Relationship of health literacy with utilization of health-care services in a general Japanese population

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A B S T R A C T

Many studies have explored the association between health literacy and health-care utilization; however, the majority assessed functional health literacy in terms of basic skills. Japan's health-care and medical examination system in workplaces is different from that of other major countries. This study examined the relationship of health literacy with health-care use (emergency visit, hospitalization, dental checkup, and health checkup or cancer screening); it focused on differences by occupation and health-care service utilization among general Japanese using the communicative and critical health literacy scale. We conducted a cross-sectional observational study of 1002 Japanese residents. Through a questionnaire, we investigated socioeconomic status, health status, health-care use, and health literacy. Among all participants and non-workers, logistic regression analyses revealed that health literacy was significantly associated with health checkup or cancer screening after adjusting for sex, age, marital status, education, and having a disease or disorder (adjusted odds ratio [OR] = 1.431, 95% confidence interval [CI], 1.131–1.810; adjusted OR = 1.614, 95% CI, 1.114–2.339, respectively). Among workers, we observed no significant association between health literacy and health-care utilization. These results indicate that health literacy is closely related to use of preventive health-care. Japan's health-care system in workplaces may promote use of preventive health-care services regardless of health literacy, whereas improving health literacy may be more critical among non-workers.

1. Introduction

Recently, health literacy has been considered an important factor with regard to individual health behaviors and health outcomes. Health literacy is defined by the World Health Organization as "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health" (Nutbeam, 1998). It has been repeatedly reported that people with limited health literacy may be unable to adequately understand and utilize health information in a way that protects and improves their health; they thus have lower health status and lower adherence to medical treatment (Berkman et al., 2011; Al Sayah et al., 2013; Miller, 2016).

Studies have also revealed that limited health literacy is related to over- and underutilization of health-care services (Rasu et al., 2015; Mantwill and Schulz, 2017; Franzen et al., 2014; Mantwill and Schulz, 2015; Haun et al., 2015). Some reports have suggested that limited health literacy is associated with increased hospitalization (Baker et al.,

2002) and emergency room visits (Baker et al., 2004; Cho et al., 2008) as well as lower cancer screening rates (Kim and Han, 2016; Oldach and Katz, 2014). Many studies have identified an association between health literacy and health-care utilization; however, those investigations mainly assessed functional health literacy in terms of basic reading and writing skills in the United States and a few other English-speaking countries. In Japan, to our knowledge, only one study has examined the association between health literacy and health-care utilization (Mitsutake et al., 2012). It currently remains uncertain whether and how health literacy beyond a basic functional level is associated with health-care utilization in a general Japanese population.

In many countries, such as the United States, China, and some European nations, individuals generally take out public medical insurance or private insurance. Annual medical examinations (e.g., dental checkup, health checkup, and cancer screening) are not usually conducted at workplaces or local community centers. Thus, residents need to voluntarily utilize health-care services as appropriate. By contrast, Japan's health-care and medical examination system are different from

those of other major countries. Japan's insurance system is a universal health-care system, allowing ready access to health-care services (Ikegami et al., 2011). In workplaces, all companies are obliged to carry out health checkup at least once a year to detect diabetes, hyperlipidemia, and other non-communicable diseases. Generally, financial support for these medical examinations is provided by companies or local communities.

However, it is widely acknowledged that the Japanese do not always adequately use health-care services. For example, since 2008, Japanese medical insurers have been obliged to conduct medical examinations and provide health guidance with a focus on metabolic syndrome for insured individuals aged 40–74 years. Despite this, the implementation rate of specific health examinations exceeded 50% for the first time in 2015 (MHLW; www.mhlw.go). Breast and cervical cancer screening rates are lower than those in some Western countries (OECD; stats.oecd.org). Thus, it is possible that important predictors exert some influence on the utilization of health-care services by Japan's general public.

