Published in final edited form as:
J Aging Health. 2013 August ; 25(5): . doi:10.1177/0898264313494411.

Health Shocks in the Family: Gender Differences in Smoking Changes

Rachel Margolis, PhD[1]
[1]University of Western Ontario, London, Ontario, Canada

Abstract

Objective—This study estimates the likelihood of starting and stopping smoking when respondents and their partners report new chronic illnesses.

Method—Analysis of longitudinal data from the Health and Retirement Study tests whether starting or stopping smoking is more likely when (a) the respondent, (b) their partner, (c) or both report a new chronic condition, and whether these patterns differ by gender.

Results—Both men and women are more likely to quit smoking when reporting a new chronic condition, relative to when reporting none. However only women are more likely to quit smoking when their partners fall ill. Women are also more likely than men to start smoking at this time.

Discussion—Among older couples, women's smoking changes are more sensitive to health shocks in the partnership. Interventions aimed at preventing unhealthy behaviors should pay attention to how each partner deals with the stress of health shocks.

Keywords

smoking; families; health behaviors; Health and Retirement Study

Smoking cessation is one of the most important health behavior changes for preventing and managing chronic illness and preventing premature mortality (Johansson & Sundquist, 1999; Rogers, Hummer, & Nam, 2000). Smoking influences the development of the leading causes of morbidity and mortality in the United States, such as heart disease, cancer, stroke, diabetes, and lung disease (Heron, 2011). Among those who smoke, a diagnosis of one of these conditions offers the opportunity to make lifestyle changes that may help to manage the illness and subsequent health problems. Treatment guidelines recommend that doctors should encourage patients to quit smoking when they are diagnosed with a variety of new chronic conditions (Lichtenstein et al., 2006).

Recent research has addressed the frequency of adopting healthy behaviors in middle and older age, finding that smoking cessation is more common after a chronic illness (Falba, 2005; Leventhal, Weinman, Leventhal, & Phillips, 2008; Margolis, 2013; Schone & Weinick, 1998; Wray, Herzog, Willis, & Wallace, 1998). This is thought to be because a new diagnosis acts as a wake-up call and causes increased attention to health. However, a new chronic illness may be stressful and prompt an unhealthy change, such as relapse among former smokers or the commencement of smoking among never smokers. This

Corresponding Author: Rachel Margolis, PhD, Department of Sociology, University of Western Ontario, Social Science Center 5326, London, ON N6A 5C2, Canada. rachel.margolis@uwo.ca.

Declaration of Conflicting Interests
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

analysis examines both kinds of changes in smoking after a new chronic illness in middle and older age. If reverting back to smoking is common after diagnosis, interventions should focus on preventing this unhealthy behavior change at the point of care.

Beyond one's own health, a partner's new illness can also be stressful (Beverly, Miller, & Wray, 2008; Lewis, Woods, Hough, & Bensley, 1989; Rajaram, 1997) and may trigger people to change their smoking behavior. To date, no quantitative research at the population level has addressed the likelihood of smoking changes in the face of a partner's chronic condition. Stopping smoking when a partner falls ill may be common to reduce second hand smoke to improve a partner's health or assist a partner in smoking cessation. Starting smoking may also be more frequent when a partner falls ill to cope with stress. Research on partnership and health behaviors has found that women do more health promoting work within the family than men, such as promoting healthy behaviors and censuring unhealthy ones (Umberson, 1987, 1992). Are women more likely than men to stop smoking when their partner becomes ill, given that secondhand smoke *directly* affects a partner's health?

The aim of the current study is to examine how men and women change their smoking behavior when they and their partners experience a health shock. I analyze longitudinal data from the Health and Retirement Study to examine whether respondents are more likely to change smoking behavior when they, their partners, or both experience a health shock and whether these patterns differ by gender. A health shock refers to a new health problem that may trigger other changes in labor force participation, education, and earnings (Burgard, Brand, & House, 2007; Fletcher & Richards, 2012). In this analysis, a health shock is measured as a respondent-reported new chronic condition.

A Focus on Couples

Social relationships are a strong predictor of health behaviors, health, and mortality, which is thought to be because close relationships provide social, economic, emotional, and instrumental support, which contribute to physical and emotional health (Durkheim, 1897/1951; House, Landis, & Umberson, 1988; Smith & Christakis, 2008). Of the different types of social relationships, most research has focused on the marital relationship, which has the strongest association with health outcomes and is assumed to be the most salient relationship for adults (Smith & Christakis, 2008; Waite & Gallagher, 2001). Much of the theory about how partnership may affect health relates to health behaviors, but most studies documenting differences in health behaviors by marital status rely on cross-sectional data and few examine health behavior changes using longitudinal data (see Carr & Springer, 2010, and Smith & Christakis, 2008, for reviews). In their review of the literature on families and health, Carr and Springer (2010) suggest that future research should better document *how* and *when* partners help or harm each other's health and health behaviors. This analysis addresses one potential mechanism through which one person's behavior change may help their partner manage a chronic condition, which could lead to improved chronic disease management and health outcomes.

A focus on couples in middle and older age is important because during this life stage there is increased attention to health concerns, new chronic conditions often develop, and people must learn to manage these conditions (Cross & Markus, 1991; Helgeson, Novak, Lepore, & Eton, 2004; Pinto, Eakin, & Maruyama, 2000; Siegler, Kaplan, Von Dras, & Mark, 1999). Middle-aged and older couples have likely been together many years and are strongly integrated into each other's routines. A new illness within the couple affects the lives of *both* people in several ways. It changes routines if one partner must start doing care work, both members must change eating habits to comply with a treatment, or alter living arrangements if mobility becomes a problem (Beverly et al., 2008; Helgeson et al., 2004; Lewis et al.,

1989). These changes in routines may also increase the stress level of each person (Lewis et al., 1989).

