



RIETI Discussion Paper Series 16-E-076

Can Financial Literacy Reduce Anxiety about Life in Old Age?

KADOYA Yoshihiko

Hiroshima University

Mostafa Saidur Rahim KHAN

Nagoya University



Research Institute of Economy, Trade & Industry, IAA

The Research Institute of Economy, Trade and Industry

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Can Financial Literacy Reduce Anxiety about Life in Old Age?*

KADOYA Yoshihiko
Hiroshima University

Mostafa Saidur Rahim KHAN
Nagoya University

Abstract

This study examines whether financial literacy can reduce anxiety about life in old age. We hypothesize that financially literate people are better equipped to make saving decisions, plan for the future, and handle uncertainty, reducing their anxiety about life in old age. The study uses data from a nationwide survey in Japan and probit regression analysis to provide evidence that financial literacy can reduce anxiety about life in old age. The regression coefficients show that financial literacy has a significantly negative impact on the level of anxiety, a relationship that holds after controlling for age, gender, education, marital status, assets, expected social security coverage, house ownership, living with children, and exercise. The results are robust after using different methods to measure financial literacy, and have implications for policies related to aging and risk management. Since financial literacy helps people to reduce risks and uncertainties effectively, policymakers should consider emphasizing financial literacy education early in life to lower anxieties about life in old age.

Keywords: Financial literacy, Anxiety, Aging policy, Japan

JEL classification: D14, D19

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* This study is conducted as a part of the Project “A Socioeconomic Analysis of Households in Environments Characterized by Aging Population and Low Birth Rates” undertaken at Research Institute of Economy, Trade and Industry (RIETI). This research used micro data from the Preference Parameters Study of Osaka University’s 21st Century COE Program ‘Behavioral Macro-dynamics Based on Surveys and Experiments’ and its Global COE project ‘Human Behavior and Socioeconomic Dynamics’. We acknowledge the program/project’s contributors: Yoshiro Tsutsui, Fumio Ohtake, and Shinsuke Ikeda. This work was supported by the JSPS KAKENHI under grant numbers 15K17075 and The Murata Science Foundation under grant numbers H2710. The author is grateful for helpful comments and suggestions by Keiichiro Kobayashi, Makoto Yano, Mitsuhide Hoshino, Keisuke Kawata and other Discussion Paper seminar participants at RIETI.

1. Introduction

Factors contributing to anxiety among the elderly are an important issue in Japan, where population ageing has become a growing concern. Anxiety could substantially affect wellbeing and overall quality of life (Hofmann et al. 2010), which policy makers will have to address through social and economic policies when it impacts a significant proportion of the population. It is difficult to pinpoint what actually makes people anxious about life in old age, though social, cultural, and economic issues may affect their subjective wellbeing and create uncertainty (Pinquart and Sörensen 2000). Previous studies identified household assets, home ownership, cultural dimensions, age, education, gender, and marital status as factors related to anxiety about life (Kadoya 2015; Heinrichs et al. 2006; Okazaki 1997; Kallmen 2000; Norasakkunkit and Kalick 2009). Previous studies also found that young people are usually not concerned about their future life in old age, though they begin to worry about this during middle age. Bland, Newman, and Orn (1998), Carta et al. (1991), Fichter et al. (1996), Weissman and Myers (1980), and Jorm (2000) claim that people in their forties, fifties, and early sixties tend to be more anxious than those older than 65. Jorm (2000) explains that aging is associated with an intrinsic reduction of susceptibility to anxiety. Kadoya (2015) provided evidence that education, gender, and marital status affects anxiety about life in old age. Education enables people to plan and thus reduce anxiety about the future. Gender differences usually depend on the culture: males tend to become more anxious in countries where they adopt more family-related responsibilities. Married people are less anxious than unmarried people because they are more likely to receive support from the family. Though previous studies identified a number of factors related to the level of anxiety, these factors do not fully explain anxiety about life in old age. What else could have impact on the level of anxiety after controlling social, economic, and cultural factors?

