

IN SICKNESS OR IN HEALTH: COUPLES' HEALTH STATUS
AND RETIREMENT PREPARATION

by

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ABSTRACT

This study examines retirement preparation activities among a sample of University of Utah employees as predicted by past diagnoses for one of six major diseases among respondents and their spouses. This research combines data from the University of Utah Retirement Planning Survey (UURPS) with medical records from the Utah Population Database (UPDB). As a measure of retirement preparation, this study examines self-reported retirement planning behaviors and total wealth accumulation in the UURPS. The UPDB provides data on the respondents' and their spouses' health histories. The availability of objective health measures from the UPDB provides an advantage over self-reported health status measures by using official diagnoses.

The study examines health-related differences in retirement preparation in four domains: (1) meeting with an advisor, (2) opening a supplemental retirement account, (3) figuring retirement financial needs, and (4) total wealth accumulation. Health history of the respondent and spouse are measured in terms of hospitalizations since 1996 for ischemic heart disease, cerebrovascular disease (stroke), chronic obstructive pulmonary disease (COPD), diabetes, and cerebral degenerations. A health history of cancer is measured both in terms of hospitalizations and diagnoses from the cancer registry dated back to 1966.

The results of multivariate regressions indicate that those who have been diagnosed or whose spouse has been diagnosed with cancer are more likely to see an

advisor and open a supplemental retirement account. For females whose spouse had been diagnosed with cancer, there was a decrease in total retirement wealth of \$67,600 compared to couples in which a cancer diagnosis had not occurred. The association between cancer diagnosis and retirement behaviors and savings could be greater in the general population due to the generous nature of the employee benefits available at the University of Utah, including both excellent health insurance with low out-of-pocket maximums and generous employer retirement participation. Implications for financial planners are discussed along with suggestions for further research based on the results of this exploratory study.

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CHAPTER I

INTRODUCTION

In recent years, individuals in the United States have become more responsible for the financial aspects of their retirement planning. Many employers have shifted from defined benefit to defined contribution plans requiring the employee rather than the employer to determine the investment allocation strategy and the adequacy of retirement savings (EBRI, 2010). Additionally, the ability of the government to sustain the level of Social Security and Medicare benefits retirees currently enjoy has been cast into doubt as the trust funds for these programs will be exhausted by 2033 and 2024, respectively, suggesting that an increase in taxes or a reduction in benefits will be necessary ("The 2012 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds," 2012; "2012 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds," 2012). Finally, increased life expectancy has created a need for additional savings to cover the longer time period spent in retirement. All of these trends have heightened personal responsibility in retirement preparation and created a need to understand the many variables that may impede or facilitate a successful retirement process.

Individual financial decisions are rarely made in isolation but instead take place in a familial context. For couples, decisions regarding how to prepare adequately for

retirement or when to retire are likely determined in response to household circumstances such as the health, work decisions, retirement plan opportunities, and care-giving responsibilities of both partners. The health status of each partner may influence retirement planning in a variety of potentially contradictory ways. For example, if one partner has a serious health problem, one or both partners may work longer and save more for retirement as a means of covering higher than average projected household medical expenses. Conversely, a history of health problems may trigger high health care expenditures and divert resources that would have been used for retirement savings leading to inadequate retirement wealth. Additionally, health problems may prevent full-time work and the associated benefits such that participation in a retirement plan is not available for one or both members of the couple (Lum & Lightfoot, 2003).

The exploratory study reported here examines the possible influences of own and spouse's health on retirement planning behaviors and wealth accumulation. I aim to assess if the retirement preparation efforts of healthy couples differ significantly from the efforts of couples in which one or both partners has been diagnosed with a serious health problem. Data for this study are derived from the University of Utah Retirement Planning Survey (UURPS), which has been linked to health information in the Utah Population Database (UPDB). Financial planners and educators along with social policy makers will benefit from the information presented in this study as they determine stages of retirement planning requiring support and intervention, especially for those households experiencing significant health issues.

CHAPTER II

LITERATURE REVIEW

The retirement process encompasses the entire life span. Retirement preparation begins, ideally, early in a person's work life and continues until the decision to retire has been made. The retirement process then continues throughout the retirement years. Retirement preparation is a complex task requiring the need to understand various investment options combined with assessing how much to save based on assumptions about the future. Couples may find it challenging to forecast future rates of inflation, at what ages they will retire, how long they will each live, or what their health will be like in the future. Although retirement needs are complicated to estimate and competing financial needs make accumulation difficult, household retirement preparation has a huge impact on personal retirement satisfaction (Schellenberg, Turcotte, & Ram, 2005). As the population of the United States ages and a large group of retirees begins to draw Social Security and Medicare benefits, household preparation will also become an important policy interest (Hershey & Mowen, 2000; Lusardi & Mitchell, 2005; Noone, Stephens, & Alpass, 2009). Understanding how well the population is doing in terms of retirement preparation and what influences the ability to prepare is therefore both timely and important.

Studies focusing on financial preparation for retirement are divided into two broad categories – financial behaviors and wealth accumulation. Specific behaviors

important to retirement preparation include setting goals, calculating how much money will be needed, acquiring information from extended family members and friends, and meeting with a professional financial planner. For instance, a study by Petkoska and Earl (2009) suggests that those who set goals do significantly better in planning and saving. Lusardi (2000) finds that talking to family members such as older siblings or parents informs understanding of the complex planning necessary for retirement preparation (Lusardi, 2000).

The other broad measure for successful retirement preparation is the adequacy of retirement wealth accumulation, including the amounts represented by pensions, supplemental retirement accounts, and savings accounts (Lusardi, 2000; Noone, Stephens, & Alpass, 2010). Wealth accumulation may demonstrate an active involvement in preparation for retirement and the successful implementation of goals. Households where no planning has taken place have lower wealth holdings than households where some retirement plans have been made (Lusardi, 2008). Another study using wealth accumulation as a measure for retirement preparation suggests that either formal planning or following a rule of thumb such as contributing a percentage of income to a 401K results in a higher retirement wealth accumulation than an unsystematic approach to savings (Binswanger & Carman, 2012).

Previous studies have identified several socio-demographic variables that are associated with retirement preparation, including age, gender, education, and income. These variables will be controls in this study. One study shows that increasing age is correlated with higher 401k participation (Bassett, Fleming, & Rodrigues, 1998). In another study, savings continue to accumulate as age increased (Glass & Kilpatrick,

1998). Being older is also related to greater financial planning, especially as the expected retirement age nears (Noone et al., 2010; Petkoska & Earl, 2009). Men have been found to save more than women in several studies for differing reasons. Women often have interrupted career paths because of nurturing or care-giving responsibilities.

Consequently, they may not have employment that offers retirement benefits, or they may have lower earnings (Davey, 2008; Glass & Kilpatrick, 1998). One study found the defined contribution wealth for men to be twice that of their wives (\$32,000 vs. \$15,000) and their annual earnings were similarly higher at \$46,000 compared to \$29,000 (Van Houtven & Coe, 2010). Higher education is highly correlated with higher income providing more resources available for savings. However, when income is held constant, higher education is associated with being more knowledgeable about the importance of saving for retirement and making wise retirement investments (Kalwij & Vermeulen, 2008; Kerkhofs, Lindeboom, & Theeuwes, 1999; Noone et al., 2009).

Many studies have examined the link between financial knowledge and retirement preparation. Often financial knowledge is measured by asking respondents about basic financial principles such as compound interest, the effects of inflation, and investing. Financial knowledge has been linked to both better retirement preparation and better decision-making quality (Hershey & Mowen, 2000; Lusardi & Mitchell, 2007b, 2009; Petkoska & Earl, 2009; Topa, Moriano, & Moreno, 2012; Wiggins & Henderson, 1996). In a study by van Rooij et al. (2012), two channels are identified through which financial literacy affects wealth accumulation even after controlling for many determinants of wealth. First, financial knowledge increases stock market participation such that individuals are willing to take more risk and then benefit from the equity premium.

Second, financial literacy is positively related to developing a savings plan, which has also been shown to increase accumulation (van Rooij, Lusardi, & Alessie, 2012).

Very few studies have looked in detail at how health status of couples affects the retirement preparation although health status has been shown to be an important determinate in decisions made near or during retirement. One study suggests that better health predicts higher retirement confidence (Kim, Kim, & Anderson, 2005). Several studies have shown there is a connection between health and retirement preparation in the sense that disease may force withdrawal from work, thereby affecting both the number of years a person is able to work and the contributions the person makes to a pension system (McGarry, 2004; Shultz & Wang, 2007; Topa et al., 2012). Being in fair health is associated with an expected probability of continued work that is 8.2 points lower than for someone in excellent health, holding other factors constant. Moreover, poor health is linked to an 18% lower probability of continuing to work compared to an otherwise similar individual who reports excellent health (McGarry, 2004).

Many studies assess the effect of health status of couples nearing retirement in regards to retirement timing decisions and they find that health has a significant effect on the decision to retire (Datta Gupta & Larsen; Kerkhofs et al., 1999; McGarry, 2004; McGeary, 2009; Shultz & Wang, 2007). As the health of one or both members of a couple declines, health may become more influential in retirement-timing plans than economic variables because of a decreasing ability to work (Bound, Stinebrickner, & Waidmann, 2010). Some studies have shown that disease forces withdrawal from work and becomes the most important determinant of retirement timing even at younger ages (Hershey & Mowen, 2000; Shultz & Wang, 2007). While these studies are helpful in

recognizing the important determinants of preparedness at the time of retirement, they do not fully inform the choices couples make with regard to retirement preparation activities earlier in life.

