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Cognitive Performance Among Older Persons in Japan and the United States

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Abstract

OBJECTIVE: To compare cognitive performance among Japanese and American persons, aged 68 years and older, using two nationally representative studies and to examine whether differences can be explained by differences in the distribution of risk factors or in their association with cognitive performance.

DESIGN: Nationally representative studies with harmonized collection of data on cognitive functioning.

SETTING: Nihon University Japanese Longitudinal Study of Aging and the US Health and Retirement Study.

PARTICIPANTS: A total of 1953 Japanese adults and 2959 US adults, aged 68 years or older.

MEASUREMENTS: Episodic memory and arithmetic working memory are measured using immediate and delayed word recall and serial 7s.

RESULTS: Americans have higher scores on episodic memory than Japanese people (0.72 points on a 20-point scale); however, when education is controlled, American and Japanese people did not differ. Level of working memory was higher in Japan (0.36 on a 5-point scale) than in the United States, and the effect of education on working memory was stronger among Americans than Japanese people. There are no differences over the age of 85 years.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article.

CONCLUSION: Even with large differences in educational attainment and a strong effect of education on cognitive functioning, the overall differences in cognitive functioning between the United States and Japan are modest. Differences in health appear to have little effect on national differences in cognition.

Keywords

cognitive performance; education; Japan; Nihon University Japanese Longitudinal Study of Aging; United States; US Health and Retirement Study

Because older age is strongly related to declines in cognitive functioning, increases in life expectancy and aging populations are making the prevalence of cognitive loss a larger issue in most countries; however, there are differences in dementia prevalence and level of cognitive functioning across countries. These differences are attributed to differences in the level of education, socioeconomic status, obesity, diabetes, hypertension, metabolic syndrome, dyslipidemia, and genetics.¹ However, it is often difficult to compare both the level of cognitive functioning and the associations of cognitive functioning with risk factors across countries because of differences in the representativeness of samples and measurement of cognitive functioning.

This study examines cognitive performance in older populations from Japan and the United States using two nationally representative samples. Studies of cognitive performance in Japan have generally been conducted in localized populations using variable diagnostic criteria and, therefore, cannot be generalized to the national population.^{2–6} Comparison of the United States and Japan is of interest because Japan has had exceptionally long life expectancy (83.7 years in 2018) and good health in recent decades, while the United States has had a poor record of improvement in life expectancy (78.7 years in 2018) and relatively poor health in recent years.^{7–9}

While some studies suggest that Japan has the lowest prevalence of dementia among developed countries,¹ prevalence has not been compared to other countries using comparable measurement and there are no comparisons of cognitive performance using similar measures. On the one hand, we expect that Japanese older adults would have better cognitive performance because they have a lower prevalence of health conditions associated with worse cognitive performance, including diabetes, obesity, heart disease, and functioning difficulties.^{8,10,11} On the other hand, the Japanese may be at a disadvantage in cognitive status because they have relatively high levels of stroke and hypertension, linked to greater cognitive loss.^{8,12}

Associations between chronic conditions and cognitive impairment are not always consistent across countries. Hypertension has been associated with impaired cognitive performance in Western countries^{11,13} and in Japan,¹⁴ but not in other Asian countries.¹⁵ While metabolic syndrome, which includes obesity, hypertension, and lipid and glucose dysregulation, has been associated with lower cognitive scores in the United States,^{10,16} associations are not always found in other Western countries¹⁷ and Japan.¹⁸ On the other hand, the presence of diabetes and heart disease has been associated with reduced cognitive functioning in the United States and other Western countries,^{10,19–22} as well as in Japan.^{23,24} Poor physical

functioning has also been associated with cognitive impairments in older persons in both the United States and Japan.^{3,25–28}

In addition, education is known to be an important predictor of cognitive functioning, and its link to cognition is strong in the United States. Japanese older adults have lower levels of education, compared to Americans.^{29–33} While studies of the association between cognitive functioning and educational attainment among older adults in Japan also indicate that low education is a risk factor for cognitive impairment,³⁴ associations between education and health outcomes tend to be weaker in Japan than in other countries.^{34–36}

This study examines whether there are differences between the two countries in cognitive performance. It also investigates how the distribution of risk factors for poor cognitive functioning and country differences in the associations of risk factors with cognitive performance affect national differences. We hypothesize that, despite having higher levels of education, older Americans will have worse cognitive performance than Japanese people because Americans experience more health problems related to cognitive loss.

