RIETI-JER Workshop

Economics of Aging in Japan and other Societies

Presentation

SEKIZAWA Yoichi

Senior Fellow, RIETI

December 13, 2014

Research Institute of Economy, Trade and Industry (RIETI)
http://www.rieti.go.jp/en/index.html

What Can We Learn from JSTAR about the Relationship between Socioeconomic Status and Depression?

December 13, 2014

Yoichi Sekizawa
RIETI
sekizawa-yoichi@rieti.go.jp

Research Interest

- The Japanese government is encouraging more women to work. The government is also promoting the continuous employment of elderly people.
- If being in the labor force is good for the mental health of middle aged and elderly people, such government policies may have additional benefit in addition to a labor supply increase.
- Another research interest is whether socioeconomic status (SES) variables predict the onset of depression.

Previous Studies on Employment and Mental Health

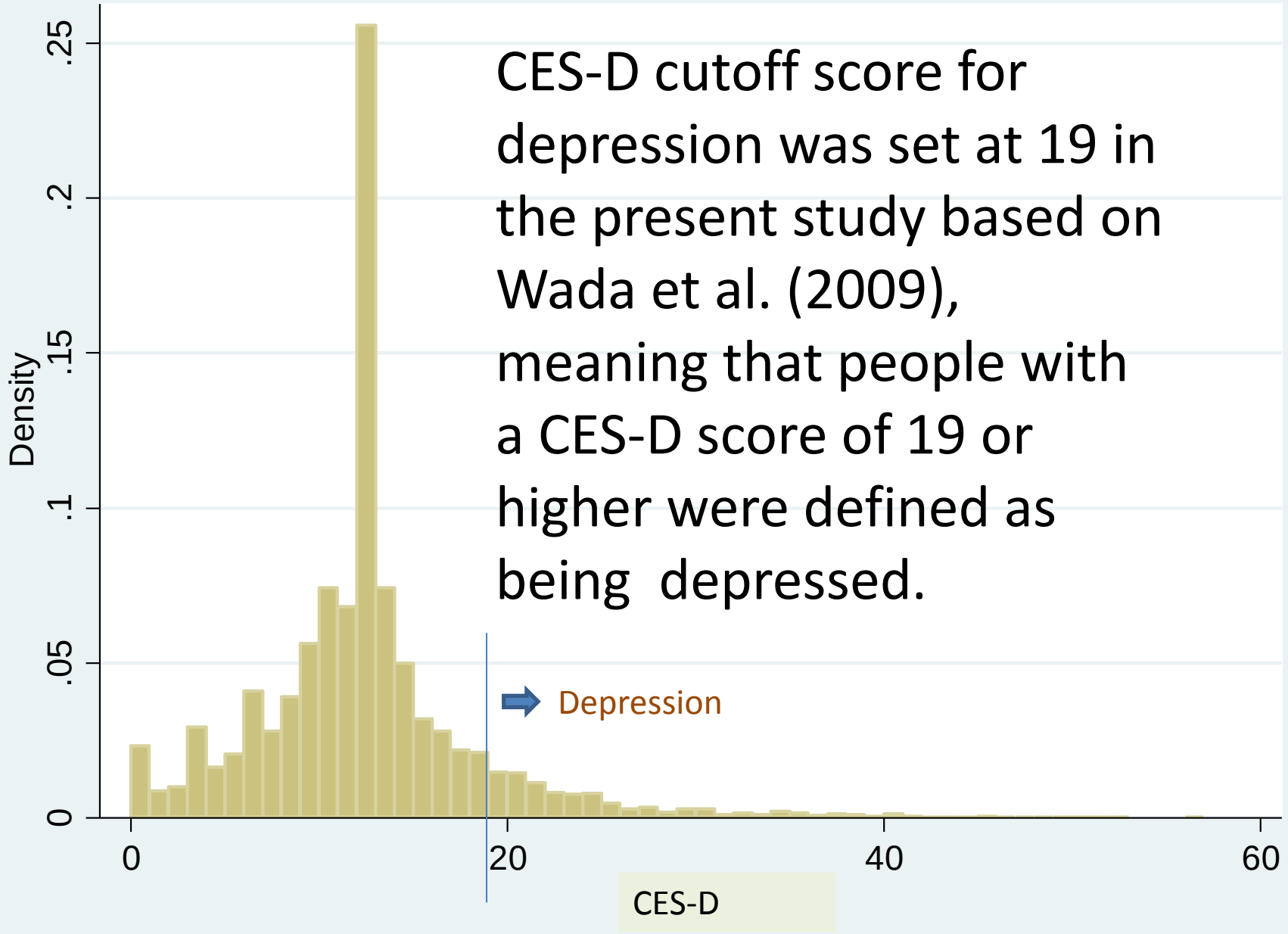
- Relationship between not being in the labor force (mainly retirees and homemakers) and depression seems unclear.
  - Unemployment has a negative impact on mental health (Paul and Moser, 2009) .
  - Retirement has a beneficial effect on mental health (van der Heide et al., 2013).
  - Employment has a beneficial effect on mental health (van der Noordt et al., 2014).
- A Japanese study showed that working women are less likely to experience postpartum depression (Miyake et al., 2011).

