

Relationship between Health Literacy and Physical Fitness of Japanese University Students

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ABSTRACT

Introduction: In recent years, attention has been focused on improving health literacy in a variety of settings. People with low health literacy do not practice various health behaviors including physical activity and are likely to be a group with high health risk. On the other hand, people with high health literacy practice various health behaviors and are expected to be physically active, which may lead to high physical function. The purpose of this study was to clarify the relationship between health literacy and physical fitness among college students.

Methods: Eighty-two subjects who consented to the study were included in the study, and HLS-EU-Q47, eHEALTH, physical composition and physical fitness (10 m run, grip strength, YoYo test) were measured.

Results: In this study, there was no relationship between health literacy and physical fitness, but only between health literacy and physical fitness respectively ($p < 0.05$).

Conclusions: The reason why the relationship between health literacy and physical fitness was not found is thought to be due to the low level of health literacy among the Japanese and the low utilization of health promotion and the lack of action to improve health.

Keywords: HLS-EU-Q47; eHEALTH; Physical fitness; College student

1. Introduction And Contextualization

The Ottawa Charter of 1986 and the Bangkok Charter of 2005 proposed a health strategy called health promotion for the health of individuals and groups in society.

Health promotion is defined as “the process of enabling people to control and improve their own health and its determinants” and health literacy is positioned as one of its outcomes.

Health literacy has been defined in various ways.

Cognitive social skills that determine an individual’s willingness and ability to access, understand, and use information to promote and maintain good health^[1].

A variety of skills, including basic literacy and numeracy, required in health care settings^[2].

Degree of ability to obtain, organize, and understand basic health information and services needed to make good health decisions^[3].

A broad range of skills and abilities developed throughout life that enable people to find, understand, evaluate, and use health information to reduce health risks and improve quality of life through informed choices^[4].

Important empowerment strategies that increase people’s ability to make good health decisions, control their own health,

find information, and take responsibility in their homes and communities, in the workplace, in health care, in commerce, and in politics^[5].

The knowledge, motivation, and ability to obtain, understand, evaluate, and use health information so that they can make decisions about health care, disease prevention, and health promotion in their daily lives and maintain or improve their quality of life throughout their lives^[6].

Health literacy, as defined by the HLS-EU (European Health Literacy Project), is simply the ability to make informed decisions about health^[6].

With the recent spread of the Internet, the concept of “information access” in health literacy should include not only the ability to research but also the ability to select information appropriately, and the eHealth Literacy Scale, which is limited to the Internet as a source of health information, has been developed. The eHealth literacy Scale (eHEALTH) was developed^[7].

eHEALTH is defined as “the ability to search for, find, understand, and evaluate health information from electronic sources, and to use the knowledge gained to solve health problems. Each university has been improving the environment through various educational methods and distinctive classes.

However, there have been no actual numerical verifications of both objective and subjective indicators to measure this effect, and there have been few similar reports.

The impact of low health literacy on health and medical care includes: not using preventive services (flu shots and mammograms), having less knowledge about diseases, treatments, and medications, and dying 1.25 times earlier with insufficient health literacy than with sufficient health literacy^[8,9].

In addition, people with low health literacy are less likely to practice a variety of health behaviors, including physical activity, and are more likely to be at higher health risk, whereas individuals with high health literacy practice a variety of health behaviors and are expected to be physically active, and therefore may have high physical functioning^[10-13].

The purpose of this study was to clarify the relationship between health literacy and physical fitness among college students.

Materials & Methods/Tables/Graphs

About the subjects

Of the 629 participants who attended the research orientation, 82 were included in the study after excluding those who did not agree to participate in the study, those who were enrolled in more than one course, and those who had not completed all data including the health literacy and physical fitness survey tasks.

All participants were informed in writing and verbally that participation in the study was voluntary, that their grades would not be affected, and that they would not be disadvantaged if they withdrew. This study was conducted with the approval of the Research Ethics Committee of Momoyama Gakuin University (approval number 29).

Health Literacy Survey

The Health Literacy Survey developed the HLS-EU-Q47 (European Health Literacy Survey Questionnaire), which measures acquisition, understanding, evaluation, and application (decision-making) in the three domains of health care,

disease prevention, and health promotion using 47 questions (Questionnaire) was used^[14].

We used a Japanese translation of the HLS-EU-Q47, which measures four competencies in health care, disease prevention, and health promotion using 47 questions.

