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Smoking, Obesity, and Labor Market Outcomes: Evidence from Japan

MORIKAWA Masayuki
RIETI

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Research Institute of Economy, Trade & Industry, IAA

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MORIKAWA Masayuki (RIETI)

Abstract

This study, using original survey data, presents evidence from Japan of the relationship between smoking and obesity on the one hand, and labor market outcomes and subjective well-being on the other hand. According to the results, first, after accounting for various individual characteristics, wages of both male and female smokers are significantly higher than those of non-smokers. This unexpected finding differs from those of past studies and general perception. In addition, the labor participation rate of smokers is higher than that of non-smokers. Second, there is a wage penalty for obesity only among male workers. This is also an unexpected finding, as many past studies have detected wage discounts for obese females. Third, smoking and obesity are associated with low life satisfaction and job satisfaction among females, but these relationships are weak among males.

Keywords: Smoking, Obesity, Body mass index, Wage, Labor participation, Life satisfaction
JEL Classification: I12, I31, J22, J28, J31

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Smoking, Obesity, and Labor Market Outcomes: Evidence from Japan

1. Introduction

While there have been many studies on the relationships between smoking and obesity with labor market outcomes, empirical economic studies have been very limited in Japan. This study, using original survey data on Japanese individuals, presents evidence on the relationship between smoking and obesity on the one hand, and labor market outcomes and subjective well-being on the other hand. An important contribution of this study is the presentation of unexpected facts that differ from the past literature and general perception. Specifically, this study finds a wage *premium* for smoking and wage penalty for obesity only for *male* workers.

There have been numerous studies that indicate negative associations of smoking and obesity with wages. Studies indicating smokers' wage discount include Levine *et al*. (1997), Viscusi and Hersch (2001), van Ours (2004), Auld (2005), Grafova and Stafford (2009), and Cowan and Schwab (2011).[1] Regarding the relationship between obesity and wages, while several studies present evidence of wage penalty for obesity both for male and female workers (e.g., Baum and Ford, 2004; Brunello and D'Hombres, 2007; Brunello *et al*., 2009; Johar and Katayama, 2012; Pinkston, 2017), numerous studies find a wage discount for obesity only for females (e.g., Harper, 2000; Cawley, 2004; Morris, 2006; Greve, 2008; Bhattacharya and Kate, 2009; Caliendo and Gehrsitz, 2016; Chu and Ohinmaa, 2016).[2]

Relatively few studies analyze the effects of smoking and obesity on employment. Irvine and Nguyen (2014), for example, present evidence of discrimination against smokers in the hiring of workers in the United States. While past studies generally find negative effects of obesity on employment (e.g., Paraponaris *et al*., 2005; Morris, 2007; Johansson *et al*., 2009; Kinge, 2016), some studies indicate that the negative impact is greater for females (e.g., Greve, 2008; Reichert, 2015), suggesting the presence of labor market discrimination against obese individuals, particularly females.[3]

Recent studies generally take it for granted that smoking has negative relationships with labor market outcomes and make efforts to detect causality and/or the specific mechanisms behind the

[1] On the other hand, Kenkel *et al*. (2014) indicate that the causality is running from income to smoking in the U.S. low-income adults.

[2] Exceptionally, Larose *et al*. (2016) indicate wage *premium* for obesity in Canada. Morris (2006) presents empirical evidence for England that BMI (body mass index) has negative effect on wages of female workers, but the effect is positive for male workers.

[3] In addition to the labor market outcomes, some studies indicate that obese people have lower subjective well-being (e.g., Katsaiti, 2012; Böckerman *et al*., 2014). In Japan, Furugoori and Matsuura (2014) show a negative relationship between BMI and life satisfaction of males.

observed negative relationships such as the different productivity of workers and labor market discrimination. However, except for Sun (2015), formal analyses on the relationship between smoking and wages in Japan have been scarce. According to the fixed-effects estimation results of Sun (2015), smokers' wage rate is statistically indistinguishable from that of non-smokers, for both male and female workers. Regarding obesity, Furugoori and Matsuura (2014) find a negative causal effect of obesity on wages among male workers in Japan.

