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The dynamic impact of retirement on health: Evidence from a nationwide ten-year panel survey in Japan

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ABSTRACT

Retirement is a major life-course transition that is closely related to changes in health. This study examined the dynamic impact of retirement on health and health behaviors, distinguishing an immediate change in the level of health at retirement and a change in the rate of change after retirement. We used panel data from 9283 individuals (4441 men and 4842 women) who had retired during a nationwide ten-year panel survey in Japan conducted in 2005–2014. We focused on three health behaviors (current smoking, heavy alcohol drinking, and leisure-time physical activity) and two health indicators (self-rated health and psychological distress). We estimated regression models that controlled for both time-invariant individual attributes and the endogeneity of retirement, using panel data collected during the five years before and after retirement. Results generally confirmed that the transition was accompanied by favorable changes in health and health behaviors with some gender differences. Among men, retirement immediately promoted leisure-time physical activity and reduced poor self-rated health and psychological distress. Retirement also accelerated smoking cessation and leisure-time physical activity and decelerated reporting poor health. Among women, retirement immediately promoted leisure-time physical activity and reduced psychological distress, while it did not affect the rate of change in any health variable after retirement. The current study underscores the need for more in-depth knowledge of the dynamic impact of retirement on health. This will assist in developing policy measures to help the middle-aged population make healthy transitions from work to retirement.

1. Introduction

Retirement is a major transition in later life that is closely related to changes in health. The impact of retirement on health is potentially a key determinant of quality of life among middle-aged and elderly individuals (van der Heide et al., 2013; Zantinge et al., 2014). Additionally, the association between retirement and health is a central issue for public policy in developed countries, because retirement is closely related to public pension schemes (Gruber and Wise, 1999) and health and long-term care for the elderly are expected to continue to increase public spending (de la Maisonneuve and Oliveira Martins, 2013).

It is reasonable to predict that retirement would have a favorable impact on health, considering the stressful influence of work. Indeed, many studies have attempted to confirm this, focusing on various types of health behaviors such as smoking (Celidoni and Rebba, 2016; Ding et al., 2016; Lang et al., 2007), alcohol consumption (Brennan et al., 2010; Celidoni and Rebba, 2016; Ding et al., 2016; Zins et al., 2011), and physical activity (Chung et al., 2009; Ding et al., 2016; Feng et al., 2016; Slingerland et al., 2007; Stenholm et al., 2016). Studies have also considered overall health variables measured by self-rated health and mental health indicators (Behncke, 2012; Coe and Zamarro, 2011; Hessel, 2016; Neuman, 2008; Westerlund et al., 2009; Westerlund et al., 2010; Zhu, 2016). As surveyed by van der Heide et al. (2013) and Zantinge et al. (2014), many studies have confirmed that retirement has a beneficial effect on health, while several other studies have obtained opposing or inconsistent results. Indeed, there are many reasons to assume the negative effects of retirement on health, through life-course disruptions, loss of key social role, income loss, and others.

There are at least three factors that may result in mixed and inconsistent observations about the positive effects of retirement, besides differences inherent to datasets collected from different countries and study groups. First, results may be biased as studies have not fully considered individual differences such as personality traits and inherent characteristics. Prospective cohort studies have usually compared health variables between participants who had retired during baseline and follow-up and those who continued to work throughout the study (e.g., Feng et al., 2016; Lang et al., 2007; Slingerland et al., 2007). These studies did control for sociodemographic and socioeconomic

Abbreviations: FE, Fixed effects; IV, Instrumental variable; MHLW, Japanese Ministry of Health, Labour and Welfare; EPI, Employees' Pension Insurance.

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attributes observed through surveys, but they could not control for unobserved individual attributes, making it difficult to identify the causal effect of retirement on health. Fixed-effects (FE) regression models have often been used to control for time-invariant individual attributes, both observed and unobserved (Celidoni and Rebba, 2016; Chung et al., 2009; Zhu, 2016).

Second, retirement must be endogenous in general; it may be a choice made by an individual, at least to some extent. To alleviate the endogeneity biases, an increasing number of studies have been utilizing the instrumental variable (IV) method (Behncke, 2012; Coe and Zamarro, 2011; Hessel, 2016; Zhu, 2016). In the first stage, this method estimates retirement through an IV expected to affect retirement but not health directly. In the second stage, the model explains health by the retirement predicted in the first stage. Many studies have used eligibility for public pension benefits as an IV (Coe and Zamarro, 2011; Hessel, 2016; Neuman, 2008; Zhu, 2016), because it is institutionally fixed and expected to affect an individual's decision to retire but not his/her health directly. In recent years, FE-IV models, which are a combination of an FE model and an IV method, have often been used to address biases due to both individual time-invariant attributes and the endogeneity of retirement (Bonsang et al., 2012; Godard, 2016; Zhu, 2016).

