LOW HEALTH LITERACY AND PERCEIVED STRESS IN ADULTS: IS THERE A LINK?

Maria Michou[1], Demosthenes B. Panagiotakos[2], Christos Lionis[3], Vassiliki Costarelli[1]

[1]Human Ecology Laboratory, Department of Home Economics and Ecology, Harokopio University, Athens, Greece
[2]Department of Nutrition and Dietetics, School of Health Science and Education, Harokopio University, Athens, Greece
[3]Clinic of Social and Family Medicine, School of Medicine, University of Crete, Heraklion, Crete, Greece

SUMMARY

Objectives: Mental stress, low health literacy (HL) and nutrition literacy (NL) are associated with serious negative health outcomes. The aim of this study was to investigate HL and NL levels, in relation to levels of perceived stress, in adults.

Methods: This cross-sectional study was conducted in the urban area of the Attica region, Greece. The sample consisted of 1,281 individuals, aged ≥ 18 years. The European Health Literacy Questionnaire 47, the Greek version of the Nutrition Literacy Scale and the Perceived Stress Scale 14 were used. Socio-demographic characteristics were also assessed. Nonparametric Mann-Whitney U and Kruskal-Wallis tests, Pearson chi-square and multiple linear regression models were used.

Results: The sample's perceived stress mean value (SD) was 26.47 (7.27) with women scoring statistically significantly higher than men. The mean HL and NL scores were 32.28 (8.28) and 22.11 (5.67), respectively. Linear regression analysis has shown that perceived stress was significantly negatively associated with HL (p < 0.001) but not with NL levels (p = 0.675) after adjusting for a series of confounding variables.

Conclusions: Low health literacy seems to be very significantly associated with high levels of perceived stress. The reasons behind this association require further investigation.

INTRODUCTION

Mental stress is prevalent in the general population, and it is a relatively inevitable aspect of life. The individual's ability to cope with stress is very important and can have a serious impact on key psychosomatic health indicators and on cognitive function. It is well documented that the prolonged activation of these systems could potentially lead to a series of stress-related diseases and to premature death (1). It is well known that chronic stress is a trigger for depression (2), and it also seems to be an important factor in determining an individual's vulnerability to ageing and age-related comorbidities, via epigenetic modifications (3). In addition, stress has a major influence upon mood, sense of well-being (4), eating behaviour (5), and may also contribute to a higher prevalence of negative health behaviours (6).

Perceived stress is defined as "the feelings or thoughts that individuals have about how much stress they are under at a given point in time or over a given time period". Perceived stress incorporates feelings about the uncontrollability and unpredictability of one's life, how often one has to deal with irritating hassles, how much change is occurring in one's life, and confidence in one's ability to deal with problems or difficulties (7).

Low levels of health literacy (HL) and nutrition literacy (NL) are often linked with ill-health and they constitute an emerging field for health research, policy and practice both in developed and developing countries. Studies suggest that health literacy is a stronger predictor of health than age, income, employment, education, and race (8). Nutrition literacy seems to be positively correlated with a healthy and balance diet (9).

The definition of HL is as follows: "HL incorporates the knowledge, motivation and competences to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning health care, disease prevention and health promotion to maintain or improve quality of life throughout the course of life (10). NL is defined as "the degree to which individuals can obtain, process, and understand basic nutrition information and nutrition services they need to make appropriate nutritional decisions" (11). In recent years, the relatively new term of mental health literacy has been introduced (12). Mental health literacy (MHL) usually refers to individuals' understanding and deeper comprehension of mental disorders and their treatments and of mental health issues, in general. It also refers to the ability to seek help and advice on mental health issues in an effective manner (13). In the current study, the participants' levels of HL and NL were assessed, but not the levels of MHL.

Mental stress and certain anxiety disorders are usually treatable conditions; however, research indicates that a great proportion of affected individuals usually do not seek professional help or find it difficult to adhere to recommended interventions (14). There is evidence that the inability to effectively recognize symptoms

may contribute to low levels of help seeking (15). Low health literacy is a key contributor to negative health behaviours and negative health outcomes.

It is important to note that perceived stress, as a multidimensional concept, is usually associated with a broad range of causative and conducive factors. The degree of stress and the ways in which a person manages stressful situations can be affected by a number of factors such as personal characteristics, life events, lifestyle, socio-demographic and occupational variables, as well as low sense of coherence, poor social network and appraisal of the stressor(s) (16, 17).

