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Weiwei Zhong March 13, 2017

Retirement's Effects on Physiological and Psychological Well-being among Elderly Chinese

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Abstract

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This paper studies the relationship between retirement and physical and mental health of old Chinese, and exams how such relationship changes between genders. Using the two longitudinal waves from China Health and Longitudinal Study and Ordinary Least Square models, we find a retirement has a significant and negative effect on physiological well-being, a significant and positive effect on physiological well-being. The effect enlarges for women's physical health and becomes small and insignificant for women's mental health. This heterogeneous effect may be the result of differences in early life factors, cognitive abilities, and power in the family.

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Table of Contents

I. INTRODUCTION

Due to China's ongoing implementation of population control policy, the share of the population that is in the labor force is decreasing, and the proportion of the elderly population over 60 is expected to exceed 30% in 2030 (CHARLS, 2013). The aging of the population makes it difficult to satisfy the demand for labor, pressures the national pension payment, and may hinder China's economy development (Liu and Kong, 2015). In light of the aging population, the Chinese government is considering increasing the legal retirement age, which is currently 60 for men and 50 for women.

When setting the official retirement age, it is important to consider how retirement affects health. For example, if retirement improves health, delaying retirement will increase the government's expenditure on health care. Additionally, it is unclear whether workers will be willing to continue to work past age 60. Research on the relationship between retirement and psychological well-being can shed light on this question.

The relationship between health and retirement is complex. In one hand, workers choose to retire when they experience a severe health issue. On the other hand, retirement may affect health. One literature provides evidence that leisure-time physical activity engagement promotes health and well-being among older adults (Kim et al., 2014). Thus, physical health might be improved or preserved after retirement, as retirees have more spare time to spend on physical activities than working people. There also might be an improvement in retirees' mental health as retirement life eliminates pressure from work and gives more freedom for leisure-time activities. However, health condition could also deteriorate, since nearly 40% of Chinese retirees receive pensions that can only cover less than 30% daily life expenditure, making health and medical care more expensive (CHARLS, 2013). Work also provides social ties and support that may

promote health. Therefore, labor force exit may generate feelings of isolation and depression for retirees, in particular for those who do not live with their family. Over 40% or 74.0 millions of Chinese elderly have a high level of depressive symptoms (CHARLS, 2013). It is important to understand retirement alleviates depression or worsens elderly's health so that we can predict the acceptance of the retirement age delay policy.

A fair amount of literature studied retirement's effects using different approaches, but they don't reach an agreement the role of retirement in physical and mental health outcomes (Asenova, 2014; Bonsang and Klein, 2012; Charles, 2004; Coe and Zamarro, 2011; Dave et al., 2006; Johnston and Lee, 2009; Mein et al., 2003; Neuman, 2007). Further, substantial literature points out that adverse health shocks reduce labor supply, implying the endogeneity problem between retirement and health outcomes (Colie, 2004; McGeary, 2009). Failure to eliminate endogeneity in data analysis may bias the results.

This research explores retirement's effects on psychological and physiological well-being Chinese elderly, including male and female. To be more specific, I aim at finding out whether retirement makes a difference on physical and mental health among the elderly, and whether the effect is different from men to women. Many papers analyze this issue using sample data from Spain, England, and America, and only small amount of them study retirement's effect on psychological and physiological well-being at the same time. Unlike those papers, this paper will contribute to the existing literature by focusing on Chinese elderly, studying both mental and physical health outcomes, and comparing the effect by gender.

For data analysis, I use two longitudinal waves of China Health and Longitudinal Study (CHARLS), spanning from 2011 to 2013. CHARLS includes information on respondents' physical, mental health, retirement status and other important characteristics such as

demographics and socio-economic. Due to this relatively short time span of the dataset, I divide sample in the survey into groups of retired and working and then test whether retirement is significant in their physical and mental health.

The results show that retirement has a significant effect on both physiological and psychological well-being of the elderly in China. Particularly, retirement has a positive effect on mental health and negative impact on physical health. However, such effect becomes insignificant and smaller on the physical health of men and mental health of women.

CHARLS provides a good comparison of health outcomes between the retired and working community. However, there exist limitations when using this dataset. First, an ideal approach to conduct data analysis is fixed effect regressions, which compares one's health status before and after retirement. This method is not feasible, as CHARLS only has two longitudinal waves of the survey so far. Using Ordinary Least Square (OSL) regressions instead may miss some significant variables that both impacting health outcomes and decisions to retirement, causing bias in the results. Second, CHARLS does not include any question asking how long have the respondents been retired. Lack of such length of retirement may cause bias in regression models, as retirement is likely to have a different impact on people who are newly retired and people who have been retired for over ten years. Therefore, a causal effect of retirement on health outcomes cannot reach based on the information at this stage.

II. LITERATURE REVIEW

A fair amount of research has studied how retirement impacts individual's health, but there is no consensus on the direction of the effect. Some conclude that retirement promotes

one's physical and mental health (Charles, 2004; Coe and Zamarro, 2011; Johnston and Lee, 2009). Some paper shows strong evidence against the argument that retirement deteriorates health status, and argues that retirement perseveres, if not improves, one's well-being (Asenova, 2014; Neuman 2007). Others find an adverse effect of retirement on physical and mental health outcomes (Bonsang and Klein, 2012; Dave et al., 2006; Mein et al., 2003).

Some of the existing literature focuses on either male or female, and they often find that retirement impacts men and women's health outcomes in a different way (Asenova, 2014; Johnston and Lee, 2009). Asenova, using the dataset from 17 European countries, shows that labor exit does not have a significant impact on male workers' mental health, but gives a positive effect on women's psychological well-being. This different effect is because that retirement cuts the size of men's social network, but not women's. Further retirement enhances the contact between women and their family, which in turn promoting psychological well-being for female (Asenova, 2014).

Johnston and Lee test the impact of retirement on health among English men from Health Survey for England (HSE). Based on the fact there is a significant jump of proportion retired at the age of 65, they use the method of Regression Discontinuity Design (RDD) to compare the health condition of men around age 65. The results from RDD show retirement brings an increase in individual's sense of well-being and mental health. Also, retirement causes a decrease in the probability of self-report bad health, but not necessarily their true physical health (Johnston and Lee, 2009).

A common concern in paper studying retirement's role in health outcomes is the endogeneity between health and labor supply. Workers sometimes choose to exit the labor force because of a bad health status. Indeed, past literature confirms a negative relationship between

health and decisions to retire, and some suggest that people's decisions are usually involved with not only their health but also their spouses' health status (Colie, 2004; McGeary, 2009). Specifically, Colie concludes that labor supply of individual is significantly influenced by health shocks, especially if shocks come with the loss of functioning (Colie, 2004). In McGeary's research on married and employed couples from Health and Retirement Study, he finds that people will reduce labor supply if health shocks happen on themselves as well as on their spouses (McGeary, 2009). McGarry (2004) demonstrates that retirement expectation is more largely driven by self-reported health status than financial status.

Therefore, any research examining the effect of retirement on health outcomes is subject to the endogeneity problem between them. To solve this endogeneity problem, researchers adopt different methodologies based on the dataset and variables of interest. Dave et al. (2006) limit the sample to respondents who reported no major illness before retirement and no decline in health between adjacent waves before retirement so that all the observations would not retire because of health issues. However, Neuman (2007) points out that this screening method may include retired people who experienced worsening of health between the last wave before retirement and retirement. Therefore, this methodology is very likely to fail to eliminate endogeneity. The adverse results capture only a relationship between retirement and health, rather than a causal effect.

