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Title:

Workplace social capital and refraining from seeking medical care in Japanese employees: a one-year prospective cohort study

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ABSTRACT

Objectives We examined the association of workplace social capital (WSC) with refraining from seeking medical care (RSMC) among Japanese employees.

Design One-year prospective cohort study.

Setting and participants We surveyed 8417 employees (6624 men and 1793 women) aged 18–70 years from 12 firms in Japan. We distributed a self-administered questionnaire comprising scales on WSC (score range 6–24) and potential confounders (ie, demographic and socioeconomic characteristics as well as health-related behaviours) at baseline (from April 2011 to March 2013).

Outcome measures At a one-year follow-up, we measured RSMC during the follow-up period using a single-item question "In the past year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist despite your sickness (including a slight cold or cavity) or injury?"

Results As a result of multiple logistic regression analysis, in the crude model, the low WSC group had a significantly higher odds ratio of RSMC compared to the high WSC group for both genders [odds ratio 1.16 (95% confidence interval 1.02 to 1.32) and 1.32 (95% confidence interval 1.03 to 1.68) for men and women, respectively]. Trend analysis also showed a significant association of low WSC with a higher prevalence of RSMC [odds ratio 1.03 (95% confidence interval 1.02 to 1.05) and 1.05 (95% confidence interval 1.02 to 1.07) for men and women, respectively]. These patterns remained unchanged after additional adjustments for potential confounders.

Conclusions Our findings suggest that the lack of social capital in the workplace is positively associated with RSMC among Japanese employees, independently of demographic and socioeconomic characteristics as well as of health-related behaviours.

Strengths and limitations of this study

- This is the first study examining the association of social capital with refraining from seeking medical care in the occupational setting.
- We used a large-scale dataset from an occupational cohort survey.
- Our findings provide practical suggestions that in a workplace with low social capital, fostering a culture of network, trust and reciprocity effectively promotes the medical care-seeking behaviour.
- Our sample was recruited from primarily large-scale enterprises in Japan; therefore, the generalisation of our findings should be done with caution.
- Refraining from seeking medical care was measured by simply asking the participants to recall their experience over the past year, which may have led to recall bias.

INTRODUCTION

Access to medical care is an essential determinant of health.[1] Delayed access to medical care, often caused by refraining from seeking medical care (RSMC) (ie, reluctance to seek or avoidance of medical care),[2] has been reported to have effects on reduced quality of life, more extended hospital stays and mortality in a wide range of age groups.[3–6] Previous studies on RSMC have examined its potential individual determinants, including health status,[7] insurance coverage[8] and social class (ie, educational attainment, household income and employment conditions).[9–14]

The interest in the effects of social contextual factors such as social capital on RSMC or access to medical care has been increasing.[1] Although social capital is defined in many ways, all definitions share the notion that social networks, generalised trust and norms of reciprocity are important aspects of the concept.[15] Generally, social capital entails three types, bonding, bridging and linking. Bonding social capital refers to relations of trust and cooperation among people within relatively homogenous groups; bridging social capital refers to relations of respect and mutuality among people between heterogeneous groups; and linking social capital refers to relations between individuals and groups in different social strata in a hierarchy where different groups have access to power, social status and wealth.[16] It has been theoretically suggested that social capital promotes positive psychological states towards self-care and appropriate medical care utilisation,[17] and empirical evidence to support this suggestion has been accumulated among community residents.[1, 18]

The idea of social capital has expanded to occupational settings,[19] often called workplace social capital (WSC). The association of social capital with RSMC applies to employees because they spend one-third of their life at the workplace.[20] In the workplace with low social capital, employees may have difficulty re-arranging their

schedules to seek medical care or may experience mistreatment when they take leave to seek medical care,[21] which may lead to RSMC among employees. To date, two previous studies in occupational settings have reported that low job control and low organisational justice (ie, procedural justice and interactional justice) were associated with less access to medical care or RSMC.[22, 23] However, the association of WSC with RSMC has not been fully examined.

The purpose of the present study was to examine the association of WSC with RSMC among Japanese employees using a one-year prospective design. It was hypothesised that those who perceived lower levels of WSC at baseline would be more likely to refrain from seeking medical care during the one-year follow-up. In the present study, we focused mainly on the bonding WSC (ie, social capital within same working teams) because it has been reported that bonding social capital is particularly related to better access to medical care,[18] and co-workers on the same team may be the closest source of support when employees re-arrange their schedules to seek medical care. We analysed the data for men and women separately because a previous study has reported gender differences in medical care utilisation.[24]

METHODS

Study design

We extracted the data from longitudinal datasets collected in an occupational cohort study on social class and health in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE). The J-HOPE was conducted in three or four waves at 13 firms located in Japan. The primary industry sectors were information technology, hospital and medical facility, manufacturing, pharmaceutical, service, transportation and real estate. The first wave was conducted from April 2010

to March 2012; the subsequent waves were conducted in one-year intervals following the first wave. Because the RSMC was assessed only at the third wave in all surveyed firms, except for one hospital, the present study treated the second wave (conducted from April 2011 to March 2013) as a baseline and the third wave (conducted from April 2012 to March 2014) as a one-year follow-up. The analyses were conducted using the J-HOPE datasets available as of 22nd December, 2016.

Participants

In the second wave of the J-HOPE (ie, the baseline in the present study), a total of 11 393 employees completed a self-administered questionnaire (response rate 82%). During the one-year follow-up period, 1497 employees were transferred, took a leave of absence (ie, sick leave, maternity leave or childcare leave), retired or declined to participate. Overall, 9896 employees participated in the third wave (ie, one-year follow-up in the present study) and completed the follow-up questionnaire (follow-up rate 87%). After excluding 481 hospital employees who were not measured for RSMC in the third wave and 998 employees who had at least one missing response for variables relevant to the present study, the data from 8417 employees (6624 men and 1793 women) were analysed (see figure 1). The type of industry, the number of participants and the study period of each firm are shown in table 1.

Table 1 Firm code, type of industry and the number of participants and study period for each firm

Firm code (type of industry)	Number of participants		Study period	
	Men (n=6624)	Women (n=1793)	Baseline	Follow-up
	n (%)	n (%)	(J-HOPE 2nd wave)	(J-HOPE 3rd wave)
1 (Information technology)	584 (8.8)	148 (8.3)	Dec. 2011 to Jan. 2012	Dec. 2012 to Jan. 2013
2 (Hospital) †	—	—	Jun. 2011 to Aug. 2011	Jun. 2012 to Jul. 2012
3 (Manufacturing)	1931 (29.2)	240 (13.4)	Oct. 2011	Jul. 2012 to Sep. 2012
4 (Information)	436 (6.6)	209 (11.7)	Sep. 2011 to Oct. 2011	Sep. 2012 to Oct. 2012
5 (Pharmaceutical)	135 (2.0)	136 (7.6)	Sep. 2011 to Oct. 2011	Sep. 2012 to Oct. 2012
6 (Service)	13 (0.2)	19 (1.1)	Dec. 2011	Nov. 2012 to Dec. 2012
7 (Veterinary)	1 (0.0)	2 (0.1)	Dec. 2011	Nov. 2012
8 (Medical)	11 (0.2)	15 (0.8)	Feb. 2012 to Mar. 2012	Mar. 2013
9 (Service)	336 (5.1)	173 (9.6)	Nov. 2011 to Dec. 2011	Oct. 2012 to Nov. 2012
10 (Manufacturing)	2063 (31.1)	730 (40.7)	Apr. 2012 to Jun. 2012	Apr. 2013 to Jun. 2013
11 (Transportation)	901 (13.6)	41 (2.3)	Apr. 2011 to Mar. 2012	Apr. 2012 to Mar. 2013
12 (Real estate)	168 (2.5)	58 (3.2)	Jan. 2012 to Dec. 2012	Jan. 2013 to Dec. 2013
13 (Real estate)	45 (0.7)	22 (1.2)	Sep 2012 to Oct. 2012	Sep 2013 to Oct. 2013

† Excluded from the analyses due to the lack of information on refraining from seeking medical care at follow-up.

Measures

Exposure: workplace social capital (baseline)

Bonding WSC was measured using a six-item scale developed by Eguchi et al.[25] This scale focuses on network, trust and reciprocity within the workplace. The first three items, focusing mainly on the network aspect, were adapted from the eight-item WSC scale developed by Kouvonen et al.,[26] which includes three items measuring bonding WSC. The remaining three items, focusing mainly on the trust and reciprocity aspects, were based on Japanese studies that used the social cohesion approach to conceptualise social capital.[27–32] These items are shown in the Appendix. All items were measured on a four-point Likert-type scale (1 *Not at all*, 2 *Not exactly*, 3 S*omewhat so* and 4 *Definitely*). The responses were summed to obtain a total score (range 6–24). In this sample, Cronbach's alpha coefficient was 0.90. According to a previous study,[33] participants were classified into tertiles (high, moderate and low) based on the total score.

Outcome: refraining from seeking medical care (one-year follow-up)

The follow-up questionnaire included a single-item question measuring RSMC, which had been used in the Japanese General Social Survey conducted in 2008 (JGSS-2008).[13] The participants were asked to respond to the question "In the past year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist despite your sickness (including a slight cold or cavity) or injury?" Those who answered "*Yes, I have*" were defined as those who refrained from seeking medical care.

Potential confounders (baseline)

Potential confounders included demographic characteristics, socioeconomic

characteristics and health-related behaviours. Demographic characteristics included age, past medical history, household size, firm, work shift and working hours per week. Age was classified into five groups: 29 years or younger, 30–39 years, 40–49 years, 50–59 years and 60 years or older. Past medical history was dichotomised into any (defined as having a past medical history of stroke, myocardial infarction, hypertension, diabetes, hyperlipidemia, cancer or mental disorders) and none. Household size was a continuous variable. The firm was classified into 12 groups using the firm code in the J-HOPE datasets. Work shift was classified into four groups: day shift, shift work with night duty, shift work without night duty and night shift. Working hours per week were classified into five groups: 30 hours or less, 31–40 hours, 41–50 hours, 51–60 hours and 61 hours or more.

Socioeconomic characteristics included education, equivalent annual household income and occupational position. Education was classified into four groups: graduate school, college, junior college and high school or junior high school. To calculate equivalent annual household income, the participants were asked to report their annual household income by selecting one of the following six response options: 2.99 million yen or less, 3–4.99 million yen, 5–7.99 million yen, 8–9.99 million yen, 10–14.99 million yen and 15 million yen or more. Subsequently, equivalent household income was computed by dividing the median household income of each response option by the square root of the household size. The occupational position was classified into four groups: manager, non-manual employee, manual employee and others.

Health-related behaviours included smoking habits, drinking habits and physical activity. Smoking habits were classified into three groups: never smoker, ex-smoker and current smoker. Drinking habits were also classified into three groups: rarely, sometimes and daily. Physical activity was classified into four groups: none, light

physical activity (ie, mild exercise without breathlessness or palpitation) one or more times a week, intense physical activity (ie, heavy exercise with breathlessness, palpitation or sweating at least for 20 minutes) once or twice a week and intense physical activity thrice or more times a week.

Statistical analysis

First, we conducted descriptive analysis using Student's t-test or Fisher's exact test to compare those who did and did not refrain from seeking medical care in potential confounders as well as in the total score for the WSC scale. Afterwards, using the high WSC group as a reference, multiple logistic regression analysis was conducted to estimate the odds ratios (ORs) and their 95% confidence intervals (CIs) of RSMC for the moderate and low WSC groups. In the multiple logistic regression analysis, we first calculated the crude OR (ie, without any adjustment) (model 1). Subsequently, we incrementally adjusted for demographic characteristics (ie, age, past medical history, household size, firm, work shift and working hours per week) (model 2), socioeconomic characteristics (ie, education, equivalent annual household income and occupational position) (model 3) and health-related behaviours (ie, smoking habits, drinking habits and physical activity) (model 4). Furthermore, we conducted a trend analysis to estimate the OR of RSMC by including WSC as a continuous variable. In the trend analysis, the total score for the WSC scale was reversed so that higher scores indicated lower WSC, which allowed us to interpret the OR of RSMC easily. Although our analysed data had a multilevel structure comprising employees nested within 12 firms, the intraclass correlation coefficient (ICC) for RSMC were close to zero (ICC=0.007) and the data did not meet the recommended sample size for multilevel logistic regression models (ie, at least a minimum of 100 groups and 50 individuals per

group);[34] therefore, we did not adopt a multilevel approach. The level of significance was 0.05 (two-tailed). The statistical analyses were conducted using IBM® SPSS® Statistics 23 for Windows.

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of the present study.

RESULTS

Table 2 details characteristics of the participants according to those who did and did not refrain from seeking medical care, together with gender. For men, those who refrained from seeking medical care were younger and highly educated, worked longer hours, had lower equivalent annual household income, were more likely to be current smokers, were less likely to engage in physical activities and perceived lower levels of WSC compared to those who did not. For women, those who refrained from seeking medical care were younger and highly educated, worked longer hours, were more likely to have no past medical history, were less likely to engage in physical activities and perceived lower levels of WSC compared to those who did not.

Table 2 Detailed characteristics of employees who participated in present the study

	Men (n=6624)					Women (n=1793)				
	Refrained from seeking medical care (n=2824)		Did not refrain from seeking medical care (n=3800)		p value †	Refrained from seeking medical care (n=829)		Did not refrain from seeking medical care (n=964)		p value †
	Mean (SD)	n (%)	Mean (SD)	n (%)		Mean (SD)	n (%)	Mean (SD)	n (%)	
Age	40.4 (10.3)		42.2 (10.6)		<0.001	38.1 (9.79)		40.6 (10.3)		<0.001
29 years or younger		520 (18.4)		589 (15.5)			215 (25.9)		181 (18.8)	
30–39 years		757 (26.8)		899 (23.7)			246 (29.7)		235 (24.4)	
40–49 years		973 (34.5)		1254 (33.0)			254 (30.6)		356 (36.9)	
50–59 years		509 (18.0)		925 (24.3)			106 (12.8)		170 (17.6)	
60 years or older		65 (2.3)		133 (3.5)			8 (1.0)		22 (2.3)	
Past medical history					0.132					0.021
Any		789 (27.9)		1127 (29.7)			135 (16.3)		199 (20.6)	
None		2035 (72.1)		2673 (70.3)			694 (83.7)		765 (79.4)	
Household size	3.00 (1.47)		2.98 (1.47)		0.630	2.88 (1.57)		2.91 (1.59)		0.683
Work shift					0.147					0.655
Day shift		2286 (80.9)		3052 (80.3)			764 (92.2)		895 (92.8)	
Shift work with night duty		445 (15.8)		644 (16.9)			20 (2.4)		24 (2.5)	
Shift work without night duty		72 (2.5)		89 (2.3)			7 (0.8)		11 (1.1)	
Night shift		21 (0.7)		15 (0.4)			38 (4.6)		34 (3.5)	
Working hours per week					0.034					0.001
30 hours or less		155 (5.5)		235 (6.2)			217 (26.2)		321 (33.3)	
31–40 hours		833 (29.5)		1193 (31.4)			323 (39.0)		371 (38.5)	
41–50 hours		1326 (47.0)		1761 (46.3)			248 (29.9)		234 (24.3)	
51–60 hours		387 (13.7)		491 (12.9)			29 (3.5)		35 (3.6)	
61 hours or more		123 (4.4)		120 (3.2)			12 (1.4)		3 (0.3)	
Education					0.023					0.004
Graduate school		353 (12.5)		456 (12.0)			38 (4.6)		31 (3.2)	
College		960 (34.0)		1308 (34.4)			229 (27.6)		207 (21.5)	
Junior college		358 (12.7)		397 (10.4)			211 (25.5)		255 (26.5)	
High school or junior high school		1153 (40.8)		1639 (43.1)			351 (42.3)		471 (48.9)	

Table 2 (continued)

	Men (n=6624)					Women (n=1793)				
	Refrained from seeking medical care (n=2824)		Did not refrain from seeking medical care (n=3800)		p value †	Refrained from seeking medical care (n=829)		Did not refrain from seeking medical care (n=964)		p value †
	Mean (SD)	n (%)	Mean (SD)	n (%)		Mean (SD)	n (%)	Mean (SD)	n (%)	
Equivalent annual household income (million yen)	4.28 (1.90)		4.48 (1.99)		<0.001	3.78 (2.21)		3.78 (2.26)		0.970
Occupational position					0.084					0.154
Managerial employee		581 (20.6)		866 (22.8)			16 (1.9)		15 (1.6)	
Non-manual employee		1140 (40.4)		1485 (39.1)			482 (58.1)		513 (53.2)	
Manual employee		805 (28.5)		1021 (26.9)			172 (20.7)		228 (23.7)	
Others		298 (10.6)		428 (11.3)			159 (19.2)		208 (21.6)	
Smoking habits					0.024					0.862
Never smoker		1459 (51.7)		2013 (53.0)			710 (85.6)		834 (86.5)	
Ex-smoker		356 (12.6)		539 (14.2)			33 (4.0)		35 (3.6)	
Current smoker		1009 (35.7)		1248 (32.8)			86 (10.4)		95 (9.9)	
Drinking habits					0.574					0.139
Rarely		889 (31.5)		1173 (30.9)			437 (52.7)		520 (53.9)	
Sometimes		1020 (36.1)		1349 (35.5)			308 (37.2)		323 (33.5)	
Daily		915 (32.4)		1278 (33.6)			84 (10.1)		121 (12.6)	
Physical activity (PA)					0.004					0.016
None		1680 (59.5)		2101 (55.3)			609 (73.5)		657 (68.2)	
Light PA one or more times per week		622 (22.0)		945 (24.9)			141 (17.0)		173 (17.9)	
Intense PA once or twice a week		395 (14.0)		592 (15.6)			63 (7.6)		98 (10.2)	
Intense PA three times or more a week		127 (4.5)		162 (4.3)			16 (1.9)		36 (3.7)	
Workplace social capital (6–24)	17.0 (3.33)		17.4 (3.30)		<0.001	16.6 (3.54)		17.1 (3.47)		0.001

† Student's t-test and Fisher's exact test were used for continuous and categorical variables, respectively.