Smoking is the only health behavior where one person's behavior *directly* affects the health of the other partner. Secondhand smoke has a direct negative effect on a partner's health and ability to manage a new illness (Barnoya & Glantz, 2005). Secondhand smoke can interfere with a partner's management of the condition. For example, if one person gets diagnosed with cancer or a respiratory illness, then their partner's smoking can be a health hazard. This externality for the partner's health may be critical in the decision to stop smoking. Secondhand smoke can also contribute to the development of other health conditions, and comorbidities complicate disease management. Previous theoretical work has highlighted how a health shock might spur both partners into behavior change through transforming motivation, with a stronger shock and greater perception that the illness can be controlled through behavioral action leading to increased odds of healthy behavior changes (Coyne & Smith, 1994; Figueiras & Weinman, 2003; Heijmans, DeRidder, & Bensign, 1999; Lewis et al., 2006; Sexton et al., 1987). Other theoretical work highlights how social support theories can explain why both partners might make a healthy change together, especially if the partner is engaged by the health care provider (Bennett, 1994; Elder, Ayala, & Harris, 1999). Building on this literature, the first hypothesis is that a new illness will be associated with smoking cessation among partnered adults.

A previously unexamined issue is whether a partner's new chronic illness may also increase the likelihood of a negative health behavior change such as starting smoking. A partner's illness may increase stress, anxiety, and depressive symptoms (Lewis et al., 1989), which may bring on smoking relapse among former smokers or new smoking behavior among those who did not smoke in the past. Therefore, the second hypothesis is that a partner's new illness will be associated with higher odds of starting smoking or relapse.

Gender Differences in Social Control and Health Behaviors

Men and women may respond differently when there is a new illness within the couple and changes in smoking behavior may reflect this. Some research has documented gender differences in the use of social control to influence a partner's health behaviors. For example, women are more likely than men to engage in healthy behaviors in and outside of marriage (DiMatteo, 2004; Duncan, Wilkerson, & England, 2006), more likely to discourage unhealthy activities such as smoking and binge drinking, and more likely to encourage healthy eating and compliance to medical regimes (Depner & Ingersoll-Dayton, 1985; Duncan et al., 2006; Gove, 1973; Helgeson et al., 2004; Umberson, 1987, 1992; Waite & Gallagher, 2001). Thus men are more likely to be affected by positive social support, social control to quit smoking, or support to not start smoking from their partner than women. These gender norms are likely to be strong among older American couples interviewed in the 1990s and early 2000s. Based on this literature, I hypothesize that men will be more likely than women to stop smoking when they experience a health shock because they will be influenced by stronger social support and social control from their partner.

Although prior literature has found that women are more likely to exert social control over a partner's health behaviors, to date there has been no population-level study examining whether people will change their *own* behaviors when their partners become ill. This is a more extreme dimension of caring for another person's health and could provide a strong example of a way in which partnership shapes health outcomes. Prior research has found that women use more interdependent and communal strategies to get their partner to change health behaviors than men (Lewis, Butterfield, Darbes, & Johnson-Brooks, 2004). However, when coping with their own illness, there is evidence that women restrain their communal

coping strategies, so as not to burden their partner (Lyons, Sullivan, Ritvo, & Coyne, 1995). Building on this literature, I hypothesize that women will be more likely than men to quit smoking when a partner falls ill. When men fall ill, their partners will be more likely to stop smoking to help manage his condition communally. However, when women fall ill, they will be less likely to engage their partners in quitting smoking.

The Current Study

The aim of the current study is to examine the likelihood of stopping and starting smoking when respondents and their partners report a new chronic condition. First, I examine whether changes in smoking are more likely when (a) respondents, (b) partners, or (c) both respondents *and* partners report a new chronic condition for which smoking cessation is recommended. I examine both healthy and unhealthy changes because I hypothesize that a new chronic illness may prompt either type of change. Smokers may be more likely to stop smoking at this time to manage a new condition, help a spouse quit, or reduce their partner's exposure to secondhand smoke. However, nonsmokers or former smokers may be more likely to start or resume smoking to manage stress arising from the new illness within the couple. Second, I examine whether there are gender differences in the relationship between health shocks within the couple and changes in smoking behavior. Based on research that has found that women do more care work and are more likely to encourage healthy behaviors, I hypothesize that men will be more likely than women to quit smoking when they fall ill because of the greater degree of social support and social control from their partners. I further hypothesize that women will be more likely to respond to a partner's illness with smoking cessation than men because of women's greater likelihood to rely on communal coping strategies for the illness of another rather than for her own illness.

Method

Sample

Data for this analysis are from the Health and Retirement Study (HRS), an aging study that is nationally representative of the U.S. population above age 50. The major strength of these data for this analysis is that the longitudinal nature of the data allows the analysis of *changes* in health and smoking among a representative sample of older Americans. Another benefit of the data is that if respondents are partnered (married or cohabiting), their partners are also interviewed and self-report their own health status. The analytic sample consists of respondents aged 50 to 85 interviewed between 1992 and 2010. This age range is chosen because many respondents report new conditions and make behavior changes to manage conditions. Above age 85, smoking is less prevalent and changes are less common. Of the 30,670 age-eligible respondents, I limit the analysis to those aged 50 to 85 who participated in the study (N = 29,325) and were partnered, defined as either married or cohabiting (N = 21,448). After excluding 52 respondents because of missing data on key measures, and 3,003 respondents who participated in only one interview and whose behavior changes could therefore not be analyzed, the analytic sample is comprised of 18,393 respondents and 105,230 person-interviews. These respondents are analyzed until they are no longer partnered or until they leave the study due to mortality, the end of the study period, or loss to follow-up. Most respondents have partners who are also in the analytic sample. Partners outside of the study age range are excluded, but age-eligible partners are included. Detailed information on the study design, sample, and response rates is available (Heeringa & Connor, 1995).

Measures

The two dependent variables are stopping and starting smoking, chosen because smoking cessation is an important part of chronic disease management. In each interview, participants were asked, “Do you smoke cigarettes now?” Cigars and pipes are excluded. Smoking cessation is defined by whether the respondent reported smoking in one interview, but reported not smoking in the subsequent interview. Starting smoking is coded as the opposite.

