

Exploring health literacy and its associated factors among Palestinian university students: a cross-sectional study

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Summary

Health literacy plays an important role in personal and community health. Since university is a turning point when young adults begin to take responsibility for their own health, understanding university students' health literacy levels is crucial. To this end, we aimed to explore health literacy and its associated factors among Palestinian university students. We conducted a cross-sectional study at Birzeit University in the Ramallah district. We recruited 472 students using convenience sampling at six on-campus cafeterias. The 44-item Arabic version of the Health Literacy Questionnaire was used to measure students' health literacy levels, while a locally developed distress scale was used to measure students' distress levels. We stratified the multiple regression model for the health literacy score by gender. Students' average total health literacy score was 135.3 (SD 20.9), with male students scoring significantly higher than female students. A higher health literacy score was significantly associated with having a father with a higher level of education, a higher frequency of medical checkups, higher self-reported health status, and consulting a higher number of sources for health-related information. High distress levels were associated with lower levels of health literacy, especially among female students. This study provides the first evidence on Palestinian university students' health literacy levels. Tailored health education and promotion are required for students with low parental education and moderate to high distress. Future research is required to explain the gender differences in health literacy and distress among university students.

Key words: health literacy, health knowledge promotion, mental health, Palestinian university students

INTRODUCTION

Over the last 30 years, health literacy has gained widespread global interest (Nutbeam, 2017). It can be broadly defined as an individual's capacity to retrieve, understand and utilize health information to make conscious health-related decisions (Nutbeam, 2008). According to Sørensen *et al.*, 'health literacy entails people's knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course' (Sørensen *et al.*, 2012). Health literacy can mediate social disparities in health outcomes and reduces the burden of illness among vulnerable people (Cooper and Schillinger, 2011). Thus, health literacy research can deepen our understanding of the great potential of health literacy in the fight against health disparities (WHO, 2013).

Higher health literacy is associated with lower levels of risky health behaviors, such as smoking, drinking, and physical inactivity, greater likelihood of obtaining health information from multiple sources and better self-reported health (Liu *et al.*, 2015; Suka *et al.*, 2015; Guo *et al.*, 2018). Health literacy is also important for disease prevention and can facilitate the use of available health services. If more people can appropriately apply health information, health disparities could be reduced (Batterham *et al.*, 2016). Health literacy mediates some disparities in utilizing preventive healthcare services. It also mediates racial and ethnic disparities in self-rated health status and receiving influenza vaccination. Education-related disparities in mammography and dental care services are also influenced by health literacy (Bennett *et al.*, 2009). Thus, improving health literacy could help individuals live as healthily as possible based on the information and services available. Furthermore, the European Health Literacy Survey (HLS-EU) has demonstrated that in countries like Greece, Bulgaria, Poland and Spain, age is a strong predictor of health literacy, with older age groups tending to have lower health literacy levels. However, this trend was not significant in Germany and Ireland, and was reversed in the Netherlands where older cohorts showed higher literacy levels (HLS-EU Consortium, 2012). Moreover, Lithuanian university students showed insufficient health literacy levels with difficulties accessing and applying health information (Sukys *et al.*, 2017). Based on these findings, calls have been made to embrace health literacy in policy agendas, focusing on young

populations, such as adolescents and university students (Vozikis *et al.*, 2014).

University students are at a transitional stage during which they develop either healthy or unhealthy habits that will influence their health throughout adulthood (Vozikis *et al.*, 2014). As they become increasingly independent from their parents, they gain more control over their daily choices regarding food, sleep, health management, physical activity and engagement in smoking or drinking (Buckworth and Nigg, 2004; Brache and Stockwell, 2011; Grekin and Ayna, 2012). However, despite reduced dependency on parents, health literacy has been found to be higher among those whose parents have higher educational attainment (Rong *et al.*, 2017). Furthermore, better health literacy can improve self-rated health and access to health information (Liu *et al.*, 2015; Suka *et al.*, 2015; Guo *et al.*, 2018), and increases utilization of preventive and medical health services (Luo *et al.*, 2018; White *et al.*, 2008; Bennett *et al.*, 2009), along with ability to make knowledgeable decisions (Nutbeam, 2000). However, adolescents and university students may not actively make conscious decisions to achieve good health, due to their lack of concern about immediate health problems (Sarhan *et al.*, 2019).