METHODS

Data Sources

Using the Nihon University Japanese Longitudinal Study of Aging (NUJLSOA) and the US Health and Retirement Study (HRS) for cross-national cognitive comparisons provides three advantages. First, measurement of cognitive function is designed to be comparable.^{37,38} Second, they are both nationally representative. Third, each data set contains comparable assessments of risk factors for cognitive loss, including obesity measured by body mass index (BMI), chronic health conditions, physical functioning, and sociodemographic characteristics.

NUJLSOA data were collected in 2006 during the fourth wave of this nationally representative study of the older Japanese population. While this is a longitudinal study with the first wave of data collected in 1999, this is the only wave at which cognitive functioning was assessed; and in this wave, the youngest participants were 68 years old.³⁹ Information on design and methods of the study can be found in English at <http://gero.usc.edu/CBPH/nujlsao/index.html>.⁴⁰

The survey included 2721 participants with cognitive data, of whom 1953 (71.8%) comprise the final analytic sample used here. Among the 768 excluded people, most did not have measured hypertension ($n = 541$) or information on education ($n = 118$), diabetes ($n = 88$), or BMI ($n = 144$), with some lacking multiple pieces of information. Excluded persons had a higher prevalence of stroke ($P = .011$), had more functioning difficulties ($P = .011$), were older ($P < .001$), and had less education ($P = .003$) than the analytic sample. Those excluded had lower cognitive scores (4.28 vs 4.61 for immediate word recall; 2.92 vs 3.44 for delayed word recall; 3.71 vs 3.89 for serial 7s). Weights adjusting for participation in the cognitive section, the biomarker measurement, and attrition from earlier waves were used in analysis to maintain the national representativeness of the sample. Descriptive statistics on other variables used in the analysis can be found in Table 1.

The HRS surveys a representative sample of Americans older than 50 years every 2 years. Data for the eighth wave of HRS used in this study were collected in 2006 and were chosen to correspond to the timing of the fourth wave of NUJSLOA. In 2006, 3161 participants were aged 68 years or older, were eligible for the face-to-face interview, and had a biomarker weight. The final analytic sample included approximately 88.4% ($n = 2959$) of the eligible sample. The major reason for being missing was similar to those in Japan: no measured or self-reported hypertension ($n = 157$). Similar to NUJLOSA, those excluded had lower cognitive scores (4.47 vs 4.92 for immediate word recall; 3.19 vs 3.69 for delayed word recall; 2.97 vs 3.51 for serial 7s). Descriptive statistics on other variables from HRS used in the analysis can also be found in Table 1. Weights are used to adjust for nonresponse to the main survey and participation in the biomarker section as well as the sampling strategy.

Measurement

Cognitive Performance—Cognitive performance was assessed using harmonized scales developed from tests of episodic memory and working memory for the two countries. In both the HRS and the NUJLSOA, cognitive performance was measured using 10 item tests of immediate word recall and delayed word recall, indicators of short- and longer-term episodic memory, and a five-item serial 7s working memory task.⁴¹ While the cognitive tests used by the NUJLSOA and HRS were designed to be comparable, the Japanese words in word recall tasks tend to have more syllables; and while the numbers in the total serial 7s task have the same number of syllables, there are differences between the two countries in three numbers (Supplementary Text S1). Summing correct answers for the two-word recall tests created a score that could range from 0 to 20. Responses to the serial 7s provide an indicator of working memory, ranging from 0 to 5. Imputations were performed for missing responses to cognitive items in both Japan and the United States using methods developed by the HRS.⁴² Our sample consists of self-respondents only, and approximately 5.6% of Japanese and 6.7% of Americans in our sample have a level of cognitive performance that may indicate dementia.⁴³

Sociodemographics—Age, sex, and country differences were examined. To examine whether the effects of sex and education differed by country, we included the interaction of sex(education)*country in regression analyses, with education centered at the median.⁴⁴

Health Indicators: BMI, Chronic Diseases, and Physical Limitations—We used BMI, chronic diseases, and physical limitations as indicators of health. BMI was calculated from height and weight and separated into three categories: underweight ($<18.5 \text{ kg/m}^2$), normal weight ($18.5 - < 25 \text{ kg/m}^2$), and overweight/obese ($\geq 25 \text{ kg/m}^2$). Normal BMI was used as the referent category. Chronic conditions, including diabetes, stroke, and heart disease, were self-reported by respondents in response to a question about ever having had a disease diagnosed. Hypertension was indicated by either self-reported hypertension or measured high blood pressure. Measured high blood pressure was based on an average of three measures of systolic (SBP) and diastolic (DBP) blood pressure and defined as SBP of 140 mm Hg or higher and/or DBP of 90 mm Hg or higher.⁴⁵ We have used the number of activity of daily living (ADL; bathing, dressing, eating, walking, and going to the bathroom

alone) and instrumental activity of daily living (IADL) (preparing meals, shopping, managing money, using the telephone, and taking medication) functioning difficulties, summed and coded as a continuous variable as an indicator of physical limitations.