Many past studies have analyzed the relationship between smoking and obesity (e.g., Gruber and Frakes, 2006; Rashad, 2006; Liu *et al*., 2010; Baum and Chou, 2011; Wehby and Courtemanche, 2012; Gallet, 2013; Pieroni and Salmasi, 2016; Courtemanche *et al*., 2018). The main interest of these studies is whether policies to reduce smoking have an unintended consequence of increasing obesity. Despite the research interest in this interdependence, empirical studies dealing with the effects of both smoking and obesity on labor market outcomes have been rare.[4] This study fills this gap in the literature.

To preview the main findings of this study, first, in contrast to past studies, wages and labor participation rates of both male and female smokers are significantly higher than those of non-smokers after accounting for the various individual characteristics. Second, there is a wage penalty of obesity among male workers, but such a penalty cannot be found among females. This is also different from past studies. Third, smoking and obesity are associated with low life and job satisfaction, particularly among females.

The rest of this paper is organized as follows. Section 2 explains the survey data used in this study and the method of analysis. Section 3 reports the result of the analysis, and Section 4 concludes.

2. Data and Methodology

This study uses individual-level microdata retrieved from the "Survey of Life and Consumption under the Changing Economic Structure," designed by the author of this paper and conducted in November 2017 by Rakuten Research, Inc., which was contracted out by the Research Institute of Economy, Trade and Industry (RIETI). The survey participants are randomly chosen from the 2.3 million registered monitors at Rakuten Research, Inc. and are stratified by gender, age category, and region in accordance with the 2015 Population Census (Ministry of Internal Affairs and Communications). The total number of respondents is 10,041. We drop four observations with abnormal calculated BMI, so the number of observations used in this study is 10,037. The

[4] In contrast, the impacts of smoking and drinking on the labor market outcomes have often been analyzed simultaneously (e.g., Lye, 2004, van Ours, 2004, Alud, 2005).

numbers and percentages of the respondents by individual characteristics are presented in **Table 1**.

The survey items used in this study include gender, age, height, weight, smoking habit, life satisfaction, educational attainment, marital status, and working status. For those who are currently working, occupation, employment type, annual earnings, weekly working hours, tenure, and job satisfaction are also surveyed. By using the data set, we analyze (1) the relationships between smoking/obesity and individual characteristics, (2) the relationships between smoking/obesity and labor market outcomes (wages and labor participation), and (3) the relationships between smoking/obesity and subjective well-being (life satisfaction and job satisfaction).

The specific question regarding smoking habits is "Do you smoke?" and the response choices are (1) yes, (2) I used to smoke, but I quit, and (3) I have never smoked. Regarding obesity, we calculate the BMI (body mass index: weight in kg/height in m)^2 from the survey questions on height and weight of the respondents. Following the convention in the literature, we define BMI$\geqq$30 as obese and 30$>$BMI$\geqq$25 as overweight.

First, we analyze the relationships of smoking and obesity with the basic individual characteristics. A probit model is applied to estimate the probability of smoking and obesity, and the OLS estimation is used to explain the BMI. In addition to gender, age, education, and working status, dummies of risk attitude are included as the explanatory variables. Furthermore, when explaining obesity (or BMI), dummies for the smoking habit are added to see the possible impact of smoking on body weight.

Among the explanatory variables, dummies of risk attitude are taken from the answer to the question, "In general, are you a risk-taker or risk averse?" The five responses to this question are (1) risk-averter, (2) more of a risk-averter, (3) difficult to say, (4) more of a risk-taker, and (5) a risk-taker.[5] In the estimations, "difficult to say" is used as the reference category and four dummies are included.

Next, we estimate wage functions where the dependent variable is the annual earnings. In these estimations, the sample individuals are limited to those who are currently engaged in market work (the number of observations is 6,852). In the "Survey of Life and Consumption under the Changing Economic Structure," the annual earnings (tax inclusive, expressed in JPY) are classified into 18 categories (less than 500 thousand; 500 to 999 thousand; 1 to 1.49 million; 1.5 to 1.99 million; 2 to 2.49 million; 2.5 to 2.99 million; 3 to 3.99 million; 4 to 4.99 million; 5 to 5.99 million; 6 to 6.99 million; 7 to 7.99 million; 8 to 8.99 million; 9 to 9.99 million; 10 to 12.49

[5] Past studies (e.g., Nosić and Weber, 2010; Lönnqvist *et al*. 2015) indicate that self-reported risk attitude is a good predictor of actual risk taking.

million; 12.5 to 14.99 million; 15 to 17.49 million; 17.5 to 19.99 million; and 20 million or more). The central values of these income classes are applied in a logarithmic transformation to construct the variable of wages.[6] In this transformation, less than 500 thousand yen and 20 million yen or more are treated as 250 thousand yen and 21.25 million yen, respectively.