Palestinians living in the occupied Palestinian territory (oPt) are exposed to chronic and ongoing political conflict. Access to food, water, electricity and basic healthcare is limited, particularly due to restrictions on movement of people and goods (Giacaman *et al.*, 2004). Exposure to violence among adolescents has been associated with negative health outcomes (Giacaman *et al.*, 2007), both physical and mental (Qouta *et al.*, 2008). Ramallah, a populous city in the oPt, was reported to have the highest percentage of distress during the intensification of conflict from 2000 to 2004 (Batniji *et al.*, 2009). Distress can disrupt the influence of health literacy on self-care behaviors, recognition of illness symptoms and seeking professional help (Kim *et al.*, 2015; Gorczynski *et al.*, 2017; Schinckus *et al.*, 2018). For example, Palestinian adolescents and young adults, especially females (Wagner *et al.*, 2019), were shown to suffer higher distress levels than males (Khader *et al.*, 2009; Ghayeb, 2013), while Palestinian youths also have a high prevalence of smoking (Khader *et al.*, 2009; Ghayeb, 2013). Similar gender differences in health literacy have been identified in the Netherlands, Germany, Poland, Austria, Ireland (HLS-EU Consortium, 2012), the United Kingdom, the USA and Korea (Lee *et al.*, 2015) with females showing higher abilities than males to understand medical forms and instructions provided by healthcare professionals (Lee *et al.*, 2015) as well as

better recognition of mental health and chronic disease symptoms (Lee *et al.*, 2015; Wong, 2016).

Although political solutions are ultimately required to end conflict, Palestinians also need tools to achieve good health and improve quality of life. In the oPt, most of the research has focused on Palestinians' mental and nutritional health, with little research on health literacy. Recent health literacy studies among Palestinians targeted adult patients with type 2 diabetes mellitus, particularly the influence of health literacy on patients' glycemic control and medication adherence (Elsous *et al.* 2017; Radwan *et al.*, 2018). Additionally, Sarhan *et al.*'s qualitative study aimed to identify what adolescents need to know to be health literate (Sarhan *et al.*, 2019). Exploring the health literacy of Palestinian university students will help fill the knowledge gap related to this crucial age group, providing baseline insight into their knowledge about health and how they perceive their health and the healthcare system. This would improve the health status of adolescents and young adults, and will eventually lead to a healthier adulthood. Specifically, we aimed to explore health literacy and its association with self-reported health status, source of health information and distress among Palestinian University students with an emphasis on gender differences in health literacy.

METHODS

Study design

We followed a cross-sectional design in this study. Of the 480 students who were approached to participate in the study, 472 participated voluntarily. Four were excluded due to missing data, resulting in a sample of 468 students for analysis.

Study setting

We conducted this study at Birzeit University in the Ramallah district of the West Bank, oPt. Birzeit University is one of the largest universities in the West Bank, and is characterized by its diverse student body who are representative of the Palestinian population. In the academic year 2016/2017, Birzeit University had 11,540 students enrolled in 67 undergraduate academic programs (Birzeit University, 2017), with almost 64% enrolled in the faculties of arts, engineering and technology and business and economics.

Sampling and data collection

We computed the minimum required sample size based on the two-step new rule of thumb for a multiple

regression analysis suggested by Green (Green, 1991) using the calculations outlined by Cohen (Cohen, 1988). The minimum required sample size for this study was 136 with 80% power and significance level of 5%, assuming a medium effect size ($f^2 = 0.15$, $R^2 = 0.13$) and 14 predictors. We recruited Birzeit University students aged 18–24 years based on convenience sampling in and around the six on-campus cafeterias. We assigned each cafeteria a planned minimum sample size, depending on the estimated number of users, location on campus and proximity to other cafeterias, to achieve the total minimum sample size. We recruited and trained 30 field workers to collect data during May 2017. Field workers conducted face-to-face interviews with students using a pre-designed questionnaire.

