Journal Sport Area
http://journal.uir.ac.id/index.php/JSP
Vol. 7. No. 1. April (2022)

Health literacy and health-related behavior in sport among University students in East Java, Indonesia: A cross sectional study

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Received: 14 November 2021; Accepted 22 February 2022; Published 23 April 2022
Ed 2022; *7*(1): 104-116

ABSTRACT

Health literacy is an important determinant of health outcomes due to its close relation to an individual's health status and well-being. The purpose of this study is to measure the level of health literacy in university students as well as analyze its relationship with socio-demographic factors and health-related behaviors. A total of 163 university students participated in this study via online-based questionnaires that assessed socio-demographic factors, health-related behavior, physical activity, and health literacy using well-validated instruments. An independent t-test and ANOVA were performed to explore any statistical significance and mean differences in health literacy score. The results discovered no significant differences in demographic characteristics on health literacy scores. However, female respondents, majoring in sport and living in urban areas with parents having higher education degrees, had a slightly higher score than their counterparts. A significant difference in scores was observed in the smoking variable ($p = 0.007$). Therefore, health literacy in university students is not influenced by demographic characteristics. However, this study showed that higher health literacy scores contribute to better practice of health-related behavior, especially smoking.

Keywords: Health literacy; e-heals; health-related behavior; physical activity

https://doi.org/10.25299/sportarea.2022.vol7(1).8098

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How to Cite: Ridwan, M., Sholikhah, A. M., & Prakoso, B. B. (2022). Health literacy and health-related behavior in sport among University students in East Java, Indonesia: A cross sectional study. *Journal Sport Area*, *7*(1), 104-116. https://doi.org/10.25299/sportarea.2022.vol7(1).8098

Authors' Contribution: a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection

INTRODUCTION

The development of Information and Communication Technology in the industrial revolution era has influenced many sectors, including health. Nowadays, health information is accessible to anyone, anytime, and anywhere, with the internet as the main source of public information (Park & Lee, 2015). However, special skills are needed for proper search and evaluation of information from the internet (Tubaishat & Habiballah, 2016). The ability to obtain, process, and understand the required health information is known as health literacy (Baker, 2006). In Indonesia, the health literacy index in the insufficient category is 1.7-

8.9% and the problem is 45.8-65% (Ayunin, Handayani, & Musniati, 2021), besides that in East Java, most of the understanding of a healthy lifestyle is in the moderate category (Ardianca, Kanca, & Wijaya, 2021).

Health literacy is a concept that first emerged in the 1970s, and its research trends have increased in recent years (Bodur, Filiz, & Kalkan, 2017). Currently, health literacy has become a concerning issue for researchers, health providers, and the public (Parker & Ratzan, 2010). This is due to the urgency that requires people to have expertise in accessing health information appropriately. People always have deal with such information, either individually or for persons closest to them. Usually, the aim involves seeking information on a certain disease or medications regarding the health problems faced. However, the ability to assess the quality of the information obtained, evaluate the health risks and benefits, and understand the messages conveyed are not the same (Rorrer, 2015).

The literacy skills of individuals in the society vary widely, ranging from limited/low to high (Rababah, Al-Hammouri, Drew, & Aldalaykeh, 2019), especially in the current era, where the internet is often used in accessing health information. Therefore, technologically literate people will have better health literacy. Electronic means are now widely used by the public in assessing a person's health literacy skills. It is an integration of basic literacy such as information, media, computers, and technology, that is scientifically packaged and applied to eHealth promotion (Yang et al., 2019). Consequently, eHealth literacy is easier to use in obtaining an overall understanding of a person's ability in accessing health information (Van der Vaart & Drossaert, 2017).