The key explanatory variables are whether respondents and their partners reported any new chronic conditions at each interview. The chronic illnesses examined are chosen because they are conditions for which smoking cessation is an important and recommended part of disease management. I examine six conditions that are reported for the first time—hypertension, heart disease, diabetes, lung disease, stroke, and cancer (RAND, 2011).[1] These are coded from questions that ask if a doctor ever told the respondent that they had the conditions listed above. If the condition is reported for the first time in a given interview after the baseline interview, it is coded as a new chronic condition. To examine whether the members of a couple report any of these new conditions, a four-category variable is used: (a) neither the respondent nor partner reports any new condition, (b) only the respondent reports a new condition, (c) only the partner reports a new condition, or (d) both the respondent and partner report a new chronic illness.

Other factors associated with changes in smoking are also included in the analysis. Demographic variables are age at interview; educational attainment of respondents coded as college degree, some college, high school degree or GED, and less than high school; and race/ethnicity coded as non-Hispanic Black, non-Hispanic White, Hispanic/other race. In addition, models control for health status, measuring the number of chronic conditions (of the six examined) that respondents reported in the previous wave. Self-rated health is also included and coded as a continuous variable.[2] To take into account the fact that some members of the analytic sample died during the period of analysis, a dummy variable for whether the respondent died during the follow-up period is included. The two health status variables are time-varying, but the others are fixed characteristics of respondents.

Analytical Approach

I examine whether individuals are more likely to change their smoking behavior when they and/or their partners report new chronic conditions, compared to when neither partner reports a new condition with a series of logistic regression models. I analyze behavior change among those at risk of that change at the previous interview. For example, smoking cessation is examined among those who smoked at last interview and starting smoking is examined among those who did not smoke at last interview. Logistic regression models allow the analysis of patterns of change for the whole population and therefore are preferable to conditional logit models with individual fixed effects that only examine change among respondents who experience a change in the behavior of interest.

The key independent variable in the analysis captures whether there were new chronic conditions reported in the partnership, distinguishing between whether neither respondent

[1]The conditions include high blood pressure or hypertension; diabetes or high blood sugar; cancer or a malignant tumor of any kind except skin cancer; chronic lung disease except asthma such as chronic bronchitis or emphysema; heart attack, coronary heart disease, angina, congestive heart failure or other heart problems; and stroke or transient ischemic attack (RAND, 2011). New conditions are coded according to the RAND guidelines (2011). A small proportion of respondents reported conditions and then in later interviews changed their responses. This analysis uses RAND's coding of these disavowed conditions. Given the low prevalence, these coding assumptions likely do not affect the analysis.

[2]Results are not sensitive to the coding choices of the control variables. Similar results are found when including education as a continuous measure, excluding “other race” from the analysis or as a category of its own, and coding self-rated health as a categorical variable.

nor partner, only the respondent or partner, or both respondent and partner, reported any new chronic condition. This measure is time-varying and is examined between interview t and t + 1, the same period that the health behavior change is measured. This is because diagnosis offers an opportunity for a turning point in health behaviors as patients are faced with new information about their health. If diagnosis is a turning point for behavior change, then it is most likely that the behavior change would occur immediately or very soon after learning about the new condition. Further analysis revealed that smoking cessation is no more likely in the period before (between t – 1 and t) or two periods after reporting new chronic conditions (between interviews t + 1 and t + 2), compared to when reporting no new conditions (results not shown), confirming that the analysis of behavior change and new conditions in the same interval is both theoretically and empirically justified.

The modeling strategy is as follows. First I examine the likelihood that men and women stop smoking when there are new chronic conditions in the partnership. Then I turn to starting smoking. All multivariate models control for respondents' age, gender, attainment, race/ethnicity, self-rated health, number of previous chronic conditions, and whether they died during follow-up. Then, to test gender differences in patterns of stopping and starting smoking, I estimate logistic regression models with an interaction term for gender and new health conditions in the partnership with the same set of controls as above. Last, predicted probabilities of stopping and starting smoking are estimated from these interaction models, holding other variables at their mean levels. All models are estimated using robust standard errors to account for the nonindependence of observations for each individual.

Sample Characteristics

Table 1 presents the characteristics of the sample, comprised of 9,322 men and 9,071 women. At first interview, male respondents are 60.1 years on average and female respondents were 58.2, and the whole sample ranges from age 50 to 85. Changes in smoking are common among the respondents in the analytic sample. One quarter of men and one in five women smoke during the study period, comprising the analytic samples of those at risk of stopping smoking. Among this group, 52% of men and 45% of women stop smoking during the period of observation. It is less common to start smoking during this period. Of the 89% of men and 90% of women who are nonsmokers at some point during the period of analysis, 7% of men and 4% of women start smoking. Almost all respondents who start smoking during the study are former smokers (97%), rather than never smokers.

It is common for respondents and spouses to report new chronic conditions. More than half of men (55%) and 46% of women report at least one new condition during the course of the study period. Similarly, many men (44%) and women (54%) have partners who report new conditions.

Results

Table 2 presents odds ratios from logistic regression models examining whether stopping smoking is more likely when there is a new illness in the couple. There are some similarities and some differences between men and women. Both men and women are more likely to stop smoking when they experience a new health problem. The odds ratio for men is 2.75 ($p < .001$) and 2.01 ($p < .001$) for women. To test whether there is a gender difference in the strength of the odds of smoking cessation when falling ill relative to when there is no new illness, we turn to the interaction term in the final model. The result is a ratio of odds ratios (Jaccard, 2001; Wooldridge, 2010). The result of 0.78 ($p < .05$) notes that women have a lower likelihood of stopping smoking when experiencing a health shock relative to none than men do.