Outcome variable

The study outcome was health literacy, which we measured using the Arabic version of the Health Literacy Questionnaire (HLQ) (Osborne *et al.*, 2013). The HLQ comprises 44 items, with 9 subscales: (1) 'Feeling understood and supported by healthcare providers', (2) 'Having sufficient information to manage my health', (3) 'Actively managing my health', (4) 'Social support for health', (5) 'Appraisal of health information', (6) 'Ability to actively engage with healthcare providers', (7) 'Navigating the healthcare system', (8) 'Ability to find good health information' and (9) "Understanding health information well enough to know what to do." For subscales 1–5, responses were measured on a 4-point Likert scale from 1 = Strongly disagree to 4 = Strongly agree. For subscales 6–9, responses were measured on a 5-point Likert scale from 1 = Cannot do or always difficult to 5 = Always easy. The possible score range for the total HLQ scale was 44–197. The analysis of reliability of the HLQ with the formal sample showed Cronbach's $\alpha = 0.94$ for the total scale, and Cronbach's $\alpha > 0.70$ for all subscales except subscale 5 ("Appraisal of health information"). We included subscale 5 in our analyses, because an α value of 0.69 was deemed acceptable.

The HLQ is a self-administered questionnaire that was originally validated in English in Australia, and is currently commercially available in other languages including Arabic. To date, however, the Arabic version had not been used or validated in the Middle Eastern context. We decided to conduct face-to-face interviews rather than self-administered questionnaires to avoid concerns raised in previous studies about the lack of validity or reliability of frequently used self-reported methods in measuring health literacy among adolescents (Wu *et al.*, 2010), as well as to avoid the measurement error that can

occur with self-administered surveys (Lavrakas, 2008). Another advantage of face-to-face interviews was that respondents' queries about survey questions could be answered by interviewers, who could motivate respondents to complete the questions (Schroder, 2016) and reduce nonresponse rates (Christensen *et al.*, 2014). A research assistant first reviewed the Arabic HLQ to ensure clarity given dialect differences across Arabic-speaking nations, and made changes to some items to fit the face-to-face interviewing method (e.g. 'I set my own goals about health and fitness' was reworded as 'Do you set your own goals about health and fitness?'). Then, two researchers reviewed the reworded version and discussed any differences before finalizing the reworded version of the HLQ. These two researchers then compared the reworded version with the original Arabic version to ensure conceptual equivalence to the original scale. We pre-tested the Arabic HLQ on 15 Birzeit university students to check the interview duration and to ensure that questions were fully understandable. No issues were found. The face-to-face interviews were conducted in Arabic. We tested reliability by measuring the coefficient alpha for the total scale and for each subscale.

Exposure variables

The main exposure variables were students' self-reported health status, source of health information and distress. Self-reported health was measured by 'How would you rate your general health status?' on a 5-point Likert scale (1 = Very good, 5 = Quite Poor) as used in the 36-Item Short-Form Health Survey (SF-36) (Ware and Sherbourne, 1992; Lee *et al.*, 2008; Hammoudeh *et al.*, 2013). We measured source of health information by asking students to select commonly used information sources from a list of 15 options (e.g. parents, friends, doctors, internet, etc.), identified in a previous study with Palestinian adolescents (Sarhan *et al.*, 2019). We then counted the number of sources selected by each student. We measured distress using a local distress scale developed by the Institute of Community and Public Health, Birzeit University and used in oPt. This 12-item scale asks the extent to which the individual feels particular feelings on a 5-point Likert scale (1 = Never, 5 = Very high), with a high score indicating high distress and a possible score range of 12–60. We calculated the reliability of the distress scale with a Cronbach's $\alpha = 0.90$, which is close to the original research ($\alpha = 0.86$) (Hamayel *et al.*, 2014). We set a 60% cut-off point to determine the categories of distress; those with a distress scale score of higher than 60%

were assigned moderate to high distress (Hamayel *et al.*, 2014).