The Institute of Medicine (IOM) estimates that half of the world's adult population possesses low literacy skills to gather, process, and use health information (Rorrer, 2015). A study shows that about 12.4% of people aged 15 and over, as well as 47.6% of study objectives have limited health literacy which may either be problematic or inadequate (Sørensen et al., 2015; Sukys, Cesnaitiene, & Ossowsky, 2017). Other studies stated that health literacy has a negative correlation with age, where the elderly have lower levels than the younger age groups (Duong et al., 2015; Sørensen et al., 2015; Wang et al., 2013). From these studies, research on health literacy is more aimed at senior groups including the old and elderly, than adolescents and young adults (Park et al., 2017; Sukys et al., 2017).

This gap is not surprising, but measurement of health literacy levels among adolescents and young adults still needs to be performed due to the many deviant health behaviors formed in recent times (Hsu, Chiang, & Yang, 2014). The university students in this age group experience a transition from adolescence to adulthood, where their health-related behavior will very likely influence their well-being in the future. During this transition period, health literacy plays an important role in shaping behavior to enable them adopt health-promoting habits (Sukys et al., 2017). Health literacy is necessary for every individual, considering its close relation to a person's health status and well-being (Bodur et al., 2017; Cho, Lee, Arozullah, & Crittenden, 2008).

Generally, health is a resultant combination of various factors, such as health-promoting lifestyles and individual factors related to one's health literacy (Li, Yin, Cui, & Xu, 2020). Research shows that low levels of literacy are associated with low physical health, including low health knowledge and behavior (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; Luo, Yang, Chen, & Chiang, 2018). Conversely, individuals with a high level of health literacy easily make more informed decisions about their health. The information found is easier to understand, judge its correctness, differentiate the quality of health websites and use this information to make informed health decisions (Bodie & Dutta, 2008). Research shows that university students with good health literacy easily adopt healthy behaviors such as eating nutritious foods, getting enough rest, and regular exercise (Yang, Luo, & Chiang, 2017). In the end, this will contribute to improving their health status (Hsu et al., 2014). Research on health literacy has been performed mainly on elderly people and health students only, such as undergraduate medical and nurse students. This is because health students become future health professionals with a lot of contact to the community in providing valid health information and education (Tubaishat & Habiballah, 2016). Furthermore, health students are required to have high health literacy skills in order to educate patients properly and make appropriate decisions (Stellefson et al., 2011). However, this task is not only carried out by medical and nursing students. Sports students also require qualified health literacy skills, as they eventually become trainers, coaches, or athletes

that educate the public in terms of promoting physical activity and healthy lifestyles (Rorrer, 2015). This means that mastery of health literacy is needed by the wider community, especially sports students who have knowledge related to health. Even today's sports profession often leads to achieve a complete level of health through physical activity and sports.

Sports students can serve as an important health center for promoting the well-being and development of health literacy (Meganck, Scheerder, & Thibaut, 2015). Participation in organized sports activities can be associated with a wide range of health such as mental health, life satisfaction, and physical health (Badura, Geckova, & Sigmundova, 2015). In addition to benefit health, some platforms also offer learning related to personal health and motor skills (Geidne, Quennerstedt, & Eriksson, 2013). Students can recognize the benefits of sports clubs as health promotion arrangements that contribute to society as a whole. Health literacy is related to the level of achievement. Sun et al. (2013) explains that health literacy and various school subjects are similar, in terms of characteristics such as logical thinking, or other types of thinking skills. Furthermore, the study showed that teens who did well in school tended to participate more often in sports club activities, compared to those who didn't do well in school. Other research by Nugroho et al. (2014) explains that the students could easily find information related to health, find out what medical action to take in the case of an emergency, and were aware of health threats. The students were also aware of the importance of the environment on their health and making decisions to improve their health.

From the above explanation, it is concluded that health literacy plays an important role in shaping healthier behavior. Not many studies have addressed this subject in sports students. Therefore, this study aims to measure the level of health literacy in sports students and to analyze its relationship with socio-demographic factors and health-promoting behaviors.