Defining Depression

- In JSTAR, depression is measured by the CES-D scale (Radloff, 1977). CES-D is composed of 20 questions. Higher scores indicate a higher level of depression.
- Four questions are reverse-scored items (4, 8, 12, 16).

Sample of CES-D

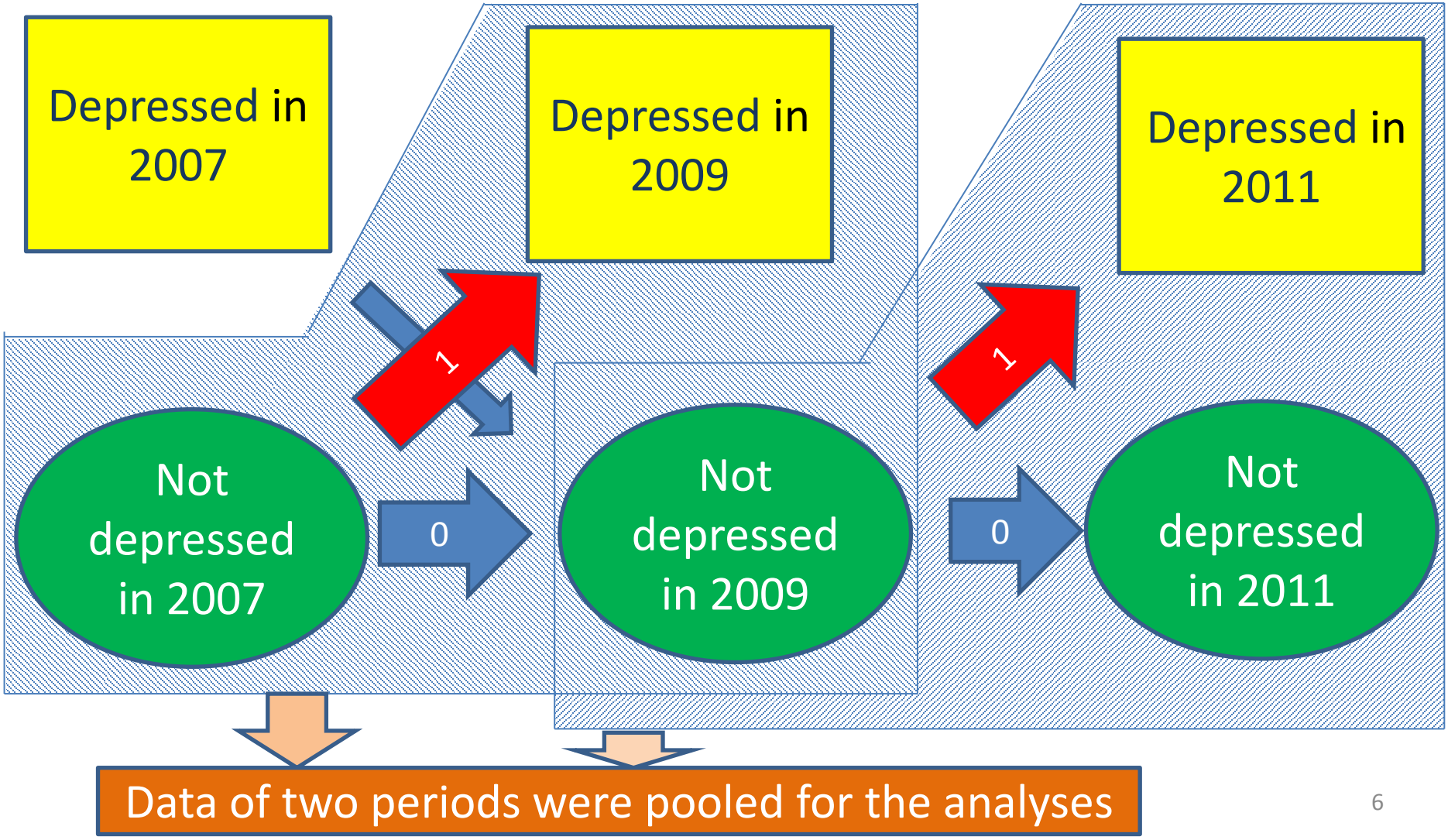
		None	1-2 days	3-4 days	5 days or more
6	I felt depressed.	✓			
12	I was happy.	✓			
16	I enjoyed life.	✓			
18	I felt sad.	✓			