Neuman, also using longitudinal data from Health and Retirement Study, utilizes three sets of instruments of exogenous variation to control the endogeneity problem(Neuman, 2007). The findings are that retirement preserves good health, but the result becomes insignificant for objective measurements of change of health. In this case, retirees simply report improvements in health condition due to less stress and work demand in retirement life. At least, the results from

regressions show strong evidence against the argument that retirement deteriorates physical health.

Another controversy in this research field is the setting up standard measurements of physical and mental health. Many take self-rate of depression, loneliness, and life satisfaction as the measure of psychological well-being, and the self-reported health status as the proxy of one's physiological well-being. However, different results are found when we switch to objective measurement of health (Neuman 2007). The question whether self-report mental and physical health reflect real health events is vital to this paper.

Rich literature tests the validity of self-reported health status. A universal agreement in those paper is that self-report health status is highly associated with true health conditions, and thus is accurate in reflecting actual health events (Idler and Benyamini, 2016; Miilunpalo et al., 1997; Wallace and Herzog, 1995). One study finds an inverse correlation between self-ratings and mortality and physician visits among the middle-aged population in Finland. This negative relationship suggests the validity of self-report health status and justifies the role of subjective assessments in population health monitoring (Miilunpalo et al., 1997). Idler and Benyamini review twenty-seven community studies, which use self-rating health as predictors of mortality in longitudinal studies of selected samples. They conclude that in the most of the studies, self-report health status lends credible references to the predictions of mortality (Idler and Benyamini, 2016). Additionally, Wallace and Herzog research all the instruments used to measure health in the Health and Retirement Study. Their analysis shows a highly convergent and correlated relationship among subjective health, mental health, and objective health (Wallace and Herzog, 1995). Therefore, subjective assessments provide valuable information on real health status, and it is indispensable when assessing one's health condition.

The public health insurance program covers almost the entire Chinese population, but retirees do not enjoy a better material well-being compared to workers. In 2011, the income poverty rate was 19.6% for the elderly aged 45-59, and the rate is 28.5% for those aged over 60 (CHARLS, 2013). However, in America, the poverty rate of older population (aged 65 or over) is lower than that of the working age population (aged 18 to 64). In 2014, the proportion of older and working-age population living in poverty was about 10% and 14%. Given the discrepancies in material well-being before and after retirement between two countries, the retirement effect in China may differ from that in the USA.

Though few studies focus on retirement's role on health outcomes of Chinese, there is literature researched the determinants of physical and mental health inequality in China. Some of them show retirement status plays a role in explaining the health inequality, but many other factors contribute more to the inequality (Cai, 2017; Xu et al., 2016).

One paper uses CHARLS (China Health and Retirement Longitudinal Study) to measure the income-related inequality of depressive symptoms of the Chinese elderly as well as identify the factors of such inequality (Xu et al. 2016). Based on logit model, the decomposition analysis shows that income is the primary reason for pro-rich depressive disparities. Working status contributes to reducing the magnitude of concentration of depressive symptoms among the worse off. In other words, working has a positive impact on depression inequality among the elderly. Apart from working status, age and living alone help to decrease the depressive symptoms of people who experience serve depression. However, residence in the rural area and low education attainment give a positive percentage of contribution to the overall inequality.

Using the Chinese General Social Survey (CGSS), Cai (2017) shows that people who are still working are more likely to report good self-assessed health. Moreover, respondents who

have high income and high socio-economic status tend to report good health status. However, women, the elderly, single or married people are less likely to give good self-rated health.

Those two literature show that health of Chinese is driven by various factors such as marital status, age, gender, income. Some of them have larger effects on health outcomes than retirement status (Cai, 2017; Xu et al., 2016). The omission of unobservable factors that influence health outcomes leads to bias in the results from regressions. To exclude such potential bias, Dave *et al.* take advantage of the informative and longitudinal aspects of the dataset and set up a set of controls (Dave et al., 2006). Thus, an extensive set of control variables is necessary for the analysis of retirement on psychological well-being to obtain an accurate result.

III. DATASET & METHODOLOGY

a. Dataset

The dataset used in this paper is China Health and Longitudinal Study (CHARLS), by National School of Development of Peking University. The 2011 national baseline survey consists of successful studies of 17,708 individuals over 45 years of old from 10,287 households in 28 of China's 30 provinces excluding Tibet. As CHARLS sample demographics mimics closely that of population consensus in 2010, the dataset is a valid representative of the elderly Chinese community.

A subsequent wave was conducted in 2013, aiming at tracking the change of elderly's health conditions, incomes as well as other socioeconomic information. Another wave was done in 2014 to get more data regarding respondents' education and work history, which provides valuable pre-retirement information that may affect post-retirement health outcomes. In this

project, the variable of interest is individuals' psychological and physiological well-being, so first two waves will be used for data analysis. Third waves are also utilized to construct control variables.

CHARLS is the ideal dataset for studying retirement's effects on mental and physical health outcomes. First, the information of reasons for retirement in the dataset helps me to avoid the potential bias due to endogeneity between retirement and health. Specifically, I exclude people retired because of health issues from themselves or spouses in my sample. Second, it records informative data in the aspects of demographics, socioeconomics, household and lifestyle, providing me enough information to set up extensive control variables to eliminate bias in regressions. Further, it provides reliable and comprehensive measurements of physical and mental health that can be directly used in data analysis.

b. Methodology

The ideal approach to study this retirement's effect on health outcomes is to comparing individuals' health conditions before and after retirement. Then, the fixed effects approach is the best candidate to do data analysis:

$$\mathbf{PH}_{it} = \boldsymbol{\beta}_0 + \boldsymbol{\beta}_1\mathbf{R}_{it} + \boldsymbol{\beta}_2\mathbf{X}_{it} + \boldsymbol{\beta}_3\mathbf{Y}_i + \boldsymbol{\mu}_i + \boldsymbol{\varepsilon}_{it}$$

$$\mathbf{MH}_{it} = \boldsymbol{\alpha}_0 + \boldsymbol{\alpha}_1\mathbf{R}_{it} + \boldsymbol{\alpha}_2\mathbf{W}_{it} + \boldsymbol{\alpha}_3\boldsymbol{Z}_i + \boldsymbol{\mu}_i + \boldsymbol{\varepsilon}_{it}$$

where $\mathbf{PH}_{it}$ is the dependent variable measuring physical well-being for *i*th individual in year *t*, $\mathbf{MH}_{it}$ is the dependent variable measuring mental well-being, $\mathbf{R}_{it}$ is the independent variable retirement status for individual *i* in year *t*, $\mathbf{X}_{it}$ and $\mathbf{W}_{it}$ is time-variant individual characteristics, such as age, income, and transfers from others, $\mathbf{Y}_i$ and $\boldsymbol{Z}_i$ is time-invariant individual

characteristics including gender, education, and region, $\boldsymbol{\mu_i}$ measures the unobserved time-invariant individual effect and $\boldsymbol{\varepsilon_{it}}$ is the error term.

However, CHARLS currently only provide two waves of the dataset in 2011 and 2013. 1926 people report job change in the second wave, but only 108 of them switched from working to retired between two waves, making the independent variable $\mathbf{R_{it}}$ unchanged for most of the individuals in the sample. Therefore, the limitations from CHARLS does not allow to use the fixed effect approach.