Men and women are also both more likely to stop smoking when both they and their partners report a new condition (Men O.R. 2.32 $p < .001$; Women O.R. 2.55 $p < .001$). However, men and women differ in how they change behavior when *only* their partner reports a new health problem. Only women are more likely to stop smoking when their partner gets sick (O.R. 1.25, $p < .05$). Men are *less* likely to stop smoking at this time than when they have no new condition (O.R. 0.76, $p < .05$). This gender difference is explicitly tested in the interaction model. It tests whether women's odds of smoking cessation when a spouse falls ill relative to when there are no new illnesses is greater than men's odds of smoking cessation for the same scenario. This interaction is statistically significant (O.R. 1.66, $p < .01$) highlighting that only women are more likely to make this change even though secondhand smoke negatively affects the health of a partner with a new condition.

The probabilities of smoking cessation shown in Table 3 are estimated from the interaction model in Table 2. When no new illnesses are reported, male smokers have a 15% chance of smoking cessation and women have a 13% chance. Smoking cessation is much more frequent when only the respondent and not his or her spouse reports a new health problem (33% for men with a new diagnosis and 24% for women with a new diagnosis). The gender difference is clear from comparing the probability of smoking cessation when the respondent reports no new illnesses but a spouse falls ill. Women are more likely to stop smoking when a partner gets sick compared to when neither does (16.1% vs. 13.1%) but men are less likely to change at this time (12.3% vs. 15.3%).

Table 4 presents odds ratios for whether starting smoking is more or less likely when there is a new illness in the couple. A new diagnosis is not associated with starting smoking for men. In fact, when men report new conditions they are less likely to start than when they report none (O.R. 0.56 $p < .01$). Moreover, they are no more likely to start when a spouse gets sick or when both have a new condition than when there is no new illness in the partnership. However, the associations between new illnesses in the partnership and starting smoking are different for women. Women are more likely to start smoking when both members of the couple have new conditions than when neither does (O.R. 2.32 $p < .01$). There are no differences for women in the odds of starting smoking when only one partner has a new condition relative to when neither does.

The gender differences are apparent in the interaction model in Table 4. Women are more likely than men to start smoking in two situations. Women start smoking more than men when they themselves report a new condition compared to when reporting none. Similarly, women are more likely than men to start when both partners fall ill. To examine the size of these associations, predicted probabilities are shown in Table 3. The probability of starting smoking in older age is low, less than 2%. However, women and men are responding differently in starting smoking when both partners fall ill relative to when there is no illness. Starting smoking may be one way in which women cope with a new illness.

Because almost all respondents who start smoking in middle and older age are former smokers, I also conducted this analysis for starting smoking among the subsample of former smokers. In Appendix Tables A1 and A2, I show comparable results in Tables 3 and 4 for starting smoking among those who (a) ever reported smoking and (b) recent smokers who report smoking during the study period. The results are very similar to those presented in Tables 3 and 4, but the probabilities of starting are much larger among former smokers. For example, 14% of women who are recent smokers start smoking when they or their partners report a new illness and 23% start smoking when both they and their respondents report new conditions (Appendix Table A2).

Additional sensitivity analyses were conducted to test the robustness of the results. First, I test whether the results are sensitive to the sample used and found that they were not. The results shown include respondents ages 50 to 85, but the results are similar if including all respondents ages 50 to 109, or only respondents 50 to 75. Moreover, results do not change if restricting the sample to the 1931-1941 HRS birth cohort that is followed throughout the entire study period (1992-2010). Second, the results are also robust to the inclusion of a rough measure of social support, whether respondents had any living children, but because this measure is not similar to other social support research, it is not included in the results shown. Results are also robust to the inclusion of measures of health insurance, wealth, and future orientation (as measured by financial planning status); however, because of large amounts of missing data on these variables, they are excluded from the final analysis. Third, the inclusion of proxy interviews does not change the results. Fourth, the pattern of results is the same if the analysis is restricted to those in good, very good, or excellent health. Last, the results presented include both married and cohabiting respondents, but the results are similar when including only married respondents. At first interview, only 5% of partnered respondents are cohabiting rather than married.

Discussion

This study examined the likelihood of starting and stopping smoking when there is a new chronic illness within the couple. Understanding the predictors of changes in smoking and identifying points of intervention for preventing unhealthy behavior changes are key to improving the health of the older population. This article builds on recent work that highlights the frequency of smoking cessation among those newly diagnosed with a chronic illness (Falba, 2005; Keenan, 2009; Newsom et al., 2012; Wray et al., 1998), but provides a new focus on how a new illness in the partnership might spark starting as well as stopping smoking. It further highlights gender differences in these patterns, providing a clear mechanism through which women influence their partner's disease management and potentially health outcomes.

When respondents experience a health shock, both men and women are much more likely to quit smoking than when there are no new illnesses. The high frequency of smoking cessation following a health shock documented here accords with other recent studies (Keenan, 2009; Margolis, 2013; Wray et al., 1998). Moreover, men have significantly higher odds of stopping smoking when they fall ill than women. This may be due to the fact that men are more likely to experience positive social control regarding healthy behaviors from their partners than women (Depner & Ingersoll-Dayton, 1985; Duncan et al., 2006; Helgeson et al., 2004; Umberson, 1987, 1992). This analysis examined older American couples in the 1990s and 2000s, however, future research should examine to what extent the gendered nature of social control shifts as gender norms change over time.

This article highlights that it is not just one's own chronic illness that predicts smoking cessation. Women who smoke are significantly more likely to stop when their husbands fall ill. However, men are no more likely to make this change when their wives report new illnesses. Why are women more likely than men to stop smoking when their partner falls ill? One might think that this is due to men being more addicted than women on average. However, this does not account for the gender difference because men are just as likely as women to stop smoking when they themselves fall ill. Rather, the gender difference in smoking cessation on a partner's illness is likely due to gender differences in taking responsibility for the health of others in the family. Perhaps women stop smoking when a husband becomes ill because secondhand smoke has a direct negative effect on his health (Barnoya & Glantz, 2005) or because she is trying to set an example and to get her husband to quit as well (Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986). Women may

also be motivated to maintain her own health to keep the family together or to care for loved ones (Cohen & Wills, 1985; Lichtenstein, Weiss, & Hitchcock, 1986; Waldron & Lye, 1989). This finding accords with research that finds that women are likely to use communal strategies to get their husbands to change their health behaviors, but restrain the use of these communal strategies when they become the patient, so as not to burden their partner or other family members (Lewis et al., 2004; Lysons et al., 1998). Future research should investigate the reasons for women's higher likelihood of smoking cessation in the face of a partner's illness.