Third, retirement is likely to affect health in two different ways: (i) an immediate change in the level at retirement and (ii) a change in the rate of change after retirement. For example, it might be that even if health keeps deteriorating after retirement, retirement reduces its rate of deterioration. A simple comparison between pre- and post-retirement levels of the health outcome may fail to capture this type of beneficial impact of retirement on health, even if the endogeneity of retirement is successfully controlled for. Indeed, studies have found that the health effect of retirement tends to change over time (Stenholm et al., 2016; Zhu, 2016), suggesting the need for examining the dynamic effect of retirement on health.

In the current study, we examined how retirement affects the dynamics of health and health behaviors, explicitly considering the above-mentioned issues—that is, (i) controlling for individual heterogeneity, (ii) alleviating endogeneity biases of retirement, and (iii) distinguishing two types of health effects of retirement. We estimated FE-IV models to examine both types of health effects of retirement separately for three health behaviors (current smoking, heavy alcohol drinking, and leisure-time physical activity) and two health indicators (self-rated health and psychological distress). We also considered gender differences in health effects of retirement, assuming that socio-institutional backgrounds of retirement and their implications for health may differ between men and women.

The present study is also expected to shed new light on the understanding of the impact of retirement on health; it used a nationwide dataset in Japan, contrary to previous studies, most of which have used data from Europe, the U.S., and other Western countries. Japan is characterized not only by a high level of labour force participation and long life-expectancy among the elderly but also by a gradual and less straightforward transition from work to retirement (Shimizutani and Oshio, 2010). In addition, a lower share of full-time employees among middle-aged women is expected to lead to more limited impact of retirement on women's health in Japan.

2. Methods

2.1. Study sample

We used data obtained from a nationwide, ten-wave panel survey, "The Longitudinal Survey of Middle-Aged and Older Adults," which was conducted by the Japanese Ministry of Health, Labour and Welfare (MHLW) each year between 2005 and 2014. Japan's Statistics Law required the survey to be reviewed from statistical, legal, ethical, and other viewpoints. We obtained the survey data from the MHLW with its official permission, so the current study did not require ethical approval.

Samples in the first wave were limited to those aged 50–59 years and were collected nationwide in November of 2005 through a two-stage random sampling procedure. A total of 34,240 individuals responded (response rate: 83.8%). The second to tenth waves of the survey were conducted in early November of each year from 2006 to 2014, and 22,748 individuals remained in the tenth wave (average attrition rate of 4.0% in each wave). No new respondents were added after the first wave.

To capture the impact of retirement as precisely as possible, we focused exclusively on the observations of the respondents who had been working continuously since the first wave and retired during the second and tenth waves (assuming that they had been working until the first wave). We excluded the data of participants when and after they resumed working after the first retirement. We also considered the observations at most five years before and after retirement; for example, we concentrated on the observations between waves 1 and 9 for the respondents who retired in wave 4 and on the observations between waves 3 and 10 for the respondents who retired in wave 8. This is because too long a period from retirement may make it difficult to distinguish the effects of retirement from other factors. Excluding further respondents who were missing key variables, we used the data of 9283 individuals (4441 men and 4842 women). The total number of observations was 54,113 (25,833 for men and 28,280 for women).

2.2. Measures

2.2.1. Health behaviors

We considered three health behaviors: current smoking, heavy alcohol drinking, and leisure-time physical activity, each of which was expressed as a binary variable. We considered a participant who answered "yes" to the question "do you smoke currently?" to be a current smoker. We defined heavy problem drinking as an intake of more than three *go* (540 ml) of Japanese sake or an equivalent amount of alcohol every day, which corresponds to about 60 g of pure alcohol. This threshold was based on a study that showed that maintaining alcohol consumption below 46 g/day appeared to minimize the risks of mortality in a Japanese population (Inoue et al., 2012). We considered respondents to have engaged in leisure-time physical activity if they reported that they were doing moderate-intensity or vigorous aerobic activity at least two days per week. This threshold was roughly consistent with the guideline proposed by the MHLW (2013).

2.2.2. Health

We considered two health indicators—poor self-rated health and psychological distress, each of which was expressed as a binary variable. Regarding self-rated health, the respondents were asked to indicate their current health condition on a 6-point scale: 1 (*very good*), 2 (*good*), 3 (*somewhat good*), 4 (*somewhat poor*), 5 (*poor*), and 6 (*very poor*). A binary variable for poor self-rated health was constructed by assigning the value 1 to those who indicated 4, 5, or 6 on the scale, and zero to those who indicated 1, 2, or 3 on the scale.

We measured psychological distress using the Kessler Psychological Distress Scale (K6; Kessler et al., 2002; Kessler et al., 2010). The respondents were asked to answer a six-item questionnaire that included items such as, "During the past 30 days, about how often did you feel a) nervous, b) hopeless, c) restless or fidgety, d) so depressed that nothing could cheer you up, e) that everything was an effort, and f) worthless?" The questions were rated on a 5-point scale (0 = *none of the time* to 4 = *all of the time*). Then, the sum of the reported scores (range: 0–24) was calculated and defined as the K6 score. Higher K6 scores reflect higher levels of psychological distress. K6 scores ≥5 indicate mood/anxiety disorder in a Japanese sample, as validated by preceding studies (Furukawa et al., 2008; Sakurai et al., 2011). A binary variable for psychological distress was constructed by assigning the