Table 3 shows the results of the multiple logistic regression analysis. For both genders, in the crude model (model 1), the low WSC group had a significantly higher OR of RSMC compared to the high WSC group [OR 1.16 (95% CI 1.02 to 1.32) and 1.32 (95% CI 1.03 to 1.68) for men and women, respectively]. Conversely, the moderate WSC group did not have a significantly higher OR of RSMC [OR 0.97 (95% CI 0.85 to 1.09) and 1.06 (95% CI 0.83 to 1.35) for men and women, respectively]. The trend analysis showed a significant association of low WSC with a higher prevalence of RSMC [OR 1.03 (95% CI 1.02 to 1.05) and 1.05 (95% CI 1.02 to 1.07) for men and women, respectively]. The adjusted models (models 2–4) showed that the association of low WSC with RSMC was not affected by any covariates (ie, demographic characteristics, socioeconomic characteristics or health-related behaviours).

Table 3 Association of workplace social capital with refraining from medical care during the one-year follow-up period among Japanese employees: multiple logistic regression analysis

	n	Number of cases (%)	Odds ratio (95% confidence interval)			
			Model 1 †	Model 2 ‡	Model 3 §	Model 4 ‖
Men						
High (19–24)	1642	686 (41.8)	1.00	1.00	1.00	1.00
Moderate (17–18)	2771	1134 (40.9)	0.97 (0.85 to 1.09)	0.97 (0.85 to 1.10)	0.96 (0.85 to 1.09)	0.96 (0.85 to 1.09)
Low (6–16)	2211	1004 (45.4)	1.16 (1.02 to 1.32)	1.18 (1.03 to 1.35)	1.17 (1.02 to 1.34)	1.16 (1.02 to 1.33)
Trend analysis ¶			1.03 (1.02 to 1.05)	1.03 (1.02 to 1.05)	1.03 (1.02 to 1.05)	1.03 (1.01 to 1.05)
Women						
High (19–24)	422	182 (43.1)	1.00	1.00	1.00	1.00
Moderate (17–18)	690	307 (44.5)	1.06 (0.83 to 1.35)	1.10 (0.85 to 1.41)	1.11 (0.86 to 1.43)	1.11 (0.86 to 1.43)
Low (6–16)	681	340 (49.9)	1.32 (1.03 to 1.68)	1.36 (1.06 to 1.75)	1.39 (1.08 to 1.79)	1.39 (1.08 to 1.79)
Trend analysis ¶			1.05 (1.02 to 1.07)	1.05 (1.02 to 1.08)	1.05 (1.02 to 1.08)	1.05 (1.02 to 1.08)

† Crude (ie, without any adjustment).

‡ Adjusted for age, past medical history, household size, firm, work shift and working hours per week.

§ Additionally adjusted for education, equivalent annual household income and occupational position.

‖ Additionally adjusted for smoking habits, drinking habits and physical activity.

¶ Continuous workplace social capital score was entered in the model. The score was reversed: higher score indicates lower workplace social capital.

DISCUSSION

We examined the one-year prospective association of WSC (mainly bonding WSC) with RSMC among Japanese employees. Our results demonstrated a significant association of low WSC with a higher prevalence of RSMC for both genders, independently of demographic and socioeconomic characteristics as well as of health-related behaviours.

Low WSC was significantly associated with a higher prevalence of RSMC, which supported our hypothesis. Our finding is consistent with the results of a previous systematic review of access to medical care among community residents, which reported that bonding social capital is related to better access to medical care.[18] The present study expanded this evidence into occupational settings. Given the findings from occupational settings suggesting the association of low job control and low organisational justice with RSMC,[22, 23] our finding is reasonable because the concept of WSC is represented by the contextual characteristics of psychosocial work environment related to job control and organisational justice.[25, 26] It is common for Japanese employees to take time off (ie, paid holiday) to seek medical care during working days because paid sick leave is not stipulated by law. Although employees have a legitimate right to take time off, and employers should not treat employees who would like to take time off unfairly, Japanese corporate culture discourages absence. Therefore, in the Japanese workplace with low social capital characterised by lack of network, trust and reciprocity, if employees take leave of absence to seek medical care, they may be suspected of being idle. In other cases, workplaces may have an uncooperative attitude towards re-arranging the work schedule of those seeking medical care. Such a situation may prevent employees from seeking necessary medical care. Future research is needed to replicate our findings in workplaces cross-culturally.

It is interesting to note that the significant association of low WSC with RSMC remained unchanged after additional adjustments for demographic and socioeconomic characteristics as well as for health-related behaviours. This finding may be explained by the fact that our study sample comprised a higher proportion of employees at large-scale enterprises who were covered by corporate health insurance and received good benefits from their companies. Such homogeneity of our study sample may have decreased the confounding effects of demographic and socioeconomic characteristics on the association of low WSC with RSMC; therefore, our findings should be replicated in employees from diverse backgrounds in the future.

Compared to the high WSC group, the OR of RSMC for the moderate WSC group was not significant for men or women. This finding indicates that the effect of WSC on the promotion of medical care-seeking behaviours among employees reaches a plateau at a moderate level. This phenomenon may be explained by the "dark side" of social capital. A recent systematic review suggested that the effect of social capital on health outcomes is not only beneficial but also harmful.[35] In an empirical study of the Japanese workplace, Sakuraya et al.[36] reported that the association of WSC with a major depressive episode (MDE) was slightly U-shaped, with the high WSC group showing a greater risk of MDE compared to the moderate WSC group. In the Japanese workplace, which has a collectively-oriented social structure,[37] high WSC may limit the freedom of employees due to a strong group norm.[38] Hence, employees in this study who perceived WSC as high may have been slightly less likely to exercise their rights to take time off to seek medical care even when getting sick. The association of WSC with RSMC observed in the present study may have been partially influenced by such a dark side effect of social capital.

Possible limitations of the present study should be considered. First, Japan and

Western countries may differ in their interpretation of taking time off; therefore, our findings may be specific to Japan or other Asian countries. Furthermore, even for Japanese employees, the present findings should be generalised cautiously since our study sample comprised employees from primarily large-scale enterprises. Second, RSMC was measured by simply asking the participants to recall their experience over the past year, which may have led to recall bias. Third, some employees dropped out during the follow-up period due to sick leave. They may have perceived lower levels of WSC at baseline and refrained from seeking medical care until their disease became severe, which may have underestimated the true association. Fourth, adjusting for past medical history, the present study did not obtain information on RSMC at baseline or regular hospital visit due to chronic disease, which may have masked the true association. Finally, the present study focused only on the bonding WSC since co-workers on the same team may be the closest source of support for employees; therefore, future research should examine the effects of other types of WSC, such as bridging and linking, on RSMC.

CONCLUSIONS

The present study offers evidence that WSC is an important factor that influences individuals' decision to seek medical care for their perceived health issues independently of demographic and socioeconomic characteristics as well as of health-related behaviours among Japanese employees. Our findings suggest that in a workplace with low social capital, fostering a culture of network, trust and reciprocity effectively promotes the medical care-seeking behaviour of Japanese employees. Future workplace intervention studies should investigate the effect of improving WSC on the promotion of employees' medical care-seeking.

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Competing interests None declared.

Contributors AI wrote the initial draft of the manuscript. AT, HE and YKa contributed to the analyses and interpretation of the data, and they assisted in the preparation of the manuscript. AI, AT, HE, AS, KM, MT, SK, KE, YKo, TT and NK contributed to the data collection. All authors critically reviewed the manuscript, approved the final version of the manuscript and agreed to be accountable for all aspects of the work, ensuring that the questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved.

Patient consent Obtained.

Data sharing statement Because the data are still in the process of transferring to a data archiving organisation, the ad hoc committee chaired by AT is taking care of this role. The data were retrieved from the occupational cohort study on social class and

health conducted in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE), and its authors may be contacted at akizumi@kitasato-u.ac.jp.

Ethical approval Research Ethics Committee, Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No. 2772-(4)), Kitasato University Medical Ethics Organisation (No. B12-103) and Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (No. 10-004) reviewed and approved the aims and procedures of the present study.

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Figure legends

Figure 1 Recruitment and follow-up flow diagram

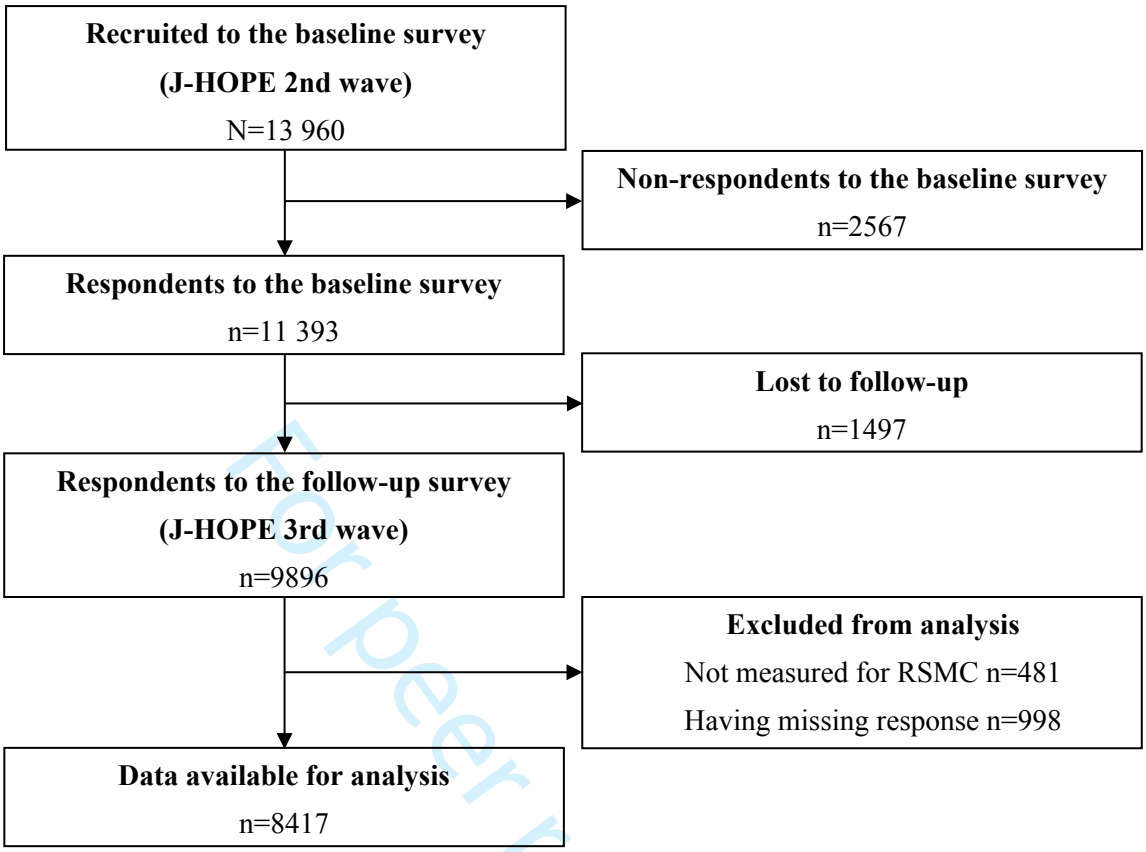

Figure 1 Recruitment and follow-up flow diagram

Appendix Bonding workplace social capital scale[25]

Item #1. People keep each other informed about work-related issues in the work unit.

Item #2. We have a ‘we are together’ attitude.

Item #3. People feel understood and accepted by each other.

Item #4. In our workplace, there is an atmosphere of helping each other.

Item #5. In our workplace, we trust each other.

Item #6. Our workplace is a place of laughter and smiles.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cohort studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Pages 1 and 3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pages 5–6
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 6
Methods			
Study design	4	Present key elements of study design early in the paper	Pages 6–7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pages 6–7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	Pages 6–7
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pages 9–11
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pages 9–11
Bias	9	Describe any efforts to address potential sources of bias	Pages 9–12
Study size	10	Explain how the study size was arrived at	Pages 7 and 27
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Pages 9–11
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 11
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Pages 7 and 27
		(*d*) If applicable, explain how loss to follow-up was addressed	Pages 7 and 27
		(*e*) Describe any sensitivity analyses	N/A
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pages 7 and 27
		(b) Give reasons for non-participation at each stage	Page 7
		(c) Consider use of a flow diagram	Page 27
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pages 12–14
		(b) Indicate number of participants with missing data for each variable of interest	Pages 7 and 27
		(c) Summarise follow-up time (eg, average and total amount)	Pages 6–7
Outcome data	15*	Report numbers of outcome events or summary measures over time	Pages 13–14
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 15
		(*b*) Report category boundaries when continuous variables were categorized	Page 9
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 17
Limitations			
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 17–19
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pages 18–19
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 20

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Title:

Workplace social capital and refraining from seeking medical care in Japanese employees: a one-year prospective cohort study

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ABSTRACT

Objectives We examined the association of workplace social capital (WSC), including structural and cognitive dimensions, with refraining from seeking medical care (RSMC) among Japanese employees.

Design One-year prospective cohort study.

Setting and participants We surveyed 8417 employees (6624 men and 1793 women) aged 18–70 years from 12 firms in Japan. We distributed a self-administered questionnaire comprising the WSC scale (score range 1–4, calculated by averaging item scores) and the items on potential confounders (ie, demographic characteristics, past medical history, work-related factors, socioeconomic characteristics and health-related behaviours) at baseline (from April 2011 to March 2013).

Outcome measures At a one-year follow-up, we measured RSMC during the follow-up period using a single-item question "In the past year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist despite your sickness (including a slight cold or cavity) or injury?"

Results As a result of Cox regression with robust variance, after adjusting for demographic characteristics, lower WSC was significantly associated with higher relative risks (RRs) of RSMC among both men and women [overall WSC: RR 1.10 (95% confidence interval 1.05 to 1.16) and 1.16 (95% confidence interval 1.07 to 1.26); structural dimension: RR 1.10 (95% confidence interval 1.05 to 1.16) and 1.16 (95% confidence interval 1.07 to 1.26); and cognitive dimension: RR 1.08 (95% confidence interval 1.03 to 1.13) and 1.13 (95% confidence interval 1.05 to 1.22), respectively]. These patterns remained almost unchanged after additionally adjusting for other potential confounders.

Conclusions Our findings suggest that the lack of social capital in the workplace is

positively associated with RSMC among Japanese employees, independently of demographic characteristics, past medical history, work-related factors and socioeconomic characteristics as well as of health-related behaviours.