This analysis highlights that starting smoking is also associated with new chronic illnesses in middle and older age. Prior research on health behavior changes has focused on smoking cessation but has not analyzed starting (Clark & Etile, 2002; Falba & Sindelar, 2008; Wray et al., 1998). Women were more likely than men to relapse into smoking (97% of those who start are former smokers) when they or both partners fall ill than when neither reports a new chronic condition. This unhealthy behavior change may be due to increased stress, anxiety, or depressive symptoms, which may be managed by smoking (Ockene et al., 2000). The higher likelihood of starting smoking among women after reporting a new illness is instructive to those designing interventions to prevent unhealthy behavior changes at this time. These respondents have interacted with the health care system recently when they were diagnosed with the new health condition. Targeting those recently diagnosed with counseling about other ways to manage illness may decrease the likelihood of starting smoking at this time and improve the health of the older population.

Scholars have long noted that married persons have substantially better health and lower mortality than the unmarried and that differences in health and mortality by marital status were larger for men than women (Farr, 1858; Gove, 1973; Hu & Goldman, 1990). Although some of the difference is likely due to selection (Hu & Goldman, 1990), recent reviews of the literature indicate that there are thought to be some causal effects, although most evidence of how spouses influence each other's health is indirect (Carr & Springer, 2010; Smith & Christakis, 2008). There is a clear mechanism shown here that may help to explain how partners can positively influence chronic disease management and health outcomes. This finding that women stop smoking when a husband falls ill can help explain one reason why married men's health is better than the unmarried who do not receive this support.

This study has several important strengths such as a representative sample, a longitudinal design, and focus on new illnesses of both members in a couple. However, it also has several limitations. First, the biennial data allow the examination of smoking changes between each interview, approximately every other year, but may not capture shorter term changes and therefore may underestimate the amount of smoking change. Relatedly, the exact ordering of the smoking change and the new diagnosis cannot be tested. However, theory predicts that a health shock will influence a smoking change and not the other way around. Moreover, sensitivity analysis shows that smoking changes were more likely in the period when the new diagnosis was reported, but not the previous or subsequent period. Third, measures of new chronic conditions and health behaviors are self-reported, which could be inaccurate. Other research has found self-reported illnesses to be accurate (Giles, Croft, Keenan, Lane, & Wheeler, 1995; Leventhal et al., 2008), but even if less serious illnesses were underreported, then this analysis would err on the side of being conservative in the relationship between new conditions and changes in smoking. Fourth, this analysis focuses on middle and older age and does not capture whether respondents changed their behavior earlier in life in response to a previous health problem or information about how smoking affects health. Prior research documents high rates of smoking cessation in the past for these cohorts (de Walque, 2010). However, the vast majority of those who start smoking (97%) are former smokers. Lastly, due to small subsamples, the data do not allow the examination

of how patterns of behavior change may differ for same-sex couples relative to heterosexual couples, or cohabiting relative to married couples. These topics can be explored with other data.

Despite limitations, these results show that new chronic illnesses in the partnership are an important predictor of smoking changes for men and women. By examining both healthy and unhealthy changes, it is clear that women's health behavior changes are much more sensitive to health shocks in the partnership than men. Interventions targeting healthy behaviors and preventing unhealthy changes should pay attention to how each member of a couple deals with the stress of health shocks.

Acknowledgments

I gratefully acknowledge Irma Elo, Sam Preston, and Jason Schnittker for valuable comments on previous drafts, and the University of Michigan and RAND for making the HRS data accessible and clearly documented. An earlier version was presented at the 2011 Population Association of America annual meeting, where Erin York Cornwell gave valuable feedback.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by the National Institutes of Health (NIA T32-AG000177, P30AG12836 and NICHD T32HD007242, R24HD044964) at the University of Pennsylvania.

Appendix

These two appendix tables present the results for starting smoking, limiting the sample to former smokers.

Table A1

Odds Ratios From Logistic Regression Models Predicting Starting Smoking Among *Former Smokers*, Health and Retirement Study (1992-2010).

	Men and women: Multivariate interaction	**Men and women: Multivariate Interaction Model**
Sample	**All former smokers Model *N* = 8,262**	**Recent smokers, those who report ever smoking during HRS study period (*N* = 1,814)**
New chronic illness in the partnership[a] (None)		
Respondent only	0.55***	0.45***
Spouse only	1.11	0.92
Both respondent and partner	0.74	0.63
Control variables		
Age	0.93***	0.91***
Education (less than high school)		
High school degree/GED	0.80*	0.82
Some college	0.90	1.01
College degree	0.55***	0.82
Race/Ethnicity (NH White)		
NH Black	1.23	1.12
Hispanic/Other	1.19	1.02
Number of previous chronic conditions	0.94	0.85***

Sample	Men and women: Multivariate interaction All former smokers Model *N* = 8,262	Men and women: Multivariate Interaction Model Recent smokers, those who report ever smoking during HRS study period (*N* = 1,814)
Self-rated health	0.82***	0.95
Died during follow-up	1.55***	1.48***
Interaction variables		
Female (male)	0.93	0.82*
New Illness × Female		
Respondent only × Female	1.87**	2.01**
Partner only × Female	0.92	1.07
Both respondent and partner × Female	2.90*	2.51*

[a] Any new chronic condition includes the following six conditions for which smoking cessation is part of treatment guidelines: hypertension, heart disease, diabetes, lung disease, cancer, stroke.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table A2

Predicted Probabilities (Shown in Percentages With 95% CI) of Stopping Smoking and Starting Smoking, by Gender and New Chronic Illness Reported in the Partnership, *Sample Restricted to Former Smokers*, Health and Retirement Study (1992-2010).