CES-D cutoff score for depression was set at 19 in the present study based on Wada et al. (2009), meaning that people with a CES-D score of 19 or higher were defined as being depressed.
Depression
Density
0
.05
.1
.15
.2
.25
0
20
40
60
CES-D

Methodology of Analyses

- Multivariate logistic regression was performed. The onset of depression two years after baseline was the dependent variable. Depressed respondents at baseline were excluded. If they became depressed two years later, their score was 1 , otherwise 0.
- We made categorical variables for work status and marriage: (1) employed and married, (2) not in labor force and married, (3) employed and not married, (4) not in labor force and not married. Those who were unemployed (not in the labor force and seeking employment) were excluded.
- Other independent variables are SES (educational attainment, household income), health (subjective health, IADL (dummy), smoking), as well as gender, age (50s, 60s, 70s), marriage status, life satisfaction, CES-D, and cross term of year and city.
- All of the independent variables except changes in household income are at baseline.

The onset of depression two years later was the dependent variable (onset of depression is 1, otherwise 0).



Results

Prevalence and Transition of Depression (CES-D≧19)

Men							
		Worked			Did Not Work		
		2007	2009	2011	2007	2009	2011
Depressed		69/1106 (6.2)	70/1007 (7.0)	69/722 (9.6)	44/404 (10.9)	51/486 (10.5)	60/525 (11.4)
Baseline	Two years later	2007 to 2009		2009 to 2011	2007 to 2009		2009 to 2011
Not depressed	Not depressed	621/659 (94.2)		591/640 (92.3)	222/235 (94.5)		245/261 (93.9)
	Depressed	38/659 (5.8)		49/640 (7.7)	13/235 (5.5)		16/261 (6.1)
Depressed	Not depressed	21/43 (48.8)		31/53 (58.5)	14/22 (63.6)		26/34 (76.5)
	Depressed	22/43 (51.2)		22/53 (41.5)	8/22 (36.4)		8/34 (23.5)

Women							
		Worked			Did Not Work		
		2007	2009	2011	2007	2009	2011
Depressed		51/667 (7.7)	59/643 (9.2)	44/523 (8.4)	97/749 (13.0)	102/807 (12.6)	87/641 (13.6)
Baseline	Two years later	2007 to 2009		2009 to 2011	2007 to 2009		2009 to 2011
Not depressed	Not depressed	353/374 (94.4)		338/361(93.6)	341/367 (92.9)		395/442 (89.4)
	Depressed	21/374 (5.6)		23/361 (6.4)	26/367 (7.1)		47/442 (10.6)
Depressed	Not depressed	13/27 (48.2)		16/40 (40.0)	23/48 (47.9)		18/50 (36.0)
	Depressed	14/27 (51.9)		24/40 (60.0)	25/48 (52.1)		32/50 (64.0)