Though panel data does not work for this research, it is still possible to look at retirement's impacts on health outcomes by using ordinary least square models. In each wave of the survey, I first categorize people into two groups retired and working based on their retirement status and then compare their physical and mental health outcomes. To get a more precise estimation, control variables such as demographics, socio-economic and household characteristics are necessary for the regressions. Two different OLS equations will be used to test psychological and physiological outcomes separately.

$$\mathbf{PH_{it}} = \boldsymbol{\beta_{0t}} + \boldsymbol{\beta_{1t}}\mathbf{R_{it}} + \sum \boldsymbol{\beta_{jt}}\boldsymbol{X_{ijt}} + \boldsymbol{\varepsilon_{it}}$$

where $\mathbf{PH_{it}}$ is the dependent variable measuring physical well-being for *i*th individual in year *t*, $\mathbf{R_{it}}$ is the independent variable retirement status for the individual in the same period, $\boldsymbol{X_{ij}t}$ is the *j*th control variables for the *i*th individual in the year t, and $\boldsymbol{\varepsilon_{it}}$ measures the error terms.

$$\mathbf{MH_{it}} = \boldsymbol{\alpha_{0t}} + \boldsymbol{\alpha_{1t}}\mathbf{R_{it}} + \sum \boldsymbol{\alpha_{jt}}\boldsymbol{X_{ijt}} + \boldsymbol{\varepsilon_{it}}$$

where $\mathbf{MH_{it}}$ is the dependent variable measuring mental well-being.

Some literature finds a heterogeneous retirement's effect on men and women's psychological well-being (Asenova, 2014). Fikree and Pasha (2004) find, in South Asia, girl

children often have poorer access to health care and nutrition compared to boys, which results in a health disparity in adulthood. It is likely that male elderly Chinese have some unobserved advantages in childhood such as health treatment and nutrition attainment, making a difference in the health outcomes with the female elderly. Therefore, an additional model is established to measure the retirement's effect on physical and mental health by gender.

c. Independent Variable

There are three types of retirement in CHARLS, normal, early and internal retirement. For normal retirement, it means people reached certain legal retirement age and retired naturally. For internal and early retirement, respondents are asked to report their reasons for such retirement decisions. I exclude those respondents who retired due to health problems from themselves or their spouses and who reported reemployment after retirement, as they cause an endogeneity problem of retirement decision and labor supply. The independent variable in data analysis is a dummy variable $\mathbf{R}_{it}$, which is set to 1 if the *i*th individual is retired in 2011 or 2013 survey, and 0 if employed or self-employed. Note that farmers working for other farmers or their households are not included in the sample, as their work is usually more physically demanding than that of people working in other industries, and thus more likely to experience a decline in health. Since our retired group only has retirees from outside the agriculture, including people who engaged in agricultural production in the working group will bias results from regressions. In total, there 948 retirees and 1,996 workers in the 2011 sample, and 405 retirees and 2,963 workers in the 2013 sample.

d. Dependent Variables

In this paper, the dependent variable physiological well-being is measured by the self-report health status in the 2011 baseline survey and the second wave in 2013. The dependent variable physical health, denoted as, $\mathbf{PH}_{\square t}$, is set to 1 if respondents report their health status as "Very good," "Good" or "Fair," and set to 0 if they report "Bad" or "Very bad."

Another dependent variable is psychological well-being, denoted as $\mathbf{MH}_{it}$, which represents mental health for *i*th individual in year *t*. Notably, $\mathbf{MH}_{it}$, is measured by the frequency of feeling "Happiness." In CHARLS, one is asked to choose one answer that can best describe their feelings of happiness. Respondents' answers are scaled from 1 to 4, where 1 is "Rarely or none of the time (<1 day)," 2 is "Some or a little of the time (1-2 days)," 3 is "Occasionally or a moderate amount of the time (3-4 days)" and 4 is "Most or all of the time (5-7 days)."

Table 1 and 2 present the summary statistics of dependent variables by retirement status in 2011 and 2013. In both years, retired groups have a worse self-report health status and a higher level of happiness on average.

Table 1: Summary Statistics of Dependent Variables in 2011, by Retirement Status

	Working N=1,996		Retired N=948		Total N=2,944	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Physical Health	0.8442	0.3628	0.7890	0.4082	0.8264	0.3788
Happiness	3.0793	1.0643	3.2365	0.9916	3.1300	1.0438

Table 2: Summary Statistics of Dependent Variables in 2013, by Retirement Status

	Working N=2,963		Retired N=405		Total N=3,368	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Physical Health	0.8488	0.3583	0.7951	0.4042	0.8423	0.3645
Happiness	2.7865	1.1730	3.0412	1.1359	2.8178	1.1713

e. Control Variables

As discussed in existing literature, there are unobserved factors impacting both retirement and physical health, and omitting such factors in regressions will cause bias (Dave et al., 2006). In this paper, the control variables are categorized into five categories, demographic, socio-economic, lifestyle, psychosocial and household characteristics.

Cai, Coyte, and Zhao (2017) find that various factors including gender, age, marital status and location account for variations in self-report health status. Further, Xu (2016) shows that the same set of demographic variables is significant in explaining the depression inequality among the Chinese elderly.

Another important demographic variable is Hukou status, which is a household registration system dividing people into "agricultural" and "non-agricultural" sectors. Hukou system plays a crucial role in determining Chinese's socioeconomic well-being, as it affects one's right to receive a pension, to enroll in public schools and to qualify for superior medical insurance (Wang 2004, 2005; Chan and Buckingham 2008). Treiman (2012) shows that though Chinese experienced improvements in health, material well-being and income, Hukou system still largely contributes to inequalities of those life aspects. In this paper, it is very likely that Hukou system impacts both retirement decisions and health outcomes. Based on their findings, those demographics factors are included in the regressions to eliminate the potential bias in results.

Table 3: Summary Statistics of Demographic Characteristics 2011, by Retirement Status

	Working N=1,996		Retired N=948		Total N=2,944	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Gender	0.595	0.491	0.513	0.500	0.568	0.495
Age	53.483	7.209	65.283	8.699	57.283	9.486
Marital Status						
Married with spouse present	0.816	0.387	0.768	0.422	0.801	0.400
Married but not living with spouse	0.068	0.251	0.035	0.183	0.057	0.232

Separated	0.006	0.074	0.006	0.079	0.006	0.076
Divorced	0.022	0.147	0.022	0.147	0.022	0.147
Widowed	0.079	0.270	0.167	0.373	0.107	0.310
Urban Residence	0.539	0.499	0.843	0.364	0.637	0.481
Region						
East China	0.454	0.498	0.382	0.486	0.431	0.495
Central China	0.380	0.486	0.477	0.500	0.411	0.492
Non-agricultural Hukou	0.296	0.457	0.892	0.310	0.488	0.500

Table 4: Summary Statistics of Demographic Characteristics 2013, by Retirement Status

	Working N=2,963		Retired N=405		Total N=3,368	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Gender	0.457	0.498	0.417	0.494	0.452	0.498
Age	52.857	7.260	62.978	9.161	54.074	8.202
Marital Status						
Married with spouse present	0.842	0.365	0.820	0.385	0.839	0.367
Married but not living with spouse	0.086	0.280	0.049	0.217	0.081	0.273
Separated	0.004	0.066	0.007	0.086	0.005	0.069
Divorced	0.012	0.111	0.017	0.130	0.013	0.114
Widowed	0.050	0.219	0.104	0.305	0.057	0.231
Cohabitated	0.002	0.041	0.002	0.050	0.002	0.042
Urban Residence	0.563	0.496	0.869	0.338	0.600	0.490
Region						
East China	0.408	0.491	0.370	0.484	0.403	0.491
Central China	0.402	0.490	0.447	0.498	0.407	0.491
Non-agricultural Hukou	0.318	0.466	0.854	0.353	0.382	0.486

Apart from demographic characteristics, socio-economics variables such as household income, insurance, and self-rated economic status impact people's self-reported health status and life satisfaction (Cai, Coyte, and Zhao, 2017; Ng, Tey and Asadullah, 2017). However, besides income, transfers from other family members and friends significantly impact Chinese's material well-being, which in turn may make medical care more affordable and promote health status. In the old Chinese community, the family transfer is very common and is the primary source of the old's daily expenditure. 46.9%, nearly half of the elderly receives transfers from children who do not live with them, and 53.3%, over half of the elderly who do not live with their children receive transfers from them (CHARLS, 2013). Therefore, in addition to those socio-economics variables used in existing literature, transfers from others is also involved in regressions.