	Starting smoking among former smokers			
	All former smokers		Recent smokers, those who report ever smoking during HRS study period	
Sample	Men	Women	Men	Women
New chronic illness in the partnership				
None reported	2.3 (2.0, 2.5)	2.4 (2.1, 2.7)	17.4 (15.5, 19.2)	16.7 (14.6, 18.8)
Respondent only	1.2 (0.9, 1.6)	2.6 (1.8, 3.4)	8.3 (5.9, 10.7)	14.4 (10.2, 18.6)
Spouse only	2.3 (1.7, 2.9)	2.3 (1.6, 3.0)	14.7 (11.1, 18.4)	14.3 (10.3, 18.3)
Both respondent and partner	1.6 (0.6, 2.6)	5.2 (2.7, 7.6)	9.7 (3.7, 15.8)	22.7 (12.6, 32.8)

Note. Predicted probabilities are calculated from Multivariate Interaction Models on Table A1, holding other covariates at mean levels.

References

Barnoya J, Glantz SA. Cardiovascular effects of secondhand smoke: Nearly as large as smoking. Circulation. 2005; 111:2684–2698. [PubMed: 15911719]

Bennett P. Psychological care for the coronary patient. Journal of Mental Health. 1994; 3:477–484.

Beverly EA, Miller CK, Wray LA. Spousal support and food-related behavior change in middle-aged and older adults living with type 2 diabetes. Health Education and Behavior. 2008; 35:707–720. [PubMed: 17456857]

Burgard SA, Brand JE, House JS. Toward a better estimation of the effect of job loss on health. Journal of Health and Social Behavior. 2007; 48:369–384. [PubMed: 18198685]

Carr D, Springer KW. Advances in families and health research in the 21st century. Journal of Marriage and Family. 2010; 72:743–761.

Clark A, Etile F. Do health changes affect smoking? Evidence from British panel data. Journal of Health Economics. 2002; 21:533–562. [PubMed: 12146590]

Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. Psychological Bulletin. 1985; 98:310. [PubMed: 3901065]

Coyne JC, Smith DAF. Couples coping with a myocardial infarction: Contextual perspective on patient self-efficacy. Journal of Family Psychology. 1994; 8(1):43–54.

Cross S, Markus H. Possible selves across the life span. Human Development. 1991; 34:230–255.

de Walque D. Education, information, and smoking decisions. Journal of Human Resources. 2010; 45:682–717.

Depner CE, Ingersoll-Dayton B. Conjugal social support: Patterns in later life. Journal of Gerontology. 1985; 40:761. [PubMed: 4056334]

DiMatteo MR. Social support and patient adherence to medical treatment: A meta-analysis. Health Psychology. 2004; 23:207. [PubMed: 15008666]

Duncan GJ, Wilkerson B, England P. Cleaning up their act: The effects of marriage and cohabitation on licit and illicit drug use. Demography. 2006; 43:691–710. [PubMed: 17236542]

Durkheim, E.; Spaulding, J.; Simpson, G. Suicide: A study in sociology. Free Press; Glencoe, IL: 1951. (Original work published 1897)

Elder JP, Ayala GX, Harris S. Theories and intervention approaches to health-behavior change in primary care. American Journal of Preventive Medicine. 1999; 17:275–284. [PubMed: 10606196]

Falba T. Health events and the smoking cessation of middle aged Americans. Journal of Behavioral Medicine. 2005; 28:21–33. [PubMed: 15887873]

Falba TA, Sindelar JL. Spousal concordance in health behavior change. Health Services Research. 2008; 43:96–116. [PubMed: 18211520]

Farr, W. Influence of marriage on the mortality of the French people.. In: Hastings, GW., editor. Transactions of the National Association for the Promotion of Social Science. Park; London, UK: 1858. p. 504-513.

Figueiras MJ, Weinman J. Do similar patient and spouse perceptions of myocardial infarction predict recovery? Psychology and health. 2003; 18:201–216.

Fletcher JM, Richards MR. Diabetes's “health shock” to schooling and earnings: Increased dropout rates and lower wages and employment in young adults. Health Affairs. 2012; 31(1):27–34. [PubMed: 22232091]

Giles WH, Croft JB, Keenan NL, Lane MJ, Wheeler FC. The validity of self-reported hypertension and correlates of hypertension awareness among Blacks and Whites within the stroke belt. American Journal of Preventive Medicine. 1995; 39:612–616.

Gove WR. Sex, marital status, and mortality. American Journal of Sociology. 1973; 79(1):45–67.

Heeringa, SG.; Connor, JH. Technical description of the health and retirement survey sample design. 1995. Retrieved from http://hrsonline.isr.umich.edu/sitedocs/userg/HRSSAMP.pdf

Heijmans M, DeRidder D, Bensign J. Dissimilarity in patients’ and spouses’ representations of chronic illness: Exploration of relations to patient adaptation. Psychology and Health. 1999; 14:451–466.

Helgeson VS, Novak SA, Lepore SJ, Eton DT. Spouse social control efforts: Relations to health behavior and well-being among men with prostate cancer. Journal of social and personal relationships. 2004; 21(1):53–68.

Heron, M. *Deaths: Leading causes for 2007* (National Vital Statistics Reports Vol. 59, No. 8).. National Center for Health Statistics; Hyattsville, MD: 2011.

House JS, Landis KR, Umberson D. Social relationships and health. Science. 1988; 241:540. [PubMed: 3399889]

Hu Y, Goldman N. Mortality differentials by marital status: An international comparison. Demography. 1990; 27:233–240. [PubMed: 2332088]

Jaccard, J. Interaction effects in logistic regression. SAGE; London, UK: 2001.