(Note) percent in parentheses

Dependent Variable: Onset of Depression Two Years Later (Multivariate Logistic Regression)

	Overall	Men	Women
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Work and Marriage (ref: employed and married)	Model 1	Model 1	Model 1
not in labor force and married	1.25 (0.78,1.99)	0.57 (0.26,1.26)	2.25 (1.15,4.41)*
employed and not married	1.18 (0.66,2.11)	1.06 (0.48,2.35)	1.70 (0.69,4.18)
not in labor force and not married	2.86 (1.51,5.42)*	2.48 (0.88,7.02)+	3.73 (1.57,8.85)*
Female (ref: male)	1.17 (0.79,1.73)		
Age (ref: 50s) 60s	0.61 (0.40,0.95)*	0.62 (0.34,1.10)	0.63 (0.33,1.21)
70s	0.75 (0.43,1.30)	0.85 (0.38,1.89)	0.80 (0.37,1.74)
Education (ref: less than 12 years) 12 years	0.76 (0.49,1.16)	1.03 (0.54,1.98)	0.61 (0.34,1.12)
13-15 years	0.84 (0.48,1.47)	0.99 (0.40,2.46)	0.78 (0.38,1.60)
16 years or more	0.76 (0.41,1.40)	0.99 (0.46,2.11)	0.43 (0.09,2.07)
Life Satisfaction	0.57 (0.45,0.73)*	0.59 (0.42,0.82)*	0.52 (0.37,0.74)*
CES-D	1.14 (1.08,1.20)*	1.08 (1.01,1.17)*	1.21 (1.11,1.31)*
City Group and Year (ref: 5 cities in 2009)			
5 cities in 2007	1.29 (0.87,1.90)	1.62 (0.90,2.90)	1.12 (0.65,1.91)
2 cities in 2009	2.61 (1.60,4.27)*	4.56 (2.32,8.95)*	1.42 (0.64,3.13)
Household Income (million yen)	1.05 (0.97,1.13)	0.99 (0.89,1.09)	1.11 (1.00,1.23)+
N	2302	1288	1014

1. Adjusted for subjective health, dummy of IADL (instrumental activities of daily living), and smoking.

2. Green indicates statistically significant <0.05. Yellow indicates statistically significant <0.1. *p<0.05. +p<0.1.

3. Respondents not depressed at both baseline and two years later were coded as 0 and respondents not depressed at baseline and depressed two years later were code as 1. Depressed respondents at baseline were excluded.

Limitation of the Above Analysis

- Household income at baseline is positively associated with the onset of depression in women (p=0.052). This seems hard to interpret.
- Possibility of reverse causality cannot be denied. Those who are not in the labor force may have retired or chosen to be homemakers due to depression or other serious illnesses. Studies show that those who are depressed tend to retire early (Doshi et al., 2007). A past history of depression is a risk factor for future depression.

Further Analysis

- Since household income at baseline was negatively associated with a change in household income (r= -0.54), this variable was added to the explanatory variables.
- As a sub-sample analysis, we excluded the following respondents in order to compare mentally healthy respondents at baseline.
  - Those who experienced being diagnosed with mental illness.
  - Those who identified themselves as not in the labor force and, if so, also were either sick or disabled at baseline.
  - Those who were depressed in 2007 and not depressed in 2009.