Other variables

The demographic and socioeconomic characteristics included in the questionnaire were: age, sex, year of completion at university, faculty of study, place of birth (urban, rural or refugee camp), current locality (urban, rural or refugee camp), educational level of mother and father, occupation of mother and father and family financial status. We also included the following variables: having a health insurance plan; having visited a doctor, physician, or health facility in the past year; past/current illnesses; frequency of receiving medical checkups; and smoking status.

Statistical analyses

We conducted independent *t*-tests and one-way analysis of variance to examine the difference in mean health literacy scores between categories of each variable. Based on the results of the univariate and bivariate analyses, we selected factors for input into a multiple linear regression model. We stratified the model for the total health literacy score by sex ($p = 0.05$). Data were analyzed using SPSS 22.0. We excluded missing data from the analyses.

RESULTS

Overview of student characteristics

Participants' demographic and socioeconomic characteristics are summarized in Table 1. Mean age was 19.9 (SD 1.4) years. More than half (58.3%) were female, which is close to the proportion at Birzeit University in general (Birzeit University, 2017). The most common study faculty was Business and Economics (26.9%), followed by Arts (19.7%). Most students (73.8%) had been born in urban regions; 39.1% smoked cigarettes, Argileh (water pipe), or both.

Mean health literacy scores of Birzeit University students

Table 2 shows the health literacy scores of the nine subscales by sex. The average total health literacy score was 135.3 (SD 20.9), with male students scoring significantly higher than female students. On average, the highest-scoring scale was 'Social support for health', while scores for 'Actively managing my health', 'Feeling understood and supported by healthcare providers' and 'Having sufficient information to manage my health' scored lowest.

Table 1: Summary of students' characteristics

	Female students (<i>n</i> = 273)			Male students (<i>n</i> = 195)			Total (<i>n</i> = 468)		
	<i>n</i>	%	Mean (SD)	<i>n</i>	%	Mean (SD)	<i>n</i>	% Total	Mean (SD)
Age			19.9 (1.54)			20.1 (1.63)			20.0 (1.58)
≤18	44	16.1		30	15.4		74	15.8	
19	81	29.7		52	26.7		133	28.4	
20	74	27.1		52	26.7		126	26.9	
21	33	12.1		26	13.3		59	12.6	
22	20	7.3		20	10.3		40	8.5	
23+	21	7.7		15	7.7		36	7.7	
Year level									
First	108	39.6		67	34.4		175	37.3	
Second	56	20.5		48	24.6		104	22.2	
Third	69	25.3		40	20.5		109	23.2	
Fourth	30	11.0		34	17.4		64	13.6	
Fifth	10	3.7		6	3.1		16	3.4	
Faculty									
B/E	75	27.5		50	25.6		125	26.7	
Nursing	25	9.2		10	5.1		35	7.4	
Law/PA	44	16.1		44	22.6		88	18.9	
Education	14	5.1		5	2.6		19	4.1	
Arts	59	21.6		34	17.4		93	19.7	
Science	26	9.5		16	8.2		42	9.0	
Engineering	30	11.0		36	18.5		66	14.1	
Place of birth									
Urban	205	75.1		140	71.8		345	73.7	
Rural	55	20.1		46	23.6		101	21.5	
Camp	13	4.8		9	4.6		22	4.7	
Living with									
Family	237	86.8		161	82.6		398	84.9	
Alone	18	6.6		10	5.1		28	6.0	
Friends/others	18	6.6		24	12.3		42	9.0	
Smoking									
Yes, cigarettes	19	7.0		54	27.7		73	15.6	
Yes, <i>argileh</i>	52	19.0		27	13.8		79	16.9	
Yes, both	7	2.6		23	11.8		30	6.4	
No	195	71.4		91	46.7		286	61.1	

Note: Percentages may not add up to 100 due to rounding.