The only study to date that highlights the role of health status during the retirement preparation years was completed by Lum and Lightfoot (2003). Their study consists of respondents over 50 years of age in the nationally representative Health and Retirement Study (HRS). Availability of an employer-sponsored retirement plan and contributions to an IRA are assessed with regards to self-reported health status using the HRS data. For those with poor health, working enough hours to be eligible for an employer-sponsored retirement plan or having enough money to contribute to an IRA can be a challenge. In general, their findings suggest that health does matter for retirement savings. Own health has a large, significant effect on IRA participation and spouse's health has a large significant effect on a person's access to an employer-sponsored pension and IRA participation (Lum & Lightfoot, 2003).

Health status varies greatly among people and is difficult to measure precisely and without bias. To be reliable, health measurement must be consistent across repeated measures (Carmines & Zeller, 1979). The difficulty with self-reported health measures is that subjective evaluations may vary at different times, and with different understanding of scale levels. The health measure must also be valid in that it measures what it is supposed to measure rather than reflecting some other phenomenon such as claiming poor health as a justification for retirement (Carmines & Zeller, 1979). Some individuals may also report poor health status and work limitations in an effort to get disability benefits (Bound, 1991; Dwyer & Mitchell, 1999; McGarry, 2004).

Recent studies combine self-reported health with questions that are specifically aimed at disease diagnosis and/or limitations in work capacity in an effort to more accurately define health status (Dwyer & Mitchell, 1999; Kalwij & Vermeulen, 2008; Kerkhofs et al., 1999; McGarry, 2004; McGeary, 2009; Shultz & Wang, 2007).

Although these types of questions attempt to confine answers to factual health history and minimize subjective rationalizations, they are still self-reported and subject to error and bias. A study by Baker et al. (2004) finds that there is considerable error in the reporting of specific ailments when compared to actual medical records (Baker, Stabile, & Deri, 2004). In the present study, health status will be measured directly from actual medical records, allowing for a more valid and reliable measurement of disease diagnosis.

In summary, a great deal of research has been done in recent years in an effort to understand the retirement process. Some work has involved demographic variables to determine segments of the population that are successfully or unsuccessfully preparing for retirement. Other researchers have studied the importance of financial literacy and its role in retirement preparation. Virtually all of these studies treat preretirees as individuals rather than as members of a couple. While the role of couples is acknowledged in many studies of retirement timing decisions, these studies typically examine only people beyond the age of 50 and ignore retirement preparation that may long predate the retirement timing decision. In the current study, I will add to the literature by comparing the retirement preparation of healthy couples and those where one or both spouses have had a serious disease diagnosis. Data for this study include workers as young as 40 years old, allowing a more full analysis of retirement preparation across the life span. Further, the current study aims to distinguish diagnosis timing and

types of disease diagnoses, each of which may affect retirement preparation among couples in its own fashion. The use of objective health measures from administrative records provides advantages over self-reported health status, both in terms of identifying official diagnoses and age at diagnosis.

CHAPTER III

FRAMEWORK AND EMPIRICAL MODEL

The retirement planning process is extremely complex, affected by many demographic, educational, psychological, and health factors. Figure 1 shows a conceptual model of the retirement process based on a synthesis of previous research. Specific studies typically focus on only a few of the concepts in the overall model. With respect to retirement preparation *per se*, the model distinguishes financial behaviors and

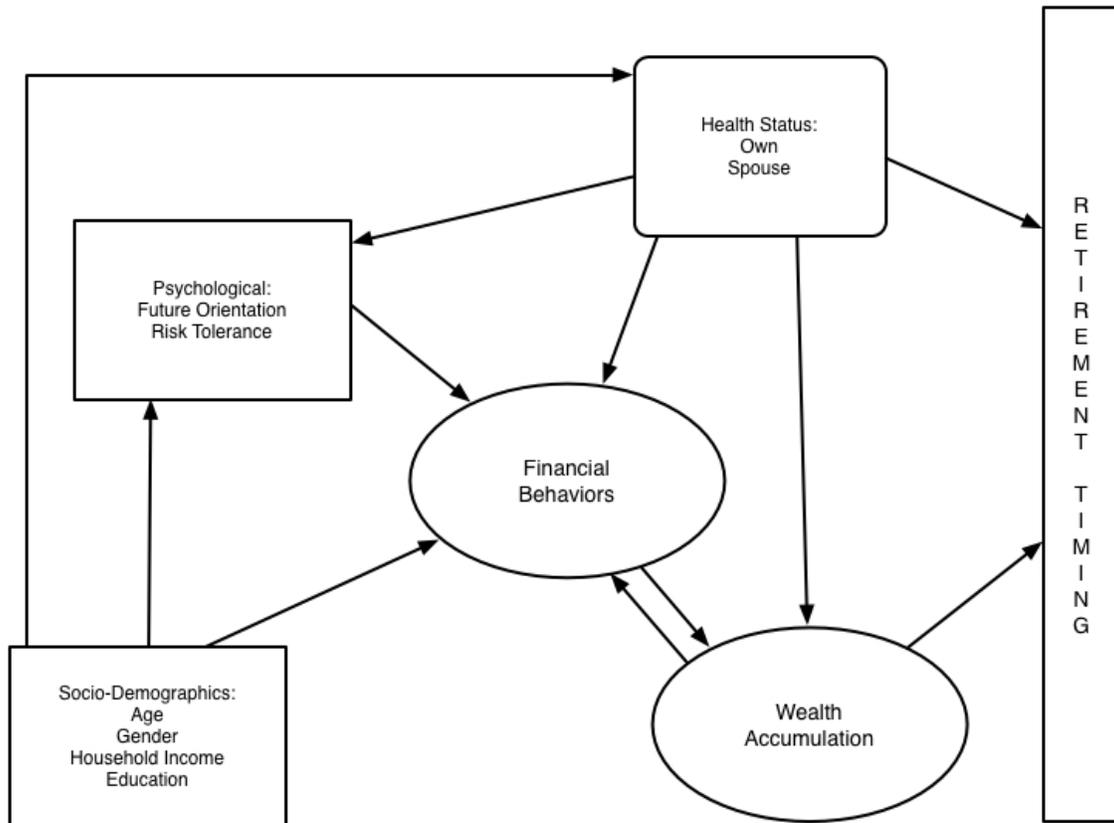


Figure 1. The Retirement Preparation Process

wealth accumulation (Bernheim, Skinner, & Weinberg, 2001; Hershey & Mowen, 2000; Lusardi & Mitchell, 2007; McGeary, 2009; Noone et al., 2010; Petkoska & Earl, 2009) The two components of retirement preparation are influenced directly and indirectly by many other factors, some of which may influence each other. In turn, these components are key determinants of decisions regarding whether and when to retire.

Although the above conceptual model highlights the many exogenous and endogenous variables that are hypothesized to influence retirement preparation, it includes many factors that are beyond the scope of this analysis. Not only do we lack measures of some of these variables, but modeling the many possible relationships among them would be premature given the state of the research literature. Accordingly, the empirical model focuses on a full set of hypothetical relationships between health status of spouses and retirement preparation while controlling for other exogenous factors that have been consistently linked to retirement preparation in the literature. These factors include psychological factors such as time preference and risk tolerance, and selected socio-demographic characteristics of the respondent.

The empirical analysis reported here is guided by the framework presented in Figure 2. Simplifying the model in this way does create some limitations specifically related to the many possible influencing factors that cannot be considered. Alternatively, the strength of this framework is its recognition that retirement decisions are made in a familial setting influenced by the circumstances within the household involving the health status of each spouse. Although health status has been studied as a determinant of retirement timing, very little work has been done to examine how health problems throughout the lifespan affect retirement preparation activities. Most couples do not

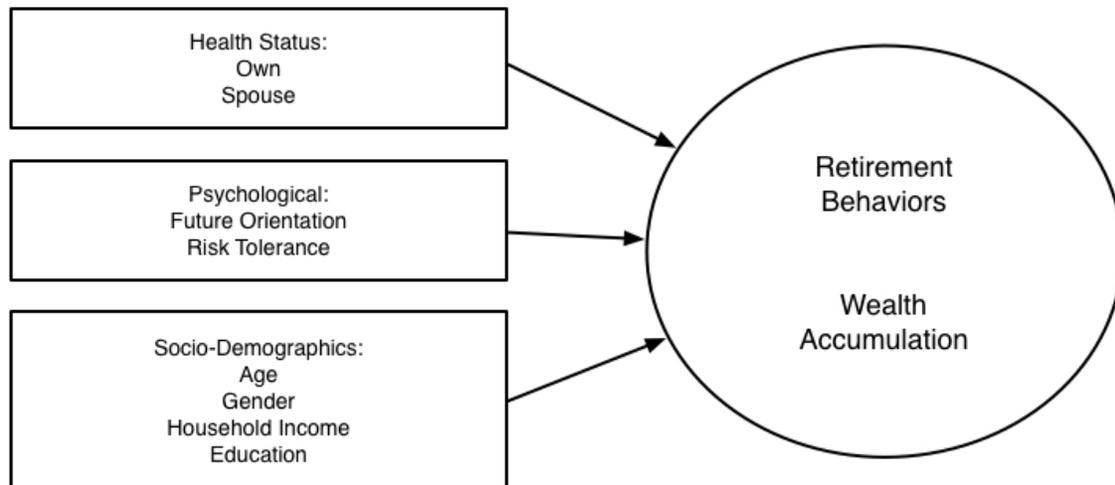


Figure 2. Retirement Preparation Empirical Model

experience a serious health diagnosis before the age of 40 so this study will focus on couples where the respondent is age 40 or older to determine if disease affects their retirement behaviors and wealth accumulation during the retirement preparation years.