The possible interrelationships between low levels of HL in the general population and stress or anxiety has not been investigated in the past. Most studies have focused on participants who are caregivers or participants with certain diseases and on mental health literacy and stress of mentally ill patients, conditions which are already associated with negative emotions and increased stress levels (15).

The aim of this cross-sectional study was to investigate HL and NL levels, in relation to levels of perceived stress, in adults.

MATERIALS AND METHODS

Ethical Approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Institutional Ethics Review Board of the Harokopio University. The protocol number was 57 and the date of expedition was 15 September 2017. Participants were informed about the purpose of the study, via a cover letter, prior to giving an informed consent.

Study Design and Sample Collection

This was a cross-sectional study which took place in the urban area of the Attica region, Greece. The areas of recruitment were selected on a feasibility basis, among the municipalities of the greater metropolitan area of Athens. The collection of the participants lasted 6 months, from October 2017 to April 2018. Power analysis estimated that a sample size of n = 1,083 was adequate to evaluate differences between subgroups of the study and the investigated parameters of 20%, achieving statistical power > 0.85 at < 0.05 probability level (p-value). The final sample consisted of 1,281 participants of both sexes, aged ≥ 18, (59.4% women), with a mean age of 44.52 (± 17.44) years. Inclusion criteria included: participants of both sexes, ≥ 18 years of age and the ability to read and write in Greek. No other exclusion criteria were used. The participation rate was 85.4%, with 14.6% dropping out. The main reasons for dropping out, as stated by the participants, were lack of time or lack of interest in the study.

Materials

Participants completed three validated questionnaires. Socio-demographic characteristics were also assessed. Participants filled the questionnaire either in a printed or in electronic form. The mean time of completion of the questionnaire was about 25 minutes. To avoid sources of bias, efforts were made to ensure the recruitment of a relatively large sample of participants, to ensure that all instruments were previously tested and validated in the Greek language and all the procedures were conducted in an anonymous manner.

Socio-demographic Characteristics

Socio-demographic characteristics such as sex, age in years, education in years and the existence or not of a chronic disease were assessed via questionnaire.

European Health Literacy Questionnaire

The European Health Literacy Questionnaire (HLS_EU_Q47), was used to evaluate HL levels (18). It is a comprehensive measure of HL with 47 items, which includes three health-relevant sectors (health care, disease prevention and health promotion) and four information-processing areas (accessing, understanding, appraising, and applying). A general HL score and 7 sub-indices can be calculated with the following formula: index = (mean−1) * (50/3). The 7 sub-indices are: the Health Care Index, Disease Prevention Index, Health Promotion Index, Access/Obtain Health Information Index, Understanding Health Information Index, Process/Appraise Health Information Index, and Apply/Use Health Information Index. Responses range from 1 to 4, using a four-point self-reported Likert-type scale. Total score varies from 0 to 50. HL categories according to the total score are the following: excellent HL (score of 42–50), adequate HL (score of 33–42), problematic HL (score of 25–33), and inadequate HL (score of < 25).

Nutrition Literacy Scale-Greek

For NL assessment the Greek validated version of the Nutrition Literacy Scale (NLS-Gr) (19) was used. This tool assesses reading comprehension and measures individual's ability to understand nutritional information. A total of 29 sentences missing a word, are included in the Greek version of the NLS (20). Four options, of which only one is correct, are given to the participant. The total score is calculated by summing the correct answers and ranges from 0 to 29. The NL categories according to the score are adequate NL (score of >15), marginal NL (score of 8–15), and inadequate NL (score of < 8).

Perceived Stress Scale-14

The Perceived Stress Scale-14 (PSS-14) is a self-reported 14-item questionnaire with a 5-point Likert type scale (0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often) (21). It is considered a brief and easy tool for completion. This measure assesses whether situations experienced by a person during the last month are stressful. It concludes seven positive and seven negative items, and the highest possible score is 56. A higher score indicates higher levels of perceived stress during the past month. The scale has been validated in Greek (22, 23).