Generosity is on the decline, though social security and public health provisions are improving, and households increasingly need to determine retirement savings and costs related to healthcare and long-term care (Banks 2010). Households increasingly need financial knowledge to make decisions in a more risky and globalized marketplace (Lusardi and Mitchell 2011a). Financial literacy can shape household behavior to ensure maximum future benefits. Decisions about savings is one important household decision, and without financial knowledge tends to be guided by rules of thumb (Bernheim 1998), though this improves through financial education in the school or workplace (Bernheim and Garrett 2003). Financial literacy also affects household behaviors related to investments, retirement planning, wealth accumulation, stock market participation, and several other related issues (Van Rooij, Lusardi, and Alessie 2011, 2012; Lusardi and Mitchell 2011b; Sekita 2013). Lusardi and Mitchell (2011b) studied the role of financial literacy in planning for retirement wellbeing using data from the US and showed that the level of financial literacy among middle-aged respondents was average, while that among women, minorities, and those without a college degree was below average. They further reported that financially literate respondents are better planners, and are likely to save more and invest in complex assets, such as stocks. Van Rooij, Lusardi, and Alessie (2011) studied the link between financial literacy and stock market participation, and found that financial literacy, especially related to finance and economics, has a positive impact on financial decisions, and those with higher levels of literacy were more likely to invest in stocks. Financially literate people also accumulate more wealth through better retirement planning, savings plans, and stock investments (Alessie, Van Rooise, and Lusardi 2012).

Though financial education can create positive outcomes, levels of financial literacy remain low worldwide (Lusardi and Mitchell 2011a; Al-Tamimi and Kalli 2009) and tends to have an uneven distribution. Females are less financially literate than males, those in middle

age are more financially literate than the young and elderly, and more educated people are more financially literate (Lusardi and Mitchell 2008, 2011a; Lusardi, Mitchell, and Curto 2010). However, policies in many countries rely on financial literacy. Alessie, Van Rooise, and Lusardi (2011) demonstrated that Dutch people had progressed toward financial literacy and financially literate people were prepared for retirement. Financially literate people in Japan make better retirement savings plans and accumulate more wealth, although the overall level of financial literacy among Japanese people is not so high, and particularly among females, the lower income group, youth, and those with less education (Sekita 2011, 2013).

Although previous studies produced findings related to the effect of financial literacy on economic and investment behavior, it is still unknown whether financial literacy reduces anxiety levels. The current study investigates whether financial literacy affects anxiety levels related to life in old age, and hypothesizes that it does reduce this anxiety. To isolate the effect of financial literacy on anxiety, we control a number of variables that affect anxiety. Financially literate people make better decisions related to savings and investments, and thus improve wealth accumulation. Increased financial resources as well as ability to make decisions under risk and uncertainty make people less anxious about life in old age. Previous studies also suggest that people usually do not save enough for retirement, accumulate less wealth, have difficulty in investing, and accumulate excessive debt that creates further burdens in old age (Sekita 2013; Lusardi and Mitchell 2007; Moore 2003).

Our study provides at least two significant contributions in the field of financial literacy and studies related to anxiety about old age. First, to the best of our knowledge, this is the first study seeking to establish a link between financial literacy and anxiety about life in old age. Second, the findings have implication for Japan, where senior citizens account for a large share of the total population. In addition, facilitating financial literacy in earlier stages in life can contribute to feelings of security among older people.

The rest of the paper is organized as follows. Sections 2 and 3 describe the data and methodology, respectively. Section 4 presents the empirical findings, which are discussed in Section 5. Section 6 concludes.

2. Data

We obtained permission to use data from Osaka University's 2012 Preference Parameters Study, which was a panel survey that followed multistage sampling and allocation methods to collect data through a nationwide survey in Japan between December 2011 and May 2012. Central Research Service Inc. conducted the survey on behalf of Osaka University. Interviewers used a questionnaire developed by the Osaka University to collect information through visits and placement surveys. The prefectures of Japan were divided into 10 regional blocks (Hokkaido, Tohoku, Kanto, Koshinetsu, Hokuriku, Tokai, Kinki, Chugoku, Shikoku, and Kyusyu) and then subdivided into the following four strata: government-designated major cities, cities with populations of more than 100,000, cities with populations of less than 100,000, and towns and villages. Although the preference parameter study collected responses from subjects aged 20 to 69, we only considered respondents between 40 and 65 years of age because people become anxious about life in old age around 40 (Carta et al. 1991; Fichter et al. 1996; Weissman and Myers 1980; Jorm 2000). Since our study measures the level of anxiety about life after 65 years of age, we excluded respondents older than 65. These criterion leave 1717 respondents out of 2412 respondents, which seem adequate at a 5% confidence level and a 2.5% margin error. Yet, we need to note that the data of the respondents' financial literacy and education were exported respectively from 2010 wave and 2011 wave of Preference Parameters Study, because the Preference Parameters Study is a panel survey and the data of the respondents' financial literacy and education are only available in the 2010 and 2011 wave respectively..