To the extent that a disease diagnosis requires the expenditure of both time and financial resources, I hypothesize that couples who have experienced health events will be less prepared for retirement compared to healthier couples.

To the extent that a serious disease diagnosis places additional burdens on a couple specifically related to their ability to work, their financial resources, and their time, I propose the following hypotheses:

Hypothesis 1: A serious disease diagnosis within a couple will compete for their time, reducing financial behaviors, thereby reducing retirement preparation activities such as the likelihood that they have seen an advisor, opened a supplemental account, or calculated the funds needed for retirement relative to disease-free couples.

Hypothesis 2: A serious disease diagnosis within a couple will compete for their financial resources, thereby reducing the total amount they have accumulated for retirement relative to disease-free couples.

Hypothesis 3: Because husbands typically earn more money than their wives and because they typically have a stronger labor force attachment than their wives, the impact of poor health on retirement preparation will be more extensive when experienced by the husband than when experienced by the wife.

Hypothesis 4: Diseases that are ongoing and require more medical attention and hospitalizations will more severely impact both wealth accumulation and retirement behaviors than isolated health problems that do not require ongoing care.

CHAPTER IV

DATA DESCRIPTIONS

The Data

Unique data from two sources are linked to test the hypotheses posed in the current study. Information on retirement preparation behaviors comes from University of Utah Retirement Planning Survey (UURPS). The UURPS was designed to assess University of Utah employees' retirement planning knowledge, priorities, perceptions, and behaviors in the aftermath of the economic recession of 2008-09.

All University of Utah benefits-eligible employees with valid email addresses ($N=9,747$) were invited to participate online in the UURPS during October 2009. Publicity efforts and participation incentives resulted in 3,000 people submitting completed surveys for an overall cooperation rate of 32.1%. Sixty-five percent of the 3,000 UURPS respondents are female and the median respondent age is 44 years. As a point of comparison, as of October 2009, 58% of all university employees were female and the median employee age was approximately 42. Thus, the survey respondents generally reflect the larger population of university benefits-eligible employees in terms of gender and age.

Detailed clinical data on the employee and her/his spouse come from the Utah Population Database (UPDB). The UPDB is a shared research resource located at the

University of Utah. For 35 years, researchers have used this resource to identify and study health issues within a family context. The central component of UPDB is an extensive set of Utah family histories, in which family members are linked to demographic (i.e., birth, death, marriage, and divorce records) and medical information. Central to the current investigation, the UPDB includes state-wide medical information on cancer diagnoses, hospital inpatient discharges, and causes of death. Most families living in Utah are represented in the UPDB, and individuals in the same family pedigrees are linked to one another with their familial relationship identified.

In accordance with the University's Institutional Review Board, consent for linkage was requested of the 2,795 respondents who provided contact information when completing the UURPS survey. Of those, 81 declined and of the 2,714 who agreed to be part of the study, 2,669 respondents linked to one or more data sources in the UPDB, for a linkage rate of 98.3%. Linkage of the UURPS survey data to UPDB records was done by the Pedigree and Population Resource (PPR) staff at the Huntsman Cancer Institute and a de-identified file was returned to the researchers for analysis.

For the purposes of this current analyses, the sample is further restricted to those UURPS respondents who are married or widowed, linked to a spouse, and age 40 and over. The sample used to examine retirement behaviors included 668 female respondents and their spouses and 446 male respondents and their spouses. The sample used to examine total retirement wealth was further limited by the number of respondents who did not answer the question or answered they did not know or were not sure of the total amount they had saved for retirement. This sample consists of 506 female respondents

and their spouses and 397 male respondents and their spouses. See Table 1 for descriptive statistics of the two sample groups.

Variable Specification

Four dependent variables are utilized in this analysis. Measurement of retirement preparation has been assessed in past studies either by evaluating retirement preparation behaviors or total wealth accumulation. From previous research, three behaviors that have been shown to make a significant difference in retirement preparation are seeing an advisor, opening a supplemental retirement account, and calculating funds needed for retirement. This study will measure these retirement preparation behaviors based on the following questions:

1. *Have you met with a financial planner in the previous two years?*
2. *Some employees have supplemental retirement accounts such as tax sheltered annuities (i.e., 403(b) account), public deferred compensation plans (i.e. 457(b) account), traditional IRAs, and Roth IRAs. These are voluntary tax-deferred savings accounts that let you put away money for retirement beyond what you might have in your primary retirement account. Please indicate whether you personally have each of the following supplemental accounts: 403(b) account through the University of Utah, 457(b) account through the University of Utah, traditional Individual Retirement Accounts (IRA), Roth Individual Retirement Account (IRA) or Other.*

Table 1. Descriptive Statistics

		Behaviors				Total Retirement Wealth			
		Females		Males		Females		Males	
Variable	Definition	Mean/ Prop.	<i>SD</i>	Mean/ Prop.	<i>SD</i>	Mean/ Prop.	<i>SD</i>	Mean/ Prop.	<i>SD</i>
advisor2yrs	Have seen an advisor within the last two years 1=yes; 0=no	0.47		0.50					
supplement	Do you have any supplemental retirement accounts 1=yes; 0=no	0.77		0.75					
figured needs	Have you figured how much money you will need in retirement 1=yes; 0=no	0.51		0.67					
tot_ret_savigs	total retirement savings divided by \$10,000					23.58	36.37	50.59	59.72
age	age in years	51.63	6.72	53.01	7.67	51.22	6.76	53.13	7.78
education	years of education	16.03	2.30	17.47	2.31	16.24	2.33	17.67	2.22
children	number of children	2.20	1.82	2.82	2.00	2.10	1.67	2.77	1.94
income	household income divided by \$10,000	10.45	5.05	11.85	5.62	10.71	5.10	12.17	5.72
db plan	Respondent has a defined benefit plan 1=yes; 2=no	0.28	0.45	0.17	0.38	0.23	0.42	0.15	0.36
risk	Risk tolerance 1=none; 2=avg; 3=above avg; 4=substantial	2.16	0.65	2.42	0.66	2.22	0.63	2.44	0.67
future-oriented	Will hold off receiving a prize for one year for more money 1=yes; 0=no	0.38	0.49	0.52	0.50	0.41	0.49	0.54	0.50
cancer-resp.	has respondent ever been hospitalized for cancer 1=yes; 0=no	0.07	0.26	0.07	0.25	0.08	0.27	0.07	0.26
cancer-sp.	has the respondent's spouse ever been hospitalized for cancer 1=yes; 0=no	0.03	0.18	0.06	0.23	0.03	0.18	0.06	0.23
all other-resp	has the respondent ever been hospitalized for heart, diabetes, cvs, copd or cerebral 1=yes; 0=no	0.03	0.18	0.06	0.23	0.03	0.17	0.06	0.23

Table 1. (cont.)

		Behaviors				Total Retirement Wealth			
		Females		Males		Females		Males	
Variable	Definition	Mean/ Prop.	<i>SD</i>	Mean/ Prop.	<i>SD</i>	Mean/ Prop.	<i>SD</i>	Mean/ Prop.	<i>SD</i>
all other-sp	has the respondent's spouse ever been hospitalized for heart, diabetes, cvs, copd or cerebral 1=yes; 0=no	0.06	0.23	0.03	0.16	0.05	0.21	0.03	0.16
widowed	has the respondent's spouse died 1=yes; 0=no	0.05	0.22	0.01	0.12	0.04	0.20	0.02	0.12
diagb440dum	was the respondent diagnosed for any disease before age 40 1=yes; 0=no	0.02	0.14	0.02	0.14	0.02	0.15	0.02	0.14
time_first_diag	how many years have passed since the first diagnosis	1.16	3.89	1.03	3.00	1.18	4.00	0.99	3.00
		<i>N</i> =668		<i>N</i> =446		<i>N</i> =506		<i>N</i> =397	

3. *With or without the help of a financial advisor, have you (or your spouse/partner) tried to figure out how much money you will need to have saved by the time you retire so that you can live comfortably in retirement?*

All three of these behavior variables have a value equal to 1 if the respondent has completed the task or a value of 0 if the respondent has never completed the behavior. In the case of seeing an advisor, the task has been completed in the previous 2 years.