Johansson SE, Sundquist J. Change in lifestyle factors and their influence on health status and all-cause mortality. International Journal of Epidemiology. 1999; 28:1073–1080. [PubMed: 10661650]

Keenan PS. Smoking and weight change after new health diagnoses in older adults. Archives of Internal Medicine. 2009; 169:237. [PubMed: 19204214]

Leventhal H, Weinman J, Leventhal EA, Phillips LA. Health psychology: The search for pathways between behavior and health. Annual Review of Psychology. 2008; 59:477–505.

Lewis FM, Woods NF, Hough EE, Bensley LS. The family's functioning with chronic illness in the mother: The spouse's perspective. Social Science & Medicine. 1989; 29:1261–1269. [PubMed: 2609200]

Lewis MA, Butterfield RM, Darbes LA, Johnston-Brooks CH. The conceptualization and assessment of health-related social control. Journal of Social and Personal Relationships. 2004; 21:669–687.

Lewis MA, McBride CM, Pollak KI, Puleo E, Butterfield RM, Emmons KM. Understanding health behavior change among couples: An interdependence and communal coping approach. Social Science & Medicine. 2006; 62:1369–1380. [PubMed: 16146666]

Lichtenstein AH, Appel LJ, Brands M, Carnethon M, Daniels S, Franch HA, Howard B. Diet and lifestyle recommendations revision 2006. Circulation. 2006; 114(1):82–96. [PubMed: 16785338]

Lichtenstein E, Weiss SM, Hitchcock JL. Task force 3: Patterns of smoking relapse. Health Psychology. 1986; 5(Suppl.):29–40. [PubMed: 3582322]

Lyons, RF.; Sullivan, MJ.; Ritvo, PG.; Coyne, JC. Relationships in chronic illness and disability. SAGE; Thousand Oaks, CA: 1995.

Margolis R. Educational differences in healthy behavior changes and adherence among middle-aged Americans. Journal of Health and Social Behavior. 2013; 54(3)

Mermelstein R, Cohen S, Lichtenstein E, Baer JS, Kamarck T. Social support and smoking cessation and maintenance. Journal of Consulting and Clinical Psychology. 1986; 54:447–453. [PubMed: 3745596]

Newsom JT, Huguet N, McCarthy MJ, Romage-Morin P, Kaplan MS, Bernier J, Oderkirk J. Health behavior change following chronic illness in middle and later life. Journal of Gerontology: Series B Psychological and Social Sciences. 2012; 67:279–288.

Ockene JK, Emmons KM, Mermelstein RJ, Perkind KA, Bonollo DS, Voorhees CC. Relapse and maintenance issues for smoking cessation. Health Psychology. 2000; 19:17–31. [PubMed: 10709945]

Pinto BM, Eakin E, Maruyama NC. Health behavior changes after a cancer diagnosis: What do we know and where do we go from here? Annals of behavioral medicine. 2000; 22(1):38–52. [PubMed: 10892527]

Rajaram SS. Experience of hypoglycemia among insulin dependent diabetics and its impact on the family. Sociology of Health & Illness. 1997; 19:281–296.

RAND Center for the Study of Aging. RAND HRS Data Documentation (Version L). Author; Santa Monica, CA: 2011.

Rogers, RG.; Hummer, RA.; Nam, CB. Living and dying in the USA: Behavioral, health, and social differentials of adult mortality. Academic Press; San Diego, CA: 2000.

Schone BS, Weinick RM. Health-related behaviors and the benefits of marriage for elderly persons. The Gerontologist. 1998; 38:618. [PubMed: 9803650]

Sexton M, Bross D, Hebel JR, Schumann BC, Gerace TA, Lassner N, Wright N. Risk factor changes in wives with husbands at high risk of coronary heart disease (CHD): The spin off effect. Journal of Behavioral Medicine. 1987; 10:251–261. [PubMed: 3612782]

Siegler, IC.; Kaplan, BH.; Von Dras, DD.; Mark, DB. Cardiovascular health: A challenge for midlife.. In: Willis, SL.; Reid, JD., editors. Life in the middle: Psychological and social development in middle age. Academic Press; San Diego, CA: 1999. p. 148-160.

Smith KP, Christakis NA. Social networks and health. Annual Review of Sociology. 2008; 34:405–429.

Umberson D. Family status and health behaviors: Social control as a dimension of social integration. Journal of Health and Social Behavior. 1987; 28:306–319. [PubMed: 3680922]

Umberson D. Gender, marital status and the social control of health behavior. Social Science & Medicine. 1992; 34:907–917. [PubMed: 1604380]

Waite, LJ.; Gallagher, M. The case for marriage: Why married people are happier, healthier, and better off financially. Broadway Books; New York, NY: 2001.

Waldron I, Lye D. Family roles and smoking. American Journal of Preventive Medicine. 1989; 5(3): 136–141. [PubMed: 2787160]

Wooldridge, JM. Econometric analysis of cross section and panel data. 2nd ed.. MIT Press; Cambridge, MA: 2010.

Wray LA, Herzog AR, Willis RJ, Wallace RB. The impact of education and heart attack on smoking cessation among middle- aged adults. Journal of Health and Social Behavior. 1998; 39:271–294. [PubMed: 9919852]

Table 1

Characteristics of the Analytic Sample, Health and Retirement Study (1992-2010).