Table 5: Summary Statistics of Socio-economics Characteristics 2011, by Retirement Status

	Working N=1,996		Retired N=948		Total N=2,944	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Highest Education Level						
Finish or Did Not Finish Elementary School	0.352	0.478	0.305	0.461	0.337	0.473
Middle or High School	0.433	0.496	0.418	0.493	0.428	0.495
Vocational Schools or above	0.099	0.299	0.201	0.401	0.132	0.339
Income	9.613	13.711	4.840	10.416	8.076	12.935
Family Transfers	1.280	7.152	2.147	12.130	1.559	9.066
Medical Insurance	0.929	0.257	0.959	0.199	0.939	0.240

Table 6: Summary Statistics of Socio-economics Characteristics 2013, by Retirement Status

	Working N=2,963		Retired N=405		Total N=3,368	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Highest Education Level						
Finish or Did Not Finish Elementary School	0.352	0.478	0.247	0.432	0.339	0.473
Middle or High School	0.433	0.496	0.437	0.497	0.433	0.496
Vocational Schools or above	0.088	0.283	0.200	0.400	0.102	0.302
Income	8.047	12.032	4.584	15.587	7.631	13.375
Family Transfers	2.037	8.278	7.252	56.654	2.664	21.173
Medical Insurance	0.943	0.233	0.968	0.176	0.946	0.227

Another level of controls is lifestyle characteristics. Intuitively, different lifestyles impact one's physical health outcomes differently. People who smoke or have the problem of obesity face the danger of various diseases like cancers and heart strokes. Further, Xu (2016) shows that smoking and social activity also explain the depression inequality among the Chinese elderly. Note that social activity participation is set as an individual level of control, called psychosocial characteristics.

Table 7: Summary Statistics of Lifestyle and Psychosocial Characteristics 2011, by Retirement Status

	Working N=1,996		Retired N=948		Total N=2,944	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
BMI						
Underweight	0.042	0.201	0.044	0.206	0.043	0.202
Normal	0.520	0.500	0.384	0.487	0.476	0.500
Overweight	0.218	0.413	0.233	0.423	0.223	0.416
Smoking	1.552	0.497	1.614	0.487	1.572	0.495
Social Activity	0.558	0.497	0.647	0.478	0.587	0.493

Table 8: Summary Statistics of Lifestyle and Psychosocial Characteristics 2013, by Retirement Status

	Working N=2,963		Retired N=405		Total N=3,368	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
BMI						
Underweight	0.019	0.135	0.030	0.170	0.020	0.140
Normal	0.333	0.471	0.277	0.448	0.326	0.469
Overweight	0.234	0.423	0.225	0.418	0.233	0.423
Smoking	1.761	0.427	1.763	0.426	1.761	0.426
Social Activity	0.563	0.496	0.672	0.470	0.576	0.494

When regressing retirement status on mental health outcomes, I use an additional level control of household characteristics, which includes the number of children and living arrangements. Compared to others, people living with family members have fewer depression symptoms and higher life satisfaction (Cai, Coyte, and Zhao 2017).

Table 9: Summary Statistics of Household Characteristics 2011, by Retirement Status

	Working N=1,996		Retired N=948		Total N=2,944	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Number of Children	1.399	1.200	1.162	1.487	1.323	1.304
Living Arrangements						
Living Alone	0.043	0.203	0.096	0.295	0.060	0.238
Living with Others	0.011	0.102	0.011	0.102	0.011	0.102
Living with Spouse Only	0.187	0.390	0.395	0.489	0.254	0.435
Living with Children	0.698	0.459	0.417	0.493	0.607	0.488

Table 10: Summary Statistics of Household Characteristics 2013, by Retirement Status

	Working N=2,963		Retired N=405		Total N=3,368	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Number of Children	1.126	1.383	1.560	1.753	1.178	1.439
Living Arrangements						
Living Alone	0.001	0.026	0.005	0.070	0.001	0.034
Living with Others	0.037	0.190	0.106	0.308	0.046	0.209
Living with Spouse Only	0.111	0.026	0.112	0.050	0.111	0.030
Living with Children	0.811	0.392	0.644	0.479	0.791	0.407

IV. RESULTS

a. Self-Rated Health Status

Table 11 and 12 show the retirement's effects on self-rated health status (Very good, good, and fair versus bad and very bad) in 2011 and 2013 dataset. The reference group is all the people who reported working in the dataset, so the regression results estimates on an effect of being retired compared to working. Appendix Table 1 and 3 give the full results of those regressions.

In Table 11 and 12, four different level of controls is used in OLS regressions. Model 1 estimates retirement's effect on physical health without any controls. Model 2 includes demographics characteristics, such as gender, age, location, marital status and Hukou type. Model 3 involves an additional set of controls, socio-economic characteristics, and Model 4 adds lifestyle characteristics to Model 3. Model 5 includes all four levels of controls. The regression coefficients (in Model 1) show a statistically significant and negative effect of retirement on physical health when one excludes all controls. This effect becomes smaller as one adds controls to regressions for both years.

Table 11: OLS Estimates Predicting Physiological Well-being (2011)

	1	2	3	4	5
Retirement Status					
Retired	-0.0552***	-0.0586***	-0.0490**	-0.0503**	-0.0533**
	(0.015)	(0.021)	(0.022)	(0.022)	(0.022)
Other Regressors					
1. Demographics Characteristics		×	×	×	×
2. Socio-economics Characteristics			×	×	×
3. Lifestyle Characteristics				×	×
4. Psychosocial Characteristics					×
Observations	2,944	2,944	2,944	2,944	2,944

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;
Reference group is people who are working

Table 12: OLS Estimates Predicting Physiological Well-being (2013)

	1	2	3	4	5
Retirement Status					
Retired	-0.0537***	-0.0294	-0.0413*	-0.0414*	-0.0440*
	(0.019)	(0.022)	(0.023)	(0.023)	(0.023)
Other Regressors					
1. Demographics Characteristics		×	×	×	×
2. Socio-economics Characteristics			×	×	×
3. Lifestyle Characteristics				×	×
4. Psychosocial Characteristics					×
Observations	3,368	3,368	3,368	3,368	3,368

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;
Reference group is people who are working

More specifically, in the simple regressions of retirement status of physical health, the probability of reporting good health status is 5.52% less for the retired group than the working group in 2011 dataset, and this number is 5.37% in 2013 dataset. Both are significant at 1 percent significance level. When taking all controls into consideration, the probability of reporting good health status becomes 5.33% less for the retired group than the working group in 2011, and the number drops to 4.40% in 2013. Their significance levels increase to 5 percent level and 10 percent level correspondingly.

Table 13 gives the effect of retirement in the full-specified model (Model 5) by gender in both years. For men, retirement becomes insignificant on physical health in both years. In contrast, retirement has a larger, negative and significant effect on female's physiological well-being. The probability of reporting good health status is 7.03% and 7.42% less for the retired group than the working group in 2011 and 2013.