Since the dependent variable is annual income, the log of weekly working hours is included as a control variable. Weekly working hours (including overtime) are classified into 12 categories (15 or less; 15–19; 20–21; 22–29; 30–45; 35–42; 43–45; 46–48; 49–59; 60–64; 65–74; and 75 or more). The logarithmic transformation of the central figures leads to the variable of total working hours.[7] In this transformation, less than 15 hours and 75 hours or longer are treated as 13 hours and 79.5 hours, respectively.

The OLS wage function estimations are performed separately for male and female workers. The main explanatory variables are the dummies for smoking status (current smoker and quitter) and for body mass categories (obese and overweight). Other explanatory variables included are the dummies for age classes in five-year intervals (20–24; 25–29; 30–34; 35–39; 40–44; 45–49; 50–54; 55–59; 60–64; 65–69; and 70 or older), tenure, education (6 categories), occupation (13 categories), and type of employment (9 categories).[8] In short, the equation to be estimated, Equation (1), is expressed as indicated below.

$$ln(earnings) = \alpha + \beta\ smoking\ dummies + \gamma\ body\ mass\ dummies + \delta\ ln(hours) + \Sigma\theta X + \varepsilon \quad (1)$$

Next, we use a probit model to estimate the probability of engaged in market work separately for males and females (Equation (2)). Similar to the wage function, the dummies for smoking status and for body mass categories are the main explanatory variables and age classes and education are included as control variables. In considering the low participation rate of elderly people, additional estimations are also conducted by splitting the sample by age 60.

$$Pr\ (working=1) = P\ (\alpha + ß\ smoking\ dummies + \gamma\ body\ mass\ dummies + \Sigma\delta X) + \varepsilon \quad (2)$$

[6] Mean and standard deviation of the log wages are 5.604 and 0.971, respectively.
[7] Mean and standard deviation of the log working hours are 3.513 and 0.502, respectively.
[8] Occupation is grouped into 13 categories: (1) administrative and managerial, (2) professional and engineering, (3) clerical, (4) sales, (5) trade, (6) service, (7) security, (8) agriculture/forestry/fishery, (9) manufacturing process, (10) transport and machine operation, (11) construction/mining, (12) carrying/cleaning/packaging, and (13) other occupations. The type of employment is grouped into nine categories: (1) company executive, (2) self-employed, (3) family-worker, (4) standard full-time employee, (5) part-time worker, (6) hourly-paid worker, (7) dispatched employee (temporary agency worker), (8) contract employee, and (9) fixed-term employee (*shokutaku*).

Finally, we analyze the relationships of smoking and obesity with subjective well-being by using ordered-probit models (Equation (3)). The survey question on life satisfaction is: "Overall, how satisfied are you with your life?" The five choices are (1) satisfied, (2) somewhat satisfied, (3) difficult to say, (4) somewhat dissatisfied, and (5) dissatisfied. In estimating the ordered-probit models, the order of the 5-point measure of life satisfaction is reversed to "satisfied" =5, "somewhat satisfied" =4, "difficult to say" =3, "somewhat dissatisfied" =2, and "dissatisfied" =1. Again, dummies for smoking status and for body mass categories are the variables of main interest. Control variables are gender (female dummy), age class, education, annual household income, working status, marital status (dummy for married), and living with children (three dummies for children in preschool, junior high school or elementary school, and high school or older children).[9]

$$Pr\ (life\ satisfaction=j) = P\ (\alpha + ß\ smoking\ dummies + \gamma\ body\ mass\ dummies + \Sigma\delta X) + \varepsilon \quad j=1, 2, 3, 4, 5 \qquad (3)$$

A similar equation is applied for job satisfaction. The question on job satisfaction is: "Overall, how satisfied are you with your current work?" The five choices are the same as the question on life satisfaction. In this case, annual earnings, working hours, and dummies for employment type are included as control variables by replacing household income, marital status dummy, and dummies for living with children.