METHOD

Study design

This study uses a cross-sectional design. Probability sampling and simple random sampling are both used in the sampling process. The participants were undergraduate students majored in sport and non-sport courses in two universities located in East Java, one public (Universitas Negeri Surabaya) and the other private (Universitas Nahdlatul Ulama Sunan Giri Bojonegoro). The participants enrolled in this study were selected based on the following criteria: (1) age 18-23 years; (2) registered as active students in one of the selected universities at the time of data collection in any academic level (first to fourth year); (3) has clear consciousness and disability-free; (4) consent to participate in this study. Ultimately, a total of 251 respondents met the inclusion criteria. Basically, all respondents have met the inclusion criteria, but data collection using online surveys needs to be screened for data in order to get data that really fits the inclusion criteria. Data screening is carried out based on filling in open items that allow writing errors to occur, such as: filling in identity, date of birth, height, weight, duration of physical activity, and other illogical fields. After excluding participants that failed to complete the entire questionnaire or gave invalid responses, the final participants were 163 students in total.

Data collection

The data was obtained using online questionnaires which were filled by participants via an online-based platform. The self-administered questionnaire instruments assessed socio-demographic information, health-related behaviors, physical activity level and health literacy. The questionnaire adopted into English has been submitted to a sworn certified translation service (https://goodlingua.com/) so that there is no language barrier in using the questionnaire.

Socio-Demographic Information

A self-reported questionnaire was developed to collate information regarding socio-demographic characteristics of students including age, sex, major (sport, non-sport), residence (living with parents or rent/boarding house), place of origin (urban, rural), highest formal education attainment of parent (did not

finish school, primary school, junior high school, high school, and college/university), and parent's occupation (unemployed, entrepreneur, civil servant, state-own enterprise or SOE official and private-own enterprise or POE official). These variables were included as covariates during statistical analyses.

Health-Related Behaviours

Health-related behaviours were measured by self-reported questionnaires, including smoking status (smoker and non-smoker), health examination during the last 12 months (never, not sure, once in a year, twice a year), frequency of exercise (0-7 days/week), sleep duration, and the most-used source of health information (internet, TV/radio, newspaper, health officers). The question items used were selected from several research results summarized in the research of Liu, Liu, Li, and Chen (2015).

Physical Activity

The physical activity was measured using the short version of the validated International Physical Activity Questionnaire (IPAQ-SF) (Evaluation Measures International Physical Activity Questionnaire-Short Form, 2002).

Table 1. International Physical Activity Questionnaire

No	Questionnaire
1	During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?
2	How much time did you usually spend doing vigorous physical activities on one of those days?
3	During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
4	How much time did you usually spend doing moderate physical activities on one of those days?
5	During the last 7 days, on how many days did you walk for at least 10 minutes at a time?
6	How much time did you usually spend walking on one of those days?
7	During the last 7 days, how much time did you spend sitting on a week day?

The questionnaire was translated into Indonesian without any modification. Afterwards, respondents were asked to calculate the time spent (expressed in days per week, and minutes per day) over the last 7 days, on varying levels of physical activity (walking, moderate, vigorous, and sitting/leisure activity). The overall physical activity was scored using metabolic equivalent task (METs) in minutes per week (Lee, Mcfarlane, Lam, & Stewart, 2011). The MET-min/week was the sum of minutes spent on activities at different levels of walking and sitting either moderately or vigorously within the last 7 days, multiplied by 8.0, 4.0, and 3.3, 1.0, respectively. The validity of the IPAQ-SF was assessed by associating the measurement results with the accelerometer with a positive and significant correlation (0.31, $p<0.000$) which indicates that the questionnaire has met the validity requirements of Rääsk et al (2017).

Health Literacy

The perceived health literacy skill was assessed by the eHealth Literacy Scales (eHEALS) developed by Norman and Skinner (2006). eHEALS is a validated instrument for measuring the perception of subject's skill and knowledge regarding each measured item. It demonstrates excellent internal reliability with alpha 0.89 - 0.97 and shows good test-retest reliability (Norman & Skinner, 2006). The questionnaire comprised 8 eHEALS items and 1 supplementary item. All items were translated into Indonesian without much modification. The total score ranged from 9 to 36, and greater scores represent higher health literacy skill.