Table 13: OLS Estimates Predicting Physiological Well-being, by Gender

	Male		Female	
	2011	2013	2011	2013
Retirement Status				
Retired	-0.0497	-0.0236	-0.0703**	-0.0742**
	(0.030)	(0.034)	(0.033)	(0.032)
Observations	1,673	1,523	1,271	1,845

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;
Reference group is people who are working

b. Psychological Well-being

Table 14 and 15 provide the estimates of retirement's effects on psychological well-being in 2011 and 2013 dataset. The physiological well-being is measured by the frequency of feeling happiness, scaled from 1 "Rarely or none of the time (<1 day)," to 4 "Most or all of the time (5-7 days)." As the same with the physiological model, the reference group is all the people who reported working in the dataset. Appendix Table 2 and 4 give the full results of those regressions.

Table 14: OLS Estimates Predicting Psychological Well-being (2011)

	1	2	3	4	5	6
Retirement Status						
Retired	0.1571***	0.1435**	0.1573***	0.1460**	0.1287**	0.1332**
	(0.041)	(0.059)	(0.061)	(0.061)	(0.061)	(0.061)
Other Regressors						
1. Demographics Characteristics		×	×	×	×	×
2. Socio-economics Characteristics			×	×	×	×
3. Lifestyle Characteristics				×	×	×
4. Psychosocial Characteristics					×	×
5. Household Characteristics						×
Observations	2,922	2,922	2,922	2,922	2,922	2,922

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;
Reference group is people who are working

Table 15: OLS Estimates Predicting Psychological Well-being (2013)

	1	2	3	4	5	6
Retirement Status						
Retired	0.2548***	0.1605**	0.1735**	0.1709**	0.1515*	0.1466*
	(0.065)	(0.075)	(0.078)	(0.078)	(0.078)	(0.078)
Other Regressors						
1. Demographics Characteristics		×	×	×	×	×
2. Socio-economics Characteristics			×	×	×	×
3. Lifestyle Characteristics				×	×	×
4. Psychosocial Characteristics					×	×
5. Household Characteristics						×
Observations	2,963	2,963	2,963	2,963	2,963	2,963

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;
Reference group is people who are working

In Table 14 and 15, five different levels of controls are used in regressions. In addition to

the four used in analyzing physical health outcomes, household characteristics including living arrangement and number of children are taken into consideration. The coefficients of retirement are positive and significant in the model without any controls in the year 2011 and 2013. The number becomes smaller and less significant in full-specified models for both years.

In the simple regression of retirement on psychological well-being, the retirement increases one's happiness level by 0.157 in 2011, and the number is 0.255 in 2013. However, in the full-specified model, the magnitude of such positive effect decreases to 0.133 higher for the retired group than the working group in 2011, and it drops to 0.147 in 2013. Their significant level increase from 1 percent to 5 and 10 percent respectively.

Table 16: OLS Estimates Predicting Psychological Well-being, by Gender

	Male		Female	
	2011	2013	2011	2013
Retirement Status				
Retired	0.2379***	0.1499	-0.0024	0.0426
	(0.087)	(0.130)	(0.088)	(0.100)
Observations	1,658	1,294	1,264	1,669

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1;
Reference group is people who are working

Table 16 provides the effect of retirement on mental health in the full-specified model (including all five control levels) by gender in both years. For men, retirement still gives a positive and relatively large effect on mental health. It increases the level of happiness by 0.2379 in 2011 and 0.1499 in 2013. However, retirement has a much smaller and insignificant when we only consider women. Being retired decreases happiness level by 0.0024 in 2011, but in another year, it increases happiness level by 0.0426. Men experience a larger enjoyment from retirement than women.

V. DISCUSSION

The results from the regressions imply that retirement decreases self-reported health status. In the fully specified model, the probability to report good health status is 5.33% less for retirees than workers in 2011, and the number is 4.40% in 2013. Income, urban residence and developed region (east China) have a positive and significant effect on one's physical health. It might be hard and costly to change people's living area, but increasing the pension income for retirees is feasible. In the summary statistics of socio-economic characteristics (Table 5 and 6), the income of workers is much higher, and it is almost twice than that of retirees on average in 2011. Though reduce the income gap cannot eliminate the negative effect of retirement on health, it will be helpful to promote the overall health of retirees.

Additionally, the coefficients from regressions by gender show that retirement's effect is small and insignificant for male, while it stays significant and becomes larger for female. This finding supports the hypothesis that male elderly Chinese have certain unobserved factors so that they experience small health decline in retirement.

One unobserved factor might be cognitive ability, which is important for managing chronic illness. In China, women have a weaker cognitive ability than men, and it also declines faster (CHARLS, 2013). Labor exit may deteriorate women's cognitive ability, and thus declines their health more than men's health. Another reason could be early life factors. Decades ago, women were often considered as subordinate to men in China, so boy children have better treatment including food and health care than girls. Gender discrimination in early life may contribute to health disparity in later life.

Different from the effect on physical health, retirement promotes one's psychological well-being. Taking all control levels into account, retirement increases the happiness level by

0.133 in 2011, and 0.147 in 2013 (about 13% of one-standard deviation). Though the numbers are small in magnitude in a question whose answer is scaled from 1 to 4, it provides strong evidence that retirees have a higher happiness level than workers. The effect of the disappearance of work demand and stress surpasses the influence of labor exit depressions. Therefore, the policy of delaying people's legal retirement age will reduce their welfare in the future.

However, this problem might be alleviated by participating social activities, which has a larger and positive effect on psychological well-being. People who engaged in social activities have a happiness level 0.158 and 0.289 higher than those who do not.

The story changes in the model analyzing retirement's effect by gender. Retirement has a insignificant and minimal effect for senior women, but it enlarges for senior men. The unobserved factors are probably associated with employment's role in women's mental health (Lennon and Rosenfield, 1992). Some researchers argue that employed women have better psychological well-being, as jobs provide empowerment in a family (Horwitz, 1982; Radloff, 1975; Rosenfield, 1980). Retirement results in the smaller relative power of women in the family, so it does not promote their mental health.

It is also possible that retirement gives different impacts on men and women's social connectedness, such as the size of the social network and the participation of social activities. However, how one's social connectedness changes are not known here, as the dataset CHARLS do not provide the information of one's social connectivity before retirement.

Compared to men, Chinese women experience a worse impact on physical health and a smaller improvement in mental health from retirement. A special compensation for female retirees would be helpful to reduce the gender gap in retirement welfare.

VI. LIMITATIONS

Since very few people change their retirement status in the dataset CHARLS, we look at the health outcomes between the workers and retirees instead. Though an extensive set of controls are included in the model, it is still possible that some unobserved determinants of psychological and physiological well-being are omitted. Thus, the OLS models only suggest a relationship between retirement and health outcomes, and an actual causal effect cannot be established so far.

Further, the length of one's retirement is unknown in the dataset. From the fully specified model, we find the probability to report good health status is 5.33% less for retirees than workers in 2011, and the number declines to 4.40% in 2013. It might be the case that retirement's impact on physical health decreases as the years of retirement increase. However, because of lack of relevant data, we cannot examine how retirement's effect on health outcomes responds to the changes of retirement length.