3. Results

3.1. Smoking and Obesity in Japan

The numbers and percentages of smokers, quitters, and non-smokers are reported in column (1) of **Table 2**. The percentages of current smokers are 28.0% in males and 13.4% in females, and

[9] In the survey, annual household income (expressed in JPY) is classified into 16 categories: (1) less than 1 million; (2) 1 to 1.99 million; (3) 2 to 2.99 million; (4) 3 to 3.99 million; (5) 4 to 4.99 million; (6) 4 to 4.99 million; (7) 5 to 5.99 million; (8) 6 to 6.99 million; (9) 7 to 7.99 million; (10) 8 to 8.99 million; (11) 9 to 9.99 million; (12) 10 to 12.49 million; (13) 12.5 to 14.99 million; (13) 15 to 19.99 million; (14) 20 to 24.99 million; (15) 25 to 29.99 million; and (16) 30 million or more. The logarithmic transformation of the central values leads to the variable of household income.

the percentages of quitters are 30.1% and 14.2%, respectively.[10] The numbers and percentages of body mass categories are reported in column (2) of the table. The percentages of obesity are 4.3% in males and 2.0% in females, and the percentages of overweight are 22.5% and 9.2%, respectively. It is obvious that obesity is less prevalent in Japan compared with other advanced countries. As shown in the last row of the table, sample means of BMI (kg/m^2) are 23.37 for males and 21.25 for females.[11]

The results of the probit estimations to explain smoking and obesity and the OLS estimations to explain BMI are presented in **Table 3**. The reference categories are male, age 45–49, those who graduated from senior high school, and those who are not currently working. The figures reported in the table indicate the marginal effects. The probability of being a smoker (column (1)) is lower for females, ages younger than 30 and 60 or older, and highly educated (particularly graduate school). On the other hand, those who currently engaged in work are more likely to be smokers. Although not reported in the table, when limiting the sample of working individuals and adding working hours as an explanatory variable, the coefficient for working hours is positive and significant. When adding dummies for risk attitude (column (2)), risk-averse people are significantly less likely to be smoker.

The probability of being obese is lower for female, people aged 60 or older, and the highly educated (column (3)). In contrast to smoking, working status is insignificant. In this specification, we do not find evidence of a statistically significant relationship between smoking and obesity. On the other hand, according to the OLS estimation to explain BMI (column (5)), while the coefficient for smoker is insignificant, the coefficient for quitter is positive and significant at the 1% level. While a systematic relationship between risk attitude and obesity is not observed, the coefficients for risk aversion are negative and marginally significant (at the 10% level) in the BMI estimation (column (6)).

3.2. Smoking, Obesity, and Labor Market Outcomes

The wage function estimation results are presented in **Table 4**. Surprisingly, the coefficients for smoker are positive and significant at the 1% level both for male and female workers, after controlling for the other individual characteristics. In percentage terms, the estimated wage premiums are 8.7% for males and 10.8% for females. In the case of males, the coefficient for

[10] According to the "National Health and Nutrition Survey" (Ministry of Health, Welfare and Labor, 2016), the percentages of smoker are 30.2% in males and 8.2% in females. The percentage of female smokers is somewhat higher in the sample of this study.

[11] According to the "National Health and Nutrition Survey" (2016), the means of BMI are 23.7 in males and 22.4 in females. The mean figures in the sample of this study are somewhat lower.

quitter is also positive and significant: a 6.4% wage premium relative to non-smokers.

On the other hand, the coefficient for obesity is negative and significant at the 5% level for males, but the coefficient is small and insignificant for females. The size of the wage penalty expressed in percentage term is 12.7% for male workers. As explained in the introduction, past studies in foreign countries often find wage discount of obesity only for female workers. In this respect, the finding of this study for Japan is surprising, although it is consistent with the result of Furugoori and Matsuura (2014) for Japanese individuals.