Retirement preparation has also been measured in terms of total wealth accumulation in previous studies. This study will measure wealth accumulation with the following question:

1. *What is the total amount of money currently in all of the accounts dedicated to your retirement? This includes money that you have contributed as well as any contributions from your employer and returns from your investments.*

The respondents were given 12 levels of savings accumulation to choose from in identifying their total amount dedicated to retirement savings amount as shown below:

*Less than \$1,000
 \$1,000 to \$9,999
 \$10,000 to \$24,999
 \$25,000 to \$49,999
 \$50,000 to \$99,999
 \$100,000 to \$149,999
 \$150,000 to \$199,999
 \$200,000 to \$249,999
 \$250,000 to \$499,999
 \$500,000 to \$999,999
 \$1 million to \$2 million
 \$2 million +
 Don't know/Not sure*

Total retirement wealth was initially a categorical variable. To make the variable continuous, all amounts within a given close-ended category range were assigned to the

midpoint of that category and then divided by \$10,000 for ease in interpreting the results. Since the highest income category is top-coded (i.e., \$2 million or above), the highest category was assigned to \$2.5 million and then divided by \$10,000. Only 4 women had savings in the top category, comprising just 0.79% of the women in this sample while 16 men or 4.03% of the men in the sample had savings in this top category. Table 2 contains a complete list of the dependent variables.

Independent variables used in these analyses are based on those factors that have been shown to affect retirement preparation behaviors and wealth accumulation in previous studies, including demographics and psychological factors. Independent variables in these categories consist of age, years of education, household income, acceptance of risk, and future-orientation.

AGEC is the centered age of the respondent created by subtracting the mean age of 53 for women or 52 for men from the actual age. AGECSQ is the centered age of the respondent squared. Because AGECSQ is also one of the regressors, AGECSQ is used to avoid multicollinearity. EDUC was initially a categorical question measuring the amount of education a respondent has achieved with the following question:

What is the highest grade you have completed?

1. *Grade school or elementary school*
2. *Some high school*
3. *High school graduate*
4. *Technical or vocational school*
5. *Some college*
6. *Bachelor's degree*
7. *Master's degree*
8. *JD*
9. *Ph.D.*
10. *MD*

Table 2

Definitions of Dependent Variables Used in the Analysis

Dependent Variable	Description of Variable	Measurement
Met with an advisor in the past 2 years (advisor2yrs)	Whether the respondent has met with a financial advisor in the past 2 years	1=Has met with an advisor 0=Otherwise
Has opened a supplemental retirement account (supplement)	Whether the respondent has opened a supplemental retirement account such as a 403b, 457b, traditional IRA, Roth IRA, or other	1=Has opened a supplemental account 0=Otherwise
Has figured out how much money will be needed in retirement (figneeds)	Whether the respondent has with or without the help of a financial advisor, figured out how much money will be needed to live comfortably in retirement.	1=Has figured retirement needs 0=Otherwise
The total amount of money currently dedicated to retirement (tot_retirement)	The total amount of money currently in all of the accounts dedicated to the respondent's retirement, including amounts both the respondent and employer have contributed and any returns from investments	Respondents identified their total savings among 12 categories which were set to their midpoint value and then divided by \$10,000

EDUC was then recoded to the number of years of education it takes to complete each of these levels (i.e., high school graduate = 12, bachelor's degree = 16, Ph.D. = 20) to create a continuous variable measuring the years of education the respondent has completed.

Household income rather than respondent income is measured in the survey initially as a categorical variable. INCOME is derived from the following question:

What is your annual household income before taxes?

*Under \$10,000
 \$10,000 - \$19,999
 \$20,000 - \$29,999
 \$30,000 - \$49,999
 \$50,000 - \$74,999
 \$75,000 - \$99,999
 \$100,000 - \$124,999
 \$125,000 - \$149,000
 \$150,000 - \$174,999
 \$175,000 - \$199,999
 \$200,000 or over*

Incomes within a given closed-ended category range were assigned the midpoint of that category and then divided by \$10,000. The highest income category is top-coded (i.e., \$200,000 or over) and was set to \$225,000. For the sample used to analyze retirement preparation behaviors, there were 66 men (14.8%) and 44 women (6.59%) in this top category. In the sample used to analyze total retirement wealth, there were 64 men (16.12%) and 38 women (7.51%) in the top category. Missing data were set at the mean household income of the full unrestricted sample or \$87,488. The retirement behaviors sample had missing data set to the mean for 7 men (1.57%) and 16 women (2.4%). Among the total retirement wealth sample, missing data set to the mean included 1 man (0.25%) and 2 women (0.40%).

Psychological factors were measured with variables representing acceptance of financial risk and future orientation. Acceptance of financial risk is measured with a question taken from the *1983 Survey of Consumer Finances: Technical Manual and Codebook*. This question has been used in many studies to assess risk tolerance (Avery & Elliehausen, 1985). The question from the survey is as follows:

Which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make investments?

1. *Take substantial financial risks expecting to earn substantial returns*
2. *Take above average financial risks expecting above average returns.*
3. *Take average financial risks expecting to earn average returns*
4. *Not willing to take any financial risks.*

The variable RISK is reverse coded 1 through 4 with 1 representing an unwillingness to take any risk and 4 representing a willingness to take on higher risk to achieve higher returns.

Whether a person is future-oriented or present-oriented has been shown in previous studies to predict retirement preparation. Future- or present-orientation has been measured with a question taken from the Health and Retirement Survey Module 2 (HRS, 2004) as follows:

Suppose that you won a prize that is worth \$1,000 if you take it today. You could wait one year to claim the prize and be guaranteed to receive \$1,100. Would you claim the \$1,000 today or would you wait one year for \$1,100?

1. *I would wait one year.*
2. *I would claim the prize today.*

The FUTURE_ORIENTED variable is coded to measure future-orientation so that the respondent was assigned a 0 if the respondent would claim the prize today and 1 if he/she would wait one year to claim the prize.

Health status will be represented as simply whether or not a respondent or their spouse has been hospitalized or diagnosed with one of the six leading causes of death in the United States (National Center for Health Statistics, 2010). These are ischemic heart disease, cerebrovascular disease, cancer, chronic obstructive pulmonary disease (COPD), diabetes, and cerebral degenerations. These diagnoses are obtained from the ICD9 and ICD10 codes available in the UPDB. Hospitalization information is limited to those events reported through September 2009, the month before the UURPS survey was administered. Table 3 shows the number of respondents who have been hospitalized or diagnosed with each disease in each of the samples.

The number of diagnoses occurring for many of the diseases is very small excepting cancer. When the number of events for a variable is small, the parameter estimates may be biased or unreliable (Courvoisier, Combescure, Agoritsas, Gayet-Ageron, & Perneger, 2011). For this reason, all of the diseases except cancer were combined into one variable called ALL_OTHER and ALL_OTHER_SP.

The effect of cancer was estimated separately with variables CANCER and CANCER_SP. All types of cancer are combined together in this variable. Table 4 shows the occurrences for each type of cancer. The total number of cases is slightly more than in Table 3 because a respondent may have been hospitalized more than once.

WIDOWED is a variable measuring those in the sample who have been widowed to determine what effect the ultimate health problem, death, has on retirement behaviors or retirement saving. Finally, two variables were created to control for the timing of the

Table 3. Frequency for Disease Diagnosis

Behaviors

Cases	Male Resp	%	Spouse	%	Female Resp	%	Spouse	%	Total Sample	%
Heart	13	2.9	4	0.9	9	1.4	21	3.1	47	4.2
cancer	31	7.0	25	5.6	49	7.3	23	3.4	128	11.5
diabetes	15	3.4	7	1.6	11	1.7	17	2.5	50	4.5
cvs	1	0.2	3	0.7	3	0.5	7	1.1	14	1.3
copd	2	0.5	1	0.2	1	0.2	3	0.5	7	0.6
cerebral	0	0.0	0	0.0	0	0.0	0	0.0	-	0.0
Total	62	13.9	40	9.0	73	10.9	71	10.6	246	22.1

Total Retirement
Wealth

Cases	Male Resp	%	Spouse	%	Female Resp	%	Spouse	%	Total Sample	%
heart	12	3.0	4	1.0	5	1.0	14	2.8	35	3.1
cancer	28	7.1	22	5.5	40	7.9	16	3.2	106	9.5
diabetes	12	3.0	6	1.5	6	1.2	10	2.0	34	3.1
cvs	1	0.3	2	0.5	3	0.6	3	0.6	9	0.8
copd	2	0.5	1	0.3	1	0.2	2	0.4	6	0.5
cerebral	0	0.0	0	0.0	0	0.0	1	0.2	1	0.1
Total	55	13.9	35	9.0	55	10.9	46	10.6	191	17.1

Table 4. Frequency for Type of Cancer

Retirement Behaviors Sample

Type	Male Respondent	Spouse	Female Respondent	Spouse	Total
colorectal	2	2	2	4	10
lung	0	0	2	0	2
hodglymp	2	0	1	1	4
skin	7	5	11	7	30
breast	0	9	26	0	35
cervix	0	4	1	0	5
uterus	0	1	4	0	5
ovary	0	1	4	0	5
prostate	16	0	0	6	22
testis	1	0	0	1	2
kidney	1	1	0	1	3
bladder	1	0	1	2	4
thyroid	1	3	2	1	7
lymph	2	0	0	2	4
TOTAL	33	26	54	25	138

 $M=446$ $F=668$ $N=1,114$

Total Retirement Wealth Sample

Type	Male Respondent	Spouse	Female Respondent	Spouse	Total
colorectal	2	1	2	4	9
lung	0	0	2	0	2
hodglymp	2	0	0	1	3
skin	5	4	11	5	25
breast	0	8	21	0	29
cervix	0	3	1	0	4
uterus	0	1	1	0	2
ovary	0	1	3	0	4
prostate	16	0	0	4	20
testis	1	0	0	1	2
kidney	1	1	0	0	2
bladder	1	0	0	0	1
thyroid	1	3	2	0	6
lymph	1	0	0	2	3
TOTAL	30	22	43	17	112

 $M=397$ $F=506$ $N=903$

disease hospitalization. `DIAGB440DUM` measures if the disease diagnosis or hospitalization occurred before the age of 40. This is a dummy variable with a value of 1 if an event occurred early before the age of 40 or a 0 if otherwise. `TIME_FIRST_DIAG` is a continuous variable measuring the number of years since the diagnosis or hospitalization first occurred. `DBPLAN` was created to control for those respondents who participate in a pension plan. Those who participate receive a value of 1 and those who do not participate receive a value of 0. Those who have a defined benefit pension plan would have significantly less retirement savings but access to an income stream from the pension that is valuable but not included in total retirement savings.