Data Analysis

Descriptive statistics were used to present socio-demographic factors, health-promoting behaviors, physical activity, and health literacy. The data obtained from measurement were analyzed using mean ± standard deviation (SD). In addition to descriptive statistics, follow up analyses like t-test and ANOVA were performed to analyze any significant differences among multiple groups. Furthermore, P values less than 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

The socio-demographic characteristics of respondents are shown in Table 2. A total of 163 university students aged 18-23 years participated in this study, where the majority of respondents were 19 years old (28.8%) in their first year at university. In terms of gender, the respondents consist of 83 (50.9%) males and 80 (49.1%) females. The majority were students majoring in sports (57.1%) from rural areas (56.4%). Almost all respondents live with their parents (95.1%), of which the majority are entrepreneurs (42.3%). In terms of parents' formal education, 36.8% have a high level of education, namely college/university graduates

Table 2. Socio-demographic Characteristics of University Students and Differences in Health Literacy Score

Socio-Demographic Characteristic	N	Health Literacy Score*	F / t	p-value
Age (Years)				
18	7 (4.3%)	27.14 ± 2.27		
19	47 (28.8%)	25.91 ± 4.23		
20	39 (23.9%)	26.23 ± 2.99	0.198	0.963
21	42 (25.8%)	26.45 ± 3.63		
22	21 (12.9%)	26.14 ± 4.90		
23	7 (4.3%)	36.71 ± 3.15		
Gender				
Male	83 (50.9%)	26.05 ± 4.35	-0.651	0.516
Female	80 (49.1%)	26.43 ± 3.09		
Major				
Sport	93 (57.1%)	26.47 ± 3.11	-0.665	0.507
Non-sport	70 (42.9%)	26.08 ± 4.19		
Place of Origin				
Urban	71 (43.6%)	26.56 ± 3.06	0.949	0.344
Rural	92 (56.4%)	26.00 ± 4.22		
Residence				
Rent / boarding house	8 (4.9%)	26.20 ± 3.79	0.678	0.800
Living with parent	155 (95.1%)	27.12 ± 2.99		
Parent's Occupation				
Unemployed	28 (17.2%)	26.14 ± 3.64		
Entrepreneur	69 (42.3%)	25.72 ± 3.87		
Civil servant	24 (14.7%)	27.79 ± 3.89	1.373	0.246
SOE official	4 (2.5%)	26.00 ± 2.00		
POE official	38 (23.3%)	26.32 ± 3.59		
Formal Education Attainment of Parent				
Primary school or below	289(17.8%)	25.75 ± 4.77		
Junior high school	17 (10.4%)	25.94 ± 3.91	0.211	0.932
High school	57 (35.0%)	26.35 ± 4.22		
College/university	60 (36.8%)	26.47 ± 2.56		

*health literacy score was measured using eHEALS and analyzed in mean ± SD

Health literacy scores vary according to age, where the highest was found in respondents aged 23 years, precisely university students in their final year (36.71 ± 3.15). The score was not significantly different between male and female respondents, namely 26.05 ± 4.35 and 26.43 ± 3.09, respectively. The same result was observed in the background variables of the majors and the residence. However, sports students had a slightly higher health literacy score (26.47 ± 3.11) than respondents from other majors (26.08 ± 4.19). Respondents from urban areas had higher scores (26.56 ± 3.06) than the ones from the countryside (26.00 ± 4.22). Respondents living with parents have a higher health literacy score (27.12 ± 2.99), but the difference is not significant. Based on parental occupation, respondents with civil servant parents had the highest score (27.79 ± 3.89) compared to other groups. Overall, the respondents' scores did not show a significant difference in terms of socio-demographic factors (p> 0.05) (Table 3).