The striking result of smokers' wage premium is worthy of delving further into. Although the estimations' control standard variables represent human capital such as education and tenure, possible endogeneity of smoking is not taken into account. In general, cigarettes are regarded as inferior goods such that the consumption of cigarettes will decline in proportion to the income level. However, some studies indicate positive elasticity of tobacco consumption with respect to income (e.g., Kenkel *et al*., 2014). If this is the case, the observed wage premium may be arising from the reverse causality. To deal with this possibility, we include earnings and household income (both expressed in logarithmic form) in the equation to explain smoking status (Equation (1)). According to this estimation, while the coefficient for earnings is positive and significant, that for household income is insignificant. Further, when we limit the sample individuals to non-workers and include household income as the explanatory variable, the coefficient for income is very small and statistically insignificant. These additional estimations suggest that the reverse causality running from earnings to smoking is unlikely.

To deal with the endogeneity issue more formally, we conduct a 2SLS estimation using risk attitude as the instrument for smoker. As seen in the previous subsection, risk attitude is correlated with the smoking behavior. The risk attitude is the 5-point scale variable from risk averter=1 to risk taker=5. In this estimation, the reference category is non-smoker, which includes both quitter and never smoked. The results are presented in **Table 5**. The first stage results reconfirm that risk attitude is a significant determinant of smoking behavior. Risk takers tend to be smokers and the F-statistics are well above the conventional validity level of the instrument. According to the second stage regression results, the coefficients for smoker are positive and significant at the 5% level for both males and females, confirming the smokers' wage premium after accounting for the possible endogeneity. However, as the estimated coefficients are very large, we do not judge the 2SLS results as quantitatively decisive ones but as an indication of the robustness against the endogeneity concern.

Another possible concern is the selection mechanism. If smokers have bad health and are likely to exit the labor force, the observed wage premium of smokers may result from the fact that only healthy and productive smokers remain in the workforce. In considering this possibility, we run probit estimations on the probability of engaging in market work (**Table 6**). The coefficients for

smoking are positive and significant at the 1% level both for males and females. Since the table indicates marginal effects, probability of working is 5% (male) and 12% (female) higher than that of non-smokers. This result suggests that the estimated wage premium of smokers is unlikely to be the selection of less productive smokers' exit from the labor market. On the other hand, the coefficient for obesity is negative and marginally significant for males.

Past studies indicate a positive relationship between job stress and smoking (Ayyagari and Sindelar, 2010) and healthy habits such as reduction of smoking and drinking after retirement (Insler, 2014; Motegi *et al*., 2015; Zhao *et al*., 2017). These studies suggest a possible causality running from continuous working to smoking.[12] In considering this possibility, we re-estimate the same probit model by splitting the sample into those aged 60 or older and younger than 60 (**Table 7**). For both males and females, the coefficients for smoker are larger for the older subsamples than for the younger subsamples (particularly for females), suggesting a possibility that retired individuals tend to adopt healthy lifestyles. However, even for the younger subsamples, the coefficients for smoking are positive and significant at the 1% level.

3.3. Smoking, Obesity, and Subjective Well-being

The ordered-probit estimation results to explain life satisfaction are presented in panel A of **Table 8**. Since the categorical dependent variables from 5 to 1 are assigned in order from "satisfied" to "dissatisfied," respectively, positive coefficients indicate higher life satisfaction. The coefficient for smoking is negative and significant at the 1% level (column (1)), indicating lower life satisfaction for smokers. However, when splitting the sample into male and female subsamples, the coefficient is significant only for females. The coefficients for obese show a similar gender pattern: insignificant for males, but negative and highly significant for females.

Panel B of **Table 8** reports the same estimations for the subsample of working individuals by using job satisfaction as an alternative dependent variable. After controlling for earnings, working hours, and various individual characteristics, job satisfaction of female smokers is low at the 5% significance level. In addition, job satisfaction of obese workers is low, irrespective of gender.

Overall, smoking and obesity are associated with low life/job satisfaction, particularly among female workers.

4. Conclusion

[12] However, Hashimoto (2015) does not find a significant effect of retirement on health-related habits including smoking in Japan.

This study, using original survey data for about 10,000 Japanese individuals, presents evidence on the relationship between smoking and obesity, on the one hand, and labor market outcomes and subjective well-being, on the other hand. The results can be summarized as follows. First, after accounting for various individual characteristics, wages of both male and female smokers are significantly higher than those of people who have never smoked. This finding is robust even when accounting for the selection out of the workforce and the endogeneity of smoking behavior. This unexpected finding is different from the past empirical studies and the general perception. Second, there is a wage penalty of obesity for male workers, but such a relationship is insignificant for female workers. This is also an unexpected finding, as many past studies have detected a wage penalty for obese females. Third, smoking and obesity are associated with low life satisfaction and job satisfaction among females, but the relationships are weak and unclear among males.

