference in older adults' health behavior between those whose spouses report consistently poor health and those whose spouses report consistently good health. However, the difference is usually insignificant between older adults whose spouses report good health earlier and poor health later (declining self-reported health) and those whose spouses consistently report good health. Neither is the difference between older adults whose spouses report poor health earlier and good health later (improved self-reported health) and those whose spouses consistently report good health. There could be two explanations. On one hand, this might indicate that while improvement in spouses' health is associated with an immediate response in older adults' health behavior, the deterioration in spouses' health is not associated with such an immediate response and the effects takes time (probably more than 2 or 4 years)to emerge. On the other hand, this might indicate that the association between spouses' health status and respondents' health behavior is not a

causal relationship, as the change in one factor is not coincided with change in the other. In this case, the associations between spouses' health status and respondents' health behavior (including the cross sectional association and the association between spouses' health status in earlier wave and respondents' health status in later waves) might be confounded by other factors.

Limitations.

There exist several limitations of the analysis. First, the analyses exclude older adults whose spouses are very sick, since only those whose spouses participate in all three waves are selected into the sample. For respondents with very sick spouses, their health behavior might be influenced differently from other respondents. However, considering that extreme poor health is not common in family life in most of the time, the exclusion of individuals whose spouses are in very poor health should not be a substantial problem.

Second, although it provides description of the relationships between spouses' health status and older adults' health behavior, it does not explore the mechanisms through which poor spousal health status influence respondents' health behavior. On one hand, some necessary information about mechanisms (for instance, marriage quality and caregiving burden) cannot be obtained from the HRS data, or any other available survey research data on health and health behavior. On the other hand, the mechanism between spouses' health status and individuals' health behavior has not been a well-established topic. In this case, some pilot qualitative research may be better than quantitative analyses for questions about mechanisms.

Finally, health behaviors other than smoking, physical activities, heavy drinking and body weight are not included in this article, mainly because of the lack of measurements in the questionnaires. These health behaviors, including substance use, diet habits, sleeping patterns, flu shots and preventive screening checks (Umberson, 1992; Adams & Schoenborn, 2006; Falba & Sindelar, 2008; Fuller, 2010) should be paid more attention to in further research.

	Mean/Percentage		
	All Respondents	Male Respondents	Female Respondents
Dependent variables			
Physical activity 3+ per week at Wave 1	0.1932	0.1879	0.1983
Physical activity 3+ per week at Wave 2	0.2172	0.2153	0.2190
Physical activity 3+ per week at Wave 3	0.5200	0.5542	0.4864
Smoke at Wave 1	0.2362	0.2485	0.2242
Smoke at Wave 2	0.2100	0.2206	0.1996
Smoke at Wave 3	0.1869	0.1945	0.1795
Heavy drinking at Wave 1	0.0833	0.0767	0.0897
Heavy drinking at Wave 2	0.0730	0.0675	0.0784
Heavy drinking at Wave 3	0.0651	0.0617	0.0685
Overweight/ Obese at Wave 1	0.6356	0.7167	0.5560
Overweight/ Obese at Wave 2	0.6378	0.7209	0.5562
Overweight/ Obese at Wave 3	0.6443	0.7254	0.5648
Independent Variables			
Poor self reported health at Wave 1 (Spouse)	0.1676	0.1615	0.1735
Poor self reported health at Wave 2 (Spouse)	0.1861	0.1739	0.1981
Poor self reported health at Wave 3 (Spouse)	0.1915	0.1773	0.2053
Change in self reported health Wave 1 – Wave 2			
Good health and stays good (Reference)	0.7335	0.7542	0.7132
Good health and declines	0.0696	0.0625	0.0765
Poor health and improves	0.0505	0.0495	0.0515
Poor health and stays poor	0.1159	0.1112	0.1205
Change in self reported health Wave 1 – Wave 3			
Good health and stays good (Reference)	0.7176	0.7381	0.6974
Good health and declines	0.0825	0.0746	0.0903
Poor health and improves	0.0596	0.0596	0.0597
Poor health and stays poor	0.1060	0.1007	0.1112
Conditions ever had at Wave 1 (Spouse)	0.9535	0.9298	0.9769
	(1.0407)	(1.0390)	(1.0420)
Conditions ever had at Wave 2 (Spouse)	1.1203	1.0924	1.1480
	(1.1279)	(1.1205)	(1.1346)
Conditions ever had at Wave 3 (Spouse)	1.2916	1.2488	1.3339
	(1.2069)	(1.1981)	(1.2141)
Change in conditions Wave 1 – Wave 2	0.1659	0.1620	0.1698
	(0.4238)	(0.4192)	(0.4284)