Statistical Analysis

Data are presented as n (%) for qualitative variables (sex, existence of chronic disease, HL and NL categories) and as mean (SD) for quantitative variables (age and education in years, HL, NL and PSS scores). In the case of participants who did not answer

all questions of the questionnaires (missing values), the final scores were not calculated and were not included in the analysis. Due to the skewed distribution of the quantitative variables (age and education in years, HL and NL scores) the Mann-Whitney, non-parametric test was used to evaluate differences between men and women. Also, the Kruskal-Wallis, non-parametric test was used to evaluate differences between HL and NL categories and perceived stress score. Moreover, Pearson chi-square was used to evaluate differences between men and women for the qualitative variables. Then, multiple linear regression analyses were further used to evaluate whether HL and NL (dependent variables) were associated with perceived stress (independent variable), adjusting for sex, age, education, existence of chronic disease, and NL and HL, respectively (independent determinants). The inclusion of the independent variables was based on literature review and the tested research hypothesis of the present study. Multicollinearity was evaluated using the variance inflation factor (VIF; variables with value >4 were not included at the same time in the model). The STATA software, version 14 (MP and Associates, Sparta, Greece) was used for all statistical analyses.

women scored higher than men (p=0.040) and the sample's mean value (SD) was 26.47 (7.27). Mean HL and NL scores were 32.28 (8.28) and 22.11 (5.67), respectively. Differences were observed between men and women in the adequate, problematic and sufficient HL (p=0.017). More specifically, the proportion of men was lower, the problematic and the sufficient HL category relevant to the women's proportion and higher in the inadequate HL category.

Table 2 shows the mean value (SD) of the perceived stress score, in every HL category in the whole sample of participants and in men and women separately. In total, those with excellent HL had lower levels of perceived stress compared to those with sufficient, problematic and inadequate HL. Also, those with sufficient HL had lower levels of perceived stress compared to those with inadequate HL (p<0.001). The same results apply to women (p<0.001). For men, those with inadequate HL had higher perceived stress compared to every other HL category (p<0.001). Table 3 presents the mean value (SD) of perceived stress score, in every NL category, both in total, for men and women separately. No statistically significant differences were observed.

RESULTS

Descriptive Characteristics and Levels of Perceived Stress according to HL and NL categories

Participants' descriptive characteristics, HL, NL, and perceived stress scores are presented in Table 1. In total 1,281 individuals (59.4% women) participated in the study. Their mean age (SD) was 44.52 (17.44). Men were older (p<0.001) and less educated (p=0.002) than women. According to perceived stress score,

Models of Linear Regression for HL

Table 4 presents the results of a linear regression for HL when considering perceived stress, as significant factor for HL. The first model including only perceived stress showed that it was significantly negatively associated with higher levels of HL with −0.266 points (p<0.001). When in model 2, sex (p=0.069), age in years (p=0.721), education in years (p<0.001), existence of chronic disease (p=0.463), and NL (p<0.001) were added as confounders, perceived stress was still significantly negatively associated with HL with −0.239 points (p<0.001).

Table 1. *Descriptive characteristics of the sample and HL, NL and perceived stress (N = 1,281)*

	Men	Women	p-value	Total
N (%)	520 (40.60)	760 (59.40)	–	1,281 (100.00)
Age, mean (SD)	46.92 (17.68)	42.88 (17.11)	<0.001	44.52 (17.44)
Education in years, mean (SD)	6.86 (1.93)	7.13 (1.96)	0.002	7.02 (1.95)
Chronic disease, n (%)				
Yes	138 (27.00)	179 (23.80)	0.227	317 (25.10)
No	373 (73.00)	572 (76.20)		946 (74.90)
Perceived stress score, mean (SD)	25.82 (7.25)	26.91 (7.26)	0.040	26.47 (7.27)
Health literacy score, mean (SD)	31.53 (8.88)	32.79 (7.82)	0.066	32.28 (8.28)
Health literacy categories, n (%)				
Inadequate HL*	93 (20.80)	87 (13.70)	0.017	180 (16.60)
Problematic HL*	170 (38.00)	277 (43.50)		447 (41.20)
Sufficient HL*	137 (30.60)	202 (31.70)		339 (31.30)
Excellent HL	47 (10.50)	71 (11.10)		118 (10.90)
Nutrition literacy score, mean (SD)	21.35 (5.94)	22.62 (5.42)	<0.001	22.11 (5.67)
Nutrition literacy categories, n (%)				
Inadequate NL	31 (6.00)	29 (3.80)	0.079	60 (4.70)
Marginal NL	37 (7.10)	41 (5.40)		78 (6.10)
Adequate NL	451 (86.90)	689 (90.80)		1,141 (89.20)

p<0.05, Mann-Whitney, χ², *shows between which categories exists the significant difference