Although this study presents new findings, its reliance on a cross-sectional data set is an obvious limitation. Therefore, it should be stressed that the results cannot be interpreted as evidence of causality running from smoking and body mass to the labor market outcomes. In considering the observed negative relationships between smoking and low subjective well-being, we conjecture that the relatively high wages of smokers might partly be a compensation for uncomfortable jobs.

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Table 1. Characteristics of the Respondents

	Individual characteristics	Nobs.	(%)
Gender	Male	4972	49.5%
	Female	5065	50.5%
Age classes	20-24	316	3.1%
	25-29	1,013	10.1%
	30-34	681	6.8%
	35-39	949	9.5%
	40-44	964	9.6%
	45-49	1,048	10.4%
	50-54	912	9.1%
	55-59	727	7.2%
	60-64	1,588	15.8%
	65-69	1,207	12.0%
	70-	632	6.3%
Education	Primary school or junior high school	218	2.2%
	Senior high school	2,863	28.5%
	Vocational school	1,084	10.8%
	Junior (2-year) college	1,287	12.8%
	4-year college or university	4,059	40.4%
	Graduate school	526	5.2%
Working status	Working	6,852	68.3%
	Not working	3,185	31.7%

Table 2. Prevalence of Smoking and Obesity

A. Smoking

	(1) All		(2) Male		(3) Female	
Smoker	2,071	20.6%	1,392	28.0%	679	13.4%
Quitter	2,217	22.1%	1,498	30.1%	719	14.2%
Never-smoker	5,749	57.3%	2,082	41.9%	3,667	72.4%
Total	10,037		4,972		5,065	

B. Obesity and Overweight

	(1) All		(2) Male		(3) Female	
Obesity	315	3.1%	212	4.3%	103	2.0%
Overweight	1,585	15.8%	1,119	22.5%	466	9.2%
BMI<25	8,137	81.1%	3,641	73.2%	4,496	88.8%
Total	10,037		4,972		5,065	
BMI	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	22.30	3.65	23.37	3.47	21.25	3.53

(Note) Obesity: BMI≧30, overweight: 30＞BMI≧25.