Dependent Variable: Onset of Depression Two Years Later
(Sub-sample with Further Adjusting for Change in Household Income)

	Men	Men	Women	Women
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Work and Marriage (ref: employed and married)	Model 2	Model 3	Model 2	Model 3
not in labor force and married	0.20 (0.05,0.78)*	0.22 (0.06,0.85)*	2.74 (1.17,6.38)*	2.74 (1.17,6.43) *
employed and not married	1.10 (0.45,2.71)	1.22 (0.48,3.10)	1.69 (0.58,4.92)	1.71 (0.56,5.23)
not in labor force and not married	3.30 (0.91,11.92)$^{+}$	3.97 (1.03,15.30)*	3.00 (0.85,10.57)$^{+}$	3.02 (0.83,10.96)$^{+}$
Female (ref: male)				
Age (ref: 50s) 60s	0.51 (0.25,1.05)$^{+}$	0.52 (0.25,1.08)$^{+}$	0.64 (0.28,1.46)	0.64 (0.28,1.48)
70s	0.89 (0.32,2.46)	0.94 (0.34,2.63)	0.69 (0.24,1.96)	0.69 (0.24,2.00)
Education (ref: less than 12 years) 12 years	0.83 (0.37,1.85)	0.78 (0.35,1.77)	0.74 (0.33,1.66)	0.74 (0.32,1.66)
13-15 years	0.80 (0.26,2.45)	0.76 (0.25,2.34)	1.15 (0.46,2.86)	1.15 (0.46,2.88)
16 years or more	0.79 (0.32,1.95)	0.71 (0.28,1.80)	0.37 (0.04,3.31)	0.37 (0.04,3.38)
Life Satisfaction (1 to 4 (satisfied))	0.60 (0.40,0.90)*	0.57 (0.38,0.87)*	0.50 (0.32,0.77)*	0.50 (0.32,0.77)*
CES-D	1.15 (1.04,1.27)*	1.15 (1.04,1.27)*	1.27 (1.13,1.42)*	1.27 (1.13,1.42)*
City Group and Year (ref: 5 cities in 2009)				
5 cities in 2007	1.77 (0.82,3.79)	1.69 (0.78,3.66)	1.19 (0.57,2.47)	1.19 (0.57,2.47)
2 cities in 2009	6.19 (2.41,15.90)*	6.56 (2.54,16.92)*	0.93 (0.26,3.32)	0.93 (0.26,3.32)
Household Income (million yen)		1.07 (0.93,1.23)		1.00 (0.83,1.21)
Change in Household Income (million yen)	1.05 (0.93,1.18)	1.08 (0.96,1.21)	0.88 (0.78,1.00)*	0.88 (0.74,1.05)
N	939	939	691	691

1. Adjusted for subjective health, dummy of IADL (instrumental activities of daily living), and smoking.
2. Green indicates statistically significant <0.05. Yellow indicates statistically significant <0.1. *p<0.05. $^{+}$p<0.1.
3. Respondents not depressed at both baseline and two years later were coded as 0 and respondents not depressed at baseline and depressed two years later were code as 1. Depressed respondents at baseline were excluded.

Dependent Variable: Onset of Depression Two Years Later
(with Sample Number Adjustment)