Statistical Analysis

Significant country differences in descriptive statistics were indicated by *P* values obtained from two-sided *t*-tests, χ^2 tests, and Cohen's *d* (or Cohen's *h*) to provide a standardized assessment of the importance of the difference in variables (Table 1). Associations between cognitive performance and independent variables were based on ordinary least squares (OLS) regressions on pooled data across the two countries, which included a variable indicating the country (coded Japan equals 1, and coded United States equals 0) (Tables 2 and 3). The series of regressions began with a model including only age, sex, and country, indicating the effect of country when the age and sex distribution was essentially the same (model I). Model II controlled for education. Model III added BMI, chronic conditions, and physical limitations. The final model, model IV, added interaction terms of country with sex and education. The addition of variables in subsequent models indicated both the effect of adding the new variables and whether the effect of country changed with controls for those variables. All analyses were conducted on Statistical Analysis System (SAS) 9.4 (SAS Institute, Inc).

RESULTS

Descriptive Statistics

Table 1 shows the episodic memory score and serial 7s score in Japan and the United States. Episodic memory score was higher for American than Japanese people (8.6 vs 8.1; $P < .001$; $d = 0.20$). On the other hand, older Japanese people scored higher on serial 7s (3.9 vs 3.5; $P < .001$; $d = -0.26$). Table 1 clarifies that older Americans are more likely to report having each of the diseases listed, except hypertension, which is higher among the Japanese; the difference in the prevalence of stroke was trivial between older American and Japanese people ($d = 0.14$). Americans were also more likely to be obese ($P < .001$; $d = 0.95$) and less likely to be underweight ($P < .001$; $d = -0.37$). The difference in functional difficulties was trivial between Americans and Japanese. The average age of the Japanese was somewhat younger than that of the Americans, but the difference is small. Average years of education for Americans exceeded those for the Japanese by 2 years ($d = 0.77$).

Next, we determine whether country differences in cognitive performance differ with age. Figure 1A illustrates mean scores by age and country for episodic memory; Figure 1B shows working memory. Figure 1A reveals that Americans from the age of 68 years through 84 years scored significantly higher than the Japanese on episodic memory performance (Supplementary Table S1). On the other hand, Japanese people in the 68 to 84 years age range scored significantly higher than Americans on serial 7s (Figure 1B). There was no difference between American and the Japanese people for those aged 85 years and older in either episodic or working memory score.

Predictors of Cognitive Performance

Tables 2 and 3 show OLS regression models for episodic memory (Table 2) and working memory (Table 3). For episodic memory (Table 2), model I, with age and sex controlled, demonstrates that Americans had better episodic memory performance; in fact, the Japanese scored 0.72 fewer points on the 20-point scale than Americans. When education was controlled, or assuming that years of education was the same in the two countries, older Japanese persons performed similarly to Americans; and the R^2 for the equation increased 6% (model II). Model III found that overweight/obesity was associated with better rather than worse cognitive performance; having diabetes, stroke, and more functional difficulties were associated with lower cognitive functioning. In contrast to the effect of controlling for education, controlling for health indicators, such as weight, chronic conditions, and physical limitations, did not change the main effects of the country coefficient much. The R^2 increased only 3% when all the health indicators were added. The fourth model indicates no significant interaction of education or sex with country on episodic memory. Women had higher episodic memory scores in both countries.

The performance of the Japanese was superior to Americans in working memory (Table 3, model I); with education controlled (model II), the difference increased (from 0.36 to 0.76). Education was strongly related to working memory, accounting for 11% of the variance. When health indicators were added to the model (model III), the effect of country did not change, indicating little effect of all of the health variables on the country differences. These variables only added 1% to the variance explained. Similar to the effect of overweight/obese on episodic memory performance, being overweight/obese was related to a better cognitive score. Stroke and functioning difficulties were related to poorer working memory performance. The fourth model indicates that education has less effect on working memory in Japan. The effect of a year of education for the Japanese was somewhat smaller ($0.20 + -0.09 = 0.11$, main conditional effect + interaction) than the effect for Americans ($0.20 + 0.00 = 0.20$, main conditional effect + 0 * interaction). The reduction in the score related to being female was also stronger for Americans than the Japanese (-0.43 and -0.19 , respectively). The findings show that the differential presence of health conditions does not explain much of the difference in cognitive performance scores between the countries, but rather, education is an important explanation of differences (Supplementary Table S2 provides results with summed total cognition score).