Two more variables were created to assess the effect of more prolonged disease. `ALL_HOSPITALIZATION_GE2` and `ALL_HOSPITALIZATION_GE3` are dummy variables representing respondents or spouses who have been hospitalized or diagnosed two or more times or three or more times respectively. Table 5 summarizes the independent variables.

Model Specification

Multivariate regression analysis will be used to evaluate the relationship between health status and retirement preparation while controlling for socio-demographics and psychological factors. Because the dependent variables for all of the retirement planning behaviors are dichotomous, I use a logistic regression. In analyzing total retirement wealth, it is necessary to use a quantile (median) regression because of the skewed distribution of total retirement savings. This quantile approach has been used in other

Table 5. Definitions of Independent Variables Used in the Analysis

Variable	Definition	Measurement
Age of the respondent (AGE_NM)	The age of the respondent	Continuous 1 to 69 years
Age, centered (AGEC)	Age minus the mean age of 52 for men or 53 for women	Continuous -13 to +17 years
Age, centered, squared (AGEC)	The square of age centered	Continuous -13 to +17 years
Education (EDUC)	The number of years of education completed by the respondent	Continuous 8-20 years
Household Income (INCOME)	Annual household income set to midpoints of closed-end categories and divided by \$10,000	Continuous Ten thousands of dollars
Defined Benefit Plan (DBPLAN)	Whether the respondent participates in the Defined Benefit Pension plan	1=DB plan participant 0=Otherwise
Acceptance of Risk (RISK)	Whether the respondent is willing to take on risk to achieve a higher return	Continuous scale 1-4 1=risk averse 4=risk accepting
Future-Orientation (FUTURE_ORIENTED)	Whether the respondent is future-oriented as opposed to present-oriented	1=Future-oriented 0=Otherwise
Cancer hospitalization-respondent (CANCER_EVER)	Whether the respondent has ever been hospitalized for cancer	1=Hospitalized 0=Otherwise
Cancer hospitalization spouse (CANCER_EVER_SP)	Whether the spouse of the respondent has ever been hospitalized for cancer	1=Hospitalized 0=Otherwise
Other diseases hospitalization respondent (ALL_OTHER_EVER)	Whether the respondent has ever been hospitalized for heart, diabetes, cvs, COPD, or cerebral degenerations	1=Hospitalized 0=Otherwise

Table 5. (cont.)

Variable	Definition	Measurement
Other diseases hospitalization spouse (ALL_OTHER_EVER_SP)	Whether the respondent's spouse has ever been hospitalized for heart, diabetes, cvs, COPD, or cerebral degenerations	1=Hospitalized 0=Otherwise
Widowed (WIDOWED)	Whether the respondent has been widowed	1=Widowed 0=Otherwise
Diagnosed before age 40 (DIAGB440DUM)	Whether the respondent or spouse was diagnosed or hospitalized before the age of 40	1=First Hospitalization before age 40 0=Otherwise
Years since the first diagnosis (TIME_FIRST_DIAG)	The number of years that have passed since the first diagnosis	Continuous 0-34 years
Hospitalized two or more times - respondent (ALL_HOSPITALIZATIONS_GE2)	Whether the respondent has been hospitalized two or more times	1=Hospitalized two or more times 0=Otherwise
Hospitalized two or more times - spouse (ALL_HOSPITALIZATIONS_GE2)	Whether the respondent's spouse has been hospitalized two or more times	1=Hospitalized two or more times 0=Otherwise
Hospitalized three or more times - respondent (ALL_HOSPITALIZATIONS_GE3)	Whether the respondent has been hospitalized three or more times	1=Hospitalized three or more times 0=Otherwise
Hospitalized three or more times - spouse (ALL_HOSPITALIZATIONS_GE3)	Whether the respondent's spouse has been hospitalized three or more times	1=Hospitalized three or more times 0=Otherwise

surveys with a similarly skewed dependent variable (Lusardi & Mitchell, 2007; Mayer, Zick, & Marsden, 2011). In all estimations, men and women will be analyzed separately as previous research has shown there is a significant difference in retirement preparation by gender. To understand the relationship between health status and retirement preparation, the coefficients associated with health for each specific hypothesis will be analyzed for size and direction.

First, retirement planning behaviors will be assessed to determine the influence of each independent variable on the dichotomous dependent variable. In a logistic regression, the dependent variable is not directly measured; instead, the probability of obtaining a particular value of the dichotomous dependent variable is estimated. These logistic regressions will predict the odds ratio using $\exp(b)$ that the dependent variable equals 1 (rather than 0) given certain values of the independent variables. The logistic equation can be expressed as:

$$\text{Logit}(Y) = \ln(\pi/1-\pi) = \alpha + \beta_1X_1 + \beta_2X_2 + \dots + \beta_nX_n$$

where Y is a dichotomous dependent variable with a value of 0 or 1 and π represents the probability of Y being equal to 1. The term α equals the log odds, for instance, of having seen an advisor, if all independent variables are introduced into the model (intercept) but have values of 0 while β equals the log of the odds ratios for each associated independent variable (Worster, Fan, & Ismaila, 2007). In this study, three separate equations will be estimated representing the three different retirement planning behaviors, including met with an advisor, opened a supplemental account, and figured retirement needs. The equations for this study are as follows:

1.
$$\begin{aligned} \text{Logit}(\text{ADVISOR2YRS}) = & \alpha + \beta_1(\text{AGEC}) + \beta_2(\text{EDUC}) + \beta_3(\text{INCOME}) + \\ & \beta_4(\text{DBPLAN}) + \beta_5(\text{RISK}) + \beta_6(\text{FUTURE_ORIENTED}) + \beta_7(\text{CANCER_EVER}) + \\ & \beta_8(\text{CANCER_EVER_SP}) + \beta_9(\text{ALL_OTHER_EVER}) + \\ & \beta_{10}(\text{ALL_OTHER_EVER_SP}) + \beta_{11}(\text{WIDOWED}) + \beta_{12}(\text{DIAGB440DUM}) + \\ & \beta_{13}(\text{TIME_FIRST_DIAG}) \end{aligned}$$
2.
$$\begin{aligned} \text{Logit}(\text{SUPPLEMENT}) = & \alpha + \beta_1(\text{AGEC}) + \beta_2(\text{EDUC}) + \beta_3(\text{INCOME}) + \\ & \beta_4(\text{DBPLAN}) + \beta_5(\text{RISK}) + \beta_6(\text{FUTURE_ORIENTED}) + \beta_7(\text{CANCER_EVER}) + \\ & \beta_8(\text{CANCER_EVER_SP}) + \beta_9(\text{ALL_OTHER_EVER}) + \\ & \beta_{10}(\text{ALL_OTHER_EVER_SP}) + \beta_{11}(\text{WIDOWED}) + \beta_{12}(\text{DIAGB440DUM}) + \\ & \beta_{13}(\text{TIME_FIRST_DIAG}) \end{aligned}$$
3.
$$\begin{aligned} \text{Logit}(\text{FIGNEEDS}) = & \alpha + \beta_1(\text{AGEC}) + \beta_2(\text{EDUC}) + \beta_3(\text{INCOME}) + \beta_4(\text{DBPLAN}) \\ & + \beta_5(\text{RISK}) + \beta_6(\text{FUTURE_ORIENTED}) + \beta_7(\text{CANCER_EVER}) + \\ & \beta_8(\text{CANCER_EVER_SP}) + \beta_9(\text{ALL_OTHER_EVER}) + \\ & \beta_{10}(\text{ALL_OTHER_EVER_SP}) + \beta_{11}(\text{WIDOWED}) + \beta_{12}(\text{DIAGB440DUM}) + \\ & \beta_{13}(\text{TIME_FIRT_DIAG}) \end{aligned}$$

Second, total retirement wealth will be assessed using quantile regression. This type of regression assesses the relationship of a skewed dependent variable and the independent variables using the median rather than the mean to avoid misinterpretation due to the effect of outliers. In an OLS regression, the relationship between the dependent and independent variables is defined by the equation of the line of best fit with α indicating the value of the dependent variable when the value of the independent variables equals 0 (intercept). β indicates the slope of the line (regression coefficient) and for each independent variable describes the change in the dependent variable based

on a unit change in that independent variable (Worster et al., 2007). The equation for an OLS regression is as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 \dots \beta_n X_n + e$$

where e equals the difference between actual Y and predicted Y or the error in measurement. The equation for the line that predicts total retirement savings is

$$\begin{aligned} 1. \text{ TOT_RETIREMENT} = & \alpha + \beta_1(\text{AGEC}) + \beta_2(\text{EDUC}) + \beta_3(\text{INCOME}) + \\ & \beta_4(\text{DBPLAN}) + \beta_5(\text{RISK}) + \beta_6(\text{FUTURE_ORIENTED}) + \beta_7(\text{CANCER_EVER}) + \\ & \beta_8(\text{CANCER_EVER_SP}) + \beta_9(\text{ALL_OTHER_EVER}) + \\ & \beta_{10}(\text{ALL_OTHER_EVER_SP}) + \beta_{11}(\text{WIDOWED}) + \beta_{12}(\text{DIAGB440DUM}) + \\ & \beta_{13}(\text{TIME_FIRT_DIAG}). \end{aligned}$$

In linear regression, the coefficient represents the increase in the dependent variable made by a one unit increase in the independent variable associated with that coefficient. The quantile regression parameter estimates the change in a specified quantile of the response variable produced by a one unit change in the predictor variable to avoid the effect of outliers which may skew the mean upward as in this case. For this analysis, I will use .5 quantile so that the calculation is based on the median rather than the mean.