Table 2. *Perceived stress for HL categories (N = 1,053)*

	HL categories				
	Inadequate HL	**Problematic HL**	**Sufficient HL**	**Excellent HL**	**p-value**
Perceived stress, mean (SD)	28.73 (7.04)[†‡]	27.17 (7.16)[§]	25.71 (7.53)[¶‡]	22.65 (7.32)[†§¶]	<0.001
Men's perceived stress, mean (SD) n = 433	28.36 (6.94)[†§¶]	26.07 (7.04)[¶]	25.16 (8.01)[§*]	22.60 (6.92)[†]	<0.001
Women's perceived stress, mean (SD) n = 620	29.11 (7.16)[¶‡]	27.86 (7.16)[§]	26.08 (7.20)[†‡]	22.68 (7.62)[†§¶#]	<0.001

p < 0.05, Kruskal-Wallis, [†, ‡, §, ¶] shows between which HL subcategories exists the significant difference

Table 3. *Perceived stress for NL categories (N = 1,053)*

	NL categories			
	Inadequate NL	**Marginal NL**	**Adequate NL**	**p-value**
Perceived stress, mean (SD)	28.44 (6.44)	26.34 (7.55)	26.38 (7.29)	0.105
Men's perceived stress, mean (SD) n = 433	27.86 (4.91)	27.31 (8.22)	25.57 (7.28)	0.056
Women's perceived stress, mean (SD) n = 620	29.16 (7.95)	25.48 (9.89)	26.91 (7.25)	0.291

p < 0.05, Kruskal-Wallis

Table 4. *Results (b, SE) from regression analysis models that evaluated determinants of health literacy (N = 1,281)*

	Model 1		Model 2	
	b ± SE	**p-value**	**b ± SE**	**p-value**
Perceived stress	−0.266 ± 0.032	<0.001	−0.239 ± 0.031	<0.001
Sex (men/women)			−0.840 ± 0.462	0.069
Age (years)			−0.006 ± 0.017	0.721
Education (years)			0.538 ± 0.152	<0.001
Chronic disease (yes/no)			−0.435 ± 0.592	0.463
Nutrition literacy			0.274 ± 0.052	<0.001

b – unstandardized b, SE – standard error coefficients, p < 0.05

Table 5. *Results (b, SE) from regression analysis models that evaluated determinants of nutrition literacy (N = 1,281)*

	Model 1		Model 2	
	b ± SE	**p-value**	**b ± SE**	**p-value**
Perceived stress	−0.048 ± 0.022	0.028	−0.007 ± 0.018	0.675
Sex (men/women)			−0.683 ± 0.259	0.008
Age (years)			−0.077 ± 0.009	<0.001
Education (years)			1.027 ± 0.080	<0.001
Chronic disease (yes/no)			−0.646 ± 0.332	0.052
Health literacy			0.086 ± 0.052	<0.001

b – unstandardized b, SE – standard error coefficients, p < 0.05

Models of Linear Regression for NL

Table 5 presents the results of a linear regression for NL when considering perceived stress as significant factor for NL. The first model including only perceived stress showed that it was significantly negatively associated with higher levels of NL with −0.048 points (p = 0.028). When in model 2, sex (p = 0.008), age in years (p < 0.001), education in years (p < 0.001), existence of chronic disease (p = 0.052), and HL (p < 0.001) were added as confounders, perceived stress was not still associated with NL.

DISCUSSION

Positive health behaviours and health risk often have complex relationships with stress, as they can be both elements of coping behaviours and of stress response. The current study was set out to investigate HL and NL levels, in relation to levels of perceived stress, in adults.