SD, standard deviation; B/E, business and economics; PA: public administration.

Association of health literacy level with demographic and socioeconomic and health characteristics

Table 3 shows the mean total health literacy scores by socioeconomic and health characteristics. Students with a working mother and higher educational attainment by their fathers and mothers had higher health literacy scores. Students with higher self-reported health status, higher frequency of receiving medical checkups and who consulted more sources for health-related information had significantly

higher health literacy scores. Students with moderate to high distress scored significantly lower in health literacy scores.

Linear regression model: Factors associated with health literacy score

Table 4 shows factors associated with total health literacy among Birzeit University students, and scores stratified by sex. Students whose fathers had high-school education or higher, a higher frequency of receiving medical

Table 2: Summary of health literacy scores by sex

Scale	Female students (<i>n</i> = 273)		Male students (<i>n</i> = 197)		Total (<i>n</i> = 468)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Health literacy (total score)*	135.4	19.34	138.1	18.29	135.7	20.27
Feeling understood and supported by HCP	10.5	2.28	10.8	2.11	10.6	2.20
Having sufficient information to manage my health	10.4	2.11	10.7	2.02	10.6	2.08
Actively managing my health	13.1	2.75	13.5	2.55	13.3	2.67
Social support for health	14.6	2.70	14.9	2.40	14.7	2.57
Appraisal of health information	13.3	2.49	13.8	2.45	13.5	2.48
Ability to actively engage with HCP	17.3	3.37	17.8	3.21	17.5	3.31
Navigating the healthcare system	20.8	3.91	21.2	3.64	21.0	3.80
Ability to find good health information	17.7	3.17	17.7	3.15	17.7	3.15
Understand health information well enough to know what to do	17.7	3.19	17.7	3.24	17.7	3.21

*The difference in the total score between female students and male students was statistically significant (significance level was set at 0.05).

Table 3: Comparing mean health literacy scores by demographic and socioeconomic and health characteristics (*n* = 468)

Variables	<i>n</i>	(%)	Mean	(SD)	<i>p</i> -value ^c
Locality					0.316
Urban	219	(46.8)	136.7	(20.4)	
Rural/camp	248	(53.2)	134.8	(20.2)	
High school					0.067
Public	143	(30.6)	137.7	(19.3)	
Private	300	(64.1)	135.4	(20.0)	
UNRWA/others	25	(5.3)	127.7	(27.2)	
Father's educational level					<0.001
Not educated ^a	17	(3.6)	118.2	(28.4)	
Until sixth grade	38	(8.1)	128.3	(23.6)	
Higher than sixth grade, lower than HS	60	(12.8)	134.9	(17.8)	
High school (HS)	145	(31.0)	137.6	(15.8)	
Higher than HS	208	(44.4)	137.3	(21.5)	
Mother's educational level					<0.001
Not educated ^a	33	(7.1)	121.0	(27.4)	
Until sixth grade	46	(9.8)	134.4	(17.3)	
Higher than sixth grade, lower than HS	68	(14.5)	136.9	(17.8)	
High school (HS)	145	(31.0)	136.6	(18.0)	
Higher than HS	175	(37.4)	137.8	(20.9)	
Father's employment status					0.511
Not working	45	(8.8)	133.8	(21.5)	
Working	423	(91.2)	135.9	(20.1)	
Mother's employment status					0.001
Not working	5	(1.1)	133.9	(20.4)	
Working	131	(28.1)	140.8	(18.9)	
Living with family					0.598
Yes	398	(84.9)	136.2	(19.5)	
No	70	(15.1)			
Family's financial status					0.640
Higher	102	(21.8)	135.0	(19.7)	

(continued)

Table 3: (Continued)