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Appendix Table 1: Full Results-OLS Estimates Predicting Physiological Well-being 2011

	(1)	(2)	(3)	(4)	(5)
Retired	-0.0552***	-0.0586***	-0.0490**	-0.0503**	-0.0533**
	(0.015)	(0.021)	(0.022)	(0.022)	(0.022)
1. Demographics Characteristics					
Gender		0.0406***	0.0267*	0.0473**	0.0478**
		(0.015)	(0.016)	(0.020)	(0.020)
Age		-0.0028***	-0.0018*	-0.0016	-0.0014
		(0.001)	(0.001)	(0.001)	(0.001)
Marital Status					
Married with spouse present		0.0747	0.0638	0.0579	0.0545
		(0.083)	(0.082)	(0.082)	(0.082)
Married but not living with spouse		0.0604	0.0525	0.0480	0.0416
		(0.087)	(0.087)	(0.087)	(0.087)
Separated		-0.0307	-0.0380	-0.0374	-0.0407
		(0.123)	(0.123)	(0.122)	(0.122)
Divorced		0.0689	0.0618	0.0604	0.0589
		(0.095)	(0.095)	(0.094)	(0.094)
Widowed		0.0742	0.0678	0.0649	0.0615
		(0.085)	(0.085)	(0.085)	(0.085)
Urban Residence		0.0359**	0.0294*	0.0291*	0.0292*
		(0.017)	(0.018)	(0.018)	(0.018)
Region					
East China		0.0401*	0.0312	0.0309	0.0312
		(0.020)	(0.021)	(0.021)	(0.021)
Central China		-0.0025	-0.0050	-0.0055	-0.0051
		(0.021)	(0.021)	(0.021)	(0.021)
Non-agricultural Hukou		0.0521***	0.0288	0.0301	0.0283
		(0.019)	(0.021)	(0.021)	(0.021)
2. Socio-economics Characteristics					
Highest Education Level					
Finish or Did Not Finish Elementary School			0.0147	0.0142	0.0138
			(0.026)	(0.026)	(0.026)
Middle or High School			0.0317	0.0301	0.0282
			(0.027)	(0.027)	(0.027)
Vocational Schools or above			0.0439	0.0415	0.0370
			(0.033)	(0.033)	(0.033)
Income			0.0021***	0.0021***	0.0021***
			(0.001)	(0.001)	(0.001)
Family Transfers			0.0003	0.0003	0.0002
			(0.001)	(0.001)	(0.001)
Medical Insurance			-0.0218	-0.0219	-0.0254
			(0.029)	(0.029)	(0.029)
3. Lifestyle Characteristics					
BMI					
Underweight				-0.0612*	-0.0602
				(0.037)	(0.037)
Normal				0.0201	0.0191
				(0.018)	(0.018)
Overweight				0.0419**	0.0406**
				(0.020)	(0.020)
Smoking				0.0318*	0.0332*
				(0.019)	(0.019)
4. Psychosocial Characteristics					
Social Activity					0.0278*

					(0.014)
Constant	0.8442***	0.8449***	0.8035***	0.7178***	0.7019***
	(0.008)	(0.100)	(0.107)	(0.114)	(0.114)
Observations	2,944	2,944	2,944	2,944	2,944

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 2: Full Results-OLS Estimates Predicting Psychological Well-being 2011

	(1)	(2)	(3)	(4)	(5)	(6)
Retired	0.1571***	0.1435**	0.1573***	0.1460**	0.1287**	0.1332**
	(0.041)	(0.059)	(0.061)	(0.061)	(0.061)	(0.061)
1. Demographics Characteristics						
Gender		0.0427	-0.0378	-0.0367	-0.0329	-0.0237
		(0.042)	(0.043)	(0.055)	(0.055)	(0.055)
Age		-0.0061**	-0.0001	0.0006	0.0014	0.0021
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Marital Status						
Married with spouse present		-0.1076	-0.1817	-0.2021	-0.2212	-0.0522
		(0.227)	(0.226)	(0.226)	(0.225)	(0.260)
Married but not living with spouse		-0.1912	-0.2493	-0.2613	-0.2982	-0.1563
		(0.240)	(0.238)	(0.238)	(0.238)	(0.271)
Separated		-0.7055**	-0.7421**	-0.7487**	-0.7674**	-0.7443**
		(0.338)	(0.335)	(0.336)	(0.335)	(0.348)
Divorced		-0.1710	-0.2299	-0.2346	-0.2439	-0.2166
		(0.261)	(0.259)	(0.259)	(0.259)	(0.268)
Widowed		-0.1968	-0.2459	-0.2620	-0.2808	-0.2723
		(0.235)	(0.233)	(0.233)	(0.233)	(0.255)
Urban Residence		-0.0022	-0.0359	-0.0438	-0.0428	-0.0508
		(0.048)	(0.048)	(0.049)	(0.048)	(0.049)
Region						
East China		0.2021***	0.1574***	0.1513***	0.1530***	0.1569***
		(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
Central China		0.1216**	0.1020*	0.1009*	0.1028*	0.1037*
		(0.057)	(0.057)	(0.057)	(0.057)	(0.057)
Non-agricultural Hukou		0.1664***	0.0570	0.0552	0.0444	0.0433
		(0.054)	(0.056)	(0.057)	(0.057)	(0.057)
2. Socio-economics Characteristics						
Highest Education Level						
Finish or Did Not Finish Elementary School			0.1110	0.1122	0.1096	0.1095
			(0.071)	(0.071)	(0.071)	(0.071)
Middle or High School			0.2704***	0.2721***	0.2610***	0.2662***
			(0.075)	(0.075)	(0.075)	(0.075)
Vocational Schools or above			0.2685***	0.2689***	0.2420***	0.2418***
			(0.092)	(0.092)	(0.092)	(0.092)
Income			0.0085***	0.0084***	0.0081***	0.0078***
			(0.002)	(0.002)	(0.002)	(0.002)
Family Transfers			0.0050**	0.0051**	0.0046**	0.0045**
			(0.002)	(0.002)	(0.002)	(0.002)
Medical Insurance			-0.0161	-0.0169	-0.0370	-0.0446
			(0.080)	(0.080)	(0.080)	(0.080)
3. Lifestyle Characteristics						
BMI						
Underweight				-0.1253	-0.1192	-0.1189
				(0.101)	(0.101)	(0.101)
Normal				-0.0407	-0.0463	-0.0363

				(0.049)	(0.049)	(0.049)
Overweight				0.0522	0.0452	0.0552
				(0.056)	(0.056)	(0.056)
Smoking				-0.0046	0.0035	0.0025
				(0.052)	(0.052)	(0.052)
4. Psychosocial Characteristics						
Social Activity					0.1599***	0.1580***
					(0.040)	(0.040)
5. Household Characteristics						
Number of Children						0.0199
						(0.024)
Living Arrangements						
Living Alone						-0.0171
						(0.137)
Living with Others						0.1399
						(0.225)
Living with Spouse Only						-0.0697
						(0.086)
Living with Children						-0.0465
						(0.091)
Healthsp						0.0848**
						(0.039)
Constant	3.0793***	3.3190***	2.9349***	2.9468***	2.8560***	2.6027***
	(0.023)	(0.275)	(0.295)	(0.313)	(0.313)	(0.358)
Observations	2,922	2,922	2,922	2,922	2,922	2,922

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 3: Full Results-OLS Estimates Predicting Physiological Well-being 2013