The present study explored the relationship between health literacy and health-care utilization in a general Japanese population using the communicative and critical health literacy (CCHL) scale. We hypothesized that health literacy is associated with preventive health-care utilization (i.e., dental checkup, health checkup, and cancer screening). We also hypothesized that health literacy was more strongly associated with preventive health-care utilization among non-workers compared with workers because non-workers need to voluntarily obtain annual medical examinations every year. The Japanese insurance system is a universal health-care system, and many citizens can receive appropriate treatment and medical examinations at no cost or for a low price; thus, we hypothesized that there is no association between health literacy and necessary health-care utilization (i.e., emergency visit and hospitalization).

2. Materials and methods

2.1. Study design and subjects

In this cross-sectional observational study, we recruited participants among Japanese residents who had registered with a commercial survey research company database. We aimed to collect data from a minimum of 1000 males and females aged 20–79 years. We randomly invited potential respondents via fax or mail to participate in a survey regarding socioeconomic status, health status, utilization of health-care services, and health literacy. Those who agreed to participate were asked to return the completed consent form. When inviting participants from the registered monitors in the database, we tried to match the distributions of the participants' sex and age-group with those of estimated data for Japan's population. Japanese population data were collected in the national census conducted on October 1, 2016 (NC; www.stat.go). We collected up to the targeted number of responses from potential participants for each sex and age-group. We mailed a paper-based self-administered questionnaire to individuals who agreed to participate in the survey. Finally, we obtained data from 1002 people.

The study was approved by the ethical review committee of the Graduate School of Medicine, The University of Tokyo (examination number 11476).

2.2. Measures

2.2.1. Sociodemographic variables

We obtained the following details: sex (men or women); age (years); marital status (unmarried or married, divorced, widowed); education (elementary school, junior high school; senior high school, professional school; 2-year college, technical college; college, university; or graduate); occupation (worker [self-employed business, company management, full-time worker, part-time worker] or non-worker [retired, out of work, full-time homemaker]); and self-rated economic status. Self-rated economic status was ranked on a 10-point scale, ranging from 1 (lowest) to 10 (highest). We categorized the result as low (1–3 points), moderate (4–6 points), or high (7–10 points).

2.2.2. Health status

We assessed whether participants had experienced a disease or disability for which they had received treatment in the previous year. We requested details of body height and weight to calculate body mass index (BMI). BMI was calculated based on body weight (kg) divided by height squared (m^2).

2.2.3. Utilization of health-care services

Using the self-administered questionnaire, we assessed whether participants had visited an emergency room twice or more in the previous year. We also checked whether participants had stayed in a hospital and undergone a medical checkup, such as a dental checkup, health checkup, or cancer screening, at least once in the previous year.

2.2.4. Communicative and critical health literacy

We measured health literacy using a scale developed and validated in Japan to assess communicative and critical health literacy (Ishikawa et al., 2008). The scale includes three items for communicative health literacy (items 1–3) and two for critical health literacy (items 4–5). Participants were asked whether they could do the following: (1) obtain health-related information from various sources; (2) extract the required information; (3) understand and communicate the information obtained; (4) assess the reliability of the information; and (5) make decisions based on the information, specifically in the context of health-related issues. We rated each item on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The scores of the five items were summed and divided by the number of items in the scale to yield a scale score (theoretical range, 1–5). The internal consistency of the scale was adequate (Cronbach's α = 0.86).

2.3. Statistical analysis

We first examined the associations between each participant's characteristic variables and occupation using the chi-square test and independent *t*-test. We also examined the associations between each utilization of health-care services and occupation with the chi-square test. We then conducted logistic regression analyses to test the relationship of health literacy with utilization of health-care services, adjusting for sex, age, marital status, education, and having a disease or disorder under treatment. Every year, most Japanese employees undergo a health checkup and cancer screening according to instructions at their workplace; thus, we also conducted logistic regression analyses separately for occupation (worker or non-worker).

A *P* value of < .05 was set as significant for all statistical tests. We analyzed the data using SPSS, version 21.0 (SPSS Inc., Chicago, IL, USA).