Strengths and limitations of this study

- This is the first study examining the association of social capital with refraining from seeking medical care in the occupational setting.
- We used a large-scale dataset from an occupational cohort survey.
- Our sample was recruited from primarily large-scale enterprises in Japan; therefore, the generalisation of our findings should be made with caution.
- Refraining from seeking medical care was measured by simply asking the participants to recall their experience over the past year, which may have led to recall bias.

INTRODUCTION

Access to medical care is an essential determinant of health.[1] Delayed access to medical care, often caused by refraining from seeking medical care (RSMC) (ie, reluctance to seek or avoidance of medical care),[2] has been reported to have effects on reduced quality of life, more extended hospital stays and mortality in a wide range of age groups.[3–6] Previous studies on RSMC have examined its potential individual determinants, including health status,[7] insurance coverage[8] and social class (ie, educational attainment, household income and employment conditions).[9–14]

The interest in the effects of social contextual factors such as social capital on RSMC or access to medical care has been increasing.[1] Although social capital is defined in many ways, all definitions share the notion that social networks, norms of reciprocity and generalised trust are essential aspects of the concept.[15] Particularly in the health research field, social capital is conceptualised primarily as a two-dimensional construct consisting of a structural dimension (ie, what people 'do') and a cognitive dimension (ie, what people 'feel').[16] Based on this construct, the network aspect is categorised as the structural dimension while the reciprocity and trust aspects are categorised as the cognitive dimension.[17] Generally, social capital entails three types: bonding, bridging and linking. Bonding social capital refers to relations of trust and cooperation among people within relatively homogenous groups; bridging social capital refers to relations of respect and mutuality among people between heterogeneous groups; and linking social capital refers to relations between individuals and groups in different social strata in a hierarchy where different groups have access to power, social status and wealth.[18] As just described, the theoretical framework of social capital encompasses many complex aspects, dimensions and types of social interactions and cognitions that can have potential benefits but also

disadvantages for communities and the individuals living within them. Several reviews have highlighted the challenge of empirically verify the associations of social capital with health outcomes.[19–21] Medical care utilisation or RSMC is no exception. It has been theoretically suggested that social capital promotes positive psychological states towards self-care and appropriate medical care utilisation,[22] and empirical evidence to support this suggestion has been accumulated among community residents.[1, 19]

The idea of social capital is a natural candidate for expansion to occupational settings. Kawachi[23] pointed out that social capital is likely to be found in settings where people now spend most of their time. The workplace represents an important social unit, mainly since many people spend one-third of their lives at work[24] and the workplace is a significant source of social relations.[25] Several previous studies reported that the lack of workplace social capital (WSC) was associated with various kinds of health outcomes: poor self-rated health,[25–29] hypertension (or high blood pressure),[30, 31] poor mental health (eg, depression, depressive symptoms and psychological distress),[26, 32–37] unhealthy behaviours (eg, smoking)[38–41] and mortality.[42]

In the theoretical framework of job stress, WSC is considered to be a summary outcome of the favourable psychosocial work environment called job resources (eg, job control, supervisor and co-worker support, extrinsic reward, organisational justice, etc.) and also to improve mental and physical health among employees.[43] Given the definition of social capital, the workplace with low social capital can be characterised by lack of network, reciprocity and trust. In such a workplace, employees may have difficulty asking co-workers to re-arrange their schedules associated with seeking medical care, which may lead to the lack of time to excuse themselves from work and

consequently to RSMC. In other cases, employees may experience mistreatment[44] when they take leave to seek medical care. To avoid such mistreatment, employees may refrain from seeking medical care, which may cause the delay of early treatment[2] and subsequent deterioration of health problems as well as of self-rated health.[45] To date, two previous studies in occupational settings have reported that low job control and low organisational justice (ie, procedural justice and interactional justice) were associated with less access to medical care or RSMC.[46, 47] However, the association of WSC with RSMC has not been thoroughly examined.

The purpose of the present study was to examine the association of WSC with RSMC among Japanese employees using a one-year prospective design. It was hypothesised that those who perceived lower levels of WSC at baseline would be more likely to refrain from seeking medical care during the one-year follow-up. In the present study, we focused mainly on the bonding WSC (ie, social capital within same working teams) because it is of particular importance in Japanese corporate culture, which is group-oriented: altruism, teamwork and group cohesiveness are emphasised[48] and it has been reported that bonding social capital is related mainly to better access to medical care.[19] On the other hand, it has also been pointed out that the empirical evidence for the association of bonding social capital with access to medical care is somewhat limited, primarily because of the tendency to mix different dimensions of social capital into overall indices.[19] Therefore, we focused not only on overall bonding WSC but also on its construct dimensions (ie, the structural dimension, including the network aspect and the cognitive dimension, including the reciprocity and trust aspects). Furthermore, in Japanese culture, laughter and smiles are also essential to maintain social harmony.[49] Therefore, we also focused on the laughter/smiles aspect and included it in the cognitive dimension. We analysed the

data for men and women separately because a previous study has reported gender differences in medical care utilisation.[50]

METHODS

Study design

We extracted the data from longitudinal datasets collected in an occupational cohort study on social class and health in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE). The J-HOPE was conducted in three or four waves at 13 firms located in Japan. The primary industry sectors were information technology, hospital and medical facility, manufacturing, pharmaceutical, service, transportation and real estate. The first wave was conducted from April 2010 to March 2012; the subsequent waves were conducted in one-year intervals following the first wave. Because the RSMC was assessed only at the third wave in all surveyed firms, except for one hospital, the present study treated the second wave (conducted from April 2011 to March 2013) as a baseline and the third wave (conducted from April 2012 to March 2014) as a one-year follow-up. The analyses were conducted using the J-HOPE datasets available as of 22nd December, 2016.

Participants

In the second wave of the J-HOPE (ie, the baseline in the present study), a total of 11 393 employees completed a self-administered questionnaire (response rate 82%). During the one-year follow-up period, 1497 employees were transferred, took a leave of absence (ie, sick leave, maternity leave or childcare leave), retired or declined to participate. Overall, 9896 employees participated in the third wave (ie, one-year follow-up in the present study) and completed the follow-up questionnaire (follow-up

rate 87%). After excluding 481 hospital employees who were not measured for RSMC in the third wave and 998 employees who had at least one missing response for variables relevant to the present study, the data from 8417 employees (6624 men and 1793 women) were analysed (see figure 1). The type of industry and the number of participants of each firm are shown in table 1.

Table 1 Firm code, type of industry and the number of participants in each firm

Firm code (type of industry)	Men (n=6624)	Women (n=1793)
	n (%)	n (%)
1 (Information technology)	584 (8.8)	148 (8.3)
2 (Hospital) †	—	—
3 (Manufacturing)	1931 (29.2)	240 (13.4)
4 (Information)	436 (6.6)	209 (11.7)
5 (Pharmaceutical)	135 (2.0)	136 (7.6)
6 (Service)	13 (0.2)	19 (1.1)
7 (Veterinary)	1 (0.0)	2 (0.1)
8 (Medical)	11 (0.2)	15 (0.8)
9 (Service)	336 (5.1)	173 (9.6)
10 (Manufacturing)	2063 (31.1)	730 (40.7)
11 (Transportation)	901 (13.6)	41 (2.3)
12 (Real estate)	168 (2.5)	58 (3.2)
13 (Real estate)	45 (0.7)	22 (1.2)

† Excluded from the analyses due to the lack of information on refraining from seeking medical care at follow-up.

Measures

Exposure: workplace social capital (baseline)

Bonding WSC was measured using a six-item scale developed by Eguchi et al.[48] This scale focuses on the structural and cognitive dimensions of the bonding WSC. The first three items (items #1–#3) that focus on the structural dimension by measuring the network aspect were adapted from the eight-item WSC scale developed by Kouvonen et al.,[27] which includes three items measuring bonding WSC. The remaining three items (items #4–#6) that focus on the cognitive dimension by measuring the reciprocity, trust and laughter/smiles aspects were based on Japanese studies that used the social cohesion approach to conceptualise social capital.[29, 31, 41, 51–53] These items are shown in the Appendix. All items were measured on a four-point Likert-type scale (1 *Not at all*, 2 *Not exactly*, 3 S*omewhat so* and 4 *Definitely*). Total scores for overall WSC (items #1–#6), the structural dimension (items #1–#3) and the cognitive dimension (items #4–#6) were calculated by averaging their item scores (range 1–4). In this sample, Cronbach's alpha coefficients were 0.90, 0.83 and 0.82 for overall WSC, the structural dimension and the cognitive dimension, respectively.

Outcome: refraining from seeking medical care (one-year follow-up)

The follow-up questionnaire included a single-item question measuring RSMC, which had been used in the Japanese General Social Survey conducted in 2008 (JGSS-2008).[13] The participants were asked to respond to the question "In the past year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist despite your sickness (including a slight cold or cavity) or injury?" Those who answered "*Yes, I have*" were defined as those who refrained from seeking medical care.

Potential confounders (baseline)

According to previous studies on the potential individual determinants of RSMC[7–14] and the association of psychosocial work environment with access to medical care or RSMC,[46, 47] potential confounders included demographic characteristics, past medical history, work-related factors, socioeconomic characteristics and health-related behaviours. Demographic characteristics included age, household size and firm. Age was classified into five groups: 29 years or younger, 30–39 years, 40–49 years, 50–59 years and 60 years or older. Household size was a continuous variable. The firm was classified into 12 groups using the firm code in the J-HOPE datasets.

Past medical history was dichotomised into any (defined as having a past medical history of stroke, myocardial infarction, hypertension, diabetes, hyperlipidemia, cancer or mental disorders) and none.

Work-related factors included work shift and working hours per week. Work shift was classified into four groups: day shift, shift work with night duty, shift work without night duty and night shift. Working hours per week were classified into five groups: 30 hours or less, 31–40 hours, 41–50 hours, 51–60 hours and 61 hours or more.

Socioeconomic characteristics included education, equivalent annual household income and occupational position. Education was classified into four groups: graduate school, college, junior college and high school or junior high school. To calculate equivalent annual household income, the participants were asked to report their annual household income by selecting one of the following six response options: 2.99 million JPY (28 750 EUR) or less, 3–4.99 million JPY (28 850–48 000 EUR), 5–7.99 million JPY (48 100–76 800 EUR), 8–9.99 million JPY (76 900–96 050 EUR), 10–14.99 million JPY (96 150–144 100 EUR) and 15 million JPY (144 200 EUR) or more [EUR

was converted from JPY using the average monthly exchange rate from April 2011 to March 2013 (104 JPY per EUR)]. Subsequently, equivalent household income was computed by dividing the median household income of each response option by the square root of the household size. Occupational position was classified into four groups: manager, non-manual employee, manual employee and others.

Health-related behaviours included smoking habits, drinking habits and physical activity. Smoking habits were classified into three groups: never smoker, ex-smoker and current smoker. Drinking habits were also classified into three groups: rarely, sometimes and daily. Physical activity was classified into four groups: none, light physical activity (ie, mild exercise without breathlessness or palpitation) one or more times a week, intense physical activity (ie, heavy exercise with breathlessness, palpitation or sweating at least for 20 minutes) once or twice a week and intense physical activity thrice or more times a week.

Statistical analysis

First, we conducted Student's t-test or Fisher's exact test to compare those who did and did not refrain from seeking medical care in potential confounders as well as in the total score for the WSC scale. Afterwards, Cox regression was conducted with robust variance using the time variable as a constant to estimate the relative risks (RRs) and their 95% confidence intervals (CIs) of RSMC for overall WSC as well as for its construct dimensions (ie, the structural and cognitive dimensions). In the Cox regression, we first adjusted for demographic characteristics (ie, age, household size and firm) (model 1). Subsequently, we incrementally adjusted for past medical history (model 2), work-related factors (ie, work shift and working hours per week) (model 3), socioeconomic characteristics (ie, education, equivalent annual household income and

occupational position) (model 4) and health-related behaviours (ie, smoking habits, drinking habits and physical activity) (model 5). In a series of Cox regressions, total scores for overall WSC and each construct dimension were reversed so that higher score indicated lower WSC, which allowed us to interpret the RR of RSMC easily. The level of significance was 0.05 (two-tailed). The statistical analyses were conducted using Stata/MP 14.0 for Windows.

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of the present study.

RESULTS

Table 2 details the characteristics of the participants according to those who did and did not refrain from seeking medical care, together with gender. For men, those who refrained from seeking medical care were younger and highly educated, worked longer hours, had lower equivalent annual household income, were more likely to be current smokers, were less likely to engage in physical activities and perceived lower levels of WSC compared to those who did not. For women, those who refrained from seeking medical care were younger and highly educated, worked longer hours, were more likely to have no past medical history, were less likely to engage in physical activities and perceived lower levels of WSC compared to those who did not.

Table 2 Detailed characteristics of employees who participated in the present study

	Men (n=6624)					Women (n=1793)				
	Refrained from seeking medical care (n=2824)		Did not refrain from seeking medical care (n=3800)		p value †	Refrained from seeking medical care (n=829)		Did not refrain from seeking medical care (n=964)		p value †
	Mean (SD)	n (%)	Mean (SD)	n (%)		Mean (SD)	n (%)	Mean (SD)	n (%)	
Age	40.4 (10.3)		42.2 (10.6)		<0.001	38.1 (9.79)		40.6 (10.3)		<0.001
29 years or younger		520 (18.4)		589 (15.5)			215 (25.9)		181 (18.8)	
30–39 years		757 (26.8)		899 (23.7)			246 (29.7)		235 (24.4)	
40–49 years		973 (34.5)		1254 (33.0)			254 (30.6)		356 (36.9)	
50–59 years		509 (18.0)		925 (24.3)			106 (12.8)		170 (17.6)	
60 years or older		65 (2.3)		133 (3.5)			8 (1.0)		22 (2.3)	
Household size	3.00 (1.47)		2.98 (1.47)		0.630	2.88 (1.57)		2.91 (1.59)		0.683
Past medical history					0.132					0.021
Any		789 (27.9)		1127 (29.7)			135 (16.3)		199 (20.6)	
None		2035 (72.1)		2673 (70.3)			694 (83.7)		765 (79.4)	
Work shift					0.147					0.655
Day shift		2286 (80.9)		3052 (80.3)			764 (92.2)		895 (92.8)	
Shift work with night duty		445 (15.8)		644 (16.9)			20 (2.4)		24 (2.5)	
Shift work without night duty		72 (2.5)		89 (2.3)			7 (0.8)		11 (1.1)	
Night shift		21 (0.7)		15 (0.4)			38 (4.6)		34 (3.5)	
Working hours per week					0.034					0.001
30 hours or less		155 (5.5)		235 (6.2)			217 (26.2)		321 (33.3)	
31–40 hours		833 (29.5)		1193 (31.4)			323 (39.0)		371 (38.5)	
41–50 hours		1326 (47.0)		1761 (46.3)			248 (29.9)		234 (24.3)	
51–60 hours		387 (13.7)		491 (12.9)			29 (3.5)		35 (3.6)	
61 hours or more		123 (4.4)		120 (3.2)			12 (1.4)		3 (0.3)	
Education					0.023					0.004
Graduate school		353 (12.5)		456 (12.0)			38 (4.6)		31 (3.2)	
College		960 (34.0)		1308 (34.4)			229 (27.6)		207 (21.5)	
Junior college		358 (12.7)		397 (10.4)			211 (25.5)		255 (26.5)	
High school or junior high school		1153 (40.8)		1639 (43.1)			351 (42.3)		471 (48.9)	

Table 2 (continued)

	Men (n=6624)					Women (n=1793)				
	Refrained from seeking medical care (n=2824)		Did not refrain from seeking medical care (n=3800)		p value †	Refrained from seeking medical care (n=829)		Did not refrain from seeking medical care (n=964)		p value †
	Mean (SD)	n (%)	Mean (SD)	n (%)		Mean (SD)	n (%)	Mean (SD)	n (%)	
Equivalent annual household income ‡	41 113 (18 266)		43 107 (19 152)		<0.001	36 350 (21 230)		36 388 (21 767)		0.970
Occupational position					0.084					0.154
Managerial employee		581 (20.6)		866 (22.8)			16 (1.9)		15 (1.6)	
Non-manual employee		1140 (40.4)		1485 (39.1)			482 (58.1)		513 (53.2)	
Manual employee		805 (28.5)		1021 (26.9)			172 (20.7)		228 (23.7)	
Others		298 (10.6)		428 (11.3)			159 (19.2)		208 (21.6)	
Smoking habits					0.024					0.862
Never smoker		1459 (51.7)		2013 (53.0)			710 (85.6)		834 (86.5)	
Ex-smoker		356 (12.6)		539 (14.2)			33 (4.0)		35 (3.6)	
Current smoker		1009 (35.7)		1248 (32.8)			86 (10.4)		95 (9.9)	
Drinking habits					0.574					0.139
Rarely		889 (31.5)		1173 (30.9)			437 (52.7)		520 (53.9)	
Sometimes		1020 (36.1)		1349 (35.5)			308 (37.2)		323 (33.5)	
Daily		915 (32.4)		1278 (33.6)			84 (10.1)		121 (12.6)	
Physical activity (PA)					0.004					0.016
None		1680 (59.5)		2101 (55.3)			609 (73.5)		657 (68.2)	
Light PA one or more times per week		622 (22.0)		945 (24.9)			141 (17.0)		173 (17.9)	
Intense PA once or twice a week		395 (14.0)		592 (15.6)			63 (7.6)		98 (10.2)	
Intense PA three times or more a week		127 (4.5)		162 (4.3)			16 (1.9)		36 (3.7)	
Workplace social capital (WSC) §										
Overall WSC (items #1–#6)	2.84 (0.55)		2.89 (0.55)		<0.001	2.76 (0.59)		2.85 (0.58)		0.001
Structural dimension (items #1–#3)	2.83 (0.58)		2.90 (0.57)		<0.001	2.74 (0.61)		2.84 (0.59)		<0.001
Cognitive dimension (items #4–#6)	2.84 (0.59)		2.89 (0.58)		0.001	2.79 (0.62)		2.87 (0.62)		0.007

† Student's t-test and Fisher's exact test were used for continuous and categorical variables, respectively.