Results

Correlation Results

Multicollinearity exists when two or more of the independent or predictor variables are highly correlated such that redundant information is provided about the response. Consequences of high multicollinearity could include both higher standard errors related to decreased reliability and misleading or confusing results. A collinearity

test was performed on all of the independent variables used in the above models. Eigenvalues for each independent variable were assessed. None of the independent variables had values high enough to indicate problems with collinearity.

Bi-variate Cross-tabulations

Cross-tabulations analyze the relationship between two different variables revealing interactions that might otherwise not be immediately apparent. In order to better understand the relationships between the three retirement behaviors used as dependent variables in this study, cross-tabulations with the health variables were completed. Table 6 reveals the significant relationship between the three dependent variables ADVISOR2YRS, SUPPLEMENT, and FIGNEEDS and those health variables that were statistically significant.

Male respondents that had ever been diagnosed with cancer had seen an advisor 65% of the time while those male respondents never diagnosed with cancer had only seen an advisor 48% of the time. Female respondents ever diagnosed with cancer had seen an advisor 65% of the time while those female respondents never diagnosed with cancer had only seen an advisor 46% of the time. Finally, female respondents whose spouses had been diagnosed with cancer had seen an advisor 70% of the time while female respondents whose spouses were never diagnosed with cancer had only seen an advisor 46% of the time.

Female respondents diagnosed with cancer also figured their retirement needs at a higher percentage (65%) than female respondents who have not been diagnosed with cancer (49%). There were no significant relationships among the health variables associated with opening a supplemental account. For these significant findings, there is

Table 6. Significant results of cross-tabulations
between health variables and retirement behaviors

Health Variable	% if diagnosed	% if not diagnosed	Chi-square	<i>P</i> value
Advisor2yrs				
Male respondent cancer	65%	48%	2.9845	0.08
Female respondent cancer	65%	46%	7.109	0.01
Female respondent spouse – cancer	70%	46%	4.8665	0.03
Figured Needs				
Female respondent cancer	65%	49%	4.5758	0.03

*% of respondents who have seen an advisor or figured needs when diagnosed with a disease and when they have not.

generally a 15-20% difference for having completed a retirement behavior when experiencing the diagnosis.

Logistic Regression Results

This section will review the results of the three logistic regression analyses for each of the three retirement behaviors outlined earlier in the chapter. The results will be presented in the following order: (a) ADVISOR2YRS, (b) SUPPLEMENT, and (c) FIGNEEDS. A discussion of whether or not the hypotheses were confirmed follows all of the logit regression results.

Table 7 shows the results of the logistic regression for having seen an advisor in the past two years. For females, AGE, EDUCATION, and INCOME are all statistically significant among the socio-demographic variables as would be expected. Both RISK and FUTURE-ORIENTATION are significant among the psychological factors. Among the health variables, CANCER_EVER and CANCER_EVER_SP are both significant. The odds ratio shows that for this sample, if the respondent has ever been hospitalized for cancer, the couple is 2.8 times more likely than an otherwise similar healthy respondent to have seen an advisor. If a female respondent's spouse is hospitalized for cancer, the couple is 2.4 times more likely than a healthy person to have seen an advisor.

Among the male respondents, AGE is the only demographic variable that is statistically significant. Neither psychological variable nor any of the health variables are significant for the men.

Table 8 shows the results of the logistical regressions for having opened a supplemental account. For female respondents, AGE and INCOME are statistically significant among the socio-demographic variables. Both psychological variables, RISK

Table 7. Logistic Regression - Seen an Advisor in the Past 2 Years

Variable	Females <i>N</i> =668		Males <i>N</i> =446	
	Estimate	Odds Ratio	Estimate	Odds Ratio
age, centered	0.06***	1.06	0.06***	1.06
age, centered squared	.00**	1.00	0.00	1.00
education	0.09**	1.10	0.04	1.04
household income	0.03**	1.03	0.03	1.03
db plan	-0.08	0.92	-0.35	0.70
Risk	0.45***	1.57	0.22	1.25
future_oriented	0.37**	1.44	-0.06	0.94
cancer ever	1.03**	2.80	0.70	2.01
cancer ever, spouse	0.89*	2.43	0.63	1.88
all other ever	-0.63	0.54	0.49	1.63
all other ever, spouse	-0.01	0.99	-0.76	0.47
widowed	0.39	1.48	0.12	1.13
diagnosed before age 40	1.21	3.34	-0.04	0.96
years since first diagnosis	-0.09**	0.92	-0.04	0.96
<i>R</i> -squared	0.11		0.09	
Likelihood Ratio	79.80***		42.66***	

* *Pr* < .10 ** *Pr* < .05 ****Pr* < .01

Table 8. Logistic Regression - Opened a Supplemental Account

Variable	Females <i>N</i> =668		Males <i>N</i> =446	
	Estimate	Odds Ratio	Estimate	Odds Ratio
age, centered	0.06***	1.06	0.01	1.05
age, centered squared	0.00	1.00	0.00	1.00
education	0.02	1.02	0.09	1.10
household income	0.05*	1.05	0.05*	1.05
db plan	-0.16	0.86	0.54	1.72
Risk	0.82***	2.26	0.59***	1.81
future_oriented	0.62***	1.87	0.07	1.08
cancer ever	-0.16	0.85	0.34	1.41
cancer ever, spouse	-0.14	0.87	1.14*	3.13
all other ever	0.05	1.05	0.99*	2.70
all other ever, spouse	-0.27	0.76	-0.59	0.55
widowed	0.59	1.80	15.07	0.00
diagnosed before age 40	-0.63	0.53	-0.04	0.97
years since first diagnosis	0.02	1.02	-0.06	0.94
<i>R</i> -squared	0.10		0.07	
Likelihood Ratio	68.93***		33.98***	

* *Pr* <.10 ***Pr*<.05 ****Pr*<.01

and FUTURE-ORIENTED are significant. None of the health variables for female respondents are statistically significant.

For the male respondents, only INCOME is statistically significant among the socio-demographic variables while RISK is significant among the psychological variables such that each one unit increase in risk taking is associated with a male respondent being 1.8 times more likely to have a supplemental account than an otherwise similar male who is one unit lower on the risk tolerance scale. For males, if their spouse has been diagnosed or hospitalized for cancer, they are 3.1 times more likely to have opened a supplemental account. Also for the men, if they have been hospitalized for any of the other diseases, they are 2.7 times more likely to have opened a supplemental account than a married male where both partners have not had a diagnosis.

Table 9 shows the parameter estimates of the logistical regression for having figured retirement needs. For female respondents AGE and INCOME are both statistically significant among the socio-demographic variables. Both RISK and FUTURE-ORIENTED are significant for the psychological variables and none of the health variables are significant. Among the male respondents, AGE and INCOME are statistically significant among the socio-demographic variables while no health variables are significant.

Quantile Regression Results

A quantile or median regression was completed for the dependent variable TOT_RETIREMENT as described previously. The sample size for this regression is somewhat smaller because about 200 respondents either did not answer this question or

Table 9. Logistic Regression - Figured Retirement Needs

Variable	Females <i>N</i> =668		Males <i>N</i> =446	
	Estimate	Odds Ratio	Estimate	Odds Ratio
age, centered	0.08***	1.09	0.06***	1.06
age, centered squared	0.00	1.00	0.00	1.01
education	0.03	1.03	0.10	1.10
household income	0.1***	1.11	0.08***	1.08
db plan	-0.09	0.92	-0.08	0.92
Risk	0.46***	1.58	0.23	1.27
future_oriented	0.33*	1.39	0.28	1.33
cancer ever	0.44	1.56	0.13	1.14
cancer ever, spouse	-0.65	0.52	-0.03	0.97
all other ever	-0.13	0.87	0.42	1.52
all other ever, spouse	0.22	1.25	-0.22	0.81
widowed	0.34	1.40	0.13	1.14
diagnosed before age 40	-0.64	0.53	0.85	2.35
years since first diagnosis	-0.04	0.97	-0.05	0.95
<i>R</i> -squared	0.15		0.13	
Likelihood Ratio	109.55***		60.41***	

* $Pr < .10$ ** $Pr < .05$ *** $Pr < .01$

chose “Do Not Know/Not Sure.” The regression is estimated separately for men and women.