DISCUSSION

The intent of this article was to examine potential differences in cognitive performance between the United States and Japan and the role played by differences in levels of risk factors and comorbidities and the effects of risk factors and comorbidities on cognitive performance scores. OLS regression models, using a pooled data set across the two countries, found evidence of significant differences between the two countries in cognitive performance scores. However, one type of cognitive performance was better in the United States, and the other was better in Japan. The Japanese older persons had lower episodic memory performance scores than Americans from the age of 68 to 85 years. This finding is consistent with the international findings of Skirbekk et al,³² in which the authors found that

higher cognitive scores were found in countries with earlier improvements in childhood conditions and more years of education. However, with controls for education, the country differential disappeared and the Japanese and the Americans did not differ in episodic memory. The effect of education was fairly strong in explaining variability in episodic memory, and it did not differ by country. Episodic memory decline may reflect changes in brain aging, such as decreased availability of the neurotransmitter dopamine, deterioration of functional connectivity between brain regions, or reductions of volume in the hippocampus and prefrontal cortex.^{46–48}

On the other hand, older Japanese persons performed better on the serial 7s task without controls for education; and with controls, their superiority increased. Women in the United States performed worse on this task than in Japan, which is one reason the Japanese performed better overall. Education had a beneficial effect on this outcome in both countries, while the effect of education was smaller in Japan than in the United States. This cognitive test involves mental math tasks that may be affected by ability to pay attention and do arithmetic operations.⁴⁹ Perhaps, the Japanese are better at these tasks, and it is not captured by the years of schooling variable.

The size of the respective coefficients on age compared to average scores on the cognitive measures indicates stronger effects of age on the episodic memory than on the arithmetic working memory (which is shown in Figure 1 also). The fact that Japanese women do not experience the same deficit as American women in the arithmetic score helps the Japanese score better in tasks that involve arithmetic skills, causing the two indicators of cognition to differ across the countries in different ways.

While we hypothesized that health differences would play a critical role in explaining national differences in cognitive performance, they appear to explain little of the cognitive performance assessed here. Americans are more likely to be overweight and obese, but the association of over-weight/obese with both aspects of cognitive performance was positive, not negative; and underweight was not related to cognitive performance. While diabetes, stroke, and functioning difficulties were related to worse cognitive performance, hypertension and heart disease did not relate to cognitive functioning in the two countries.

While our findings showed that years of education played a critical role in country differences in cognitive performance, it is hard to accurately quantify the meaning of these educational differences with years of schooling. Japan and the United States have different levels of education, as measured by years of schooling. This reflects different levels of economic development in the past and different patterns of economic expansion over the lives of these cohorts. The educational systems of the two countries differed in years of mandatory schooling, different days/hours spent at school, and different curriculum, all of which changed over the time these cohorts were schooled (see details in Supplementary Text S2). These differences and the fact that educational philosophy and content differed between the two countries make it difficult to quantify differences in the educational experience that may affect cognitive performance.^{50,51} Given the differential educational systems in Japan and the United States, we tested the sensitivity of our results to our specification of education and we operationalized education into three broad educational levels: 0 to 8, 9 to

12, and 13 or more years for the United States; and 0 to 9, 10 to 12, and 13 or more years for Japan. The results did not differ from our results using years of education. However, our reported results on the importance of education rest on the assumption that a year is an equivalent year in both countries.

There are some limitations to our analysis arising from variable specification. For instance, current weight may not reflect lifetime weight patterns; while hypertension was based on measured blood pressure, other health conditions were self-reported and, thus, may not be fully known or reported and people in the two countries could differ in their knowledge of the presence of conditions or the likelihood of reporting. In addition, we were limited to a cross-sectional design to establish country differences in cognitive performance. Future work would benefit from examining change in cognitive performance in Japan and the United States.