Table 3. Smoking and Obesity: Individual Characteristics

	(1) Smoking	(2) Smoking	(3) Obesity	(4) Obesity	(5) BMI	(6) BMI
Female	-0.1451 ***	-0.1309 ***	-0.0218 ***	-0.0214 ***	-2.1001 ***	-2.0890 ***
	(0.0086)	(0.0087)	(0.0039)	(0.0039)	(0.0860)	(0.0869)
20-24	-0.1009 ***	-0.0984 ***	-0.0099	-0.0096	-1.3925 ***	-1.3915 ***
	(0.0173)	(0.0171)	(0.0071)	(0.0071)	(0.2570)	(0.2564)
25-29	-0.0788 ***	-0.0755 ***	-0.0162 ***	-0.0158 ***	-1.2479 ***	-1.2439 ***
	(0.0135)	(0.0134)	(0.0042)	(0.0042)	(0.1531)	(0.1534)
30-34	-0.0259	-0.0222	-0.0063	-0.0057	-0.9661 ***	-0.9571 ***
	(0.0177)	(0.0177)	(0.0060)	(0.0061)	(0.1769)	(0.1771)
35-39	-0.0040	-0.0003	-0.0079	-0.0078	-0.7951 ***	-0.7884 ***
	(0.0167)	(0.0167)	(0.0052)	(0.0052)	(0.1612)	(0.1614)
40-44	-0.0049	-0.0047	-0.0086	-0.0085	-0.2466	-0.2435
	(0.0167)	(0.0165)	(0.0051)	(0.0051)	(0.1746)	(0.1750)
50-54	-0.0169	-0.0169	-0.0069	-0.0067	-0.1719	-0.1697
	(0.0164)	(0.0162)	(0.0053)	(0.0053)	(0.1597)	(0.1597)
55-59	0.0012	0.0009	-0.0057	-0.0055	0.2574	0.2617
	(0.0184)	(0.0182)	(0.0058)	(0.0058)	(0.1859)	(0.1861)
60-64	-0.0373 **	-0.0374 **	-0.0153 ***	-0.0151 ***	-0.0316	-0.0284
	(0.0141)	(0.0140)	(0.0041)	(0.0041)	(0.1383)	(0.1384)
65-69	-0.0627 ***	-0.0655 ***	-0.0198 ***	-0.0195 ***	0.0616	0.0631
	(0.0142)	(0.0139)	(0.0038)	(0.0038)	(0.1466)	(0.1470)
70-	-0.1182 ***	-0.1232 ***	-0.0235 ***	-0.0233 ***	-0.0621	-0.0713
	(0.0134)	(0.0124)	(0.0034)	(0.0034)	(0.1676)	(0.1681)
Junior high	0.1176 ***	0.1085 ***	0.0050	0.0037	-0.1310	-0.1483
school	(0.0338)	(0.0331)	(0.0112)	(0.0109)	(0.2737)	(0.2742)
Vocational	-0.0023	-0.0059	0.0001	0.0000	-0.0560	-0.0603
school	(0.0138)	(0.0134)	(0.0053)	(0.0052)	(0.1337)	(0.1340)
Junior college	-0.0598 ***	-0.0586 ***	-0.0138 ***	-0.0136 ***	-0.4670 ***	-0.4668 ***
	(0.0121)	(0.0119)	(0.0043)	(0.0043)	(0.1101)	(0.1102)
University	-0.0654 ***	-0.0636 ***	-0.0117 ***	-0.0116 ***	-0.4111 ***	-0.4101 ***
	(0.0093)	(0.0092)	(0.0037)	(0.0036)	(0.0887)	(0.0890)
Graduate	-0.1315 ***	-0.1287 ***	-0.0123 *	-0.0120 *	-0.4329 ***	-0.4363 ***
school	(0.0108)	(0.0107)	(0.0052)	(0.0051)	(0.1621)	(0.1625)
Working	0.0633 ***	0.0578 ***	-0.0040	-0.0037	-0.0112	-0.0123
	(0.0092)	(0.0092)	(0.0043)	(0.0043)	(0.0827)	(0.0828)
Risk averter		-0.1453 ***		-0.0064		-0.1907 *
		(0.0088)		(0.0040)		(0.1037)
More of a risk		-0.0676 ***		-0.0114 ***		-0.1703 *
averter		(0.0093)		(0.0038)		(0.0946)
More of a risk		-0.0253		-0.0083		-0.1123
taker		(0.0165)		(0.0059)		(0.1683)
Risk taker		-0.0598		-0.0017		0.0760
		(0.0324)		(0.0146)		(0.4294)
Smoker			0.0002	-0.0005	0.0235	-0.0034
			(0.0042)	(0.0042)	(0.1044)	(0.1041)
Quitter			0.0062	0.0060	0.3688 ***	0.3598 ***
			(0.0044)	(0.0044)	(0.0902)	(0.0913)
Observations	10037	10037	10037	10037	10037	10037
Pseudo R^2/R^2	0.0647	0.0868	0.0337	0.0369	0.1100	0.1104

(Notes) Columns (1)-(4) are the probit estimation results with robust standard errors in parentheses. Columns (5) and (6) are the OLS estimation results with robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4. Earnings of Smoker and Obese Workers

	(1) Male	(2) Female
Smoker	0.0830 ***	0.1023 ***
	(0.0234)	(0.0329)
Quitter	0.0618 **	-0.0174
	(0.0272)	(0.0328)
Obesity	-0.1361 **	-0.0471
	(0.0587)	(0.0869)
Overweight	0.0090	-0.0282
	(0.0246)	(0.0448)
Age	yes	yes
Education	yes	yes
Tenure	yes	yes
Working hours	yes	yes
Occupation	yes	yes
Employment type	yes	yes
Observations	3974	2878
Adj. R^2	0.4840	0.5193

(Notes) OLS estimation results with robust standard errors in parentheses. *** and ** indicate statistical significance at the 1% and 5% levels, respectively.