Table 10 shows that for females in the sample, AGE, EDUCATION, and INCOME were statistically significant among the socio-demographic variables which is consistent with the findings of previous research. FUTURE-ORIENTED is significant among the psychological variables. Female respondents whose spouse has been hospitalized or diagnosed with cancer have saved \$67,600 less than healthy couples, holding other factors constant. WIDOWED is significant and shows that a widowed individual has \$134,600 more than a healthy couple. This finding may be the result of life insurance that was collected at the time of the spouse’s death or inheriting the spouse’s defined contribution retirement plan.

For men, once again, AGE, EDUCATION, and INCOME are all significant and their estimated coefficients have the expected signs. No other variables are significant, including the health variables.

Another set of logistic and quantile regressions was completed with new health variables related to the number of times a respondent or spouse has been hospitalized. The four health variables previously used were replaced by four new variables created to measure more prolonged disease processes. ALL_HOSPITALIZATION_GE2 includes the total number of respondents who have been hospitalized two or more times for any of the diseases. A similar variable was created for spouses who have been hospitalized two or more times referred to as ALL_HOSPITALIZATION_GE2_SP. Another set of variables, ALL_HOSPITALIZATION_GE3 and ALL_HOSPITALIZATION_GE3_SP, was created For those respondents and spouses who have been hospitalized or diagnosed

Table 10. Quantile (median) Regression - Total Retirement Wealth

Variable	Females <i>N</i> =506		Males <i>N</i> =397	
	Parameter Estimate	t Value	Parameter Estimate	t Value
age, centered	0.73***	7.67	2.60***	7.52
age, centered squared	.03**	2.49	.13***	3.22
education	1.10***	3.56	2.54***	2.67
household income	1.65***	8.46	2.52***	5.01
db plan	0.10	0.08	-3.04	-0.64
Risk	1.30	1.50	3.65	1.26
future_oriented	5.33***	4.40	1.21	0.33
cancer ever	3.79	0.86	-8.64	-0.75
cancer ever, spouse	-6.76**	-2.47	-5.06	-0.58
all other ever	-4.73	-0.83	-14.81	-1.22
all other ever, spouse	0.82	0.31	8.35	0.39
widowed	13.46**	2.00	0.39	0.01
diagnosed before age 40	-3.86	-0.55	-24.97	-1.46
years since first diagnosis	-0.24	-0.82	1.78	1.19
<i>R</i> -squared	0.41		0.53	
F statistic	45.58***		61.69***	

* *Pr* < .10 ** *Pr* < .05 ****Pr* < .01

three or more times with any of the diseases. Table 11 shows the number of respondents by each disease type who have been hospitalized two or more times and three or more times.

Very few respondents or spouses have been diagnosed or hospitalized more than once, as you can see in this table. The males are much more likely to have an occurrence multiple times for a disease. Male respondents who have had an occurrence twice or more make up only 4.5% of the sample. Additionally, male respondents only make up 2% of the sample if they have had three or more occurrences. Female respondents experiencing two or more occurrences are even more uncommon at only 1.8% of the sample and only 0.7% of the sample for three times or more occurrences. Among spouses, the female spouses of male respondents experiencing two or more occurrences make up 1.3% of the sample or 0.2% of the sample for three or more occurrences. For male spouses of female respondents, 5.5% of the sample experienced two or more occurrences while 3.1% of the sample experienced an occurrence more than 3 times. The quantile regression for total retirement wealth had no significant results. A logistical regression for each retirement behavior was completed and only one statistically significant finding among all the behaviors was observed. Female respondents with 2 or more disease diagnosis or hospitalizations, were 74% less likely to have opened a supplemental account. Table 12 below shows the logistical regression for opening a supplemental account when the couple has suffered two or more or three or more diagnosis or hospitalizations.

Table 11. Respondents/Spouses with Multiple Hospitalizations

Respondent	Hospitalizations >= 2					
	Male	%	Female	%	Total	%
Heart	10	2.2	5	0.7	15	1.3
Cancer	5	1.1	5	0.7	10	0.9
Diabetes	5	1.1	2	0.3	7	0.6
CVS	0	0.0	0	0.0	0	0.0
COPD	0	0.0	0	0.0	0	0.0
Cerebral	0	0.0	0	0.0	0	0.0
Total	20	4.5	12	1.7964	32	2.9

Spouse	Female	%	Male	%	Total	%
Heart	1	0.2	16	2.4	17	1.5
Cancer	2	0.4	5	0.7	7	0.6
Diabetes	2	0.4	10	1.5	12	1.1
CVS	0	0.0	3	0.4	3	0.3
COPD	1	0.2	2	0.3	3	0.3
Cerebral	0	0.0	1	0.1	1	0.1
Total	6	1.3	37	5.5	43	3.9

Males = 446

Females = 668

Table 11. (cont.)

Respondent	Hospitalizations ≥ 3					
	Male	%	Female	%	Total	%
Heart	6	1.3	2	0.3	8	0.7
Cancer	1	0.2	2	0.3	3	0.3
Diabetes	2	0.4	1	0.1	3	0.3
CVS	0	0.0	0	0.0	0	0.0
COPD	0	0.0	0	0.0	0	0.0
Cerebral	0	0.0	0	0.0	0	0.0
Total	9	2.0	5	0.7	14	1.3

Spouse	Female	%	Male	%	Total	%
Heart	0	0.0	12	1.8	12	1.1
Cancer	0	0.0	0	0.0	0	0.0
Diabetes	1	0.2	6	0.9	7	0.6
CVS	0	0.0	2	0.3	2	0.2
COPD	0	0.0	1	0.1	1	0.1
Cerebral	0	0.0	0	0.0	0	0.0
Total	1	0.2	21	3.1	22	2.0

Males = 446

Females = 668

Table 12. Logistic Regression - Opened a Supplemental Retirement Account

Variable	Females N=668		Males N=446	
	Estimate	Odds Ratio	Estimate	Odds Ratio
age, centered	0.07***	1.07	0.02	1.02
age, centered squared	0.00	1.00	0.00	1.00
education	0.02	1.02	0.08	1.09
household income	0.04	1.04	0.04	1.04
db plan	-0.17	0.84	0.45	1.56
Risk	0.81***	2.24	0.54***	2.45
future_oriented	0.66***	1.93	0.11	1.11
all hospitalizations ge 2	-1.35*	0.26	0.72	2.05
all hospitalizations spouse ge 2	-0.45	0.64	-0.28	0.76
Likelihood Ratio	70.45***		22.22***	

* $Pr < .10$ ** $Pr < .05$ *** $Pr < .01$

Discussion of Hypotheses

Hypothesis 1 proposes that couples experiencing one of the major six causes of death will have less time to complete retirement behaviors known to improve retirement preparation and will not have completed these tasks. The findings of the logistical regressions suggest that at least in the case of cancer, just the opposite is true. If a female respondent or her spouse had been diagnosed with cancer, they were more than 2 times as likely to have seen an advisor and for male respondents whose spouse suffered from cancer or who themselves suffered from one of the other diseases, the couple was 3.1 times as likely or 2.7 times as likely to have a supplemental account than a couple without such a diagnosis. These results suggest that, for this sample, disease diagnosis has the ability to push couples to think more about their finances and being prepared for the future.

Hypothesis 2 proposes that couples that have experienced one of the major six diseases will have had competing expenses for their retirement savings and would not have saved as much money. The results for female respondents with a spouse who has been diagnosed for cancer support this hypothesis with the finding that the respondent had saved \$67,600 less than a healthy respondent. Although a female respondent who has been widowed has saved \$137,000 more than a healthy respondent, rather than negating Hypothesis 2, this result could be the result of the respondent inheriting the retirement wealth of her husband.

Hypothesis 3 states that husbands typically make more money than their wives and because they typically have a stronger labor force attachment than their wives, the impact of poor health on retirement preparation will be more extensive when experienced

by the husband than when experienced by the wife. The one significant finding that resulted in less retirement savings for a couple was due to the illness of the husband, which supports this hypothesis. The effect of the health variables for a female respondent or the spouse of a male respondent were not significant, suggesting that for this sample, it is the husband's illness that provides the detrimental result. Certainly, female respondents were more likely to see an advisor when health issues arise that may serve to protect savings. We can also see from the descriptive statistics that male respondents and male spouses of female respondents were sick more often than their wives. The trend, though, has been that women have increased both their wages and their labor force attachment such that these results may change in the future as a couple will not be so completely dependent upon the husband's wages.

Hypothesis 4 states that ongoing diseases require more medical attention and hospitalizations will more severely impact both wealth accumulation and retirement behaviors than isolated health problems that do not require ongoing care. One significant finding that supports this hypothesis is that female respondents hospitalized 2 or more times were 74% less likely to have opened a supplemental account. This could suggest a lack of funds available for opening a supplemental account hinting at support for this hypothesis such that ongoing illnesses which include more hospitalizations have a more severe impact than one-time health shocks.