3. Results

Table 1 presents the participant characteristics and descriptive results for the study variables. The mean age of the participants was 49.8 years; 50.4% were women. The majority of participants (69.9%) were married, divorced, or widowed; 63.0% were workers. The utilization rate of health-care services—emergency visit, hospitalization, dental checkup, and health checkup or cancer screening—was 12.4%, 5.5%, 65.1%, and 74.7%, respectively. The mean health literacy score was 3.61 (standard deviation [SD] = 0.64). Occupation was significantly associated with sex, age, marital status, education, and having a disease or disorder under treatment (*P* < .001, *P* < .001, *P* = .001, *P* < .001, and *P* < .001, respectively; Table 1). In

Table 1
Participant characteristics and sociodemographics (1002 participants).

Variable	Total (N = 1002)		Occupation				P
			Worker[a] (n = 631)		Non-worker[b] (n = 371)		
	n	%	n	%	n	%	
Sex (n = 1002)							
Men	497	49.60	381	60.38	116	31.27	< .001[c]
Women	505	50.40	250	39.62	255	68.73	
Age-group (years) (n = 1002)							
< 29	136	13.57	70	11.09	66	17.79	< .001[c]
30–39	169	16.87	143	22.66	26	7.01	
40–49	197	19.66	155	24.56	42	11.32	
50–59	164	16.37	131	20.76	33	8.89	
60–69	191	19.06	95	15.06	96	25.88	
70–79	145	14.47	37	5.86	108	29.11	
Marital status (n = 1002)							
Unmarried	302	30.14	213	33.76	89	23.99	.001[c]
Married, divorced, or widowed	700	69.86	418	66.24	282	76.01	
Education (n = 1002)							
Elementary school or junior high school	36	3.59	18	2.85	18	4.85	< .001[c]
Senior high school or professional school	439	43.81	256	40.57	183	49.33	
2-year college or technical college	136	13.57	78	12.36	58	15.63	
College or university	371	37.03	262	41.52	109	29.38	
Graduate			17	2.69	3	0.81	
Self-rated economic status (n = 998)							
Low (1–3)	157	15.73	98	15.53	59	15.90	.0837[c]
Moderate (4–6)	636	63.73	405	64.18	231	62.26	
High (7–10)	205	20.54	126	19.97	79	21.29	
Missing	4	0.40	2	0.32	2	0.54	
Having a disease or disorder under treatment (n = 988)							
Yes	501	50.71	264	41.84	223	60.11	< .001[c]
No	487	49.29	361	57.21	140	37.74	
Missing	14	1.42	6	0.95	8	2.16	
Body mass index (n = 998)							
< 18.5	115	11.52	75	11.89	40	10.78	.404[c]
18.5–24.9	674	67.54	416	65.93	258	69.54	
≥25.0	209	20.94	139	22.03	70	18.87	
Missing	4	0.40	1	0.16	3	0.81	
Utilization of health-care services							
Emergency visit (n = 998)							
Yes	124	12.42	79	12.52	45	12.13	.866[c]
No	874	87.58	550	87.16	324	87.33	
Missing	4	0.40	2	0.32	2	0.54	
Hospitalization (n = 1001)							
Yes	55	5.49	31	4.91	24	6.47	.299[c]
No	946	94.51	599	94.93	347	93.53	
Missing	1	0.10	1	0.16	0	0.00	
Dental checkup (n = 1002)							
Yes	652	65.07	393	62.28	259	69.81	.016[c]
No	350	34.93	238	37.72	112	30.19	
Health checkup or cancer screening (n = 999)							
Yes	746	74.67	514	81.46	232	62.53	< .001[c]
No	253	25.33	116	18.38	137	36.93	
Missing	3	0.30	1	0.16	2	0.54	
Health literacy			Mean ± SD[e]				
	3.61 ± 0.64		3.64 ± 0.62		3.55 ± 0.65		.095[d]

[a] Self-employed business, company management, full-time or part-time employment.
[b] Retired, out of work, or full-time homemaker.
[c] Chi-square test.
[d] *t* test.
[e] Standard deviation.

utilization of health-care services, occupation was significantly associated with dental checkup and health checkup or cancer screening (P = .016, P < .001, respectively; Table 1).