	Men	Men	Men	Men	Men
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Work and Marriage (ref: employed and married)	Model 3	Model 1 (samples in Model 3)	Model 1 (sub-sample)	Model 1	Model 0
not in labor force and married	0.22 (0.06,0.85)*	0.21 (0.06,0.83)*	0.54 (0.23,1.27)	0.57 (0.26,1.26)	0.77 (0.43,1.37)
employed and not married	1.22 (0.48,3.10)	1.21 (0.48,3.07)	1.06 (0.47,2.36)	1.06 (0.48,2.35)	1.25 (0.65,2.41)
not in labor force and not married	3.97 (1.03,15.30)*	3.71 (0.97,14.19)$^{+}$	1.95 (0.58,6.51)	2.48 (0.88,7.02)$^{+}$	2.07 (0.88,4.87)$^{+}$
Age (ref: 50s) 60s	0.52 (0.25,1.08)$^{+}$	0.52 (0.25,1.08)$^{+}$	0.56 (0.31,1.03)$^{+}$	0.62 (0.34,1.10)	0.80 (0.50,1.26)
70s	0.94 (0.34,2.63)	0.92 (0.33,2.56)	0.78 (0.34,1.81)	0.85 (0.38,1.89)	0.77 (0.41,1.44)
Education (ref: less than 12 years)					
12 years	0.78 (0.35,1.77)	0.80 (0.35,1.79)	1.09 (0.55,2.15)	1.03 (0.54,1.98)	1.00 (0.61,1.64)
13-15 years	0.76 (0.25,2.34)	0.78 (0.25,2.39)	0.92 (0.35,2.43)	0.99 (0.40,2.46)	0.93 (0.44,1.96)
16 years or more	0.71 (0.28,1.80)	0.74 (0.29,1.86)	1.00 (0.45,2.21)	0.99 (0.46,2.11)	0.76 (0.41,1.38)
Life Satisfaction (1 to 4 (satisfied))	0.57 (0.38,0.87)*	0.60 (0.40,0.90)*	0.58 (0.41,0.81)*	0.59 (0.42,0.82)*	
CES-D	1.15 (1.04,1.27)*	1.15 (1.04,1.27)*	1.06 (0.98,1.14)	1.08 (1.01,1.17)*	
City Group and Year (ref: 5 cities in 2009)					
5 cities in 2007	1.69 (0.78,3.66)	1.73 (0.80,3.73)	1.77 (0.94,3.32)$^{+}$	1.62 (0.90,2.90)	1.30 (0.81,2.08)
2 cities in 2009	6.56 (2.54,16.92)*	5.78 (2.29,14.56)*	5.22 (2.56,10.66)*	4.56 (2.32,8.95)*	4.01 (2.36,6.83)*
Household Income (million yen)	1.07 (0.93,1.23)	1.03 (0.91,1.17)	0.97 (0.87,1.09)	0.99 (0.89,1.09)	
Change in Household Income (million yen)	1.08 (0.96,1.21)				
N	939	939	1254	1288	1774

1. Adjusted for subjective health, dummy of IADL (instrumental activities of daily living), and smoking.
2. Green indicates statistically significant <0.05. Yellow indicates statistically significant <0.1. *p<0.05. $^{+}$p<0.1.
3. Respondents not depressed at both baseline and two years later were coded as 0 and respondents not depressed at baseline and depressed two years later were code as 1. Depressed respondents at baseline were excluded.

Dependent Variable: Onset of Depression Two Years Later
(with Sample Number Adjustment)

	Women	Women	Women	Women	Women
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Work and Marriage (ref: employed and married)	Model 3	Model 1 (samples in Model 3)	Model 1 (sub-sample)	Model 1	Model 0
not in labor force and married	2.74 (1.17,6.43)*	2.91 (1.25,6.78)*	2.49 (1.24,5.02)*	2.25 (1.15,4.41)*	1.67 (1.00,2.79)*
employed and not married	1.71 (0.56,5.23)	1.87 (0.61,5.76)	1.92 (0.77,4.80)	1.70 (0.69,4.18)	1.42 (0.72,2.82)
not in labor force and not married	3.01 (0.83,10.96)+	3.47 (0.97,12.40)+	3.15 (1.20,8.26)*	3.73 (1.57,8.85)*	2.52 (1.31,4.83)*
Age (ref: 50s) 60s	0.64 (0.28,1.48)	0.67 (0.29,1.53)	0.66 (0.33,1.31)	0.63 (0.33,1.21)	0.60 (0.36,0.99)*
70s	0.69 (0.24,2.00)	0.71 (0.25,2.03)	0.98 (0.43,2.21)	0.80 (0.37,1.74)	0.66 (0.36,1.19)
Education (ref: less than 12 years)					
12 years	0.74 (0.32,1.66)	0.71 (0.32,1.60)	0.65 (0.34,1.22)	0.61 (0.34,1.12)	0.61 (0.38,0.96)*
13-15 years	1.15 (0.46,2.88)	1.07 (0.43,2.67)	0.85 (0.40,1.83)	0.78 (0.38,1.60)	0.70 (0.39,1.24)
16 years or more	0.37 (0.04,3.38)	0.29 (0.03,2.61)	0.49 (0.10,2.37)	0.43 (0.09,2.07)	0.42 (0.12,1.42)
Life Satisfaction (1 to 4 (satisfied))	0.50 (0.32,0.77)*	0.51 (0.33,0.79)*	0.54 (0.38,0.78)*	0.52 (0.37,0.74)*	
CES-D	1.27 (1.13,1.42)*	1.27 (1.13,1.42)*	1.20 (1.10,1.31)*	1.21 (1.11,1.31)*	
City Group and Year (ref: 5 cities in 2009)					
5 cities in 2007	1.19 (0.57,2.47)	1.20 (0.58,2.47)	1.18 (0.66,2.09)	1.12 (0.65,1.91)	0.82 (0.53,1.26)
2 cities in 2009	0.93 (0.26,3.32)	0.91 (0.25,3.30)	1.63 (0.73,3.65)	1.42 (0.64,3.13)	1.57 (0.91,2.69)
Household Income (million yen)	1.00 (0.83,1.21)	1.10 (0.96,1.26)	1.10 (0.99,1.23)+	1.11 (1.00,1.23)+	
Change in Household Income (million yen)	0.88 (0.74,1.05)				
N	691	691	977	1014	1506