Variables	<i>n</i>	(%)	Mean	(SD)	<i>p</i> -value ^c
Like others/lower	366	(78.2)	136.1	(20.3)	
Self-reported health status					<0.001
Poor	12	(2.6)	121.7	(22.1)	
Neither good nor poor	51	(10.9)	123.5	(22.2)	
Quite good	212	(45.3)	136.6	(17.3)	
Very good ^a	193	(41.2)	138.8	(21.2)	
Frequency of visiting a doctor ^b					0.378
Never, or rarely	243	(51.8)	134.5	(20.9)	
Sometimes	154	(32.8)	137.3	(19.0)	
Always, or most of the time	72	(15.3)	136.4	(20.8)	
Receiving medical checkups					0.008
Never	118	(25.2)	131.2	(19.8)	
Rarely	184	(39.3)	136.0	(19.8)	
Sometimes	102	(21.8)	137.5	(18.1)	
Most of the time	41	(8.8)	136.4	(27.1)	
Always ^a	23	(4.9)	146.5	(16.4)	
Smoking					0.152
No	286	(61.1)	136.8	(20.1)	
Yes	182	(38.9)	134.0	(20.4)	
Number of sources of information used					<0.001
0–1	127	(27.1)	131.8	(21.5)	
2–4	222	(47.4)	134.0	(20.2)	
5+	119	(25.4)	143.0	(17.1)	
Distress					<0.001
Low	402	(85.9)	137.2	(20.3)	
Moderate to high	66	(14.1)	126.3	(17.2)	

^aMean health literacy score for:

-‘Not educated’ fathers was significantly different from that of ‘Higher than sixth grade, lower than HS’ ($p = 0.02$), ‘High school (HS)’ ($p = 0.002$) and ‘Higher than HS’ ($p = 0.001$).

-‘Not educated’ mothers was significantly different from that of ‘Until the sixth grade’ ($p = 0.027$), ‘Higher than sixth grade, lower than HS’ ($p = 0.002$), ‘High school (HS)’ ($p = 0.001$) and ‘Higher than HS’ ($p < 0.001$).

-‘Very good’ self-rated health status was significantly different from that of ‘Neither good nor poor’ ($p = 0.018$) and ‘Poor’ ($p < 0.001$)

-‘Always’ receiving medical checkups was significantly different from that of ‘Never’ ($p = 0.006$)

-Using ‘5+’ sources of information was significantly different from that of ‘2–4’ and ‘0–1’ ($p < 0.001$)

^bOr physician or health facility, in the past year.

^cSignificance level was set at 0.05.

checkups, higher self-reported health status and who consulted more sources for health-related information had higher health literacy scores. Students with moderate to high distress had lower health literacy scores.

When stratified by sex, female students whose fathers had high school education or higher, who had a working mother, who were living with their families, who had higher self-reported health status and who consulted more sources for health-related information had higher health literacy scores. Female students with moderate to high distress had lower health literacy scores.

Male students who received medical checkups more frequently, consulted more sources for health-related information, and had higher self-reported health status

had higher health literacy scores. Distress was not significantly associated with health literacy scores in male students.

DISCUSSION

The following factors were found to be associated with higher health literacy among Palestinian university students: higher parental education, receiving more medical checkups, higher self-reported health status and more sources of information. In contrast, moderate to high distress was associated with lower health literacy scores. Gender differences seem to be important when

Table 4: Factors associated with health literacy score among Birzeit University students ($n = 468$)