In Greece, there is relatively limited data on stress and anxiety in the general population (24). The levels of perceived stress in the current study were slightly higher in comparison to similar

studies conducted in the past (22, 23). This could partially be attributed to the prolonged economic austerity period faced by Greece, which seems to have affected many aspects of health and well-being of the population. Women had significantly higher levels of perceived stress in comparison to men, a finding which is in accordance with the findings of other studies conducted in Greece (22, 23) and worldwide (25). Women usually report more stress than men, potentially because of their different roles in family life and work compared to men (26).

With respect to HL categories, important differences were observed between men and women. More men had inadequate HL levels in comparison to women. As for NL categories, there were no gender differences, but women reported higher NL levels compared to men.

Interestingly, the results clearly show that low HL is significantly positively associated with high levels of perceived stress. The reasons behind this finding are unclear and the methodology employed in this study does not permit to conclude a clear cause-effect relationship. It is highly likely that limited health literacy increases the individuals' stress levels, by limiting their ability to effectively deal with various psychosocial health related issues. On the other hand, it is plausible that the presence of stress, per se, hinder the ability of the individual to improve health literacy levels.

There is evidence that people with low levels of HL often experience negative feelings and feelings of guilt which obstruct them from communicating with family, friends or health personnel, possible problems they face regarding the comprehension of health information (27).

A recent study, conducted in healthy Japanese people, explored the associations of health literacy and the use of information sources with health-risk anxiety and related protective behaviours. The associations of the use of certain information sources with health-risk anxiety and protective behaviours differed by level of health literacy. In particular, those with lower levels of health literacy, according to the study results, may find it difficult to seek and make use of information from the Internet in adopting the appropriate protective measures against health risks (28).

Hence, it is highly likely that low HL levels constitute an important stress factor for some individuals. Increasing health literacy of individuals with or at risk of anxiety disorders may encourage appropriate treatment seeking through increasing health knowledge (12).

In addition, it has to be underlined that high HL levels could be associated with better coping strategies of the individuals. It is known that coping strategies protect both mental and physical health from the negative effects of stress (29). Identifying risk groups that show maladaptive profile of coping is of paramount importance for the prevention of various health problems.

It is vital to develop effective strategies to decrease perceived stress, improve mental health and increase social support in the community via the amelioration of health literacy levels of the population.

Limitations

Limitations include the cross-sectional design of the study, which results in inability to support a temporal relationship and the fact that the instruments used were subjective. Also, participants were recruited only from the urban area of the Attica region. In addition, this study did not collect data with variables that may have an explanatory impact on its findings, including – as mentioned before – personal characteristics, life events, lifestyle, socio-demographic and occupational variables, as well as low sense of coherence, poor social network and appraisal of the stressor(s).

CONCLUSIONS

Low health literacy seems to be very significantly associated with high levels of perceived stress. The reasons behind this association require further investigation.

Data Availability
Data is accessible upon request.

REFERENCES

1. Herman JP, McKlveen JM, Ghosal S, Kopp B, Wulsin A, Makinson R, et al. Regulation of the hypothalamic-pituitary-adrenocortical stress response. Compr Physiol. 2016;6(2):603-21.
2. Khan S, Khan RA. Chronic stress leads to anxiety and depression. Ann Psychiatry Ment Health. 2017;5(1):1091.
3. Lee CM, Watson REB, Kleyn CE. The impact of perceived stress on skin ageing. J Eur Acad Dermatol Venereol. 2020;34(1):54-8.
4. Schneiderman N, Ironson G, Siegel SD. Stress and health: psychological, behavioral, and biological determinants. Annu Rev Clin Psychol. 2005;1:607-28.
5. Christaki E, Kokkinos A, Costarelli V, Alexopoulos EC, Chrousos GP, Darviri C. Stress management can facilitate weight loss in Greek overweight and obese women: a pilot study. J Hum Nutr Diet. 2013;26 Suppl 1:132-9.
6. Slopen N, Kontos EZ, Ryff CD, Ayanian JZ, Albert MA, Williams DR. Psychosocial stress and cigarette smoking persistence, cessation, and relapse over 9-10 years: a prospective study of middle-aged adults in the United States. Cancer Causes Control. 2013;24(10):1849-63.
7. Gellman MD, Turner JR, editors. Encyclopedia of behavioral medicine. Washington DC: Springer; 2013.
8. Ad Hoc Committee on Health Literacy for the Council on Scientific Affairs, American Medical Association. Health literacy: report of the Council on Scientific Affairs. JAMA. 1999;281(6):552-7.
9. Gibbs HD, Ellerbeck EF, Gajewski B, Zhang C, Sullivan DK. The Nutrition Literacy Assessment Instrument is a valid and reliable measure of nutrition literacy in adults with chronic disease. J Nutr Educ Behav. 2018;50(3):247-57.
10. Sorensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. BMC Public Health. 2012;12:80. doi: 10.1186/1471-2458-12-80.
11. Silk KJ, Sherry J, Winn B, Keesecker N, Horodynski MA, Sayir A. Increasing nutrition literacy: testing the effectiveness of print, web site, and game modalities. J Nutr Educ Behav. 2008;40(1):3-10.