Research Limitations and Strengths

Strengths

A couple of unique and important strengths of this study are worth noting. First, access to the Utah Population Database (UPDB) gives a unique opportunity to access

respondent and spouse health status information. Objective disease diagnosis and hospital records provide a very rich opportunity to explore health with access, as well, to retirement savings and preparation behaviors provided by the University of Utah Retirement Planning Survey (UURPS). Because of the unique linkage with the UPDB of respondents and their spouses, analysis of disease diagnoses and hospitalizations in a familial setting is possible.

Second, the sample consists of a full range of working adults, allowing analysis of retirement preparation among younger workers than has been available in most other datasets to this point.

Limitations

There are limitations that should be noted in connection with the results of this study as well. First, the sample is made up of a highly educated, high income, and mostly White population. For this reason, the sample may also be healthier than the general population.

Second, all respondents in the sample are employees of one institution – The University of Utah. The employee benefits of the University, including access to excellent low-cost health care and generous employer retirement contributions, most likely minimize the actual effect of disease on retirement savings that may exist in the general population.

Third, the survey used in this analysis was completed in 2009. A major recession occurred in the same year which affected most retirement wealth accumulation in dramatic ways. The downward spiral of retirement investments may also have affected the outcome of this study.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

Conclusions

This exploratory study has produced several findings, as discussed in the previous chapter, that are important for policy makers and consumers facing decisions regarding health insurance and retirement plan availability and participation. There are three important findings that merit repeating here for emphasis and clarity.

First, the cancer diagnosis of a respondent or a spouse both predicted seeing an advisor and opening a supplemental retirement account. Both figuring needs and making a plan for retirement preparation have been shown in the literature to increase retirement preparation. Cancer motivates respondents in this study to see an advisor, which suggests they are concerned about their financial well-being and want to be prepared for the future given the new health diagnosis.

Second, for female respondents who have suffered multiple disease occurrences, there is a 74% less likelihood that they have opened a supplemental account compared to their otherwise similar healthy counterparts. This huge discrepancy supports the hypothesis that ongoing illness severely affects the ability to save for retirement, especially over the long term, due to the cost of health care competing with money available for saving.

Third, total retirement savings are negatively affected for female respondents whose spouses have suffered from cancer. The respondent in this situation has saved \$67,000 less than a respondent with a healthy spouse, holding other factors constant. The cost of paying for medical bills does have an impact on the ability of the couple to set aside as much money for retirement. The Agency for Healthcare Research and Quality tracks the mean costs of hospitalization by disease for each state. The figures shown in Table 13 are for all hospitalizations by disease in Utah in 2009.

Of course, health insurance, and especially out-of-pocket maximums, determine the total amount the respondent will have to pay for the hospitalization. Important to this discussion are the employee benefits for both healthcare and retirement available for employees of the University of Utah. For chronic diseases where the couple pays the maximum out-of-pocket expense year after year, certainly medical bills will lessen the amount of money that can be set aside for retirement. University of Utah employees generally enjoy access to excellent health care services and insurance so that I would expect to see even more of an impact from the cost of disease for members of the general population where many have higher premiums and deductibles, less coverage, and higher out-of-pocket maximums.

Retirement benefits also serve to assure that individuals will be prepared for retirement and vary greatly in terms of access and employer contribution. The retirement benefits offered at the University of Utah maintain a continuous investment in retirement wealth with the employer either providing a pension, providing a defined contribution account with a sole employer contribution of 14.2% or, for University of Utah hospital employees, a defined contribution account with a 6% automatic employer contribution

Table 13. Inpatient Hospital Length of Stay and Mean Costs by Disease
Utah 2009

Disease Diagnosis	Cases	Length of Stay (Days)	Mean Charge
Cancer:			
Lymphoma & leukemia with O.R.	19	22.7	\$134,251
Lymphoma & leukemia with O.R.	51	6.6	36,588
Lymphoma & leukemia with O.R.	34	2.6	20,082
Mastectomy for malignancy	103	2.1	20,640
Ovarian or adnexal malignancy procedure	20	13.6	75,917
Male reproductive system O.R.	468	1	13,583
Transurethral prostatectomy	267	1.5	10,458
Heart:			
Cardiac valve & other major cardiothoracic	113	15.8	156,663
Cardiac defib implant with cardiac cath	31	13.3	161,121
Coronary bypass with cardiac cath	147	11.2	104,094
Permanent cardiac pacemaker implant	186	5.7	53,276
Cardiac arrest, unexplained	42	2.2	25,429
Cardiac congenital & valvular disorders	32	5.1	22,281
Cardiac arrhythmia & conduction disorders	385	3.8	19,217
Cardiac arrhythmia & conduction disorders	473	2.5	12,067
Diabetes:			
Diabetes with mcc	319	3.6	18,687
Diabetes with cc	539	2.6	11,219
Diabetes without cc/mcc	812	2	7,579
Cerebrovascular Disease:			
Acute ischemic stroke/thrombolytic agent	18	6.5	55,634
Nonspecific cerebrovascular disorders mcc	78	5.8	30,393
Nonspecific cerebrovascular disorders cc	83	6.1	22,701
Cerebral Degenerations:			
Degenerative nervous system disorders mcc	66	7.8	27,944
Degenerative nervous system disorders	259	9.2	18,492
Lung Disease:			
Chronic obstructive pulmonary disease mcc	588	4.3	18,149
Chronic obstructive pulmonary disease cc	380	3.4	15,039
Chronic obstructive pulmonary disease mcc/cc	432	2.7	10,408
Bronchitis & asthma with cc/mcc	1063	3.5	11,913
Bronchitis & asthma without cc/mcc	2386	2.6	7,398

Source: AHRQ (Agency for Healthcare Research & Quality)

<http://hcupnet.ahrq.gov>

and an additional 3% employer match if the employee contributes 3%. All three of these retirement plans are very generous and provide steady retirement savings regardless of employee contribution. Although the respondents are employees of the University of Utah at the time of the survey (2009), it is impossible to ascertain that all of the respondent's retirement savings are attributable to employment at the University.

Few workers enjoy such protective benefits. According to FACTS from EBRI in 2006, only 69% of workers have access to a medical care plan and only 53% actually participate (McDonnell, 2006). Also from EBRI in 2009, among full-time, full-year wage and salary workers ages 21-64, 54.4% participated in a retirement plan. Among all workers (including those who work part-time), only 39.6% participated in a retirement plan in 2009, the first time the rate had dropped below 40% in 15 years (Copeland, 2010). It is well established in the literature that at least one-third of the American population has very little savings for retirement (Lusardi, 2000). Having access to a tax-advantaged employer-sponsored retirement plan is fundamental to saving adequately for retirement. Although Social Security is meant to protect all workers in retirement, more could be done to allow workers without access to an employer sponsored plan to put more money away for retirement in tax advantaged accounts. Employees of the University of Utah have more saved than people in the general population, most likely due to the generosity of the employer. The median retirement savings for female respondents in our survey is \$75,000 while the median retirement savings for male respondents is \$225,000. These figures could partly be a function of higher income and a better education, but the generous retirement benefits offered at the University largely contributed by the

employer certainly promote a more consistent investment and, therefore, higher retirement savings.

Implications

Implications for Financial Planners

Financial planners have the task of helping clients prepare for the obligations and goals they will encounter as they move through life. Many situations experienced in life are typical and a plan can be developed to help the client meet their commitments. This study demonstrates that serious health problems encountered during the working years are not typical with only 22% of the sample experiencing a disease diagnosis of some kind. Because many (78%) do not experience a serious health diagnosis, the possibility of health problems and associated challenges such as paying for costly medical care or the inability to work often are not considered in a general plan for a healthy couple.

In this study, findings suggest that those who do suffer a disease diagnosis are 2.5 to 3 times more likely to begin planning by seeing an advisor or opening a supplemental account. At the point of diagnosis, it appears many are awakened to how important it is to plan and prepare for the future. Financial planners recognize that planning at any time will help a client to be better prepared for the future challenges of life. The question remaining here is how to motivate healthy couples, the greater majority, to plan despite their good health. It appears many have a false sense of security that there is still plenty of time and they will plan later if a problem occurs or retirement is near. Financial education for younger couples needs to include staying out of debt and saving for emergencies and retirement even when life is going smoothly with the idea that many situations in life are unforeseen. Teaching future-orientation is not an easy task in our

instant-gratification world. Saving for the future seems to be lost in the rush of current demands. This study has shown that there are factors, such as health status, that motivate couples to begin planning. Identifying other factors could help unlock the reasons why so many are unprepared for the future in an effort to improve the situation for the entire population.

Implications for Further Research

Because this exploratory study supports our hypothesis that disease can be a detriment to retirement savings even in a sample which has access to both health insurance and retirement benefits, further research is needed to assess health status and retirement preparation among a more diverse population and especially among respondents who have different employers and, therefore, different access to the opportunity for the benefits of both health insurance and retirement preparation. The unique contribution of the UPDB with its ability to connect family health history makes this research hard to duplicate in other places where such information may not be available. Perhaps another study in the state of Utah with a survey of random respondents who have a more diverse background would help to clarify how much the results of this study can be attributed to employer benefits and how much can be attributed to other factors related to the individual.

This exploratory thesis does provide some understanding of how disease affects retirement preparation behaviors, but much more remains to be understood about the role of disease and its effects on retirement preparation. This thesis does, however, provide a foundation from which further research may be conducted that may better inform policy in this area.

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