It measures the ability to obtain, understand, evaluate, and use health information in the three domains of health care, disease prevention, and health promotion. Responses to each question are scored on a 4-point scale: very easy (4 points), somewhat easy (3 points), somewhat difficult (2 points), and very difficult (1 point). Responses to each question are scored on a 4-point scale.

eHealth literacy is defined as the ability to seek, find, understand, and evaluate health information from electronic sources and to use the knowledge gained to solve health problems^[7].

eHealth Score measures the ability to obtain, understand, evaluate, and judge reliable health information on the Internet as eHEALTH score. The eHealth Score measures the ability to obtain, understand, evaluate, and judge reliable health information on the Internet as the eHEALTH Score. The total score was calculated using the eHealth Scale, a score consisting of eight items (8-40 points) developed to measure the ability to obtain, understand, evaluate, and judge reliable health information on the Internet.

The HLS-EU-Q47 and eHEALTH surveys were administered using a web-based questionnaire (Google form).

Participants were given a paper copy of the questionnaire regarding the purpose and application of the survey, as well as a URL with a QR code for their responses.

After responding, the QR-coded form was collected and the responses on the form were matched to the responses on the questionnaire. If there were any discrepancies in the responses, the paper responses were adopted.

Physical Fitness Surveys

Body composition (height, weight, body fat percentage, fat mass, muscle mass*, muscle score), grip strength, 10 m run, and YoYo test (Intermittent recovery test: male level 2, female level 1) were conducted.

Muscle mass was calculated for the right and left arms, right and left legs, and trunk.

Grip strength and 10 m run were used as indices of power, and YoYo test was used as an index of endurance (maximal oxygen uptake).

Body composition was measured using the Body Composition Analyzer InnerScan Dual (RD-804L, TANITA).

Yo-Yo Intermittent Recovery Test (Yo-Yo IRT)

The Yo-Yo Intermittent Recovery Test (Yo-Yo IRT) is a repetitive exercise performed at gradually increasing speeds, with a 20-m round-trip sprint each way and a 10-second recovery time (jogging to a marker located 5 m from the starting position and back) interspersed with repetitions to a signal tone. The participants are asked to repeat the process with a 10-second recovery period (jogging back and forth to a marker located 5 m from the starting position) in between. The interval between the signal tones becomes shorter as the level increases, and failure is defined as failure to return to the start line within the time limit.

Failure is limited to two times and is evaluated based on the distance traveled at the time of the second failure. In this study, level 1 was used for females and level 2 for males.

Statistical Analysis

Correlations between HLS-EU-Q47, eHEALTH, 10-meter run, grip strength, and YoYo test were performed using Pearson's product rate correlation coefficient ($n = 82$).

IBM SPSS statistics 28 was used for all statistical analyses,

Table 1: Percentages of “Somewhat Difficult” and Very Difficult” in HLS-EU-47 and comparison between EU, Japan and our university.