Table 5. Smoking and Earnings: 2SLS Estimation Results

	(1) Male	(2) Female
Smoker	0.5672 **	0.5354 **
	(0.2411)	(0.2149)
Age	yes	yes
Education	yes	yes
Tenure	yes	yes
Working hours	yes	yes
Occupation	yes	yes
Employment type	yes	yes
BMI	yes	yes
Observations	3974	2878
R2	0.4177	0.4972
(First stage)		
Risk attitude	0.0492 ***	0.0726 ***
	(0.0075)	(0.0084)
F-statistics	42.65 ***	75.33 ***

(Notes) 2SLS estimation results with robust standard errors in parentheses. *** and ** indicate statistical significance at the 1% and 5% levels, respectively. Subjective risk attitude is used as the instrument.

Table 6. Probability of Engaging in Market Work

	(1) Male	(2) Female
Smoker	0.0559 ***	0.1217 ***
	(0.0127)	(0.0209)
Quitter	0.0231 *	0.0305
	(0.0133)	(0.0210)
Obesity	-0.0512 *	-0.0125
	(0.0324)	(0.0533)
Overweight	-0.0083	-0.0203
	(0.0133)	(0.0259)
Age	yes	yes
Education	yes	yes
Observations	4972	5065
Pseudo R^2	0.2083	0.0919

(Notes) Probit estimation results with standard errors in parentheses. The figures indicate marginal effects. *** and * indicate statistical significance at the 1% and 10% levels, respectively.

Table 7. Probability of Engaging in Market Work by Age Categories

	(1) Male 60 or older	(2) Male 59 or younger	(3) Female 60 or older	(4) Female 59 or younger
Smoker	0.0651 *	0.0442 ***	0.2002 ***	0.0894 ***
	(0.0357)	(0.0099)	(0.0409)	(0.0218)
Quitter	0.0325	0.0137	0.0709 **	0.0066
	(0.0311)	(0.0118)	(0.0349)	(0.0238)
Obesity	0.0011	-0.0512 **	0.1431	-0.0668
	(0.0799)	(0.0272)	(0.1004)	(0.0576)
Overweight	0.0026	-0.0097	0.0356	-0.0581 *
	(0.0293)	(0.0123)	(0.0371)	(0.0319)
Age	yes	yes	yes	yes
Education	yes	yes	yes	yes
Observations	1626	3346	1801	3264
Pseudo R^2	0.1011	0.0643	0.0672	0.0161

(Notes) Probit estimation results with standard errors in parentheses. The figures indicate marginal effects. *** and * indicate statistical significance at the 1% and 10% levels, respectively.

Table 8. Smoking, Obesity, and Subjective Well-being

A. Life Satisfaction

	(1) All	(2) Male	(3) Female
Smoker	-0.1077 ***	0.0100	-0.2899 ***
	(0.0295)	(0.0389)	(0.0474)
Quitter	-0.0581 **	-0.0228	-0.0766 *
	(0.0283)	(0.0388)	(0.0452)
Obesity	-0.1461 **	-0.0537	-0.2932 ***
	(0.0641)	(0.0800)	(0.1038)
Overweight	0.0066	0.0208	-0.0174
	(0.0304)	(0.0374)	(0.0537)
Gender	yes	no	no
Age	yes	yes	yes
Education	yes	yes	yes
Household income	yes	yes	yes
Working	yes	yes	yes
Marital status	yes	yes	yes
Children	yes	yes	yes
Observations	10037	4972	5065
Pseudo R^2	0.0397	0.0431	0.0405

(Notes) Ordered-probit estimation results with robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

B. Job Satisfaction

	(1) All	(2) Male	(3) Female
Smoker	-0.0550	0.0008	-0.1494 **
	(0.0337)	(0.0419)	(0.0588)
Quitter	-0.0004	0.0351	-0.0603
	(0.0339)	(0.0440)	(0.0567)
Obesity	-0.2264 ***	-0.1988 **	-0.2689 *
	(0.0728)	(0.0828)	(0.1515)
Overweight	0.0103	0.0269	-0.0263
	(0.0357)	(0.0411)	(0.0713)
Gender	yes	no	no
Age	yes	yes	yes
Education	yes	yes	yes
Earnings (log)	yes	yes	yes
Working hours (log)	yes	yes	yes
Employment type	yes	yes	yes
Observations	6852	3974	2878
Pseudo R^2	0.0257	0.0312	0.0258

(Notes) Ordered-probit estimation results with robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.