	(1)	(2)	(3)	(4)	(5)
Retired	-0.0537***	-0.0294	-0.0413*	-0.0414*	-0.0440*
	(0.019)	(0.022)	(0.023)	(0.023)	(0.023)
1. Demographics Characteristics					
Gender		0.0664***	0.0571***	0.0513***	0.0538***
		(0.013)	(0.013)	(0.016)	(0.016)
Age		-0.0044***	-0.0039***	-0.0037***	-0.0034***
		(0.001)	(0.001)	(0.001)	(0.001)
Marital Status					
Married with spouse present		0.1531	0.1369	0.1325	0.1310
		(0.114)	(0.114)	(0.114)	(0.114)
Married but not living with spouse		0.1346	0.1210	0.1167	0.1225
		(0.116)	(0.116)	(0.116)	(0.116)
Separated		-0.1801	-0.1892	-0.1910	-0.1885
		(0.145)	(0.145)	(0.145)	(0.145)
Divorced		0.0582	0.0452	0.0402	0.0358
		(0.126)	(0.126)	(0.126)	(0.126)
Widowed		0.1178	0.1069	0.1001	0.0986
		(0.117)	(0.117)	(0.117)	(0.117)
Cohabited		-0.0031	-0.0190	-0.0293	-0.0266
		(0.185)	(0.186)	(0.186)	(0.185)
Urban Residence		0.0285*	0.0279*	0.0277*	0.0267*
		(0.015)	(0.015)	(0.015)	(0.015)
Region					
East China		0.0826***	0.0772***	0.0776***	0.0805***
		(0.017)	(0.017)	(0.017)	(0.017)
Central China		0.0251	0.0206	0.0212	0.0225
		(0.017)	(0.017)	(0.017)	(0.017)
Non-agricultural Hukou		0.0351**	0.0147	0.0141	0.0115
		(0.016)	(0.018)	(0.018)	(0.018)
2. Socio-economics Characteristics					
Highest Education Level					
Finish or Did Not Finish Elementary School			0.0277	0.0264	0.0238
			(0.021)	(0.021)	(0.021)
Middle or High School			0.0392*	0.0379*	0.0324
			(0.022)	(0.022)	(0.022)
Vocational Schools or above			0.0879***	0.0883***	0.0760**
			(0.030)	(0.030)	(0.031)
Income			0.0006	0.0005	0.0004
			(0.001)	(0.001)	(0.001)
Family Transfers			0.0002	0.0002	0.0002
			(0.000)	(0.000)	(0.000)
Medical Insurance			0.0103	0.0099	0.0049
			(0.028)	(0.028)	(0.028)
3. Lifestyle Characteristics					
BMI					

Underweight				-0.1132**	-0.1173***
				(0.045)	(0.045)
Normal				0.0086	0.0037
				(0.015)	(0.015)
Overweight				-0.0015	-0.0070
				(0.016)	(0.016)
Smoking				-0.0124	-0.0104
				(0.017)	(0.017)
4. Psychosocial Characteristics					
Social Activity					0.0463***
					(0.013)
Constant	0.8488***	0.8361***	0.7904***	0.8084***	0.7759***
	(0.007)	(0.126)	(0.130)	(0.132)	(0.132)
Observations	3,368	3,368	3,368	3,368	3,368

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 4: Full Results-OLS Estimates Predicting Psychological Well-being 2013

	(1)	(2)	(3)	(4)	(5)	(6)
Retired	0.2548***	0.1605**	0.1735**	0.1709**	0.1515*	0.1466*
	(0.065)	(0.075)	(0.078)	(0.078)	(0.078)	(0.078)
1. Demographics Characteristics						
Gender		0.0936**	0.0876*	0.0857	0.0987*	0.1026*
		(0.044)	(0.046)	(0.054)	(0.053)	(0.053)
Age		-0.0012	-0.0002	-0.0001	0.0019	0.0037
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Marital Status						
Married with spouse present		0.7554	0.6801	0.7006	0.7795*	0.9421**
		(0.475)	(0.476)	(0.476)	(0.473)	(0.478)
Married but not living with spouse		0.7246	0.6499	0.6716	0.7479	0.9053*
		(0.484)	(0.484)	(0.484)	(0.481)	(0.486)
Separated		0.6901	0.6347	0.6625	0.7644	0.8590
		(0.567)	(0.567)	(0.567)	(0.563)	(0.565)
Divorced		0.4123	0.3486	0.3743	0.4460	0.5117
		(0.508)	(0.508)	(0.509)	(0.506)	(0.507)
Widowed		0.5428	0.4734	0.5028	0.5801	0.6710
		(0.482)	(0.482)	(0.483)	(0.480)	(0.482)
Cohabited		0.7681	0.6489	0.6786	0.7843	0.9435
		(0.703)	(0.702)	(0.703)	(0.699)	(0.702)
Urban Residence		0.1625***	0.1591***	0.1573***	0.1498***	0.1402***
		(0.052)	(0.052)	(0.052)	(0.052)	(0.052)
Region						
East China		0.3025***	0.3095***	0.3075***	0.3220***	0.3190***
		(0.059)	(0.059)	(0.059)	(0.059)	(0.059)
Central China		0.1508**	0.1464**	0.1429**	0.1453**	0.1512**
		(0.059)	(0.059)	(0.059)	(0.059)	(0.059)
Non-agricultural Hukou		0.1338**	0.1133*	0.1124*	0.0915	0.0831
		(0.055)	(0.060)	(0.060)	(0.060)	(0.060)
2. Socio-economics Characteristics						
Highest Education Level						
Finish or Did Not Finish Elementary School			-0.0115	-0.0077	-0.0253	-0.0249
			(0.073)	(0.073)	(0.073)	(0.073)
Middle or High School			0.0764	0.0816	0.0438	0.0410
			(0.076)	(0.077)	(0.076)	(0.076)
Vocational Schools or above			0.0812	0.0800	-0.0091	-0.0123
			(0.104)	(0.104)	(0.104)	(0.105)
Income			-0.0025	-0.0025	-0.0030*	-0.0030*
			(0.002)	(0.002)	(0.002)	(0.002)
Family Transfers			0.0036**	0.0035**	0.0029*	0.0033**
			(0.002)	(0.002)	(0.002)	(0.002)
Medical Insurance			0.2364**	0.2363**	0.2082**	0.1942**
			(0.098)	(0.099)	(0.098)	(0.099)
3. Lifestyle Characteristics						
BMI						
Underweight				0.1103	0.1153	0.1144

				(0.151)	(0.150)	(0.150)
Normal				-0.0455	-0.0429	-0.0369
				(0.051)	(0.050)	(0.051)
Overweight				0.0477	0.0474	0.0533
				(0.055)	(0.055)	(0.055)
Smoking				-0.0008	0.0229	0.0225
				(0.061)	(0.061)	(0.061)
4. Psychosocial Characteristics						
Social Activity					0.2923***	0.2894***
					(0.046)	(0.046)
5. Household Characteristics						
Number of Children						-0.0263
						(0.017)
Living Arrangements						
Living Alone						-0.2527
						(0.581)
Living with Others						0.0107
						(0.125)
Living with Spouse Only						-0.5292
						(0.668)
Living with Children						0.0053
						(0.061)
Healthsp						0.0916*
						(0.049)
Constant	2.7865***	1.7575***	1.5303***	1.5124***	1.1584**	0.8636
	(0.023)	(0.512)	(0.522)	(0.532)	(0.531)	(0.550)
Observations	2,963	2,963	2,963	2,963	2,963	2,963

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 5: Full Results-OLS Estimates Predicting Physiological and Psychological Well-being 2011, by Gender