‡ Currency unit is EUR, which was converted from JPY using the average monthly exchange rate from April 2011 to March 2013 (104 JPY per EUR).

§ Total scores for overall WSC and each construct dimension were calculated by averaging item scores (range 1–4).

Table 3 shows the results of the Cox regression with robust variance on overall WSC as well as on its construct dimensions. Among men, after adjusting for demographic characteristics (model 1), low overall WSC was significantly associated with a higher risk of RSMC (RR 1.10, 95% CI 1.05 to 1.16). Similar tendencies were observed for the structural and cognitive dimensions (RR 1.10, 95% CI 1.05 to 1.16 and RR 1.08, 95% CI 1.03 to 1.13, respectively). These patterns remained almost unchanged after additionally adjusting for other potential confounders (ie, past medical history, work-related factors, socioeconomic characteristics and health-related behaviours: models 2–5).

Additionally, among women, after adjusting for demographic characteristics (model 1), low overall WSC was significantly associated with a higher risk of RSMC (RR 1.16, 95% CI 1.07 to 1.26). Similar tendencies were observed for the structural and cognitive dimensions (RR 1.16, 95% CI 1.07 to 1.26 and RR 1.13, 95% CI 1.05 to 1.22, respectively). These patterns remained unchanged after additionally adjusting for other potential confounders (models 2–5).

Table 3 Association of workplace social capital with refraining from seeking medical care during the one-year follow-up period among Japanese employees: Cox regression with robust variance using the time variable as a constant

Workplace social capital (WSC) †	Relative risk (95% confidence interval)				
	Model 1 ‡	Model 2 §	Model 3 ‖	Model 4 ¶	Model 5 ††
Men (n=6624)					
Overall WSC (items #1–#6)	1.10 (1.05 to 1.16)	1.10 (1.05 to 1.16)	1.11 (1.06 to 1.17)	1.10 (1.05 to 1.16)	1.10 (1.05 to 1.16)
Structural dimension (items #1–#3)	1.10 (1.05 to 1.16)	1.10 (1.05 to 1.16)	1.11 (1.06 to 1.17)	1.11 (1.06 to 1.16)	1.11 (1.05 to 1.16)
Cognitive dimension (items #4–#6)	1.08 (1.03 to 1.13)	1.08 (1.03 to 1.13)	1.09 (1.04 to 1.14)	1.08 (1.03 to 1.14)	1.08 (1.03 to 1.13)
Women (n=1793)					
Overall WSC (items #1–#6)	1.16 (1.07 to 1.26)	1.16 (1.07 to 1.26)	1.15 (1.06 to 1.25)	1.16 (1.07 to 1.26)	1.16 (1.07 to 1.26)
Structural dimension (items #1–#3)	1.16 (1.07 to 1.26)	1.16 (1.08 to 1.26)	1.16 (1.07 to 1.25)	1.17 (1.08 to 1.26)	1.16 (1.07 to 1.26)
Cognitive dimension (items #4–#6)	1.13 (1.05 to 1.22)	1.13 (1.05 to 1.22)	1.12 (1.04 to 1.21)	1.13 (1.05 to 1.22)	1.13 (1.04 to 1.22)

† Total scores for overall WSC and each construct dimension were calculated by averaging item scores (score range 1–4, which were reverse-coded so that higher score indicated lower WSC.

‡ Adjusted for age, household size and firm.

§ Additionally adjusted for past medical history.

‖ Additionally adjusted for work shift and working hours per week.

¶ Additionally adjusted for education, equivalent annual household income and occupational position.

†† Additionally adjusted for smoking habits, drinking habits and physical activity.

DISCUSSION

We examined the one-year prospective association of WSC (mainly bonding WSC) with RSMC among Japanese employees. For both genders, low overall WSC was significantly associated with a higher risk of RSMC, independently of demographic characteristics, past medical history, work-related factors and socioeconomic characteristics as well as of health-related behaviours. Similar tendencies were observed when we separated overall WSC into structural and cognitive dimensions.

For both structural and cognitive dimensions, the lack of WSC was significantly associated with a higher risk of RSMC, which supported our hypothesis. Our finding is consistent with the results of a previous systematic review of access to medical care among community residents, which reported that bonding social capital is related to better access to medical care.[19] The present study expanded this evidence into occupational settings. Given the findings from occupational settings suggesting the association of low job control and low organisational justice with RSMC,[46, 47] our finding is reasonable because WSC is theoretically considered to be a summary outcome of job resources (ie, favourable psychosocial work environment) including job control and organisational justice.[43] It is common for Japanese employees to take time off (ie, paid holiday) to seek medical care during working days because Japanese law does not necessarily require each company to establish paid sick leave. Although employees have a legitimate right to take time off, and employers should not treat employees who would like to take time off unfairly, Japanese corporate culture recognises working without taking time off as diligent. The social notion that "working hard is a virtue" is still firmly rooted in the Japanese psyche and taking time off in itself is viewed negatively.[54] Therefore, in the Japanese workplace with low social capital characterised by lack of network, reciprocity and trust, employees who

take leave of absence to seek medical care are more likely to be perceived negatively (eg, enjoying benefits or causing trouble for others) by co-workers as well as by supervisors. In other cases, workplaces may have an uncooperative attitude towards re-arranging the work schedule of those seeking medical care. Such a situation may prevent employees from seeking necessary medical care. On the other hand, it is unclear whether our findings would emerge in countries other than Japan. For example, in Western countries that are more individualistic compared to Asian countries, including Japan,[55] and have a legally established paid sick leave system, employees may seek medical care when getting sick irrespective of social capital of their workplace; therefore, a clear association of WSC with RSMC may not be observed. Future research is needed to replicate our findings in workplaces cross-culturally.

In the present study, the association of low WSC with RSMC after adjusting for demographic characteristics (model 1) remained almost unchanged after additionally adjusting for any potential confounders, including past medical history, work-related factors, socioeconomic characteristics and health-related behaviours (models 2–5). This finding may be explained by the fact that our study sample comprised a higher proportion of employees at large-scale enterprises who were covered by corporate health insurance and received excellent benefits from their companies. Such homogeneity of our study sample may have decreased the confounding effects of demographic and socioeconomic characteristics on the association of low WSC with RSMC; therefore, our findings should be replicated in employees from diverse backgrounds in the future.

Possible limitations of the present study should be considered. First, as discussed above, Japan and Western countries may differ in their interpretation of taking time off; therefore, our findings may be specific to Japan or other Asian countries. Furthermore,

even for Japanese employees, the present findings should be generalised cautiously since our study sample comprised employees from primarily large-scale enterprises, which tend to provide excellent benefits (eg, generous health care) to employees. In that sense, our study sample may have been more likely to seek medical care when getting sick, which may lead to underestimation of the true association. Second, RSMC was measured by simply asking the participants to recall their experience over the past year. Those who evaluated WSC as low may have been more likely to recall their own experience of RSMC during the follow-up period; therefore, our findings may be overestimated due to recall bias. Third, some employees dropped out during the follow-up period due to sick leave. They may have perceived lower levels of WSC at baseline and refrained from seeking medical care until their disease became severe, which may have underestimated the true association. Fourth, adjusting for past medical history, the present study did not obtain information on RSMC at baseline or regular hospital visit due to chronic disease, which may have masked the true association. Furthermore, personality traits may also have influenced our findings. Recent studies have reported that neuroticism is associated with an increased number of physician visits[56] as well as with higher levels of work-related stress;[57] therefore, without adjusting for neuroticism, our findings may have inflated the apparent association. Fifth, the influence of psychosocial work environment (ie, job demands or job resources) on the association of WSC with RSMC was not considered in the present study. As introduced earlier, WSC is considered a summary outcome of job resources aimed at improving health outcomes among employees;[43] therefore, various kinds of unobserved job resources may explain the association demonstrated in the present study. Future work should focus on the mediation effect of WSC on the association of psychosocial work environment with RSMC. Furthermore, some previous studies

have examined the moderating effect of WSC on the association of adverse psychosocial work environment with health outcomes (eg, psychological distress and smoking);[35, 36, 40] therefore, research on the moderation effect of WSC on the association of psychosocial work environment with RSMC (or interaction effect of WSC and psychosocial work environment on RSMC) is also promising. Finally, the present study focused only on the bonding WSC since co-workers on the same team may be the closest source of support for employees; therefore, future research should examine the effects of other types of WSC, such as bridging and linking, on RSMC.

CONCLUSIONS

The present study offers evidence that WSC is an essential factor that influences individuals' decision to seek medical care for their perceived health issues independently of demographic characteristics, past medical history, work-related factors and socioeconomic characteristics as well as of health-related behaviours among Japanese employees. Our findings suggest that fostering a culture of network, reciprocity and trust in a workplace effectively promotes the medical care-seeking behaviour of Japanese employees. Future workplace intervention studies should investigate the effect of improving WSC on the promotion of employees' medical care-seeking.

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Patient consent Obtained.

Data sharing statement Because the data are still in the process of transferring to a data archiving organisation, the ad hoc committee chaired by AT is taking care of this role. The data were retrieved from the occupational cohort study on social class and health conducted in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE), and its authors may be contacted at akizumi@kitasato-u.ac.jp.

Ethical approval Research Ethics Committee, Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No. 2772-(4)), Kitasato University

Medical Ethics Organisation (No. B12-103) and Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (No. 10-004) reviewed and approved the aims and procedures of the present study.

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Figure legends

Figure 1 Recruitment and follow-up flow diagram

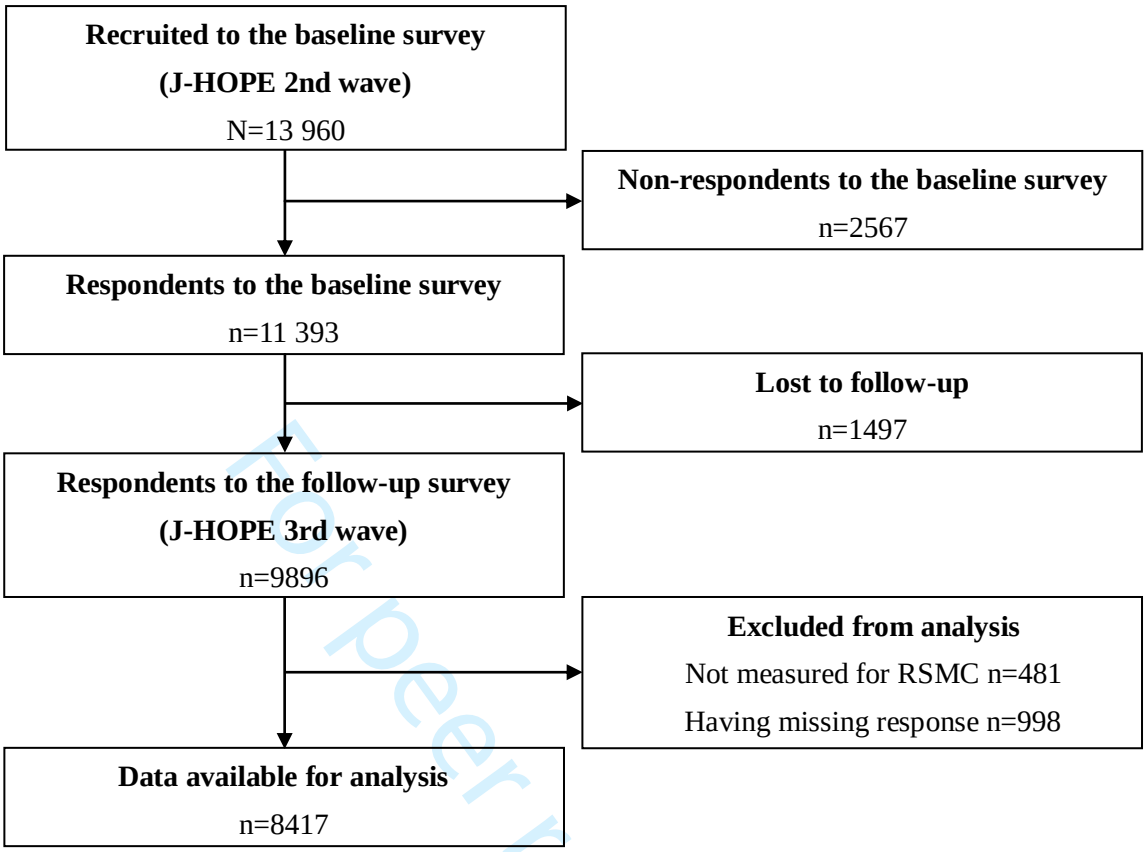

Figure 1 Recruitment and follow-up flow diagram

Appendix Bonding workplace social capital scale[48]

Item #1. People keep each other informed about work-related issues in the work unit.

Item #2. We have a ‘we are together’ attitude.

Item #3. People feel understood and accepted by each other.

Item #4. In our workplace, there is an atmosphere of helping each other.

Item #5. In our workplace, we trust each other.

Item #6. Our workplace is a place of laughter and smiles.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cohort studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Pages 1 and 3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pages 3–4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pages 5–7
Objectives	3	State specific objectives, including any prespecified hypotheses	Pages 7–8
Methods			
Study design	4	Present key elements of study design early in the paper	Pages 8–9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pages 8–9
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	Pages 8–9
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pages 11–13
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pages 11–13
Bias	9	Describe any efforts to address potential sources of bias	Pages 12–14
Study size	10	Explain how the study size was arrived at	Pages 7–8 and Fig. 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Pages 11–14
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pages 13–14
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Pages 8–9 and Fig. 1
		(*d*) If applicable, explain how loss to follow-up was addressed	Pages 8–9 and Fig. 1
		(*e*) Describe any sensitivity analyses	N/A
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pages 8–9 and Fig. 1
		(b) Give reasons for non-participation at each stage	Page 8
		(c) Consider use of a flow diagram	Fig. 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pages 14–16
		(b) Indicate number of participants with missing data for each variable of interest	Pages 8–9 and Fig. 1
		(c) Summarise follow-up time (eg, average and total amount)	Pages 8–9
Outcome data	15*	Report numbers of outcome events or summary measures over time	Pages 15–16
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 18
		(*b*) Report category boundaries when continuous variables were categorized	Page 12
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 19
Limitations			
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 19–22
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pages 20–21
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Pages 22–23

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Title:

Workplace social capital and refraining from seeking medical care in Japanese employees: a one-year prospective cohort study

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ABSTRACT

Objectives We examined the association of workplace social capital (WSC), including structural and cognitive dimensions, with refraining from seeking medical care (RSMC) among Japanese employees.