12. Jorm A. Mental health literacy: empowering the community to take action for better mental health. Am Psychol. 2012;67(3):231-43.

13. Kutcher S, Wei Y, Coniglio C. Mental health literacy past, present, and future. Can J Psychiatry. 2016;61(3):154-8.

14. Bandelow B, Michaelis S, Wedekind D. Treatment of anxiety disorders. Dialogues Clin Neurosci. 2017;19(2):93-107.

15. Coles ME, Coleman SL. Barriers to treatment seeking for anxiety disorders: initial data on the role of mental health literacy. Depress Anxiety. 2010;27(1):63-71.

16. Chu JJ, Khan MH, Jahn HJ, Kraemer A. Sense of coherence and associated factors among university students in China: cross-sectional evidence. BMC Public Health. 2016;16:336. doi: 10.1186/s12889-016-3003-3.

17. Feizi A, Aliyari R, Roohafza H. Association of perceived stress with stressful life events, lifestyle and sociodemographic factors: a large-scale community-based study using logistic quantile regression. Comput Math Methods Med. 2012;2012:151865. doi: 10.1155/2012/151865.

18. Sørensen K, Van den Broucke S, Pelikan JM, Fullam J, Doyle G, Slonska Z, et al. Measuring health literacy in populations: illuminating the design and development process of the European Health Literacy Survey Questionnaire (HLS-EU-Q). BMC Public Health. 2013;13:948. doi: 10.1186/1471-2458-13-948.

19. Diamond JJ. Development of a reliable and construct valid measure of nutritional literacy in adults. Nutr J. 2007;6:5. doi: 10.1186/1475-2891-6-5.

20. Michou M, Panagiotakos D, Costarelli V. Development and validation of the Greek version of the nutrition literacy scale. Mediterranean J Nutr Metabol. 2018;12(1):61-7.

21. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983;24(4):385-96.

22. Katsarou A, Panagiotakos P, Zafeiropoulou A, Vryonis M, Skoulgaris I, Tryposkiadis F, et al. Validation of a Greek version of PSS-14; a global measure of perceived stress. Cent Eur J Public Health. 2012;20(2):104-9.

23. Andreou E, Alexopoulos EC, Lionis C, Varvogli L, Gnardellis C, Chrousos GP, et al. Perceived stress scale: reliability and validity study in Greece. Environ Res Public Health. 2011;8(8):3287-98.

24. Kokaliari E. Quality of life, anxiety, depression, and stress among adults in Greece following the global financial crisis. Int Soc Work. 2016;61(3):410-24.

25. Worly B, Verbeck N, Walker C, Clinchot DM. Burnout, perceived stress, and empathic concern: differences in female and male Millennial medical students. Psychol Health Med. 2019;24(4):429-38.

26. Xu X, Bao H, Strait K, Spertuc JA, Lichtman JH, D'Onofrio G, et al. Sex differences in perceived stress and early recovery in young and middle-aged patients with acute myocardial infarction. Circulation. 2015;131(7):614-23.

27. Diviani N, van den Putte B, Giani S, van Weert JCM. Low health literacy and evaluation of online health information: a systematic review of the literature. J Med Internet Res. 2015;17(5):e112. doi: 10.2196/jmir.4018.

28. Ishikawa H, Kato M, Kiuchi T. Associations of health literacy and information sources with health-risk anxiety and protective behaviors. J Commun Healthcare. 2016;9(1):33-9.

29. Skinner EA, Edge K, Altman J, Sherwood H. Searching for the structure of coping: a review and critique of category systems for classifying ways of coping. Psychol Bull. 2003;129(2):216-69.