item	EU	JAPAN	our university
Q1.1 find information about symptoms of illnesses that concern you?	22.8	46.1	55.4
Q1.2 find information on treatments of illnesses that concern you?	26.9	53.3	58.7
Q1.3 find out what to do in case of a medical emergency?	21.8	60.9	59.2
Q1.4 find out where to get professional help when you are ill?	11.9	63.4	48.4
Q1.5 understand what your doctor says to you?	15.3	44	36.4
Q1.6 understand the leaflets that come with your medicine?	28	40.8	41.3
Q1.7 understand what to do in a medical emergency?	21.7	63.5	60.5
Q1.8 understand your doctor's or pharmacist's instruction on how to take a prescribed medicine?	6.5	25.6	26.1
Q1.9 judge how information from your doctor applies to you?	18	46.7	49.3
Q1.10 judge the advantages and disadvantages of different treatment options?	42.6	70.6	64
Q1.11 judge when you may need to get a second opinion from another doctor?	38.6	73	64.7
Q1.12 judge if the information about illness in the media is reliable?	49.7	73.2	63.7
Q1.13 use information the doctor gives you to make decisions about your illness?	23.1	49.3	42.9
Q1.14 follow the instructions on medication?	6.8	16.8	20.5
Q1.15 call an ambulance in an emergency?	8.8	36.8	32.3
Q1.16 follow instructions from your doctor or pharmacist?	5.6	15.5	16.7
Q1.17 find information about how to manage unhealthy behaviour such as smoking, low physical activity and drinking too much?	14.7	28.3	28.3
Q1.18 find information on how to manage mental health problems like stress or depression?	33.5	52.9	47.8
Q1.19 find information about vaccinations and health screenings that you should have?	24	40.1	48.5
Q1.20 find information on how to prevent or manage conditions like being overweight, high blood pressure or high cholesterol?	18.1	34.7	41.3
Q1.21 understand health warnings about behaviour such as smoking, low physical activity and drinking too much?	10.3	15.9	19.7
Q1.22 understand why you need vaccinations?	16.6	21.7	22.2
Q1.23 understand why you need health screenings?	10.4	19.2	31.6
Q1.24 judge how reliable health warnings are, such as smoking, low physical activity and drinking too much?	14.4	25.8	25.6
Q1.25 judge when you need to go to a doctor for a check-up?	16.3	53.2	52.7
Q1.26 judge which vaccinations you may need?	23.7	57	50.6
Q1.27 judge which health screenings you should have?	25.1	52.8	56.5
Q1.28 judge if the information on health risks in the media is reliable?	42.1	64.2	57
Q1.29 decide if you should have a flu vaccination?	26.2	35.9	28.2
Q1.30 decide how you can protect yourself from illness based on advice from family and friends?	22.2	48.5	36.4
Q1.31 decide how you can protect yourself from illness based on information in the media?	36.9	52.1	44.6
Q1.32 find information on healthy activities such as exercise, healthy food and nutrition?	14.3	29.9	37.2
Q1.33 find out about activities that are good for your mental well-being?	22.6	27.3	28.1
Q1.34 find information on how your neighbourhood could be more healthfriendly?	40.3	47.9	41.4
Q1.35 find out about political changes that may affect health?	53.2	63.1	53.9
Q1.36 find out about efforts to promote your health at work?	34.8	38	43.2
Q1.37 understand advice on health from family members or friends?	13	30.5	28.5
Q1.38 understand information on food packaging?	36.2	41.8	40.2
Q1.39 understand information in the media on how to get healthier?	23.3	33.6	38.7
Q1.40 understand information on how to keep your mind healthy?	26.1	49.3	43.7
Q1.41 judge where your life affects your health and well-being?	24.6	61.8	51.2
Q1.42 judge how your housing conditions help you to stay healthy?	19.5	58.9	49.8
Q1.43 judge which everyday behaviour is related to your health?	12.6	45.5	39.9
Q1.44 make decisions to improve your health?	21.7	50.7	41.6
Q1.45 join a sports club or exercise class if you want to?	24.1	56.4	41
Q1.46 influence your living conditions that affect your health and wellbeing?	25.5	63.6	52.3
Q1.47 take part in activities that improve health and well-being in your community?	38.9	64.6	48.5

There was no relationship between eHEALTH, the three domains of HLS-EU-Q47 (health care, disease prevention, and health promotion) and physical fitness, but there was a relationship between HLS-EU-Q47 and eHEALTH items related to health literacy and physical fitness such as 10 m run and grip strength (Table 2).

and the significance level of the tests was less than 5 % (two-tailed).

Results & Discussion

The results of the HLS-EU-Q47 showed that a higher percentage of our students answered “somewhat difficult” or “very difficult” compared to the 8 EU countries. This is similar to the results reported in 2015 for the general population in Japan (1054 males and females aged 20-69), which showed that the health literacy of our students is low^[15] (Table 1).

Table 2: Relationship between each measurement Item.

	health care	disease prevention	health promotion	Average score in 3 areas	HLS-EU Q47	eHEALTH	10 m run	grip	YoYo test	Estimated maximal oxygen uptake
health care	-	.708**	.586**	.859**	.859**	.413**	-0.09	-0.10	0.06	0.05
	-	<0.05	<0.05	<0.05	<0.05	<0.05	0.44	0.38	0.61	0.66
disease prevention	.708**	-	.684**	.912**	.912**	.402**	-0.01	-0.01	0.06	0.07
	<0.05	-	<0.05	<0.05	<0.05	<0.05	0.91	0.90	0.58	0.54
health promotion	.586**	.684**	-	.866**	.866**	.494**	-0.17	-0.01	0.09	0.09
	<0.05	<0.05	-	<0.05	<0.05	<0.05	0.12	0.93	0.44	0.41
Average score in 3 areas	.859**	.912**	.866**	-	1.000**	.497**	-0.11	-0.04	0.08	0.08
	<0.05	<0.05	<0.05	-	<0.05	<0.05	0.35	0.69	0.47	0.47
HLS-EU-Q47	.859**	.912**	.866**	1.000**	-	.497**	-0.11	-0.04	0.08	0.08
	<0.05	<0.05	<0.05	<0.05	-	<0.05	0.35	0.69	0.47	0.47
eHEALTH	.413**	.402**	.494**	.497**	.497**	-	-0.05	-0.08	0.01	0.02
	<0.05	<0.05	<0.05	<0.05	<0.05	-	0.63	0.48	0.89	0.85
10 m run	-0.09	-0.01	-0.17	-0.11	-0.11	-0.05	-	-.546**	-.724**	-.700**
	0.44	0.91	0.12	0.35	0.35	0.63	-	<0.05	<0.05	<0.05
grip	-0.10	-0.01	-0.01	-0.04	-0.04	-0.08	-.546**	-	.720**	.708**
	0.38	0.90	0.93	0.69	0.69	0.48	<0.05	-	<0.05	<0.05
YoYo test	0.06	0.06	0.09	0.08	0.08	0.01	-.724**	.720**	-	.985**
	0.61	0.58	0.44	0.47	0.47	0.89	<0.05	<0.05	-	<0.05
Estimated maximal oxygen uptake	0.05	0.07	0.09	0.08	0.08	0.02	-.700**	.708**	.985**	-
	0.66	0.54	0.41	0.47	0.47	0.85	<0.05	<0.05	<0.05	-