Design One-year prospective cohort study.

Setting and participants We surveyed 8770 employees (6881 men and 1889 women) aged 18–70 years from 12 firms in Japan using a self-administered questionnaire comprising the WSC scale and the items on potential confounders (ie, age, educational attainment and equivalent annual household income) at baseline (from April 2011 to March 2013).

Outcome measures At a one-year follow-up, we measured RSMC during the follow-up period using a single-item question "In the past year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist despite your sickness (including a slight cold or cavity) or injury?"

Results The results of Cox regression with robust variance showed that, after adjusting for potential confounders, the low WSC group (ie, the lowest tertile group) had a significantly higher relative risk (RR) of RSMC compared to the high WSC group (ie, the highest tertile group) among both men and women [overall WSC: RR 1.09 (95% confidence interval 1.01 to 1.17) and 1.20 (95% confidence interval 1.06 to 1.37); structural dimension: RR 1.13 (95% confidence interval 1.04 to 1.22) and 1.25 (95% confidence interval 1.07 to 1.45); and cognitive dimension: RR 1.11 (95% confidence interval 1.03 to 1.20) and 1.21 (95% confidence interval 1.06 to 1.38), respectively]. Trend analysis using a continuous score of the WSC scale also showed a significant association of low WSC with a higher risk of RSMC among both men and women.

Conclusions Our findings suggest that the lack of social capital in the workplace is

positively associated with RSMC among Japanese employees.

Strengths and limitations of this study

- This is the first study examining the association of social capital with refraining from seeking medical care in the occupational setting.
- We used a large-scale dataset from an occupational cohort survey.
- Our sample was recruited from primarily large-scale enterprises in Japan; therefore, the generalisation of our findings should be made with caution.
- Refraining from seeking medical care was measured by simply asking the participants to recall their experience over the past year, which may have led to recall bias.

INTRODUCTION

Access to medical care is an essential determinant of health.[1] Delayed access to medical care, often caused by refraining from seeking medical care (RSMC) (ie, reluctance to seek or avoidance of medical care),[2] has been reported to have effects on reduced quality of life, more extended hospital stays and mortality in a wide range of age groups.[3–6] Previous studies on RSMC have examined its potential individual determinants, including age,[7] health status,[8] insurance coverage[9] and social class (ie, educational attainment, household income and employment conditions).[10–15]

The interest in the effects of social contextual factors such as social capital on RSMC or access to medical care has been increasing.[1] Although social capital is defined in many ways, all definitions share the notion that social networks, norms of reciprocity and generalised trust are essential aspects of the concept.[16] Particularly in the health research field, social capital is conceptualised primarily as a two-dimensional construct consisting of a structural dimension (ie, what people 'do') and a cognitive dimension (ie, what people 'feel').[17] Based on this construct, the network aspect is categorised as the structural dimension while the reciprocity and trust aspects are categorised as the cognitive dimension.[18] Generally, social capital entails three types: bonding, bridging and linking. Bonding social capital refers to relations of trust and cooperation among people within relatively homogenous groups; bridging social capital refers to relations of respect and mutuality among people between heterogeneous groups; and linking social capital refers to relations between individuals and groups in different social strata in a hierarchy where different groups have access to power, social status and wealth.[19] As just described, the theoretical framework of social capital encompasses many complex aspects, dimensions and types of social interactions and cognitions that can have potential benefits but also

disadvantages for communities and the individuals living within them. Several reviews have highlighted the challenge of empirically verify the associations of social capital with health outcomes.[20–22] Medical care utilisation or RSMC is no exception. It has been theoretically suggested that social capital promotes positive psychological states towards self-care and appropriate medical care utilisation,[23] and empirical evidence to support this suggestion has been accumulated among community residents.[1, 20]

The idea of social capital is a natural candidate for expansion to occupational settings. Kawachi[24] pointed out that social capital is likely to be found in settings where people now spend most of their time. The workplace represents an important social unit, mainly since many people spend one-third of their lives at work[25] and the workplace is a significant source of social relations.[26] Several previous studies reported that the lack of workplace social capital (WSC) was associated with various kinds of health outcomes: poor self-rated health,[26–30] hypertension (or high blood pressure),[31, 32] poor mental health (eg, depression, depressive symptoms and psychological distress),[27, 33–38] unhealthy behaviours (eg, smoking)[39–42] and mortality.[43]

In the theoretical framework of job stress, WSC is considered to be a summary outcome of the favourable psychosocial work environment called job resources (eg, job control, supervisor and co-worker support, extrinsic reward, organisational justice, etc.) and also to improve mental and physical health among employees.[44] Given the definition of social capital, the workplace with low social capital can be characterised by lack of network, reciprocity and trust. In such a workplace, employees may have difficulty asking co-workers to re-arrange their schedules associated with seeking medical care, which may lead to the lack of time to excuse themselves from work and

consequently to RSMC and subsequent poor self-rated health.[45] To date, two previous studies in occupational settings have reported that low job control and low organisational justice (ie, procedural justice and interactional justice) were associated with less access to medical care or RSMC.[46, 47] However, the association of WSC with RSMC has not been thoroughly examined.

The purpose of the present study was to examine the association of WSC with RSMC among Japanese employees using a one-year prospective design. It was hypothesised that those who perceived lower levels of WSC at baseline would be more likely to refrain from seeking medical care during the one-year follow-up. In the present study, we focused mainly on the bonding WSC (ie, social capital within same working teams) because it is of particular importance in Japanese corporate culture, which is group-oriented: altruism, teamwork and group cohesiveness are emphasised[48] and it has been reported that bonding social capital is related mainly to better access to medical care.[20] On the other hand, it has also been pointed out that the empirical evidence for the association of bonding social capital with access to medical care is somewhat limited, primarily because of the tendency to mix different dimensions of social capital into overall indices.[20] Therefore, we focused not only on overall bonding WSC but also on its construct dimensions (ie, the structural dimension, including the network aspect and the cognitive dimension, including the reciprocity and trust aspects). Furthermore, in Japanese culture, laughter and smiles are also essential to maintain social harmony.[49] Therefore, we also focused on the laughter/smiles aspect and included it in the cognitive dimension. We analysed the data for men and women separately because a previous study has reported gender differences in medical care utilisation.[50]

METHODS

Study design

We extracted the data from longitudinal datasets collected in an occupational cohort study on social class and health in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE). The J-HOPE was conducted in three or four waves at 13 firms located in Japan. The primary industry sectors were information technology, hospital and medical facility, manufacturing, pharmaceutical, service, transportation and real estate. The first wave was conducted from April 2010 to March 2012; the subsequent waves were conducted in one-year intervals following the first wave. Because the RSMC was assessed only at the third wave in all surveyed firms, except for one hospital, the present study treated the second wave (conducted from April 2011 to March 2013) as a baseline and the third wave (conducted from April 2012 to March 2014) as a one-year follow-up. The analyses were conducted using the J-HOPE datasets available as of 22nd December, 2016.

Participants

In the second wave of the J-HOPE (ie, the baseline in the present study), a total of 11 393 employees completed a self-administered questionnaire (response rate 82%). During the one-year follow-up period, 1497 employees were transferred, took a leave of absence (ie, sick leave, maternity leave or childcare leave), retired or declined to participate. Overall, 9896 employees participated in the third wave (ie, one-year follow-up in the present study) and completed the follow-up questionnaire (follow-up rate 87%). After excluding 481 hospital employees who were not measured for RSMC in the third wave and 645 employees who had at least one missing response for variables relevant to the present study, the data from 8770 employees (6881 men and

1889 women) were analysed (see figure 1). The type of industry and the number of participants of each firm are shown in table 1.

Table 1 Firm code, type of industry and the number of participants in each firm

Firm code (type of industry)	Men (n=6881)	Women (n=1889)
	n (%)	n (%)
1 (Information technology)	588 (8.5)	152 (8.0)
2 (Hospital) †	—	—
3 (Manufacturing)	1937 (28.1)	242 (12.8)
4 (Information)	446 (6.5)	222 (11.8)
5 (Pharmaceutical)	146 (2.1)	149 (7.9)
6 (Service)	13 (0.2)	23 (1.2)
7 (Veterinary)	1 (0.0)	2 (0.1)
8 (Medical)	13 (0.2)	18 (1.0)
9 (Service)	372 (5.4)	182 (9.6)
10 (Manufacturing)	2112 (30.7)	770 (40.8)
11 (Transportation)	1032 (15.0)	44 (2.3)
12 (Real estate)	168 (2.4)	58 (3.1)
13 (Real estate)	53 (0.8)	27 (1.4)

† Excluded from the analyses due to the lack of information on refraining from seeking medical care at follow-up.

Measures

Exposure: workplace social capital (baseline)

Bonding WSC was measured using a six-item scale developed by Eguchi et al.[48] This scale focuses on the structural and cognitive dimensions of the bonding WSC. The first three items (items #1–#3) that focus on the structural dimension by measuring the network aspect were adapted from the eight-item WSC scale developed by Kouvonen et al.,[28] which includes three items measuring bonding WSC. The remaining three items (items #4–#6) that focus on the cognitive dimension by measuring the reciprocity, trust and laughter/smiles aspects were based on Japanese studies that used the social cohesion approach to conceptualise social capital.[30, 32, 42, 51–53] These items are shown in the Appendix. All items were measured on a four-point Likert-type scale (1 *Not at all*, 2 *Not exactly*, 3 S*omewhat so* and 4 *Definitely*). Total scores for overall WSC (items #1–#6), the structural dimension (items #1–#3) and the cognitive dimension (items #4–#6) were calculated by summing their item scores (range 6–24 for overall WSC and 3–12 for structural and cognitive dimensions). In this sample, Cronbach's alpha coefficients were 0.90, 0.83 and 0.82 for overall WSC, the structural dimension and the cognitive dimension, respectively, indicating that the WSC scale had a higher level of internal consistency reliability and a lower risk of measurement error.[54] Participants were classified into tertiles (ie, high, moderate and low) based on the scores for overall WSC and its structural dimensions.

Outcome: refraining from seeking medical care (one-year follow-up)

The follow-up questionnaire included a single-item question measuring RSMC, which had been used in the Japanese General Social Survey conducted in 2008 (JGSS-2008).[13] The participants were asked to respond to the question "In the past

year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist despite your sickness (including a slight cold or cavity) or injury?" Those who answered "*Yes, I have*" were defined as those who refrained from seeking medical care.

Potential confounders (baseline)

Among the potential individual determinants of RSMC introduced earlier,[7–15] age, educational attainment and household income were reported to be associated with the level of social capital;[55] therefore, these three factors were treated as potential confounders.

Age was classified into five groups: 29 years or younger, 30–39 years, 40–49 years, 50–59 years and 60 years or older. Educational attainment was classified into four groups: graduate school, college, junior college and high school or junior high school. As an indicator of household income, we calculated equivalent annual household income. The participants were asked to report their annual household income by selecting one of the following six response options: 2.99 million JPY (28 750 EUR) or less, 3–4.99 million JPY (28 850–48 000 EUR), 5–7.99 million JPY (48 100–76 800 EUR), 8–9.99 million JPY (76 900–96 050 EUR), 10–14.99 million JPY (96 150–144 100 EUR) and 15 million JPY (144 200 EUR) or more [EUR was converted from JPY using the average monthly exchange rate from April 2011 to March 2013 (104 JPY per EUR)]. Subsequently, equivalent annual household income was computed by dividing the median household income of each response option by the square root of the household size.

Statistical analysis

First, we conducted Student's t-test or Fisher's exact test to compare those who did and

did not refrain from seeking medical care in potential confounders as well as in the total score for the WSC scale. Afterwards, using the high overall WSC group (ie, the highest tertile group) as a reference, Cox regression was conducted with robust variance using the time variable as a constant[56] to estimate the relative risks (RRs) and their 95% confidence intervals (CIs) of RSMC for the moderate and low overall WSC groups (ie, the middle and lowest tertile groups). We did not use logistic regression because it has been pointed out that the odds ratio (OR) overestimates RR when the outcome is relatively common (ie, ≥10%).[57] In the Cox regression, we first calculated the crude RR (ie, without any adjustment) (model 1). Subsequently, we adjusted for potential confounders (ie, age, educational attainment and equivalent annual household income) (model 2). A similar analysis was conducted for the structural and cognitive dimensions of WSC. Furthermore, to examine whether the results of Cox regression using the tertile classification for WSC were robust, trend analysis was conducted using the continuous score of WSC. In the trend analysis, the total score of WSC was reversed (ie, higher score indicated lower WSC) and divided by the number of items (ie, converted so that the scoring range was 1–4), which allowed us to interpret RRs easily and make RRs of overall WSC and its construct dimensions comparable. In addition, we supplementally examined the association of every single item of the WSC scale with RSMC. In the supplementary analysis, each item score was also reversed for the same reasons mentioned above. The level of significance was 0.05 (two-tailed). The statistical analyses were conducted using Stata/MP 14.0 for Windows (Stata Corp., College Station, TX, USA).

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or

dissemination plans of the present study.

RESULTS

Table 2 details the characteristics of the participants according to those who did and did not refrain from seeking medical care, together with gender. For men, those who refrained from seeking medical care, compared to those who did not, were younger ($p<0.001$) and highly educated ($p=0.012$), had lower equivalent annual household income ($p<0.001$) and perceived lower levels of WSC (overall WSC: $p<0.001$; structural dimension: $p<0.001$; and cognitive dimension: $p=0.001$). For women, those who refrained from seeking medical care, compared to those who did not, were younger ($p<0.001$) and highly educated ($p=0.003$) and perceived lower levels of WSC (overall WSC: $p=0.001$; structural dimension: $p<0.001$; and cognitive dimension: $p=0.006$) while there was no significant difference in equivalent annual household income between those who did and did not refrain from seeking medical care ($p=0.980$).

Table 2 Detailed characteristics of employees who participated in the present study

	Men (n=6881)				Women (n=1889)			
	Refrained from seeking medical care (n=2924)		Did not refrain from seeking medical care (n=3957)		Refrained from seeking medical care (n=870)		Did not refrain from seeking medical care (n=1019)	
	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)
Age	40.5 (10.3)		42.2 (10.6)		38.1 (9.74)		40.8 (10.3)	
29 years or younger		537 (18.4)		610 (15.4)		222 (25.5)		187 (18.4)
30–39 years		787 (26.9)		938 (23.7)		257 (29.5)		249 (24.4)
40–49 years		996 (34.1)		1294 (32.7)		272 (31.3)		371 (36.4)
50–59 years		537 (18.4)		975 (24.6)		111 (12.8)		188 (18.4)
60 years or older		67 (2.3)		140 (3.5)		8 (0.9)		24 (2.4)
Educational attainment								
Graduate school		359 (12.3)		460 (11.6)		39 (4.5)		31 (3.0)
College		979 (33.5)		1332 (33.7)		234 (26.9)		214 (21.0)
Junior college		377 (12.9)		421 (10.6)		220 (25.3)		266 (26.1)
High school or junior high school		1209 (41.3)		1744 (44.1)		377 (43.3)		508 (49.9)
Equivalent annual household income †	41 153 (18 297)		42 985 (19 161)		35 928 (21 180)		35 904 (21 565)	
Workplace social capital (WSC)								
Overall WSC (items #1–#6) (range 6–24)	17.0 (3.32)		17.4 (3.31)		16.6 (3.55)		17.1 (3.45)	
Structural dimension (items #1–#3) (range 3–12)	8.50 (1.73)		8.68 (1.71)		8.20 (1.84)		8.51 (1.75)	
Cognitive dimension (items #4–#6) (range 3–12)	8.52 (1.77)		8.67 (1.76)		8.36 (1.88)		8.60 (1.86)	

† Currency unit is EUR, which was converted from JPY using the average monthly exchange rate from April 2011 to March 2013 (104 JPY per EUR).

Table 3 shows the results of the Cox regression with robust variance on overall WSC as well as on its construct dimensions. In the crude model (model 1), the low overall WSC group had a significantly higher RR of RSMC compared to the high overall WSC group for both genders (RR 1.09, 95% CI 1.01 to 1.17 and RR 1.16, 95% CI 1.02 to 1.33 for men and women, respectively). Conversely, the moderate overall WSC group did not have a significantly higher RR of RSMC (RR 0.98, 95% CI 0.92 to 1.06 and RR 1.03, 95% CI 0.90 to 1.18 for men and women, respectively). These patterns remained unchanged after adjusting for potential confounders (model 2). When we separated overall WSC into structural and cognitive dimensions, similar tendencies were observed for both dimensions. Trend analysis using a continuous score of the WSC scale also showed a significant association of low WSC with a higher risk of RSMC, irrespective of gender, statistical model or construct dimensions of WSC.