Change in conditions Wave 1 – Wave 3	0.3405	0.3180	0.3630
	(0.5971)	(0.5793)	(0.6135)
Control variables			
Age at Wave 1	55.2331	57.2427	53.2609
	(5.8542)	(5.3901)	(5.6166)
Age groups at Wave 1			
25-39	0.0102	0.0011	0.0191
40-49	0.1152	0.0245	0.2043
50-54	0.3258	0.3152	0.3362
55-59	0.3260	0.3391	0.3132
60-69	0.2106	0.2978	0.1252
70-83	0.0121	0.0224	0.0021
Race			
Non-Hispanic Whites (Reference)	0.7917	0.7939	0.7895
Non-Hispanic Blacks	0.1094	0.1094	0.1094
Hispanics	0.0790	0.0764	0.0815
Other	0.0193	0.0195	0.0191
Education			
Less than high school (Reference)	0.2279	0.2422	0.2139
GED	0.0521	0.0553	0.0489
High school graduate	0.3372	0.2964	0.3773
Some college	0.2002	0.1868	0.2133
College and above	0.1826	0.2192	0.1466
Total assets at Wave 1	246484	247836	245158
	(476902)	(476603)	(477253)
Household income at Wave 1	54441	54855	54035
	(47540)	(48026)	(47062)
N	7662	3795	3867

Table 1 Descriptive Statistics by Gender

	Male Respondents			Female Respondents			All Respondents		
	Wave 1	Wave 2	Wave 3	Wave 1	Wave 2	Wave 3	Wave1	Wave2	Wave3
Panel A: Spouses' self-reported health									
Spouse in poor health at wave1	0.8395	0.6263***	0.6977***	0.9930	0.8825***	0.7423***	0.9194	0.7558**	0.7204***
S.E.	(0.1028)	(0.0834)	(0.0648)	(0.1103)	(0.1029)	(0 .0668)	(0.0769)	(0.0672)	(0.0473)
N	7499	7204	7496	7499	7204	7496	7499	7204	7496
Panel B: Changes in spouses' self-reported health (Ref: Spouse's health stays good)									
Poor health and stays poor		0.6447**	0.6389***		0.8245	0.6518***		0.7371**	0.6453***
S.E.		(0.1012)	(0.0737)		(0.1142)	(0.0721)		(0.0777)	(0.0523)
Good health and declines		0.7851	0.8403		0.8685	0.7757*		0.8286	0.8041*
S.E.		(0.1490)	(0.1085)		(0.1439)	(0.0916)		(0.1042)	(0.0704)
Poor health and improves		0.5560*	0.7796		0.9560	0.8496		0.7483	0.8138*
S.E.		(0.1279)	(0.1111)		(0.1860)	(0.1208)		(0.1111)	(0.0824)
N		7133	7396		7133	7396		7133	7396
Panel C: Spouses' doctor-diagnosed conditions									
Doctor-diagnosed conditions at wave1	0.9194	0.7827***	0.9333*	0.9871	0.9646	0.9121**	0.9541	0.8755***	0.9222**
S.E.	(0.0397)	(0.0364)	(0.0307)	(0.0400)	(0.0402)	(0.0298)	(0.0284)	(0.0273)	(0.0216)
N	7499	7204	7496	7499	7204	7496	7499	7204	7496
Panel D: Changes in spouses' conditions									
One more condition		0.9550	0.8772*		0.9333	0.9139		0.9436	0.8967**
S.E		(0.0994)	(0.0516)		(0 .0973)	(0.0505)		(0.0696)	(0.0362)
N		7135	7397		7135	7397		7135	7397

Note: 1.* p<0.05, **p<0.01, ***p<0.001.

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2. Underline indicates that the difference between male respondents and female respondents is significant at $p<0.05$.

3. Control variables of respondents: race and ethnicity (White , Hispanic and other), education(less than high school, GED, high school, some college and college), age, age squared, household income, household assets and gender. All the controls are measured at Wave 1.