Table 1 provides the descriptive statistics of the variables used in this study. The mean value for anxiety is 3.54, which is moderately high on a five-point scale. The mean value of financial literacy is 0.50, reflecting respondents' inability to respond correctly to financial literacy questions. On average, respondents are able to answer two out of four questions correctly. There were slightly more male than female respondents. The average age of the respondents is 51.64 years, and 66.8% expect to live with children during old age. The literacy rate in Japan is historically very high, which is also reflected in our study. On average, respondents attained 13 years of education, equivalent to slightly more than college-level. As citizens of a developed country, respondents had rather high household assets, though with some degree of inequality. The average house held ¥23 million in assets, with minimum asset holdings of ¥2.5 million and maximum asset holdings of ¥100 million. The descriptive statistics reveal some interesting facts as well: 86.8% of respondents were married, indicating that 13.2% respondents older than 40 were unmarried; and only 34.5% of respondents exercised once per week.

[Table 1]

2.1 Financial literacy: Measurement and the current state in Japan

There are different ways to measure financial literacy, typically done using several questions comprised of easy basic calculations and more complex pricing. Lusardi and Mitchell (2007, 2008) used three questions; Van Rooij, Lusardi, and Alessie (2011) used five questions; and Stango and Zinman (2009) used only one question. Studies on financial literacy mostly adopt Lusardi and Mitchell's (2007, 2008) methodology to measure financial literacy, as we do here, but we used the following four questions:

1. Suppose you had ¥10,000 in a savings account, and the interest rate is 2% per year and you never withdraw money or interest payments. After 5 years, how much would you have in this account?

More than ¥10,200 Exactly ¥10,200 Less than ¥10,200 Do not know Refuse to answer

2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

More than today Exactly the same Less than today Do not know Refuse to answer

3. Please indicate whether the following statement is True or False: 'Buying a company stock usually provides a safer return than a stock mutual fund.'

True False Do not know Refuse to answer

4. If the interest rate falls, what should happen to bond prices?

Rise Fall Stay the same None of the above Do not know Refuse to answer

The first two questions measure respondents' understanding of basic financial calculations, and the last two questions are related to financial instruments, which measure respondents' understanding of the pricing and riskiness of financial securities.

Each correct answer received one point, with no deductions for wrong answers. Respondents' level of financial literacy was measured according to the points accumulated through correct answers. We primarily used the unweighted measure of financial literacy that does not differentiate between respondents' ability to answer easy and difficult questions. However, our alternative measure considers this distinction. In the weighted measure of

financial literacy, we used the same four questions but assigned one point for each correct answer and deducted points for each wrong answer. Moreover, we put more weight on the last two questions, as these were more difficult than the first two. Sekita (2013) also used both unweighted and weighted methods to examine the relationship between financial literacy and wealth accumulation in Japan, but did not find a difference in the empirical results. Although measurement issues are not expected to change the implications of the results, they make the results robust.

Financial literacy among the respondents was rather low. On average, respondents were able to answer two questions out of four (Table 1). Table 2 shows the current state of financial literacy in Japan classified by respondents' gender and education level. Male respondents were more financially literate than female respondents, and the number of female respondents who could not answer any question correctly was significantly higher. Though female respondents were able to correctly answer the basic financial calculation questions at an almost equal rate as male respondents, female respondents fell behind as the questions grew more complex. The lack of financial literacy among females is not unique to Japan, but also evident in the US (Lusardi and Mitchell 2011). Financial literacy also differed significantly by education level. Respondents with more years of education scored high on financial literacy.

[Table 2]

3. Methodology

To examine whether financial literacy reduces the level of anxiety about life in old age, we used an ordered probit regression model. The ordered probit model is a generalization of the probit model, which is suitable for studies with more than two outcomes of an ordinal dependent variable, which in this case is level of anxiety in old age. Since the number of

possible outcomes, five, is also ordered, an ordered probit model is the best fit for our study. It is not possible to control the non-linearity and ordered responses in the dependent variable using linear regressions, and thus the ordered probit model is the most suitable to address our research question.