Factors	Total			Female students ($n = 273$)			Male students ($n = 195$)		
	B	SE	p^b	B	SE	p^b	B	SE	p^b
Year level ^a	0.43	0.8	0.573	0.00	1.1	0.999	0.89	1.1	0.420
Locality (urban vs. rural/camp)	-0.04	1.9	0.984	0.91	2.6	0.728	-0.16	3.0	0.956
Father's education (HS or higher vs. lower than HS)	5.79	2.3	0.011	11.52	3.2	<0.001	0.07	3.3	0.983
Mother's education (HS or higher vs. lower than HS)	1.61	2.2	0.471	0.18	3.1	0.954	0.79	3.4	0.816
Father's employment status (working vs. not working)	1.88	3.1	0.549	0.87	4.4	0.842	1.95	4.6	0.673
Mother's employment status (working vs. not working)	3.98	2.1	0.062	6.49	3.1	0.040	1.37	2.9	0.638
Living with family (yes vs. no)	4.77	2.6	0.068	8.84	3.7	0.018	-0.89	3.8	0.813
Family financial status (higher vs. like others/lower)	-2.76	2.2	0.213	-3.51	2.9	0.234	-1.86	3.3	0.578
Self-reported health status ^a	5.20	1.3	<0.001	5.69	1.7	0.001	3.96	1.9	0.043
Frequency of visiting doctor ^a	2.43	1.3	0.071	2.78	1.8	0.127	0.15	2.2	0.945
Frequency of receiving medical checkups ^a	1.78	0.9	0.045	1.58	1.2	0.183	3.09	1.4	0.027
Number of sources of information ^a	4.76	1.2	<0.001	4.79	1.7	0.006	3.91	1.8	0.035
Smoking (yes vs. no)	-2.02	2.0	0.302	1.34	2.8	0.634	-4.68	2.7	0.087
Distress (moderate to high vs. low)	-6.55	2.7	0.016	-8.30	3.5	0.020	-4.19	4.3	0.331

^aEntered the model as ordinal variables.

^bSignificance level was set at 0.05.

addressing health literacy and distress among university students.

Parents' education

Students whose fathers had a high-school education or more had significantly higher health literacy scores, similar to Chinese college students (Rong *et al.*, 2017). In the context of the oPt, the characteristics of the head of the family (almost always male) influence the family's financial situation. A well-educated father is likely to have a higher income job, affording family members better access to information and services, as well as to better schools.

Medical checkups and self-reported health status and sources of information

More frequent use of health services was associated with higher health literacy. In Taiwan, a positive association was found between e-health literacy and health service utilization among college students (Luo *et al.*, 2018). In contrast, patients from Germany with lower health literacy used health services more often (Ganahl *et al.*, 2017). Moreover, in the USA, elderly persons with low health literacy were more susceptible to using emergency hospital services (Cho *et al.*, 2008), and less likely to use preventive health services (White *et al.*, 2008; Bennett *et al.*, 2009). Frequent medical checkups, either from illness or as preventive behavior, could

lead to more exposure to health professionals, thus contributing to higher health literacy among university students.

Moreover, a positive association was found between higher self-reported health and higher health literacy among university students. In the USA, people with lower health literacy had poorer communication skills to engage with healthcare providers and thus reported poorer self-rated health status (Williams *et al.*, 2002). In Japan and China, people with higher literacy were more likely to have better self-reported health as well as to obtain information from multiple sources (Liu *et al.*, 2015; Suka *et al.*, 2015; Guo *et al.*, 2018). Better access to health information from various sources could increase health literacy levels among university students.

Distress

Using the same distress scale, the participants reported moderate and severe distress levels close to those reported for 12- to 18-year-old Palestinian adolescents from Ramallah (14.1% vs.16.1%) (Hamayel *et al.*, 2014). Moderate to high distress reports were associated with lower health literacy. Distress can moderate students' health literacy and health-related behaviors. For example, the impact of health literacy on self-care behaviors was disrupted by emotional distress among diabetic patients (Schinckus *et al.*, 2018). Additionally, highly depressed and distressed American university

students had low mental health literacy and were consequently unable to recognize their depression symptoms (Kim *et al.*, 2015), and had lower tendency to seek professional help (Kim *et al.*, 2015; Gorczynski *et al.*, 2017). While the HLQ includes a wide range of domains, distress was associated with lower health literacy across all domains. Thus, distress may have a disruptive role in all areas of health literacy.