1. Adjusted for subjective health, dummy of IADL (instrumental activities of daily living), and smoking.
2. Green indicates statistically significant <0.05. Yellow indicates statistically significant <0.1. *p<0.05. +p<0.1.
3. Respondents not depressed at both baseline and two years later were coded as 0 and respondents not depressed at baseline and depressed two years later were code as 1. Depressed respondents at baseline were excluded.

Interpretation of Results

- Wives who are not in the labor force (mostly homemakers) are more likely to develop depression than working wives among middle aged and elderly women.
- It is not clear whether men not in the labor force (mostly retirees) are less likely to develop depression than working men.
- Reduction of household income may lead to the onset of depression in women only (similar to Barbaglia et al. (2014)).

Limitation of the Study

- Wealth variables are not among the explanatory variables. Imputation may be necessary because there are many missing values in such variables in JSTAR.
- Definition of depression is different from medical diagnosis.
- There may be city and time differences. We may need more waves and data in order to reach a confident conclusion.

References

Barbaglia, M. G., ten Have, M., Dorsselaer, S., Alonso, J., & de Graaf, R. (2014). "Negative socioeconomic changes and mental disorders: a longitudinal study," *Journal of Epidemiology and Community Health*, jech-2014.

Doshi, J. A., L. Cen, and D. Polsky (2008) "Depression and retirement in late middle-aged U.S. workers," *Health Services Research*, Vol. 43, No. 2, pp. 693-713.

Miyake, Y., K. Tanaka, S. Sasaki, and Y. Hirota (2011). "Employment, income, and education and risk of postpartum depression: The Osaka Maternal and Child Health Study," *Journal of Affective Disorders*, Vol. 130, No. 1, pp. 133-137.

Paul, K. I. and K. Moser (2009) "Unemployment impairs mental health: Meta-analyses", *Journal of Vocational Behavior*, Vol. 74, No. 3, pp. 264-282.

Radloff, L. S. (1977) "The CES-D Scale: A self-report depression scale for research in the general population", *Applied Psychological Measurement*, Vol. 1, No. 3, pp. 385-401.

van der Heide, I., R. M. van Rijn, S. J. Robroek, A. Burdorf, K. I. Proper (2013) "Is retirement good for your health? A systematic review of longitudinal studies," *BMC Public Health*, Vol. 13, No. 1180.

van der Noordt, M., IJzelenberg, H., Droomers, M., & Proper, K. I. (2014). "Health effects of employment: a systematic review of prospective studies," *Occupational and Environmental Medicine*, oemed-2013.

Wada, K., K. Tanaka, G. Theriault, T. Satoh, M. Mimura, H. Miyaoka, and Y. Aizawa (2007) "Validity of the Center for Epidemiologic Studies Depression Scale as a screening instrument of major depressive disorder among Japanese workers", *American Journal of Industrial Medicine*, Vol. 50, No. 1, pp. 8-12.