Table 3 summarizes the variables used in the probit regression model. Level of anxiety, measured on a five-point scale, is the dependent variable in the model. The independent variable is financial literacy measured by respondents' ability to understand basic financial calculations, inflation, risks, and pricing behavior of financial securities. Financial literacy is the only independent variable because we are interested in the causality between anxiety and financial literacy. The control variables include gender, education, age, assets, whether the respondents had their own housing, social security, marital status, living with children, and exercise. During the survey, respondents disclosed financial assets by choosing among different ranges of asset values. We then used the mean values of the scale in the questionnaire to measure financial assets. Education level is measured by the number of year of education. Social security was measured using the midpoint of the social security scale used in the questionnaire.

The general form of the ordered probit regression equation used in the study is as follows:

$$\begin{aligned}
 & \textit{Probability (Level of anxiety)}_{\textit{ordered from 5 (maximum) to 1 (minimum)}} = \alpha + \\
 & \beta_1 \textit{financial literacy} + \beta_2 \textit{male} + \beta_3 \textit{age} + \beta_4 \textit{education} + \beta_5 \textit{household asset} + \\
 & \beta_6 \textit{own housing} + \beta_7 \textit{social security} + \beta_8 \textit{spouse} + \beta_9 \textit{living with children} + \\
 & \beta_{10} \textit{exercise}
 \end{aligned}$$

[Table 3]

4. Empirical Findings

Table 4 reports the empirical findings for two models to assess levels of anxiety about life in old age. In the first model, level of anxiety is regressed with financial literacy without control variables, while the second model includes the controls. The financial literacy coefficient is negative and highly significant in the first model, indicating that financial literacy can reduce anxiety levels significantly. Financial literacy appears to affect the level of anxiety even after controlling a number of variables, as in the second model. Among the control variables, age is the most noteworthy factor, having a significantly negative effect. We argue that relatively young respondents are more anxious because they are more likely not to have any plans for future. Respondents at this age are also more likely possess fewer assets and earn lower incomes.

Asset holdings and home ownership are negatively related to the level of anxiety. Previous studies reported that wealth is positively related to financial literacy (Montecone 2010). These factors may lower anxiety because asset owners are better planners, or the asset itself reduces anxiety about financial matters in old age.

In addition, married respondents are less anxious about life in old age. The ‘spouse’ coefficient is significantly negative. Family relationships and the care for family members could explain why married respondents are less anxious than unmarried respondents, since they are more likely to receive care from family members during old age, thus reducing their anxiety. It is also possible that married people plan for future more effectively because they have family responsibilities, which in turn reduces their anxiety.

Social security also reduces anxiety. A developed social security systems ensures financial and health-related security during old age, thus reducing anxiety about this stage of life. However, the effect of living with children does not support our assumption that this would lower anxiety about life in old age, though the regression coefficient shows a positive

relationship to the level of anxiety. The social structure and family relationships in Japan could explain the positive relationship. Traditionally, Japanese people are self-reliant and do not expect much support from children during old age. Holding sufficient assets and living in a country with a developed social security system could be the reason for this self-reliance. Again, the respondents' age structure could explain the positive relationship between living with children and anxiety about life in old age. The respondents' average age of 53 indicate that they are more likely to live with dependent children, and their concerns about their children could explain why they worry about the future.

[Table 4]

4.1 Robustness checks

We check the robustness of the findings using an alternative measure of financial literacy. The main analysis used an unweighted measure of financial literacy that does not differentiate between easy financial calculations and difficult pricing behavior questions. To accommodate respondents' ability to understand complex pricing behavior of financial securities, we used an alternative measure of financial literacy where we put more weight on the questions related to risk and pricing behavior. Moreover, for each wrong answer, we deduct points depending on the distribution of the answer to that question. We used the term financial expert (fexpert) to denote financial literacy measured by the alternative method, and the same ordered probit model to estimate the effect of financial literacy on anxiety about life in old age. The second column of Table 5 shows the coefficient of financial literacy without the control variables. Like the unweighted measure of financial literacy, the weighted measure of financial literacy also shows a significant negative impact on anxiety both with and without the control variables. The effect and statistical significance of the control variables are also quite similar to those of the unweighted measure of financial literacy.