Table 3. Health-Related Variable and Differences in Health Literacy Score among University Students

Health-Related Variable	N	Health Literacy Score*	F / t	p-value
BMI				
< 17.0	7 (4.29 %)	26.59 ± 3.52	5.041	0.001**
17.0 – 18.4	19 (11.66 %)	25.31 ± 3.22		
18.5 – 25.0	106 (65.03 %)	27.57 ± 2.76		
25.1 – 27.0	12 (7.36 %)	22.08 ± 5.76		
> 27.0	19 (11.66 %)	27.16 ± 2.85		
Smoking				
Smoker	20 (12.27%)	24.15 ± 5.75	2.715	0.007**
Non-smoker	143 (87.73%)	26.54 ± 3.31		
Health Examination				
Never	33 (20.25%)	26.21 ± 3.66	0.165	0.920
Not sure	120 (73.62 %)	26.22 ± 3.89		
Once a year	5 (3.07 %)	27.40 ± 3.05		
Twice a year	5 (3.07 %)	26.25 ± 3.76		
Physical Exercise				
Never	7 (4.29 %)	28.29 ± 2.98	1.807	0.089
a day/week	35 (21.47 %)	26.06 ± 3.50		
2 days/week	29 (17.79 %)	25.45 ± 5.03		
3 days/week	39 (23.93%)	25.69 ± 3.32		
4 days/week	18 (11.04 %)	26.00 ± 2.93		
5 days/week	12 (7.36 %)	27.67 ± 3.42		
6 days/week	8 (4.91 %)	25.12 ± 2.53		
7 days/week	15 (9.20 %)	28.67 ± 3.75		
Source of Health Information				
Internet	144 (88.34 %)	26.30 ± 3.77	0.152	0.928
Television	10 (6.13 %)	26.20 ± 2.30		
Newspaper	1 (0.61 %)	26.00		
Health official	8 (4.91 %)	25.38 ± 5.40		

*health literacy score was measured using eHEALS and analyzed in mean ± SD
**significant at α = 0,05

The analysis of the respondent's health-related variable and literacy score are shown in Table 3. The majority of respondents had a normal BMI within the 18.5 - 25.0 range (65.03%). The BMI variable showed a significant difference in health literacy score (p = 0.001). The smoking variable also showed a significant difference (p = 0.007), where non-smoker respondents had a higher score than the smokers (26.54 ± 3.31). The number of respondents that performed health checks regularly were 5 (3.07%), with a mean health literacy score of 26.25 ± 3.76. As many as 15 people (9.20%) performing physical activities daily had the highest health literacy score of 28.67 ± 3.75. In terms of health information source variables, the majority of respondents (88.34%) accessing health information through the internet had the highest score compared to the respondents obtaining information from other sources. Variations in health literacy scores as indicated by variables such as health examination, physical exercise, and source of health information were not significantly different (p> 0.05).

Table 4. Correlation between Age, BMI, MET and Health Literacy

Variables	Mean±SD	r	p-value
Age	20.8±1.52	0.019	0.807
Body Mass Index	22.4±5.34	0.003	0.972
Metabolic Equivalent Task (MET)	3,218±2,007	-0.032	0.681

From Table 4, it is observed that the variable respondent characteristics including age, BMI, and MET do not show a significant correlation with health literacy (p> 0.05). Therefore, these three variables are not related to a person's health literacy score.

This research was conducted with the aim of obtaining information on health literacy among university students. This is due to research on health literacy in sports students is rare, especially in developing countries like Indonesia. Furthermore, its measurement using the eHEALS instrument in the university student population has not been widely adopted (Rababah et al., 2019). Moreover, university students in the final phase are highly influenced by their environment, which renders them vulnerable to unhealthy behavior which become a habit in the future (Rababah et al., 2019; Schmidt, 2012). Therefore, this research was conducted to measure the health literacy score of university students and its relation to socio-demographic factors and health-related behavior.