	Male	Female	Male	Female
	(1)	(2)	(1)	(2)
Variables	Physical Health	Physical Health	Happiness	Happiness
retirement11	-0.0497	-0.0703**	0.2379***	-0.0024
	(0.030)	(0.033)	(0.087)	(0.088)
1. Demographics Characteristics				
Age	-0.0002	-0.0026*	-0.0010	0.0050
	(0.001)	(0.002)	(0.004)	(0.004)
Marital Status				
Married with spouse present	0.0197	0.2304	-0.2415	0.2075
	(0.093)	(0.174)	(0.338)	(0.483)
Married but not living with spouse	-0.0125	0.2450	-0.4579	0.2121
	(0.101)	(0.178)	(0.356)	(0.495)
Separated	-0.1057	0.1716	-1.2942***	0.0691
	(0.148)	(0.227)	(0.441)	(0.610)
Divorced	0.0301	0.2247	-0.3461	0.0301
	(0.111)	(0.187)	(0.329)	(0.501)
Widowed	-0.0281	0.2692	-0.3051	-0.1042
	(0.099)	(0.176)	(0.325)	(0.480)
Urban Residence	0.0119	0.0666**	-0.0941	0.0481
	(0.021)	(0.032)	(0.060)	(0.085)
Region				
East China	-0.0006	0.0769**	0.1327*	0.2094**
	(0.026)	(0.033)	(0.075)	(0.088)
Central China	-0.0224	0.0190	0.0540	0.1956**
	(0.026)	(0.034)	(0.074)	(0.090)
Non-agricultural Hukou	-0.0065	0.0724**	-0.0465	0.1486
	(0.026)	(0.035)	(0.074)	(0.091)
2. Socio-economics Characteristics				
Highest Education Level				
Finish or Did Not Finish Elementary School	-0.0153	0.0160	0.1223	0.0573
	(0.042)	(0.035)	(0.120)	(0.091)
Middle or High School	0.0115	0.0093	0.2220*	0.2664***
	(0.043)	(0.037)	(0.123)	(0.098)
Vocational Schools or above	-0.0020	0.0741	0.1740	0.3107**
	(0.049)	(0.050)	(0.140)	(0.133)
Income	0.0028***	0.0003	0.0081***	0.0062**
	(0.001)	(0.001)	(0.002)	(0.003)
Family Transfers	0.0004	-0.0002	0.0051**	0.0042
	(0.001)	(0.001)	(0.003)	(0.004)
Medical Insurance	-0.0316	-0.0181	-0.0775	0.0100
	(0.041)	(0.042)	(0.117)	(0.110)
3. Lifestyle Characteristics				
BMI				
Underweight	-0.0487	-0.0700	-0.2163*	0.0522
	(0.046)	(0.062)	(0.130)	(0.164)

Normal	0.0231	0.0079	-0.0935	0.0243
	(0.024)	(0.027)	(0.069)	(0.070)
Overweight	0.0573**	0.0194	0.0570	0.0512
	(0.028)	(0.030)	(0.079)	(0.079)
Smoking	0.0242	0.1060**	0.0256	-0.0336
	(0.020)	(0.050)	(0.057)	(0.130)
4. Psychosocial Characteristics				
Social Activity	0.0329*	0.0242	0.1863***	0.1273**
	(0.019)	(0.023)	(0.053)	(0.060)
5. Household Characteristics				
Number of Children			0.0190	0.0148
			(0.034)	(0.034)
Living Arrangements				
Living Alone			-0.2570	0.1998
			(0.214)	(0.192)
Living with Others			-0.0410	0.3618
			(0.347)	(0.307)
Living with Spouse Only			-0.1601	0.0948
			(0.109)	(0.143)
Living with Children			-0.1016	0.0713
			(0.120)	(0.147)
Healthsp			0.0964*	0.0770
			(0.051)	(0.061)
Constant	0.7869***	0.3891*	3.1063***	1.9566***
	(0.139)	(0.228)	(0.473)	(0.650)
Observations	1,673	1,271	1,658	1,264

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix Table 6: Full Results-OLS Estimates Predicting Physiological and Psychological Well-being 2013, by Gender

	Male	Female	Male	Female
	(1)	(2)	(1)	(2)
Variables	Physical Health	Physical Health	Happiness	Happiness
Retired	-0.0236	-0.0742**	0.1499	0.0426
	(0.034)	(0.032)	(0.130)	(0.100)
1. Demographics Charcteristics				
Age	-0.0039***	-0.0026**	0.0036	0.0039
	(0.001)	(0.001)	(0.005)	(0.004)
Marital Status				
Married with spouse present	0.0999	0.7866**	1.0344**	0.7723
	(0.112)	(0.382)	(0.499)	(0.664)
Married but not living with spouse	0.0822	0.7862**	0.9618*	0.8033
	(0.115)	(0.383)	(0.517)	(0.672)
Separated	-0.1637	0.3396	0.6337	1.2363
	(0.152)	(0.413)	(0.644)	(0.815)
Divorced	0.0589	0.6389	0.6927	0.2636
	(0.132)	(0.389)	(0.554)	(0.712)
Widowed	0.0535	0.7567**	0.5934	0.6054
	(0.125)	(0.383)	(0.538)	(0.672)
Cohabited	0.2452	0.3215	2.3203**	-
	(0.221)	(0.440)	(0.967)	-
Urban Residence	0.0042	0.0464**	0.1400*	0.1352*
	(0.021)	(0.022)	(0.079)	(0.070)
Region				
East China	0.0874***	0.0722***	0.2890***	0.3505***
	(0.024)	(0.025)	(0.090)	(0.079)
Central China	0.0358	0.0076	0.1644*	0.1580*
	(0.023)	(0.026)	(0.088)	(0.081)
Non-agricultural Hukou	-0.0112	0.0278	0.0628	0.1007
	(0.024)	(0.026)	(0.091)	(0.081)
2. Socio-economics Characteristics				
Highest Education Level				
Finish or Did Not Finish Elementary School	-0.0330	0.0306	-0.1923	0.0398
	(0.039)	(0.027)	(0.153)	(0.085)
Middle or High School	-0.0366	0.0558*	-0.0953	0.0881
	(0.039)	(0.029)	(0.153)	(0.092)
Vocational Schools or above	0.0146	0.0954**	-0.1637	0.0433
	(0.047)	(0.043)	(0.182)	(0.139)
Income	-0.0002	0.0017*	-0.0023	-0.0045
	(0.001)	(0.001)	(0.002)	(0.003)
Family Transfers	0.0003	-0.0003	0.0030	0.0045
	(0.000)	(0.001)	(0.002)	(0.004)
Medical Insurance	-0.0595	0.0545	0.0717	0.2490**
	(0.039)	(0.038)	(0.163)	(0.126)
3. Lifestyle Characteristics				
BMI				
Underweight	-0.1172*	-0.1196*	-0.0404	0.2011
	(0.062)	(0.065)	(0.226)	(0.204)
Normal	-0.0155	0.0175	-0.0699	-0.0193
	(0.020)	(0.021)	(0.078)	(0.067)
Overweight	-0.0179	0.0055	0.0457	0.0552
	(0.022)	(0.023)	(0.084)	(0.074)

Smoking	-0.0099	-0.0011	0.0071	0.1560
	(0.017)	(0.054)	(0.067)	(0.174)
4. Psychosocial Characteristics				
Social Activity	0.0513***	0.0401**	0.2747***	0.2946***
	(0.018)	(0.019)	(0.072)	(0.062)
5. Household Characteristics				
Number of Children	1.0286***	-0.0124	-0.0098	-0.0418*
	(0.143)	(0.406)	(0.026)	(0.023)
Living Arrangements				
Living Alone			-0.4428	-0.1472
			(0.834)	(0.822)
Living with Others			-0.2011	0.1482
			(0.220)	(0.155)
Living with Spouse Only			-0.6846	-0.4219
			(1.180)	(0.821)
Living with Children			-0.0265	0.0430
			(0.096)	(0.080)
Healthsp			0.1768**	0.0138
			(0.071)	(0.068)
Constant			1.1345*	0.6845
			(0.643)	(0.823)
Observations	1,523	1,845	1,294	1,669

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1