Also, there are potential practice effects on cognitive performance in HRS, while not in the NJULOSA, where this was the only wave when the cognitive test was implemented. Among the HRS respondents, 99% took the tests at least once previously. It is possible that in HRS there has been learning of how to perform tasks, which could affect scores.^{29,43,52} On the other hand, HRS uses four different but equivalent sets of nouns for an immediate and delayed recall task, and each respondent receives each noun list only once over four waves, so it is highly unlikely that respondents' performance is improved due to learning of specific nouns.⁴¹

While we believe that measurement is as comparable as it can be, as this battery of tests was specifically designed to compare Japan with the HRS family of studies, the equivalence is not perfect. Both HRS and NJULOSA included 10 common nouns that can be visualized in their word recall lists; however, the Japanese words are more likely to be three syllable words and less likely to be one syllable words. On the other hand, the number of syllables included in the correct numbers for serial 7s is equal in Japan and in the United States (more details are provided in Supplementary Text S1).

Cognitive functioning is a critical skill for living independently and being an integrated member of society. While we have emphasized national differences throughout the article, based on statistical significance, the overall differences in cognitive performance across these two different countries are surprisingly small. With no controls for age, sex, and education, the difference between the two countries is not as large as expected. The average difference of episodic memory performance is 0.5, where the mean is 8 to 9 ($d = 0.20$), and the SDs of each country are almost the same (3.8 for Japan and 3.7 for the United States). Similarly, the difference of the average working memory performance is 0.4, where the mean is approximately 4, with similar SDs ($d = -0.26$). This is relatively small for two countries with such large differences in other measures of health and environment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

(A), Episodic memory score. (B), Serial 7s. Average number of correct responses in Japan and the United States among those aged 68 years and older in episodic memory performance (sum of immediate and delayed word recall; A) and working memory performance (serial 7s; B). Means and *P* values for country differences can be found in Supplementary Table S1. Significant country differences at $P < .05$: 68 to 69, 70 to 74, 75 to 79, and 80 to 84 years (A and B).

Table 1.

Descriptive Statistics for Japan and the United States (for those aged 68 years) for Indicators of Cognitive Functioning, BMI, Chronic Conditions, Physical Limitations, and Sociodemographic Measures

Measures	Japan		United States		P value for difference	Cohen's <i>d</i>	Cohen's <i>h</i>
	Mean/%	SD	Mean/%	SD			
Cognitive Measures							
Episodic memory score (immediate and delayed word recall), number correct	8.1	3.8	8.6	3.7	<.001	0.20 (0.14 to 0.26)	
Working memory (serial 7s), number correct	3.9	1.5	3.5	1.8	<.001	−0.26 (−0.31 to −0.20)	
BMI and Chronic Conditions							
Underweight (<18.5 kg/m ²), %	9.2		1.9		<.001		−0.34 (−0.40 to −0.28)
Normal weight (18.5–<25 kg/m ²), %	69.7		35.6		<.001		−0.70 (−0.75 to −0.64)
Overweight/obesity (≥ 25 kg/m ²), %	21.1		62.5		<.001		0.87 (0.81 to 0.93)
Diabetes, %	10.9		19.8		<.001		0.25 (0.19 to 0.31)
Stroke, %	5.3		10.0		<.001		0.18 (0.12 to 0.24)
Heart disease, %	7.8		31.6		<.001		0.63 (0.57 to 0.68)
Hypertension, %	81.6		76.6		<.001		−0.12 (−0.18 to −0.07)
Physical Limitations							
Total functioning difficulties	0.3	1.4	0.6	1.5	<.001	0.19 (0.13 to 0.24)	
Sociodemographic Measures							
Age (years)	75.5	6.2	76.9	7.0	<.001	0.02 (−0.04 to 0.07)	
Female, %	52.8		58.2		<.001		0.11 (0.05 to 0.17)
Education (years)	10.1	2.9	12.3	3.4	<.001	0.77 (0.71 to 0.83)	
No.	1953		2959				

Abbreviation: BMI, body mass index.

Table 2. Unstandardized β Coefficients from OLS Regressions on Episodic Memory Performance (Immediate and Delayed Word Recall) (N = 4912)