4. The regression models predicting physical activity in the 2nd and 3rd waves include respondent's physical activity at the 1st wave as a lagged control variable.

Table 2 Odds Ratios from Logistic Regression of Physical Activities/Exercise on Spouses' Health and Controls

	Male Respondents			Female Respondents			All Respondents		
	Wave 1	Wave 2	Wave 3	Wave 1	Wave 2	Wave 3	Wave1	Wave2	Wave3
Panel A: Spouses' self-reported health									
Spouse in poor health at wave1	1.5778***	1.5235*	1.0997	1.2930**	0.9920	0.8994	1.4276***	1.2288	0.9990
S.E.	(0.1554)	(0.3013)	(0.1958)	(0.1283)	(0 .1922)	(0.1658)	(0.1015)	(0.1723)	(0.1301)
N	7499	7498	7256	7499	7498	7256	7499	7498	7256
Panel B: Changes in spouses' self-reported health (Ref: Spouse's health stays good)									
Poor health and stays poor		1.9041**	1.0429		1.0661	0.9446		1.4148*	0.9950
S.E.		(0.4468)	(0.2263)		(0 .2398)	(0.2078)		(0.2336)	(0.1561)
Good health and declines		0.9851	0.7305		1.0920	0.9021		1.0398	0.8179
S.E.		(0.2826)	(0.1914)		(0.3122)	(0.2259)		(0.2127)	(0.1491)
Poor health and improves		0.9204	1.1063		0.8772	0.7858		0.8994	0.9503
S.E.		(0.2926)	(0.3093)		(0.2956)	(0.2399)		(0.2088)	(0.1969)
N		7427	7157		7427	7157		7427	7157
Panel C: Spouses' doctor-diagnosed conditions									
Doctor-diagnosed conditions at wave1	1.0757*	1.1085	1.0565	1.0439	0.9436	0.9003	1.0608*	1.0243	0.9782
S.E.	(0.0392)	(0.0795)	(0.0707)	(0.0391)	(0.0679)	(0.0615)	(0.0279)	(0.0526)	(0.0472)
N	7499	7498	7256	7499	7498	7256	7499	7498	7256
Panel D: Changes in spouses' conditions									
One more condition		1.0618	1.0608		0.9103	0.9881		0.9812	1.0243
S.E		(0.1869)	(0.1296)		(0.1543)	(0.1196)		(0.1198)	(0.0882)
N		7429	7158		7429	7158		7429	7158

Note: 1.* p<0.05, **p<0.01, ***p<0.001

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2. Underline indicates that the difference between male respondents and female respondents is significant at $p<0.05$.

3. Control variables of respondents: race and ethnicity (White,] Hispanic and other), education(less than high school, GED, high school, some college and college), age, age squared, household income, household assets and gender. All the controls are measured at Wave 1.

4. The regression models predicting cigarettes smoking in the 2nd and 3rd waves include respondent's cigarettes smoking at the 1st wave as a lagged control variable.

Table 3 Odds Ratios from Logistic Regression of Smoking Cigarettes on Spouses' Health and Controls

	Male Respondents			Female Respondents			All Respondents		
	Wave 1	Wave 2	Wave 3	Wave 1	Wave 2	Wave 3	Wave1	Wave2	Wave3
Panel A: Spouses' self-reported health									
Spouse in poor health at wave1	0.7866*	0.7153*	0.7291*	1.3458**	1.2411	1.0975	1.0650	0.9598	0.9066
S.E.	(0.0791)	(0.1094)	(0.1052)	(0.1227)	(0.1801)	(0.1501)	(0.0738)	(0.1032)	(0.0919)
N	7499	7420	7397	7499	7420	7397	7499	7420	7397
Panel B: Changes in spouses' self-reported health (Ref: Spouse's health stays good)									
Poor health and stays poor		0.7811	0.6970*		1.2662	1.1434		1.0121	0.9066
S.E.		(0.1418)	(0.1227)		(0.2185)	(0.1914)		(0.1290)	(0.1121)
Good health and declines		1.3271	0.9792		1.0263	1.2853		1.1445	1.1445
S.E.		(0.3215)	(0.2057)		(0.2159)	(0.2294)		(0.1835)	(0.1572)
Poor health and improves		0.6570	0.7687		1.2153	1.1107		0.9076	0.9333
S.E.		(0.1660)	(0.1734)		(0.2978)	(0.2399)		(0.1622)	(0.1475)
N		7350	7298		7350	7298		7350	7298
Panel C: Spouses' doctor-diagnosed conditions									
Doctor-diagnosed conditions at wave1	1.0779*	0.9550	0.9531	1.2020*	1.0030	1.0101	1.1457***	0.9802	0.9822
S.E.	(0.0402)	(0.0530)	(0.0498)	(0.0403)	(0.0530)	(0.0501)	(0.0289)	(0.0380)	(0.0358)
N	7499	7420	7397	7499	7420	7397	7499	7420	7397
Panel D: Changes in spouses' conditions									
One more condition		0.9389	0.8799		0.7054*	1.1286		0.8073*	1.0111
S.E		(0.1259)	(0.0804)		(0.0881)	(0.0926)		(0.0734)	(0.0624)
N		7352	7299		7352	7299		7352	7299