Correlations between HLS-EU-Q47, eHEALTH, 10-meter run, grip strength, and YoYo test were performed using Pearson's product rate correlation coefficient (n = 82). The significance level was less than 5 % (two-sided).

Discussion

The HLS-EU-Q47 has been translated and similar surveys have been conducted not only in Japan but also in other Asian countries and regions^[16]. The mean scores of Taiwan 34.4, Malaysia 32.9, Kazakhstan 31.6, Indonesia 31.4, Myanmar 31.3, and Vietnam 29.6 were higher than those of our students (pre 28.03±6.88, post 27.88±6.89).

However, the mean score of our students is almost the same as that reported below for Japanese students (Table 3).

Thus, although the domestic surveys used different methods and targets, such as Web and questionnaire surveys, the scores were all below 30, indicating that the average score of our students was not low, but was about the same as the Japanese average.

Similarly, eHEALTH reports were similar to the results of our students (pre 24.18±5.74, post 25.37±6.37) (Table 3).

Table 3: Subjects, Ages and Mean Scores of Health Literacy Surveys Conducted in Japan.

research item	author	subject	the number of people	average age	Average Score
HLS-EU-Q47	Nakayama et al. (2022)	Japanese people	3914		27.4
HLS-EU-Q47	Katsuya et al. (2019)	general public	516 male 214 female 302	32.4	26.5
HLS-EU-Q47	Ishikawa et al. (2019)	A person registered with a research firm	501	32.4	30.1
HLS-EU-Q47	Goto et al. (2018)	A person registered with a research firm	891	50.3	29.8
HLS-EU-Q47	Kimura et al. (2019)	Railroad Company Employees	381	60% under 39 years old	25.1
HLS-EU-Q47	MAIE et al. (2021)	People who have undergone medical checkups at St. Luke's International Hospital	714	51.2	27.3
HLS-EU-Q47	Shimada et al. (2021)	member of a senior citizens' club	368	Over 65 years old	27.5
HLS-EU-Q47	Taniguchi et al. (2021)	Medical school student	193		22.5 25.3 for final year only
HLS-EU-Q47	Yonekura et al. (2016)	Third-year medical student at a private university	56		29.5
eHEALTH	Ogura et al. (2023)	School of Nursing	108		26.2 ± 6.0
eHEALTH	Hamada et al. (2022)	private women's college student	382		25.53 ± 6.261

Possible reasons for the lack of relationship between physical fitness and health literacy are: 53.2% of the students in this class aimed to improve their skills in exercise and other disciplines; compared to the EU and other countries, their health literacy was low and they were not able to obtain, understand and use information about physical activity and health; the use of health promotion was low and they were not able to use health promotion. health promotion is low, and the respondents are not able to take action to improve their health.

In this study, we investigated comparisons and relationships among all subjects, but we have not yet conducted group comparisons based on body composition. Although no relationship between physical fitness and health literacy was found, it is possible that those with high lean body mass (skeletal muscle mass) and adequate body fat mass are predicted to have higher health awareness and behavior, and that a relationship may be observed.

Conflict of Interest/ Funding

This manuscript and similar manuscripts have never been published in any language, except for abstracts and scholarly articles, and there are no conflicts of interest or funding disclosures.

Ethical Approval

This study was approved by the Research Ethics Committee of Momoyama Gakuin University. Informed consent was obtained from all participants before the study was conducted. Participants participated in the study after paper forms and verbal explanations.

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