Table 2 presents the logistic regression analyses of health literacy on utilization of health-care services. Among all participants and non-workers, health literacy was significantly associated with health checkup or cancer screening after adjustment for sex, age, marital status, education, and having a disease or disorder under treatment (adjusted odds ratio [OR] = 1.431, 95% confidence interval [CI], 1.131–1.810; adjusted OR = 1.614, 95% CI, 1.114–2.339,

respectively). However, we found no statistical relationship between health literacy and emergency visit, hospitalization, and dental checkup. Among workers, health literacy was not associated with any utilization of health-care services.

4. Discussion

This study examined the relationship between health literacy and utilization of health-care services in a general Japanese population. The mean score for health literacy among all participants was 3.61

Table 2
Relationship of health literacy with utilization of health-care services (1002 participants).

Utilization of health-care services	All (N = 1002)			Worker[a] (n = 631)			Non-worker[b] (n = 371)		
	OR[c]	95% CI[d]	P	OR[c]	95% CI[d]	P	OR[c]	95% CI[d]	P
Emergency visit									
Yes	0.879	0.653–1.182	.393	0.938	0.633–1.389	.750	0.780	0.488–1.245	.297
No	1			1			1		
Hospitalization									
Yes	1.344	0.864–2.091	.190	1.651	0.870–3.131	.125	1.145	0.617–2.125	.667
No	1			1			1		
Dental checkup									
Yes	1.209	0.974–1.500	.085	1.122	0.857–1.470	.403	1.387	0.968–1.988	.075
No	1			1			1		
Health checkup or cancer screening									
Yes	1.431	1.131–1.810	.003	1.252	0.899–1.744	.184	1.614	1.114–2.339	.011
No	1			1			1		

[a] Self-employed business, company management, full-time or part-time employment.
[b] Retired, out of work, or full-time homemaker.
[c] Odds ratios (those who utilized a health-care service compared with those who did not) were calculated by multivariate logistic regression analysis adjusted for sex, age, marital status, education, and having a disease or disorder under treatment.
[d] Confidence Interval.

(SD = 0.64), which is higher than that observed in a nationwide online survey of the general Japanese population (N = 712; mean ± SD, 3.59 ± 0.62) (Ishikawa et al., 2016). Among workers, the mean score for health literacy was 3.64 (SD = 0.62). By comparison, that score is lower than one reported in a study of male Japanese white-collar workers (N = 190; mean ± SD, 3.72 ± 0.68) (Ishikawa et al., 2008).

In this study, health literacy was not independently associated with emergency visit and hospitalization. Current results concerning health literacy as a predictor for emergency visit and hospitalization are mixed. Some investigations have reported that individuals with inadequate health literacy were more likely to be hospitalized (Baker et al., 2002; Howard et al., 2006). Other studies did not find health literacy to be associated with emergency visit and hospitalization (Cho et al., 2008; Arozullah et al., 2006). Although the data are not shown in the present investigation, we found emergency visit to be significantly associated with having a disease or disorder under treatment and BMI rather than health literacy (chi-square test, P = .002 and P = .029, respectively). We also observed that hospitalization was associated with having a disease or disorder under treatment (chi-square test, P < .001). From our chi-square test results, we suspect that health-related outcomes, rather than health literacy, were associated with emergency visit and hospitalization. Among Taiwanese adults, one study found that health literacy was not associated with emergency visit and hospitalization (Lee et al., 2010). Taiwan's national health insurance system has universal coverage, and it has expanded access by waiving copayments for the very poor (Davis and Huang, 2008). Thus, it is possible that the lack of an association between health literacy and health-care utilization in Japan and Taiwan may be due to affordable, accessible health-care services.

Contrary to our expectations, health literacy was not associated with dental checkup. The finding of one study found health literacy to be associated with using dental services, including dental checkup (Parker and Jamieson, 2010). Another investigation also reported a significant association between health literacy and oral health-related outcomes, such as dental caries, number of teeth, and oral health behaviors (Firmino et al., 2017; Vann Jr et al., 2010). To measure dental health literacy, those studies mainly used Rapid Estimate of Adult Literacy in Dentistry (REALD)-30. That scale was developed based on REALD-99, which assesses the ability to read and understand health terms (Richman et al., 2007). The shortened version, REALD-30, has been validated (Lee et al., 2007). REALD-30 was based on word recognition in terms of basic skills; however, our health literacy scale (CCHL) measured more advanced literacy skills, such as communicative and critical health literacy. This partly explains why in the present

study, health literacy was not significantly associated with dental checkup.