The supplementary analysis revealed significant associations of all items of the WSC scale with RSMC, except for item #6 (laughter/smiles) in the crude model among women (details are available in online supplementary table).

Table 3 Association of workplace social capital (WSC) with refraining from seeking medical care during the one-year follow-up period among Japanese employees: Cox regression with robust variance using the time variable as a constant

	Men (n=6881)				Women (n=1889)			
	n	Number of cases (%)	Relative risk (95% confidence interval)		n	Number of cases (%)	Relative risk (95% confidence interval)	
			Model 1 †	Model 2 ‡			Model 1 †	Model 2 ‡
Overall WSC (items #1–#6)								
High (19–24)	1701	706 (41.5)	1.00	1.00	439	188 (42.8)	1.00	1.00
Moderate (17–18)	2873	1174 (40.9)	0.98 (0.92 to 1.06)	0.99 (0.92 to 1.06)	731	324 (44.3)	1.03 (0.90 to 1.18)	1.07 (0.94 to 1.22)
Law (6–16)	2307	1044 (45.3)	1.09 (1.01 to 1.17)	1.09 (1.01 to 1.17)	719	358 (49.8)	1.16 (1.02 to 1.33)	1.20 (1.06 to 1.37)
Continuous (for one point score) §			1.11 (1.06 to 1.16)	1.10 (1.05 to 1.16)			1.15 (1.06 to 1.25)	1.17 (1.08 to 1.27)
Structural dimension (items 1#–#3)								
High (10–12)	1368	554 (40.5)	1.00	1.00	305	126 (41.3)	1.00	1.00
Moderate (9)	2891	1168 (40.4)	1.00 (0.92 to 1.08)	1.00 (0.93 to 1.08)	768	331 (43.1)	1.04 (0.89 to 1.22)	1.06 (0.91 to 1.24)
Law (3–8)	2622	1202 (45.8)	1.13 (1.05 to 1.22)	1.13 (1.04 to 1.22)	816	413 (50.6)	1.23 (1.05 to 1.42)	1.25 (1.07 to 1.45)
Continuous (for one point score) §			1.11 (1.06 to 1.17)	1.10 (1.05 to 1.16)			1.16 (1.08 to 1.26)	1.17 (1.09 to 1.27)
Cognitive dimension (items 4#–#6)								
High (10–12)	1499	614 (41.0)	1.00	1.00	410	177 (43.2)	1.00	1.00
Moderate (9)	2707	1091 (40.3)	0.98 (0.91 to 1.06)	0.99 (0.92 to 1.07)	694	302 (43.5)	1.01 (0.88 to 1.16)	1.05 (0.91 to 1.21)
Law (3–8)	2675	1219 (45.6)	1.11 (1.03 to 1.20)	1.11 (1.03 to 1.20)	785	391 (49.8)	1.15 (1.01 to 1.32)	1.21 (1.06 to 1.38)
Continuous (for one point score) §			1.08 (1.03 to 1.13)	1.08 (1.03 to 1.13)			1.11 (1.03 to 1.20)	1.14 (1.06 to 1.23)

† Crude (ie, without any adjustment).

‡ Adjusted for age, educational attainment and equivalent annual household income.

§ To interpret relative risks easily and make relative risks of overall WSC and its construct dimensions comparable, the total score was reversed (ie, higher score indicated lower WSC) and divided by the number of items (ie, converted so that the scoring range was 1–4).

DISCUSSION

We examined the one-year prospective association of WSC (mainly bonding WSC) with RSMC among Japanese employees. For both genders, low overall WSC was significantly associated with a higher risk of RSMC, independently of age and socioeconomic characteristics (ie, educational attainment and equivalent annual household income). Similar tendencies were observed when we separated overall WSC into structural and cognitive dimensions.

For both structural and cognitive dimensions, the lack of WSC was significantly associated with a higher risk of RSMC, which supported our hypothesis. Our finding is consistent with the results of a previous systematic review of access to medical care among community residents, which reported that bonding social capital is related to better access to medical care.[20] The present study expanded this evidence into occupational settings. Given the findings from occupational settings suggesting the association of low job control and low organisational justice with RSMC,[46, 47] our finding is reasonable because WSC is theoretically considered to be a summary outcome of job resources (ie, favourable psychosocial work environment) including job control and organisational justice.[44] It is common for Japanese employees to take time off (ie, paid holiday) to seek medical care during working days because Japanese law does not necessarily require each company to establish paid sick leave. Although employees have a legitimate right to take time off, and employers should not treat employees who would like to take time off unfairly, Japanese corporate culture recognises working without taking time off as diligent. The social notion that "working hard is a virtue" is still firmly rooted in the Japanese psyche and taking time off in itself is viewed negatively.[58] Therefore, in the Japanese workplace with low social capital characterised by lack of network, reciprocity and trust, employees who

take leave of absence to seek medical care are more likely to be perceived negatively (eg, enjoying benefits or causing trouble for others) by co-workers as well as by supervisors. In other cases, workplaces may have an uncooperative attitude towards re-arranging the work schedule of those seeking medical care. Such a situation may prevent employees from seeking necessary medical care. On the other hand, it is unclear whether our findings would emerge in countries other than Japan. For example, in Western countries that are more individualistic compared to Asian countries, including Japan,[59] and have a legally established paid sick leave system, employees may seek medical care when getting sick irrespective of social capital of their workplace; therefore, a clear association of WSC with RSMC may not be observed. Future research is needed to replicate our findings in workplaces cross-culturally.

In the present study, the association of low WSC with RSMC remained unchanged after adjusting for potential confounders, including socioeconomic characteristics (model 2). This finding may be explained by the fact that our study sample comprised a higher proportion of employees at large-scale enterprises who were covered by corporate health insurance and received excellent benefits from their companies. Such homogeneity of our study sample may have decreased the confounding effects of demographic and socioeconomic characteristics on the association of low WSC with RSMC; therefore, our findings should be replicated in employees from diverse backgrounds in the future.

Possible limitations of the present study should be considered. First, as discussed above, Japan and Western countries may differ in their interpretation of taking time off; therefore, our findings may be specific to Japan or other Asian countries. Furthermore, even for Japanese employees, the present findings should be generalised cautiously since our study sample comprised employees from primarily large-scale enterprises,

which tend to provide excellent benefits (eg, generous health care) to employees. In that sense, our study sample may have been more likely to seek medical care when getting sick, which may lead to underestimation of the true association. Second, RSMC was measured by simply asking the participants to recall their experience over the past year. Those who evaluated WSC as low may have been more likely to recall their own experience of RSMC during the follow-up period; therefore, our findings may be overestimated due to recall bias. Third, some employees dropped out during the follow-up period due to sick leave. They may have perceived lower levels of WSC at baseline and refrained from seeking medical care until their disease became severe, which may have underestimated the true association. Fourth, the present study did not obtain information on RSMC at baseline or regular hospital visit due to chronic disease, which may have masked the true association. Furthermore, personality traits may also have influenced our findings. Recent studies have reported that neuroticism is associated with an increased number of physician visits[60] as well as with higher levels of work-related stress;[61] therefore, without adjusting for neuroticism, our findings may have inflated the apparent association. Fifth, the influence of psychosocial work environment (ie, job demands or job resources) on the association of WSC with RSMC was not considered in the present study. As introduced earlier, WSC is considered a summary outcome of job resources aimed at improving health outcomes among employees;[44] therefore, various kinds of unobserved job resources may explain the association demonstrated in the present study. Future work should focus on the mediation effect of WSC on the association of psychosocial work environment with RSMC. Furthermore, some previous studies have examined the moderating effect of WSC on the association of adverse psychosocial work environment with health outcomes (eg, psychological distress and smoking);[36, 37, 41] therefore, research on

the moderation effect of WSC on the association of psychosocial work environment with RSMC (or interaction effect of WSC and psychosocial work environment on RSMC) is also promising. Finally, the present study focused only on the bonding WSC since co-workers on the same team may be the closest source of support for employees; therefore, future research should examine the effects of other types of WSC, such as bridging and linking, on RSMC.

CONCLUSIONS

The present study offers evidence that WSC is an essential factor that influences individuals' decision to seek medical care for their perceived health issues independently of age and socioeconomic characteristics among Japanese employees. Our findings suggest that fostering a culture of network, reciprocity and trust in a workplace effectively promotes the medical care-seeking behaviour of Japanese employees. Future workplace intervention studies should investigate the effect of improving WSC on the promotion of employees' medical care-seeking.

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Competing interests None declared.

Contributors AI wrote the initial draft of the manuscript. AT, HE and YKa contributed to the analyses and interpretation of the data, and they assisted in the preparation of the manuscript. AI, AT, HE, AS, KM, MT, SK, KE, YKo, TT and NK contributed to the data collection. All authors critically reviewed the manuscript, approved the final version of the manuscript and agreed to be accountable for all aspects of the work, ensuring that the questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved.

Patient consent Obtained.

Data sharing statement Because the data are still in the process of transferring to a data archiving organisation, the ad hoc committee chaired by AT is taking care of this role. The data were retrieved from the occupational cohort study on social class and health conducted in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE), and its authors may be contacted at akizumi@kitasato-u.ac.jp.

Ethical approval Research Ethics Committee, Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No. 2772-(4)), Kitasato University Medical Ethics Organisation (No. B12-103) and Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (No. 10-004) reviewed and approved the aims and procedures of the present study.

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Figure legends

Figure 1 Recruitment and follow-up flow diagram

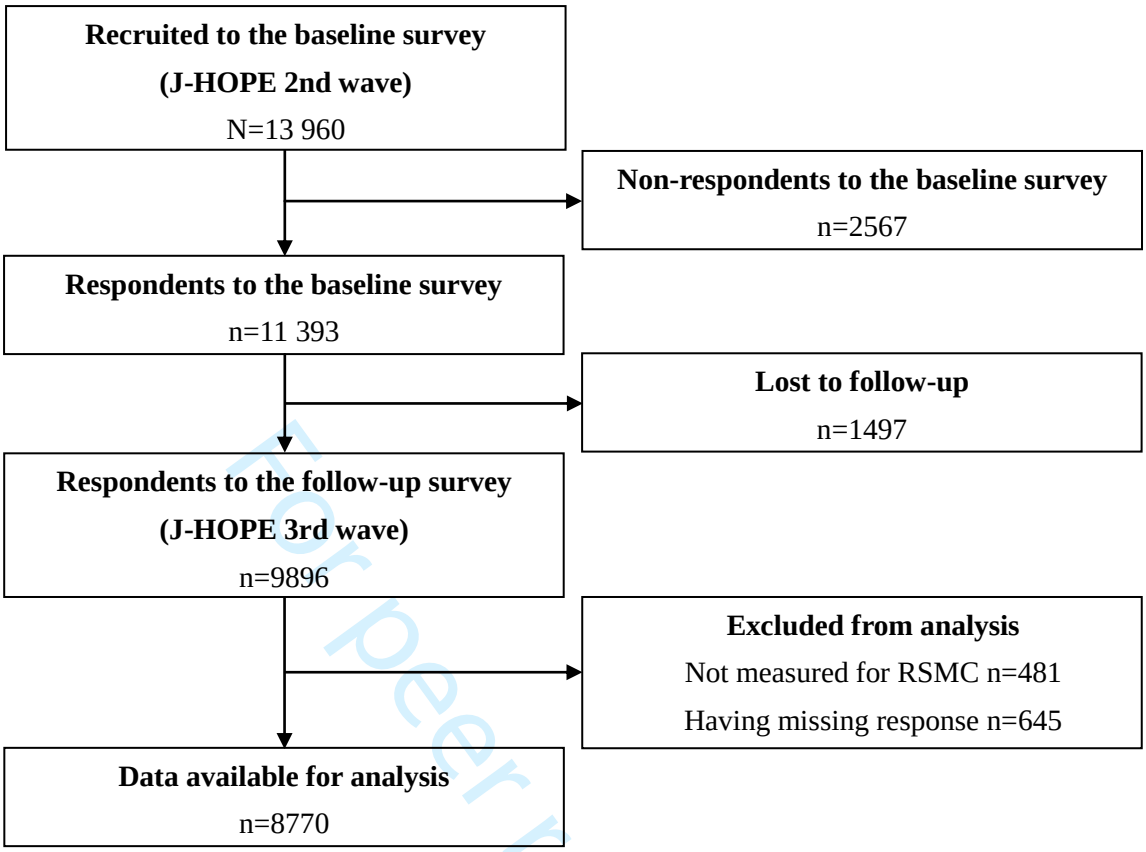

Figure 1 Recruitment and follow-up flow diagram

Supplementary Table Association of each item of the workplace social capital (WSC) scale with refraining from seeking medical care during the one-year follow-up period among Japanese employees: Cox regression with robust variance using a constant in the time variable †

	Men (n=6881)		Women (n=1889)	
	Relative risk (95% confidence interval)		Relative risk (95% confidence interval)	
	Model 1 ‡	Model 2 §	Model 1 ‡	Model 2 §
Item #1 (network-1)	1.05 (1.00 to 1.09)	1.04 (1.00 to 1.08)	1.14 (1.06 to 1.22)	1.14 (1.07 to 1.22)
Item #2 (network-2)	1.09 (1.05 to 1.14)	1.09 (1.04 to 1.13)	1.10 (1.03 to 1.18)	1.12 (1.04 to 1.19)
Item #3 (network-3)	1.11 (1.07 to 1.16)	1.10 (1.06 to 1.15)	1.12 (1.04 to 1.21)	1.12 (1.05 to 1.20)
Item #4 (reciprocity)	1.07 (1.03 to 1.11)	1.06 (1.02 to 1.11)	1.11 (1.04 to 1.18)	1.12 (1.05 to 1.19)
Item #5 (trust)	1.07 (1.03 to 1.12)	1.07 (1.03 to 1.11)	1.10 (1.03 to 1.18)	1.12 (1.05 to 1.19)
Item #6 (laughter/smiles)	1.04 (1.00 to 1.08)	1.05 (1.01 to 1.09)	1.05 (0.98 to 1.13)	1.07 (1.01 to 1.15)

† Each item score was reverse-coded so that higher score indicated lower WSC.

‡ Crude (ie, without any adjustment).

§ Adjusted for age, educational attainment and equivalent annual household income.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cohort studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Pages 1 and 3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pages 3–4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pages 5–7
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 7
Methods			
Study design	4	Present key elements of study design early in the paper	Page 8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pages 8–9
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	Pages 8–9
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pages 11–12
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pages 11–12
Bias	9	Describe any efforts to address potential sources of bias	Pages 12–13
Study size	10	Explain how the study size was arrived at	Pages 8–9 and Fig. 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Pages 11–13
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 13
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Pages 8–9 and Fig. 1
		(*d*) If applicable, explain how loss to follow-up was addressed	Pages 8–9 and Fig. 1
		(*e*) Describe any sensitivity analyses	N/A
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pages 8–9 and Fig. 1
		(b) Give reasons for non-participation at each stage	Page 8
		(c) Consider use of a flow diagram	Fig. 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pages 10 and 14–15
		(b) Indicate number of participants with missing data for each variable of interest	Pages 8–9 and Fig. 1
		(c) Summarise follow-up time (eg, average and total amount)	Page 8
Outcome data	15*	Report numbers of outcome events or summary measures over time	Page 15
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 17
		(*b*) Report category boundaries when continuous variables were categorized	Pages 11–12 and 17
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 18
Limitations			
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 18–21
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pages 19–20
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 21

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Workplace social capital and refraining from seeking medical care in Japanese employees: a one-year prospective cohort study

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Title:

Workplace social capital and refraining from seeking medical care in Japanese employees: a one-year prospective cohort study

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ABSTRACT

Objectives We examined the association of workplace social capital (WSC), including structural and cognitive dimensions, with refraining from seeking medical care (RSMC) among Japanese employees.

Design One-year prospective cohort study.