Note: 1.* p<0.05, **p<0.01, ***p<0.001.

2. Underline indicates that the difference between male respondents and female respondents is significant at p<0.05.

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3. Control variables of respondents: race and ethnicity (White, Black, Hispanic and other), education(less than high school, GED, high school, some college and college), age, age squared, household income, household assets and gender. All the controls are measured at Wave 1.

4. The regression models predicting overweight/obesity in the 2nd and 3rd waves include respondent's body weight status at the 1st wave as a lagged control variable.

Table 4 Odds Ratios from Logistic Regression of Being Overweight /Obese on Spouses' Health and Controls

	Male Respondents			Female Respondents			All Respondents		
	Wave 1	Wave 2	Wave 3	Wave 1	Wave 2	Wave 3	Wave1	Wave2	Wave3
Panel A: Spouses' self-reported health									
Spouse in poor health at wave1	1.3205	1.4319	0.9910	0.5016***	0.5107*	0.5011*	0.8261	0.9185	0.7401
S.E.	(0.2167)	(0.3022)	(0.2170)	(0.0984)	(0.1358)	(0.1365)	(0.1042)	(0.1512)	(0.1263)
N	7499	7496	7457	7499	7496	7457	7499	7496	7457
Panel B: Changes in spouses' self-reported health (Ref: Spouse's health stays good)									
Poor health and stays poor		1.3472	0.8781		0.5331*	0.2854**		0.8949	0.5667*
S.E.		(0.3458)	(0.2478)		(0.1700)	(0.1188)		(0.1789)	(0.1299)
Good health and declines		1.6854	1.1008		1.3284	0.7445		1.4874	0.8958
S.E.		(0.5258)	(0.3317)		(0.4023)	(0.2189)		(0.3272)	(0.1898)
Poor health and improves		1.6603	1.1526		0.5406	0.8496		1.0336	0.9960
S.E.		(0.5641)	(0.3701)		(0.2458)	(0.3040)		(0.2774)	(0.2393)
N		7425	7358		7425	7358		7425	7358
Panel C: Spouses' doctor-diagnosed conditions									
Doctor-diagnosed conditions at wave1	0.9990	1.1653*	0.9277	0.9474	0.9560	0.9103	0.9704	1.0534	0.9185
S.E.	(0.0610)	(0.0887)	(0.0747)	(0.0544)	(0.0735)	(0 .0709)	(0.0410)	(0.0577)	(0.0519)
N	7499	7496	7457	7499	7496	7457	7499	7496	7457
Panel D: Changes in spouses' conditions									
One more condition		1.0030	1.0779		0.9618	0.9121		0.9812	0.9871
S.E		(0.1992)	(0.1493)		(0.1864)	(0.1236)		(0.1362)	(0.0959)
N		7427	7359		7427	7359		7427	7359

Note: 1.* p<0.05, **p<0.01, ***p<0.001.

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2. Underline indicates that the difference between male respondents and female respondents is significant at $p<0.05$.

3. Control variables of respondents: race and ethnicity (White, Black, Hispanic and other), education(less than high school, GED, high school, some college and college), age, age squared, house come, household assets and gender. All the controls are measured at Wave 1.

4. The regression models predicting heavy drinking in the 2nd and 3rd waves include respondent's heavy drinking at the 1st wave as a lagged control variable.

Table 5 Odds Ratios from Logistic Regression of Heavy Drinking on Spouses' Health and Controls

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