After we adjusted for various potential confounders, our logistic regression analyses demonstrated that among all participants and non-workers, participants with higher health literacy were more likely to undergo obtain health checkup or cancer screening. This finding is consistent with those of previous reports. For example, investigations have repeatedly observed an association between inadequate health literacy and lower cancer screening rates (Kim and Han, 2016; Oldach and Katz, 2014). Educational interventions about health literacy have been developed to improve health-related behavior, including cancer screening (Van den Broucke et al., 2014; Crowley et al., 2013). One review has suggested that such interventions help mediate the impact of barriers to undergoing cancer screening, such as low health literacy (Luque et al., 2018). One Japanese report found that health education designed to impart knowledge and interpersonal skills may improve health literacy beyond functional health literacy (Ishikawa et al., 2018); however, in Japan, there are few educational opportunities to support health management with respect to health literacy. As a first step toward improving this situation, it would be advantageous to assess health literacy among the general Japanese population.

In the present study, we did not find a significant association between health literacy and health checkup or cancer screening among workers. One previous investigation also failed to identify an association between health literacy and health checkup among Japanese workers who for many years had ignored recommendations to visit a physician following health checkup (Goto et al., 2018). The participants' attitude to visiting physicians was associated with several environmental factors, such as living arrangements, job demands, and having a primary doctor. Based on the Industrial Safety and Health Act, all companies in Japan organize annual health checkup for employees; every year, over 80% of workers take such health checkup through their company (SSEH; www.mhlw.go). For the purpose of secondary prevention, many companies also organize cancer screening for employees. In the present study, the health checkup or cancer screening rate for workers was 81.6%; this rate is significantly higher than that for non-workers (62.9%; chi-square test, P < .001; data not shown). Japanese companies are well placed to organize health checkup and cancer screening; thus, we suspect that workers' health checkup or cancer screening were more strongly affected by environmental factors than by health literacy. Thus, medical examinations, including health checkup and cancer screening, conducted through the workplace may play a key role toward promoting the utilization of preventive health-care services by Japanese employees.

This investigation has several limitations. First, it was a cross-sectional observational study. Thus, we were unable to determine the causal relationship between health literacy and use of health-care services. Our findings should be considered preliminary: a longitudinal study is necessary to address this issue. Second, we obtained data through a self-report questionnaire. One study on self-report bias regarding cancer screening found that subjects were more likely to provide socially desirable answers; that resulted in over-reporting of their counseling history (Rauscher et al., 2008). The effect of self-report bias cannot be excluded in the case of the present investigation because we used self-report questionnaires. Third, health literacy was evaluated by means of self-assessed scales rather than objective methods. This raises the possibility of participants reporting more favorable health literacy; that could have led to overestimation of the health literacy level in this study. Fourth, the participants had registered with a commercial survey research company database; thus, they are not representative of the general Japanese population. We did attempt to match the distributions of our participants' sex and age with those of estimated data for the Japanese population. However, the proportion of university graduates in our study was greater than that in national census data for 2010 (almost 40% and 20%, respectively). Thus, it is possible that there was some sample selection bias.

5. Conclusions

In the present study in a general Japanese population, we found that health literacy is related to differences in occupation and the utilization of health-care services. We observed that health literacy was not significantly associated with emergency visit, hospitalization, and dental checkup. However, we did identify a significant association between health literacy and health checkup or cancer screening among all participants and non-workers; that association was not evident among workers. These results imply that Japan's health insurance and medical examination system in the workplace affect the population's use of health-care services. Improving non-workers' health literacy could be effective in encouraging preventive health-care utilization (i.e., health checkup and cancer screening). Further studies are needed to elucidate in greater detail the associations between health literacy beyond functional level and determining the use of health-care services in Japan.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2019.01.015.

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