Setting and participants We surveyed 8770 employees (6881 men and 1889 women) aged 18–70 years from 12 firms in Japan using a self-administered questionnaire comprising the WSC scale and the items on potential confounders (ie, age, educational attainment and equivalent annual household income) at baseline (from April 2011 to March 2013).

Outcome measures At a one-year follow-up, we measured RSMC during the follow-up period using a single-item question "In the past year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist despite your sickness (including a slight cold or cavity) or injury?"

Results The results of Cox regression with robust variance showed that, after adjusting for potential confounders, the low WSC group (ie, the lowest tertile group) had a significantly higher relative risk (RR) of RSMC compared to the high WSC group (ie, the highest tertile group) among both men and women [overall WSC: RR 1.09 (95% confidence interval 1.01 to 1.17) and 1.20 (95% confidence interval 1.06 to 1.37); structural dimension: RR 1.13 (95% confidence interval 1.04 to 1.22) and 1.25 (95% confidence interval 1.07 to 1.45); and cognitive dimension: RR 1.11 (95% confidence interval 1.03 to 1.20) and 1.21 (95% confidence interval 1.06 to 1.38), respectively]. Trend analysis using a continuous score of the WSC scale also showed a significant association of low WSC with a higher risk of RSMC among both men and women.

Conclusions Our findings suggest that the lack of social capital in the workplace is

positively associated with RSMC among Japanese employees.

Strengths and limitations of this study

- This is the first study examining the association of social capital with refraining from seeking medical care in the occupational setting.
- We used a large-scale dataset from an occupational cohort survey.
- Our sample was recruited from primarily large-scale enterprises in Japan; therefore, the generalisation of our findings should be made with caution.
- Refraining from seeking medical care was measured by simply asking the participants to recall their experience over the past year, which may have led to recall bias.

INTRODUCTION

Access to medical care is an essential determinant of health.[1] Delayed access to medical care, often caused by refraining from seeking medical care (RSMC) (ie, reluctance to seek or avoidance of medical care),[2] has been reported to have effects on reduced quality of life, more extended hospital stays and mortality in a wide range of age groups.[3–6] Previous studies on RSMC have examined its potential individual determinants, including age,[7] health status,[8] insurance coverage[9] and social class (ie, educational attainment, household income and employment conditions).[10–15]

The interest in the effects of social contextual factors such as social capital on RSMC or access to medical care has been increasing.[1] Although social capital is defined in many ways, all definitions share the notion that social networks, norms of reciprocity and generalised trust are essential aspects of the concept.[16] Particularly in the health research field, social capital is conceptualised primarily as a two-dimensional construct consisting of a structural dimension (ie, what people 'do') and a cognitive dimension (ie, what people 'feel').[17] Based on this construct, the network aspect is categorised as the structural dimension while the reciprocity and trust aspects are categorised as the cognitive dimension.[18] Generally, social capital entails three types: bonding, bridging and linking. Bonding social capital refers to relations of trust and cooperation among people within relatively homogenous groups; bridging social capital refers to relations of respect and mutuality among people between heterogeneous groups; and linking social capital refers to relations between individuals and groups in different social strata in a hierarchy where different groups have access to power, social status and wealth.[19] As just described, the theoretical framework of social capital encompasses many complex aspects, dimensions and types of social interactions and cognitions that can have potential benefits but also disadvantages for communities and

the individuals living within them. Several reviews have highlighted the challenge of empirically verify the associations of social capital with health outcomes.[20–22] Medical care utilisation or RSMC is no exception. It has been theoretically suggested that social capital promotes positive psychological states towards self-care and appropriate medical care utilisation,[23] and empirical evidence to support this suggestion has been accumulated among community residents.[1, 20]

The idea of social capital is a natural candidate for expansion to occupational settings. Kawachi[24] pointed out that social capital is likely to be found in settings where people now spend most of their time. The workplace represents an important social unit, mainly since many people spend one-third of their lives at work[25] and the workplace is a significant source of social relations.[26] Several previous studies reported that the lack of workplace social capital (WSC) was associated with various kinds of health outcomes: poor self-rated health,[26–30] hypertension (or high blood pressure),[31, 32] poor mental health (eg, depression, depressive symptoms and psychological distress),[27, 33–38] unhealthy behaviours (eg, smoking)[39–42] and mortality.[43]

In the theoretical framework of job stress, WSC is considered to be a summary outcome of the favourable psychosocial work environment called job resources (eg, job control, supervisor and co-worker support, extrinsic reward, organisational justice, etc.) and also to improve mental and physical health among employees.[44] Given the definition of social capital, the workplace with low social capital can be characterised by lack of network, reciprocity and trust. In such a workplace, employees may have difficulty asking co-workers to re-arrange their schedules associated with seeking medical care, which may lead to the lack of time to excuse themselves from work and consequently to RSMC and subsequent poor self-rated health.[45] To date, two previous

studies in occupational settings have reported that low job control and low organisational justice (ie, procedural justice and interactional justice) were associated with less access to medical care or RSMC.[46, 47] However, the association of WSC with RSMC has not been thoroughly examined.

The purpose of the present study was to examine the association of WSC with RSMC among Japanese employees using a one-year prospective design. It was hypothesised that those who perceived lower levels of WSC at baseline would be more likely to refrain from seeking medical care during the one-year follow-up. In the present study, we focused mainly on the bonding WSC (ie, social capital within same working teams) because it is of particular importance in Japanese corporate culture, which is group-oriented: altruism, teamwork and group cohesiveness are emphasised[48] and it has been reported that bonding social capital is related mainly to better access to medical care.[20] On the other hand, it has also been pointed out that the empirical evidence for the association of bonding social capital with access to medical care is somewhat limited, primarily because of the tendency to mix different dimensions of social capital into overall indices.[20] Therefore, we focused not only on overall bonding WSC but also on its construct dimensions (ie, the structural dimension, including the network aspect and the cognitive dimension, including the reciprocity and trust aspects). Furthermore, in Japanese culture, laughter and smiles are also essential to maintain social harmony,[49] which is one of the elements of cognitive dimension.[17, 18] Therefore, we also focused on the laughter/smiles aspect and included it in the cognitive dimension. We analysed the data for men and women separately because a previous study has reported sex differences in medical care utilisation.[50]

METHODS

Study design

We extracted the data from longitudinal datasets collected in an occupational cohort study on social class and health in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE). The J-HOPE was conducted in three or four waves at 13 firms located in Japan. The primary industry sectors were information technology, hospital and medical facility, manufacturing, pharmaceutical, service, transportation and real estate. The first wave was conducted from April 2010 to March 2012; the subsequent waves were conducted in one-year intervals following the first wave. Because the RSMC was assessed only at the third wave in all surveyed firms, except for one hospital, the present study treated the second wave (conducted from April 2011 to March 2013) as a baseline and the third wave (conducted from April 2012 to March 2014) as a one-year follow-up. The analyses were conducted using the J-HOPE datasets available as of 22nd December, 2016.

Participants

In the second wave of the J-HOPE (ie, the baseline in the present study), a total of 11 393 employees completed a self-administered questionnaire (response rate 82%). During the one-year follow-up period, 1497 employees were transferred, took a leave of absence (ie, sick leave, maternity leave or childcare leave), retired or declined to participate. Overall, 9896 employees participated in the third wave (ie, one-year follow-up in the present study) and completed the follow-up questionnaire (follow-up rate 87%). After excluding 481 hospital employees who were not measured for RSMC in the third wave and 645 employees who had at least one missing response for variables relevant to the present study, the data from 8770 employees (6881 men and 1889 women) were analysed (see figure 1). Table 1 shows the type of industry and the

number of participants of each firm.

Table 1 Firm code, type of industry and the number of participants in each firm

Firm code (type of industry)	Men (n=6881)	Women (n=1889)
	n (%)	n (%)
1 (Information technology)	588 (8.5)	152 (8.0)
2 (Hospital) †	—	—
3 (Manufacturing)	1937 (28.1)	242 (12.8)
4 (Information)	446 (6.5)	222 (11.8)
5 (Pharmaceutical)	146 (2.1)	149 (7.9)
6 (Service)	13 (0.2)	23 (1.2)
7 (Veterinary)	1 (0.0)	2 (0.1)
8 (Medical)	13 (0.2)	18 (1.0)
9 (Service)	372 (5.4)	182 (9.6)
10 (Manufacturing)	2112 (30.7)	770 (40.8)
11 (Transportation)	1032 (15.0)	44 (2.3)
12 (Real estate)	168 (2.4)	58 (3.1)
13 (Real estate)	53 (0.8)	27 (1.4)

† Excluded from the analyses due to the lack of information on refraining from seeking medical care at follow-up.

Measures

Exposure: workplace social capital (baseline)

Bonding WSC was measured using a six-item scale developed by Eguchi et al.[48] This scale focuses on the structural and cognitive dimensions of the bonding WSC. The first three items (items #1–#3) that focus on the structural dimension by measuring the network aspect were adapted from the eight-item WSC scale developed by Kouvonen et al.[28] The remaining three items (items #4–#6) that focus on the cognitive dimension by measuring the reciprocity, trust and laughter/smiles aspects were based on Japanese studies that used the social cohesion approach to conceptualise social capital.[30, 32, 42, 51–53] These items are shown in the Appendix. All items were measured on a four-point Likert-type scale (1 *Not at all*, 2 *Not exactly*, 3 S*omewhat so* and 4 *Definitely*). Total scores for overall WSC (items #1–#6), the structural dimension (items #1–#3) and the cognitive dimension (items #4–#6) were calculated by summing their item scores (range 6–24 for overall WSC and 3–12 for structural and cognitive dimensions). In this sample, Cronbach's alpha coefficients were 0.90, 0.83 and 0.82 for overall WSC, the structural dimension and the cognitive dimension, respectively, indicating that the WSC scale had a higher level of internal consistency reliability and a lower risk of measurement error.[54] Participants were classified into tertiles (ie, high, moderate and low) based on the scores for overall WSC and its structural dimensions.

Outcome: refraining from seeking medical care (one-year follow-up)

The follow-up questionnaire included a single-item question measuring RSMC, which had been used in the Japanese General Social Survey conducted in 2008 (JGSS-2008).[13] The participants were asked to respond to the question "In the past year, have you ever refrained from visiting a hospital, clinic, acupuncturist or dentist

despite your sickness (including a slight cold or cavity) or injury?" The response options were "1 *Yes, I have*," "2 *No, I have not*" and "3 *I did not get sick or injured*." Participants were dichotomised into those who refrained from seeking medical care (ie, those who answered 1) and those who did not (ie, those who answered 2 or 3).

Potential confounders (baseline)

Among the potential individual determinants of RSMC introduced earlier,[7–15] age, educational attainment and household income were reported to be associated with the level of social capital;[55] therefore, these three factors were treated as potential confounders.

Age was classified into five groups: 29 years or younger, 30–39 years, 40–49 years, 50–59 years and 60 years or older. Educational attainment was classified into four groups: graduate school, college, junior college and high school or junior high school. As an indicator of household income, we calculated equivalent annual household income. The participants were asked to report their annual household income by selecting one of the following six response options: 2.99 million JPY (28 750 EUR) or less, 3–4.99 million JPY (28 850–48 000 EUR), 5–7.99 million JPY (48 100–76 800 EUR), 8–9.99 million JPY (76 900–96 050 EUR), 10–14.99 million JPY (96 150–144 100 EUR) and 15 million JPY (144 200 EUR) or more [EUR was converted from JPY using the average monthly exchange rate from April 2011 to March 2013 (104 JPY per EUR)]. Subsequently, equivalent annual household income was computed by dividing the median household income of each response option by the square root of the household size.

Statistical analysis

First, we conducted Student's t-test or Fisher's exact test to compare those who did and did not refrain from seeking medical care in potential confounders as well as in the total score for the WSC scale. Afterwards, using the high overall WSC group (ie, the highest tertile group) as a reference, we estimated the relative risks (RRs) and their 95% confidence intervals (CIs) of RSMC for the moderate and low overall WSC groups (ie, the middle and lowest tertile groups). When the outcome variable is dichotomous, logistic regression is typically used. The odds ratio (OR) calculated by the logistic regression is an approximation of RR when the outcome is relatively rare (ie, <10%). However, it has been pointed out that the OR overestimates RR when the outcome is common.[56] As shown later, the percentage of the RSMC cases was over 40% in the present sample (see tables 2 and 3). Therefore, we did not conduct logistic regression but Cox regression with robust variance, which has been recommended as a suitable method for estimating RR.[57] In the Cox regression, the time variable was treated as a constant since all of the participants analysed in the present study had a one-year follow-up period and there were no censored cases. In the analysis, we first calculated the crude RR (ie, without any adjustment) (model 1). Subsequently, we adjusted for potential confounders (ie, age, educational attainment and equivalent annual household income) (model 2). A similar analysis was conducted for the structural and cognitive dimensions of WSC. Furthermore, to examine whether the results of Cox regression using the tertile classification for WSC were robust, trend analysis was conducted using the continuous score of WSC. In the trend analysis, the total score of WSC was reversed (ie, higher score indicated lower WSC) and divided by the number of items (ie, converted so that the scoring range was 1–4), which allowed us to interpret RRs easily and make RRs for overall WSC and its construct dimensions comparable. In addition, we examined the association of every single item of the WSC scale with RSMC. In the

analysis, each item score was also reversed for the same reasons mentioned above. The level of significance was 0.05 (two-tailed). The statistical analyses were conducted using Stata/MP 14.0 for Windows (Stata Corp., College Station, TX, USA).

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of the present study.

RESULTS

Table 2 details the characteristics of the participants according to those who did and did not refrain from seeking medical care, together with sex. For men, those who refrained from seeking medical care, compared to those who did not, were younger ($p<0.001$) and highly educated ($p=0.012$), had lower equivalent annual household income ($p<0.001$) and perceived lower levels of WSC (overall WSC: $p<0.001$; structural dimension: $p<0.001$; and cognitive dimension: $p=0.001$). For women, those who refrained from seeking medical care, compared to those who did not, were younger ($p<0.001$) and highly educated ($p=0.003$) and perceived lower levels of WSC (overall WSC: $p=0.001$; structural dimension: $p<0.001$; and cognitive dimension: $p=0.006$) while there was no significant difference in equivalent annual household income between those who did and did not refrain from seeking medical care ($p=0.980$).

Table 2 Detailed characteristics of employees who participated in the present study

	Men (n=6881)				Women (n=1889)			
	Refrained from seeking medical care (n=2924)		Did not refrain from seeking medical care (n=3957)		Refrained from seeking medical care (n=870)		Did not refrain from seeking medical care (n=1019)	
	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)	Mean (SD)	n (%)
Age	40.5 (10.3)		42.2 (10.6)		38.1 (9.74)		40.8 (10.3)	
29 years or younger		537 (18.4)		610 (15.4)		222 (25.5)		187 (18.4)
30–39 years		787 (26.9)		938 (23.7)		257 (29.5)		249 (24.4)
40–49 years		996 (34.1)		1294 (32.7)		272 (31.3)		371 (36.4)
50–59 years		537 (18.4)		975 (24.6)		111 (12.8)		188 (18.4)
60 years or older		67 (2.3)		140 (3.5)		8 (0.9)		24 (2.4)
Educational attainment								
Graduate school		359 (12.3)		460 (11.6)		39 (4.5)		31 (3.0)
College		979 (33.5)		1332 (33.7)		234 (26.9)		214 (21.0)
Junior college		377 (12.9)		421 (10.6)		220 (25.3)		266 (26.1)
High school or junior high school		1209 (41.3)		1744 (44.1)		377 (43.3)		508 (49.9)
Equivalent annual household income †	41 153 (18 297)		42 985 (19 161)		35 928 (21 180)		35 904 (21 565)	
Workplace social capital (WSC)								
Overall WSC (items #1–#6) (range 6–24)	17.0 (3.32)		17.4 (3.31)		16.6 (3.55)		17.1 (3.45)	
Structural dimension (items #1–#3) (range 3–12)	8.50 (1.73)		8.68 (1.71)		8.20 (1.84)		8.51 (1.75)	
Cognitive dimension (items #4–#6) (range 3–12)	8.52 (1.77)		8.67 (1.76)		8.36 (1.88)		8.60 (1.86)	

† Currency unit is EUR, which was converted from JPY using the average monthly exchange rate from April 2011 to March 2013 (104 JPY per EUR).