	Men	Women	
	N = 9,322	*N* = 9,071	Men vs. Women[a]
Changes in smoking (1992-2010)			
% at risk of smoking cessation during study[b]	25.3	19.6	**
% smokers who stop smoking	51.6	45.4	**
% smokers who do not stop smoking	48.4	54.6	**
% At risk of starting smoking during study[c]	89.4	90.4	*
% starts smoking	6.7	4.4	**
% does not start smoking	93.3	95.6	**
New chronic conditions (1992-2010)			
Reports at least one new chronic condition	55.5	46.2	**
Partner reports at least one new chronic condition	43.6	54.0	**
Age at first interview, mean (*SD*)	60.1 (8.8)	58.2 (8.6)	**
Educational attainment			**
Less than high school	24.8	20.8	
High school degree/GED	31.8	39.6	
Some college	20.1	22.5	
College degree	23.3	17.0	
Race/ethnicity			
Non-Hispanic White	77.6	78.2	
Non-Hispanic Black	11.5	11.1	
Hispanic/other	10.9	10.7	
Self-rated health (at first interview)			**
Excellent	20.1	19.9	
Very good	27.9	30.9	
Good	30.7	29.0	
Fair	14.6	14.6	
Poor	6.7	5.6	
Number of existing chronic conditions (at first interview)			**
None	47.7	53.4	
One	33.1	31.9	
Two	13.9	11.1	
Three or more	5.2	3.5	
Reported dead during follow-up	30.5	18.3	**

Note. Source: RAND Health and Retirement Study.

[a]Results of chi square and *t* test that test for differences between men and women.

[b] This sample is comprised of respondents who report ever smoking during the study period. This is the group among which smoking cessation is examined.

[c] This sample is comprised of respondents who report not smoking during the study period. This is the group among which starting smoking is examined.

* $p < .05$.

** $p < .01$.

Table 2

Odds Ratios From Logistic Regression Models Predicting Smoking Cessation Among Smokers, Health and Retirement Study (1992-2010).

	Men	Men	Women	Women	Men and Women
	Bivariate	Multivariate	Bivariate	Multivariate	Multivariate
N = 2,148		*N* = 1,651		*N* = 3,799	
New chronic illness in the partnership[a] (None)					
Respondent only	2.71***	2.75***	2.11**	2.01***	2.67***
Spouse only	0.78*	0.76*	1.27**	1.25*	0.75*
Both respondent and partner	2.35***	2.32***	2.67***	2.55***	2.25***
Control variables					
Age	1.01**	1.01*	1.03***	1.02**	1.01***
Education (Less than high school)					
High school degree/GED	1.11	1.15	0.93	1.12	1.12
Some college	1.19	1.25*	1.19	1.49**	1.33***
College degree	1.22	1.28*	1.34	1.76**	1.43***
Race/Ethnicity (NH White)					
NH Black	1.06	1.14	1.20	1.24	1.18*
Hispanic/Other	1.10	1.23	1.64***	1.82***	1.42***
Number of previous chronic conditions	1.09**	1.09*	1.20***	1.14**	1.12***
Self-rated health	0.98**	1.01	0.86***	0.94**	0.98
Died during follow-up	0.91	0.81**	1.21	1.11	0.89
Interaction variables					
Female (male)					0.88
New Illness × Female					
Respondent only × Female					0.78*
Partner only × Female					1.66**
Both respondent and partner × Female					1.18

[a] Any new chronic illness includes the following six conditions for which smoking cessation is part of treatment guidelines: hypertension, heart disease, diabetes, lung disease, cancer, and stroke.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Predicted Probabilities (Shown in Percentages With 95% CI) of Stopping Smoking and Starting Smoking, by Gender and New Chronic Illness Reported in the Partnership, Health and Retirement Study (1992-2010).

	Smoking cessation among smokers		Starting smoking among nonsmokers	
	Men	**Women**	**Men**	**Women**
New chronic illness in the partnership				
None reported	15.3 (14.2, 16.3)	13.1 (12.0, 14.3)	1.5 (1.3, 1.6)	0.9 (0.8, 1.0)
Respondent only	33.1 (30.2, 35.9)	24.3 (21.1, 27.6)	0.9 (0.6, 1.1)	1.0 (0.7, 1.3)
Spouse only	12.3 (9.8, 14.8)	16.1 (13.4, 18.8)	1.5 (1.1, 1.9)	0.9 (0.6, 1.1)
Both respondent and partner	30.0 (22.5, 37.3)	28.9 (21.2, 36.6)	1.1 (0.4, 1.8)	2.0 (1.0, 2.9)

Note. Predicted probabilities are calculated from Multivariate Interaction Model on Tables 2 and 4, holding other covariates at mean levels.

Table 4

Odds Ratios From Logistic Regression Models Predicting Starting Smoking Among Nonsmokers,[a] Health and Retirement Study (1992-2010).

	Men	Men	Women	Women	Men and Women
	Bivariate	Multivariate	Bivariate	Multivariate	Multivariate
N = 7,700		*N* = 7,614		*N* = 15,314	
New chronic illness in the partnership[b] (None)					
Respondent only	0.60**	0.56***	1.14	1.08	0.58***
Spouse only	1.05	1.11	0.97	1.02	1.12
Both respondent and partner	0.80	0.76	2.21**	2.32**	0.78
Control variables					
Age	0.94***	0.93***	0.94***	0.93***	0.93***
Education (Less than high school)					
High school degree/GED	0.78*	0.80	0.59***	0.68*	0.74**
Some college	0.91	0.93	0.77	0.89	0.90
College degree	0.42***	0.48***	0.40***	0.49**	0.47***
Race/Ethnicity (NH White)					
NH Black	1.63***	1.19	1.28	0.91	1.08
Hispanic/Other	1.22	0.85	1.66**	1.15	0.97
Number of previous chronic conditions	0.97	0.93	1.11	1.10	0.99
Self-rated health	0.79***	0.77***	0.81***	0.90	0.82***
Died during follow-up	1.46***	1.52***	2.10***	2.23***	1.73***
Interaction variables					
Female (male)					0.55***
New Illness × Female					
Respondent only × Female					1.81**
Partner only × Female					0.91
Both respondent and partner × Female					2.82**

[a] Sample of nonsmokers includes all respondents who did not smoke in the previous wave. This includes never smokers and former smokers.

[b] Any new chronic illness includes the following six conditions for which smoking cessation is part of treatment guidelines: hypertension, heart disease, diabetes, lung disease, cancer, and stroke.

* $p < .05$.

** $p < .01$.

*** $p < .001$.