Endogeneity could be a concern in the ordered probit model as well. Endogeneity problem arises when explanatory variables are correlated with the error term. Considering that endogeneity can create biasness of the coefficients of the ordered probit regression model, we used Generalized Structural Equation Model (GSEM) to control the probable endogeneity problem. GSEM handles endogeneity by including common, unobserved components, into the equations for many variables. Regression coefficients and their level of significance using GSEM are virtually the same as those in the ordered probit model suggesting that endogeneity problem does not affect the estimation results.

[Table 5]

5. Discussion

Our study provides empirical evidence that financial literacy helps to reduce levels of anxiety about life in old age. The coefficients of the probit regression models show that financial literacy is negatively associated with the level of anxiety, which holds true after controlling for age, gender, education, marital status, assets, social security, living with children, and exercise. Among the control variables, age, assets, and marital status reduce anxiety about life in old age, which is in line with Kadoya's (2015) finding.

We use several studies as the foundation to examine the relationship between financial literacy and anxiety levels. Kadoya (2015) showed that age, household assets, home ownership, and living with children influence anxiety about life after the age of 65. However, these factors could not explain anxiety levels completely. Our study adds financial literacy as an additional factor. This issue is important in Japan, since the population is rapidly aging. Though Japan has a universal pension system, benefits depend on people's ability to pay, and this type of pension system is not capable of addressing financial burdens after retirement. Sekita (2013) demonstrated that financial literacy triggers wealth accumulation in Japan,

which in turn is affected by financial literacy (Van Rooij, Lusardi, and Alessie 2012; Behrman et al. 2010). Moreover, financial literacy positively affects household savings and investment behavior (Van Rooij, Lusardi, and Alessie 2011; Sekita 2011, Al-Tamimi and Kalli 2009; Bernheim and Garrett 2003). The positive association between financial literacy and savings, investment, and wealth accumulation behavior indicates that financially literate people are more likely to be better prepared for life in old age, which in turn reduces anxiety.

6. Conclusion

We examine whether financial literacy can reduce anxiety about life in old age, and hypothesize that financially literate people can make better savings decisions, plans for the future, and handle uncertainty, thus reducing their anxieties around life during old age. Using the preference parameter study conducted by the Osaka University with a sample of 1,717 respondents aged between 40 and 65, we provide empirical evidence that financial literacy can reduce the level of anxiety. The estimation results show that financial literacy has a significantly negative impact on anxiety levels, and the relationship remains after controlling for age, gender, education, marital status, assets, social-security coverage, home ownership, living with children, and exercise, using two measures for financial literacy. Among the control variables, age, assets, home ownership housing, marital status, and social security lowers anxiety about life in old age. We argue that financial literacy reduces anxiety about life in old age through two channels. First, financial literacy enables better savings and investment decisions, leading to more wealth accumulation that in turn provides security. Second, financially literate people understand risks and uncertainties well, and thus they can manage the uncertainties related to old age in a better way.

Our study has important implications. Because financial literacy lowers the level of anxiety about life during old age, providing financial literacy education at younger ages could reduce people's anxiety about this phase of life.

This study is subject to several limitations. First, there is no consensus around how to measure financial literacy (Hung, Parker, and Yoong 2009). Other measures of financial literacy include obtaining financial literacy through practical experience and active integration of knowledge (Moore 2003) and the ability to evaluate new and complex instruments and make informed judgments (Mandell 2007). Second, self-reported subjective anxiety levels might be misleading to some extent because some respondents will tend to make extreme choices (i.e., 1 or 5 on a 5-point scale), whereas others prefer moderate choices (i.e., 3). Third, the results would be more robust if it were possible to control for other variables such as employment status and child savings bank account at the school. However, the Osaka University preference parameter study does not include these variables.