Variable	β Coefficient	95% CI	P value	β Coefficient	95% CI	P value
	Model I			Model II		
Japan	-0.72	-0.91 ~ -0.54	***	-0.04	-0.23 ~ 0.16	
Age (years)	-0.18	-0.19 ~ -0.16	***	-0.16	-0.17 ~ -0.15	***
Female	0.71	0.53 ~ 0.90	***	0.86	0.69 ~ 1.04	***
Education (median centered)				0.30	0.27 ~ 0.33	***
Underweight						
Overweight/obesity						
Diabetes						
Stroke						
Heart disease						
Hypertension						
Total functioning difficulties						
Japan * female						
Japan * education						
Intercept	21.97	20.84 ~ 23.10	***	20.27	19.16 ~ 21.38	***
R^2		0.12			0.18	
	Model III			Model IV		
Japan	-0.08	-0.29 ~ 0.14		-0.08	-0.38 ~ 0.21	
Age (years)	-0.14	-0.15 ~ -0.12	***	-0.14	-0.15 ~ -0.12	***
Female	0.85	0.68 ~ 1.03	***	0.88	0.65 ~ 1.11	***
Education (median centered)	0.28	0.25 ~ 0.31	***	0.29	0.26 ~ 0.33	***
Underweight	0.28	-0.13 ~ 0.69		0.28	-0.13 ~ 0.69	
Overweight/obesity	0.40	0.21 ~ 0.60	***	0.40	0.21 ~ 0.60	***
Diabetes	-0.57	-0.80 ~ -0.33	***	-0.56	-0.80 ~ -0.32	***
Stroke	-0.57	-0.89 ~ -0.25	***	-0.57	-0.89 ~ -0.24	***
Heart disease	-0.10	-0.32 ~ 0.13		-0.09	-0.32 ~ 0.13	
Hypertension	-0.09	-0.30 ~ 0.13		-0.08	-0.30 ~ 0.13	
Total functioning difficulties	-0.38	-0.45 ~ -0.31	***	-0.38	-0.45 ~ -0.31	***

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Variable	β Coefficient	95% CI	P value	β Coefficient	95% CI	P value
Japan * female				-0.08	-0.44 ~ 0.28	
Japan * education				-0.04	-0.11 ~ 0.02	
Intercept	18.82	17.67 ~ 19.97	***	18.89	17.74 ~ 20.05	***
R^2		0.21			0.21	

 $P < .001$.

Abbreviations: CI, confidence interval; OLS, ordinary least squares.

Table 3.
Unstandardized β Coefficients from OLS Regressions of Working Memory Performance (Serial 7s) (N = 4912)

Variable	β Coefficient	95% CI	P value	β Coefficient	95% CI	P value
Model I						
Japan	0.36	0.27 ~ 0.45	***	0.76	0.67 ~ 0.85	***
Age (years)	-0.03	-0.03 ~ -0.02	***	-0.01	-0.02 ~ -0.01	***
Female	-0.41	-0.50 ~ -0.33	***	-0.33	-0.41 ~ -0.24	***
Education (median centered)				0.17	0.16 ~ 0.19	***
Underweight						
Overweight/obesity						
Diabetes						
Stroke						
Heart disease						
Hypertension						
Total functioning difficulties						
Japan * female						
Japan * education						
Intercept	5.71	5.17 ~ 6.25	***	4.72	4.21 ~ 5.24	***
R^2		0.04			0.15	
Model III						
Japan	0.78	0.68 ~ 0.88	***	0.54	0.40 ~ 0.68	***
Age (years)	-0.01	-0.01 ~ 0.00		-0.01	-0.01 ~ 0.00	*
Female	-0.32	-0.40 ~ -0.23	***	-0.43	-0.53 ~ -0.32	***
Education (median centered)	0.17	0.15 ~ 0.18	***	0.20	0.18 ~ 0.21	***
Underweight	-0.09	-0.29 ~ 0.10		-0.09	-0.29 ~ 0.10	
Overweight/obesity	0.15	0.06 ~ 0.25	**	0.14	0.05 ~ 0.23	**
Diabetes	-0.07	-0.18 ~ 0.04		-0.06	-0.17 ~ 0.05	
Stroke	-0.19	-0.34 ~ -0.04	*	-0.18	-0.33 ~ -0.03	*
Heart disease	-0.00	-0.11 ~ 0.10		-0.09	-0.11 ~ 0.10	
Hypertension	-0.01	-0.11 ~ 0.09		0.00	-0.10 ~ 0.10	
Total functioning difficulties	-0.13	-0.17 ~ -0.10	***	-0.13	-0.16 ~ -0.09	***
Model IV						

Variable	β Coefficient	95% CI	P value	β Coefficient	95% CI	P value
Japan * female				0.24	0.07 ~ 0.41	**
Japan * education				-0.09	-0.12 ~ -0.06	***
Intercept				4.32	3.77 ~ 4.86	***
R^2					0.17	

* $P < .05$,

** $P < .01$,

*** $P < .001$.

Abbreviations: CI, confidence interval; OLS, ordinary least squares.