Table 3 shows the results of the Cox regression with robust variance on overall WSC as well as on its construct dimensions. In the crude model (model 1), the low overall WSC group had a significantly higher RR of RSMC compared to the high overall WSC group for both sexes (RR 1.09, 95% CI 1.01 to 1.17 and RR 1.16, 95% CI 1.02 to 1.33 for men and women, respectively). Conversely, the moderate overall WSC group did not have a significantly higher RR of RSMC (RR 0.98, 95% CI 0.92 to 1.06 and RR 1.03, 95% CI 0.90 to 1.18 for men and women, respectively). These patterns remained unchanged after adjusting for potential confounders (model 2). When we separated overall WSC into structural and cognitive dimensions, similar tendencies were observed for both dimensions. Trend analysis using a continuous score of the WSC scale also showed a significant association of low WSC with a higher risk of RSMC, irrespective of sex, statistical model or construct dimensions of WSC.

When we examined the association of every single item of the WSC scale with RSMC, significant RRs for all items were observed, except for the item #6 (laughter/smiles) in the crude model among women (details are available in online supplementary table).

Table 3 Association of workplace social capital (WSC) with refraining from seeking medical care during the one-year follow-up period among Japanese employees: Cox regression with robust variance using the time variable as a constant

	Men (n=6881)				Women (n=1889)			
	n	Number of cases (%)	Relative risk (95% confidence interval)		n	Number of cases (%)	Relative risk (95% confidence interval)	
			Model 1 †	Model 2 ‡			Model 1 †	Model 2 ‡
Overall WSC (items #1–#6)								
High (19–24)	1701	706 (41.5)	1.00	1.00	439	188 (42.8)	1.00	1.00
Moderate (17–18)	2873	1174 (40.9)	0.98 (0.92 to 1.06)	0.99 (0.92 to 1.06)	731	324 (44.3)	1.03 (0.90 to 1.18)	1.07 (0.94 to 1.22)
Low (6–16)	2307	1044 (45.3)	1.09 (1.01 to 1.17)	1.09 (1.01 to 1.17)	719	358 (49.8)	1.16 (1.02 to 1.33)	1.20 (1.06 to 1.37)
Continuous (for one point score) §			1.11 (1.06 to 1.16)	1.10 (1.05 to 1.16)			1.15 (1.06 to 1.25)	1.17 (1.08 to 1.27)
Structural dimension (items 1#–#3)								
High (10–12)	1368	554 (40.5)	1.00	1.00	305	126 (41.3)	1.00	1.00
Moderate (9)	2891	1168 (40.4)	1.00 (0.92 to 1.08)	1.00 (0.93 to 1.08)	768	331 (43.1)	1.04 (0.89 to 1.22)	1.06 (0.91 to 1.24)
Low (3–8)	2622	1202 (45.8)	1.13 (1.05 to 1.22)	1.13 (1.04 to 1.22)	816	413 (50.6)	1.23 (1.05 to 1.42)	1.25 (1.07 to 1.45)
Continuous (for one point score) §			1.11 (1.06 to 1.17)	1.10 (1.05 to 1.16)			1.16 (1.08 to 1.26)	1.17 (1.09 to 1.27)
Cognitive dimension (items 4#–#6)								
High (10–12)	1499	614 (41.0)	1.00	1.00	410	177 (43.2)	1.00	1.00
Moderate (9)	2707	1091 (40.3)	0.98 (0.91 to 1.06)	0.99 (0.92 to 1.07)	694	302 (43.5)	1.01 (0.88 to 1.16)	1.05 (0.91 to 1.21)
Low (3–8)	2675	1219 (45.6)	1.11 (1.03 to 1.20)	1.11 (1.03 to 1.20)	785	391 (49.8)	1.15 (1.01 to 1.32)	1.21 (1.06 to 1.38)
Continuous (for one point score) §			1.08 (1.03 to 1.13)	1.08 (1.03 to 1.13)			1.11 (1.03 to 1.20)	1.14 (1.06 to 1.23)

† Crude (ie, without any adjustment).

‡ Adjusted for age, educational attainment and equivalent annual household income.

§ To interpret relative risks easily and make relative risks for overall WSC and its construct dimensions comparable, the total score was reversed (ie, higher score indicated lower WSC) and divided by the number of items (ie, converted so that the scoring range was 1–4).

DISCUSSION

We examined the one-year prospective association of WSC (mainly bonding WSC) with RSMC among Japanese employees. For both sexes, low overall WSC was significantly associated with a higher risk of RSMC, independently of age and socioeconomic characteristics (ie, educational attainment and equivalent annual household income). Similar tendencies were observed when we separated overall WSC into structural and cognitive dimensions.

For both structural and cognitive dimensions, the lack of WSC was significantly associated with a higher risk of RSMC, which supported our hypothesis. Our finding is consistent with the results of a previous systematic review of access to medical care among community residents, which reported that bonding social capital is related to better access to medical care.[20] The present study expanded this evidence into occupational settings. Given the findings from occupational settings suggesting the association of low job control and low organisational justice with RSMC,[46, 47] our finding is reasonable because WSC is theoretically considered to be a summary outcome of job resources (ie, favourable psychosocial work environment) including job control and organisational justice.[44] It is common for Japanese employees to take time off (ie, paid holiday) to seek medical care during working days because Japanese law does not necessarily require each company to establish paid sick leave. Although employees have a legitimate right to take time off, and employers should not treat employees who would like to take time off unfairly, Japanese corporate culture recognises working without taking time off as diligent. The social notion that "working hard is a virtue" is still firmly rooted in the Japanese psyche and taking time off in itself is viewed negatively.[58] Therefore, in the Japanese workplace with low social capital characterised by lack of network, reciprocity and trust, employees who take leave of

absence to seek medical care are more likely to be perceived negatively (eg, enjoying benefits or causing trouble for others) by co-workers as well as by supervisors. In other cases, workplaces may have an uncooperative attitude towards re-arranging the work schedule of those seeking medical care. Such a situation may prevent employees from seeking necessary medical care. On the other hand, it is unclear whether our findings would emerge in countries other than Japan. For example, in Western countries that are more individualistic compared to Asian countries, including Japan,[59] and have a legally established paid sick leave system, employees may seek medical care when getting sick irrespective of social capital of their workplace; therefore, a clear association of WSC with RSMC may not be observed. Future research is needed to replicate our findings in workplaces cross-culturally.

In the present study, the association of low WSC with RSMC remained unchanged after adjusting for potential confounders, including socioeconomic characteristics (model 2). This finding may be explained by the fact that our study sample comprised a higher proportion of employees at large-scale enterprises who were covered by corporate health insurance and received excellent benefits from their companies. Such homogeneity of our study sample may have decreased the confounding effects of demographic and socioeconomic characteristics on the association of low WSC with RSMC; therefore, our findings should be replicated in more vulnerable employees, such as employees at small and medium-scale enterprises or non-permanent employees, in the future.

Possible limitations of the present study should be considered. First, as discussed above, our study sample comprised Japanese employees from primarily large-scale enterprises, which tend to provide excellent benefits (eg, generous health care) to employees; therefore, the present findings should be generalised cautiously. Second,

RSMC was measured by simply asking the participants to recall their experience over the past year. Those who evaluated WSC as low may have been more likely to recall their own experience of RSMC during the follow-up period; therefore, our findings may be overestimated due to recall bias. Third, some employees dropped out during the follow-up period due to sick leave. They may have perceived lower levels of WSC at baseline and refrained from seeking medical care until their disease became severe, which may have underestimated the true association. Fourth, the present study did not obtain information on RSMC at baseline or regular hospital visit due to chronic disease, which may have masked the true association. Furthermore, personality traits may also have influenced our findings. Recent studies have reported that neuroticism is associated with an increased number of physician visits[60] as well as with higher levels of work-related stress;[61] therefore, without adjusting for neuroticism, our findings may have inflated the apparent association. Fifth, the influence of psychosocial work environment (ie, job demands or job resources) on the association of WSC with RSMC was not considered in the present study. As introduced earlier, WSC is considered a summary outcome of job resources aimed at improving health outcomes among employees;[44] therefore, various kinds of unobserved job resources may explain the association demonstrated in the present study. Future work should focus on the mediation effect of WSC on the association of psychosocial work environment with RSMC. Furthermore, some previous studies have examined the moderating effect of WSC on the association of adverse psychosocial work environment with health outcomes (eg, psychological distress and smoking);[36, 37, 41] therefore, research on the moderation effect of WSC on the association of psychosocial work environment with RSMC (or interaction effect of WSC and psychosocial work environment on RSMC) is also promising.

CONCLUSIONS

The present study offers evidence that WSC is an essential factor associated with individuals' decision to seek medical care for their perceived health issues independently of age and socioeconomic characteristics among Japanese employees. Our findings suggest that fostering a culture of network, reciprocity and trust in a workplace effectively promotes the medical care-seeking behaviour of Japanese employees. Future workplace intervention studies should investigate the effect of improving WSC on the promotion of employees' medical care-seeking.

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Competing interests None declared.

Contributors AI wrote the initial draft of the manuscript. AT, HE and YKa contributed to the analyses and interpretation of the data, and they assisted in the preparation of the manuscript. AI, AT, HE, AS, KM, MT, SK, KE, YKo, TT and NK contributed to the data collection. All authors critically reviewed the manuscript, approved the final

version of the manuscript and agreed to be accountable for all aspects of the work, ensuring that the questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved.

Patient consent Obtained.

Data sharing statement Because the data are still in the process of transferring to a data archiving organisation, the ad hoc committee chaired by AT is taking care of this role. The data were retrieved from the occupational cohort study on social class and health conducted in Japan (Japanese Study of Health, Occupation and Psychosocial Factors Related Equity: J-HOPE), and its authors may be contacted at akizumi@kitasato-u.ac.jp.

Ethical approval Research Ethics Committee, Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No. 2772-(4)), Kitasato University Medical Ethics Organisation (No. B12-103) and Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (No. 10-004) reviewed and approved the aims and procedures of the present study.

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Figure legends

Figure 1 Recruitment and follow-up flow diagram

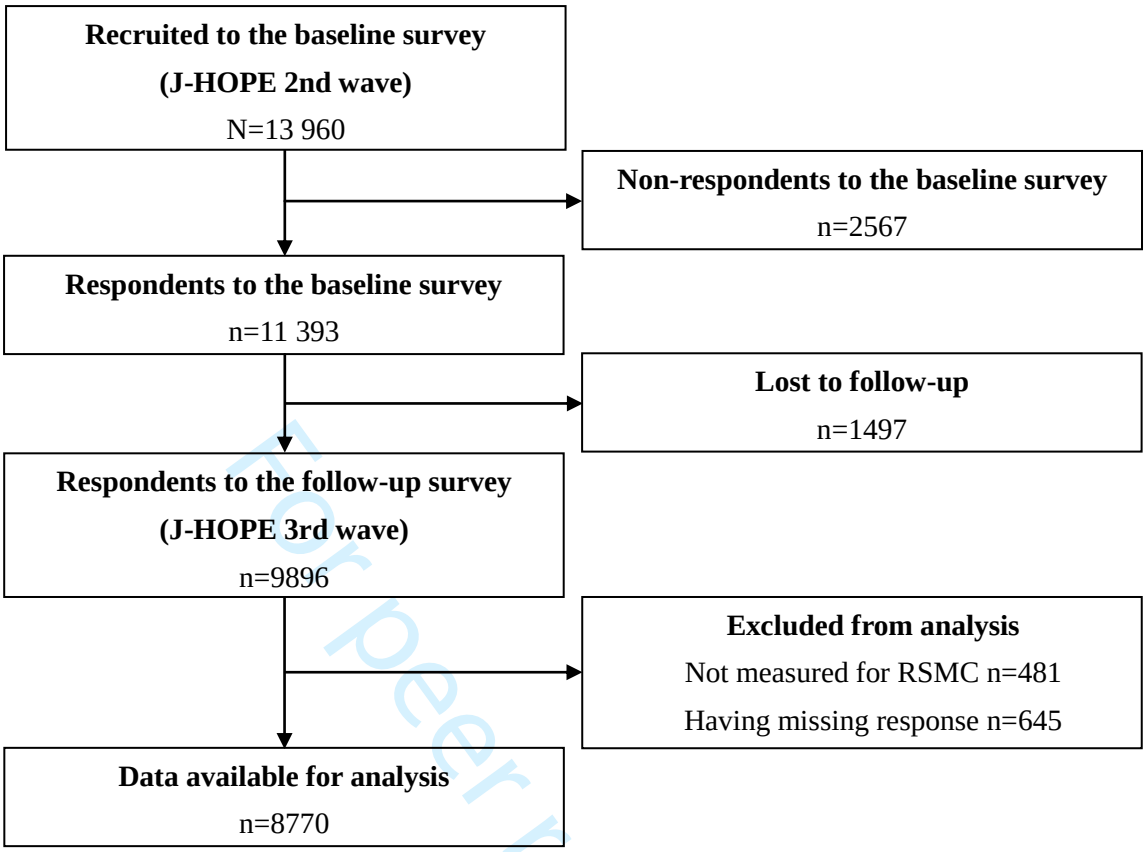

Figure 1 Recruitment and follow-up flow diagram

Appendix Bonding workplace social capital scale[48]

Item #1. People keep each other informed about work-related issues in the work unit.

Item #2. We have a 'we are together' attitude.

Item #3. People feel understood and accepted by each other.

Item #4. In our workplace, there is an atmosphere of helping each other.

Item #5. In our workplace, we trust each other.

Item #6. Our workplace is a place of laughter and smiles.

Supplementary Table Association of each item of the workplace social capital (WSC) scale with refraining from seeking medical care during the one-year follow-up period among Japanese employees: Cox regression with robust variance using a constant in the time variable †

	Men (n=6881)		Women (n=1889)	
	Relative risk (95% confidence interval)		Relative risk (95% confidence interval)	
	Model 1 ‡	Model 2 §	Model 1 ‡	Model 2 §
Item #1 (network-1)	1.05 (1.00 to 1.09)	1.04 (1.00 to 1.08)	1.14 (1.06 to 1.22)	1.14 (1.07 to 1.22)
Item #2 (network-2)	1.09 (1.05 to 1.14)	1.09 (1.04 to 1.13)	1.10 (1.03 to 1.18)	1.12 (1.04 to 1.19)
Item #3 (network-3)	1.11 (1.07 to 1.16)	1.10 (1.06 to 1.15)	1.12 (1.04 to 1.21)	1.12 (1.05 to 1.20)
Item #4 (reciprocity)	1.07 (1.03 to 1.11)	1.06 (1.02 to 1.11)	1.11 (1.04 to 1.18)	1.12 (1.05 to 1.19)
Item #5 (trust)	1.07 (1.03 to 1.12)	1.07 (1.03 to 1.11)	1.10 (1.03 to 1.18)	1.12 (1.05 to 1.19)
Item #6 (laughter/smiles)	1.04 (1.00 to 1.08)	1.05 (1.01 to 1.09)	1.05 (0.98 to 1.13)	1.07 (1.01 to 1.15)

† Each item score was reverse-coded so that higher score indicated lower WSC.

‡ Crude (ie, without any adjustment).

§ Adjusted for age, educational attainment and equivalent annual household income.

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cohort studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Pages 1 and 3
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Pages 3–4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pages 5–7
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 7
Methods			
Study design	4	Present key elements of study design early in the paper	Page 8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 8
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	Page 8
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed	N/A
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pages 9–10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pages 9–10
Bias	9	Describe any efforts to address potential sources of bias	Pages 10–11
Study size	10	Explain how the study size was arrived at	Page 8 and Fig. 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Pages 9–12
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pages 11–12
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	Page 8 and Fig. 1
		(*d*) If applicable, explain how loss to follow-up was addressed	Page 8 and Fig. 1
		(*e*) Describe any sensitivity analyses	N/A
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8 and Fig. 1
		(b) Give reasons for non-participation at each stage	Page 8
		(c) Consider use of a flow diagram	Fig. 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pages 12–14
		(b) Indicate number of participants with missing data for each variable of interest	Page 8 and Fig. 1
		(c) Summarise follow-up time (eg, average and total amount)	Page 8
Outcome data	15*	Report numbers of outcome events or summary measures over time	Page 14
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 16
		(*b*) Report category boundaries when continuous variables were categorized	Pages 9–10 and 16
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 17
Limitations			
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 17–19
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pages 17–18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 20

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.