Gender differences

For female students, higher educational levels of fathers, having working mothers, and living with their families were associated with higher health literacy. In the oPt, women and young female students are more likely to live with their families than their male counterparts, due to existing inequalities, such as women's unemployment rates, limited participation in social, political and community events (Interpeace, 2017), and restrictions on movement (Al-Adili *et al.*, 2008; JICA, 2016). These inequalities might limit female students' access to various sources of health information other than their parents, thus explaining their lower health literacy scores.

When stratified by sex, moderate to high distress was associated with lower health literacy for female students, but not males. Among Palestinian adults, women experience higher psychological distress levels than men (Khamis, 2013; Wagner *et al.*, 2019). For example, Palestinian young women reported lower exposure to violence, but were more likely to report mental health problems than men. Almost 64.3%, 63.8% and 60.9% of young women had symptoms of anxiety, distress and depression, respectively (Wagner *et al.*, 2019). This could be explained by women's general tendency to experience psychological distress more often than men (Thoits, 1986; Fuhrer *et al.*, 1999), and in the oPt context, by restrictions on women's freedom of movement. Female university students have greater awareness of mental health issues than men (Lee *et al.*, 2015; Wong, 2016), suggesting that male students may have lower awareness of their mental health problems. Additionally, to conform to patriarchal norms and images of masculinity, male students in this study may have been more reluctant to openly report their distress to the interviewer. Masculine stereotypes can lead men to hide their emotions, seeking private emotional support behind closed doors (Coen *et al.*, 2013). Moreover, despite their need for social connections and support from family members or friends, young distressed men may fear being judged as weak and emotionally vulnerable (Cleary, 2005).

Study limitations

This study is limited by its sampling frame of purposeful convenience sampling restricted to students using the campus cafeterias. Although the study results cannot be generalized to all Palestinian university students in the West Bank, they nevertheless provide insight into the relation between health literacy and several demographic and socioeconomic factors among Palestinian university students. Another limitation is the social desirability bias associated with face-to-face questionnaire. People tend to choose the socially acceptable responses instead of responses that reflect their actual feelings. This issue might occur when the questions are related to personal or other sensitive topics (e.g. drug use, cheating or protecting environment) (Grimm, 2010). It could have affected the results of this study by inducing under- or over-reporting by students, particularly on the sensitive topic of distress. However, the field workers and the researchers emphasized on the confidentiality of the results and encouraged students to choose responses that reflect their actual feelings and beliefs.

The chosen measurement tool may limit the assessment of health literacy, as this study is confined to the domains that this specific scale measures. Although this tool was selected for its diversity of domains, as well as its widespread use and applicability across many languages and age ranges, to the best of our knowledge, this scale has not been used among Middle Eastern populations, and only once among the young adult age group (Rong *et al.*, 2017). Similarly, the Arabic version has previously only been used in Australia and may not reflect cultural and contextual differences between different Arabic-speaking nations. This issue should be addressed in future research, focusing on adapting the HLQ scale to Middle Eastern contexts, considering cultural differences, and testing the psychometrics of the adapted scales. Moreover, the broad concept of health literacy and the varying measurement tools used across the different studies relating to health literacy, made comparing results with other studies difficult, as different tools measure different domains of health literacy.

CONCLUSION

This study provides insight into the health literacy level of Palestinian university students. The results suggest that their health literacy could be improved to ensure better student welfare. Health education and promotion may require tailoring for students with low parental education and moderate to high distress. Further research is therefore required to explain: (i) health-related information accessibility to students; (ii) the influence of the

social determinants of health literacy that emphasizes gender differences in health literacy and distress among this age group at the country level; and (iii) how emotional and social well-being can be integrated in HLQ or other health literacy measures, given their vital role in determining health literacy. This research also emphasizes the continued need for research on distress among the Palestinian population, as the negative influence of conflict extends beyond mental health into student health literacy.

ETHICAL APPROVAL

Ethical approval was obtained from The Research Ethics Committee of the Graduate School of Medicine, the University of Tokyo (Ethical approval no. 11545-1), Japan and The Research Ethics Committee of the Institute of Community and Public Health, Birzeit (Reference no. 4-2017).

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