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Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
anxiety	1717	3.535	1.057	1	5
fliteracy	1717	0.504	0.273	0	1
Male	1717	0.556	0.497	0	1
Age	1717	51.637	7.047	40	65
Asset	1717	23.473	25.306	2.5	100
Educ	1717	13.351	2.083	9	21
ownhousing	1717	0.902	0.297	0	1
security	1717	0.488	0.249	0.045	0.95
Spouse	1717	0.868	0.339	0	1
Childlt	1717	0.668	0.471	0	1
exercise	1717	0.345	0.476	0	1

Table 2: Financial literacy in Japan by gender and education level

Fin.Literacy	Gender		Education			Total
	Female	Male	<12	12 to 16	>16	
0	115 (0.15)	77 (0.08)	30 (0.29)	161 (0.10)	1 (0.02)	192 (0.11)
1	158 (0.21)	157 (0.16)	23 (0.22)	289 (0.18)	3 (0.07)	315 (0.18)
2	282 (0.37)	317 (0.33)	31 (0.30)	559 (0.36)	9 (0.22)	599 (0.35)
3	183 (0.24)	312 (0.33)	16 (0.16)	463 (0.30)	16 (0.38)	495 (0.29)
4	24 (0.03)	92 (0.10)	3 (0.03)	100 (0.06)	13 (0.31)	116 (0.07)
Total	762 (1.00)	955 (1.00)	103 (1.00)	1572 (1.00)	42 (1.00)	1,717 (1.00)

Figures within parentheses show the share of each category.

Table 3: Variables and definitions

Variable	Definition
Dependent variable	
Anxiety	How much do you agree with the following sentence? (5 being the maximum and 1 the minimum) ‘I have anxieties about my “life after I turn 65.”’
Independent Variables	
Financial literacy	Measured by four questions related to basic financial calculation skills and understanding of financial instruments. The first question measures the ability to understand compound interest, the second question measures the ability understand the effect of inflation, the third questions measures the understanding of risk, and the fourth question measures understanding of pricing behavior.
Male	1= male, 0 = female
Age	Respondents aged 40-65
Educ	Years of education
Asset	Balance of financial assets (savings, stocks, bonds, insurance, etc.) for the entire household (unit: JPY10,000)
Ownhousing	1= own, 0 = otherwise
Security	Expected social security (pension) income for total living expenses after retirement (%)
Spouse	1= married, 0= otherwise
Childt	1= living with child(ren), 0= otherwise
Exercise	1= exercise at least once a week, 0 = otherwise.

Table 4: Estimation results

	Estimation results without control variables	Estimation results with control variables
Fliteracy	-0.323 (-3.46) ^{***}	-0.175 (-1.72) [*]
Male		0.023 (0.43)
Age		-0.021 (-5.41) ^{***}
Educ		-0.008 (-0.63)
Ownhousing		-0.139 (-1.57)
Asset		-0.003 (-2.75) ^{***}
Security		-0.208 (-1.91) [*]
Spouse		-0.265 (-3.23) ^{***}
Childlt exercise		0.107 (1.78) [*] -0.055 (-1.01)
/cut1	-1.911	-3.526
/cut2	-1.093	-2.685
/cut3	-0.359	-1.928
/cut4	0.773	-0.764
Number of obs.	1717	1717
Log likelihood	-2429.227	-2386.639
Pseudo R2	0.0025	0.0199
LR chi2	11.96	97.13

t statistics in parentheses

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

Table 5: Estimation results using an alternative financial literacy measure

	Estimation results without control variables	Estimation results with control variables	Estimation results with control variables using GSEM
Fexpert	-0.331 (-3.28) ^{***}	-.228 (-2.19) ^{**}	-.182 (-1.72) [*]
Male		.221 (0.40)	.004 (0.15)
Age		-.021 (-4.97) ^{***}	-.020 (-5.40) ^{***}
Educ		-.009 (-0.76)	-.011 (-0.64)
asset		-.003 (-2.81) ^{***}	-.003 (-3.09) ^{***}
Ownhousing		-.148 (-1.66) [*]	-.166 (-1.81) [*]
Security		-.221 (-2.05) ^{**}	-.247 (-2.18) ^{**}
Spouse		-0.264 (-3.22) ^{***}	-.312 (-3.87) ^{***}
Childlt		.109 (1.81) [*]	.113 (1.88) [*]
Exercise		-.054 (-0.99)	-.048 (-0.92)
/cut1	-1.772	-3.481	
/cut2	-0.951	-2.637	
/cut3	-0.218	-1.880	
/cut4	0.913	-.716	
Number of obs.	1717	1717	1761
Log likelihood	-2429.844	-2385.729	-2445.73
Pseudo R2	0.002	0.020	
LR chi2	10.72	98.95	

t statistics in parentheses

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