Differences in Socio-demographic Factors Based on the Health Literacy Score

In this study, a comparative analysis was carried out between the socio-demographic variables of the respondents and the health literacy score, including age, gender, major background, regional origin, place of residence, parent's occupation and last formal education. The results showed that there were differences in student health literacy scores in terms of socio-demographic factors, but they were not significant enough to conclude that the varying health literacy was due to background differences. There was no significant difference observed at the age variable which agrees with Rababah et al. (2019) where the univariate and further analysis of the student age variable did not significantly influence health literacy. This contrasts with the results of previous studies, that health literacy scores are influenced by respondent characteristics, such as age and gender (Bodur et al., 2017; Duong et al., 2015; Islam et al., 2017), and their effects are highly diverse. A study conducted by Duong et al. (2015), Protheroe et al. (2017), and Hoa et al. (2020), stated that health literacy showed a significant difference and negative correlation with the age variable, where younger respondents had a higher level of health literacy than the adult and elderly respondents. This is due to older people often have difficulty accessing health information through the media, especially the internet. This makes them less confident in their ability to find the right information (Hsu, 2019). Furthermore, it is necessary to know the medical history and records for the elderly to access health information (Yoshida, Iwasa, Kumagai, Suzuki, & Yoshida, 2014). Older people have a significant need for health information and use a variety of means to find the available and quality ones. Conversely, research conducted by Nakayama et al., (2015) showed a positive correlation between age and health literacy. The results of previous studies are not strong enough to serve as a basis for drawing conclusions in this study due to the homogeneous age group used, precisely 18-23 years, as other studies used respondents with a more heterogeneous age group. Therefore, the respondent's age did not result in a significant difference in health literacy in this study.

Based on the gender variable, female students had a slightly higher score than the male, though not significant. This result agrees with the research of Juvinyà-Canal et al. (2020) examining literacy in health students. The difference in terms of gender is not only seen in the university student group, but also in middle school students (Ran et al., 2018), and adult groups, such as in Turkey (Bodur et al., 2017), and Korean adults (Lee, Lee, & Kim, 2015). Several possible reasons attempt to explain this result. For example, women are more concerned about their health, therefore, they search for health information either through the mass media or from people around them (Vardavas, Kondilis, Patelarou, Akrivos, & Falagas, 2009). Furthermore, women pay more attention to appearance and personal image than men (Ran et al., 2018), which encourages them to find out more health-related information. Lee et al. (2015) stated that higher health literacy in women adds to an understanding on the importance of gender roles in health literacy

Previous research focuses more on the educational level as a predictor of health literacy (Beauchamp et al., 2015; Quartuccio et al., 2019; Soones et al., 2018). In this study, differences in the majors are investigated, which is usually overlooked. Based on the variable of majors, the sports students had a slightly higher health literacy score than students in engineering, mathematics, arts, and languages (non-sport major). Although the difference is not significant, these results signify that students majoring in sports are more exposed to health information obtained from lectures which indirectly impacts their understanding and health literacy (Rababah et al., 2019). These results are in line with research by Dolezel et al. (2020) which stated that students in health faculty have a significantly higher health literacy score than students in other faculties. It was further stated that university classification is an important factor influencing the health

literacy of students. The number of courses on health education obtained by students is one of the factors behind the positive correlation between the majors and the health literacy level (Sukys et al., 2017). However, another study shows contradictory results, in which students majoring in engineering are reported to have higher health literacy scores (Zhang et al., 2016). Despite these mixed results, student majoring backgrounds have to be viewed as disparate sources in health literacy levels among students. This is highly useful in developing programs to improve health literacy among students.

Health literacy is a complex issue involving many factors. These factors are contextual in nature, and differ from one setting to another (Hoa et al., 2020). This research observed that health literacy does not show any significant difference to other socio-demographic variables such as origin, place of residence, parent's occupation and educational qualification. However, students from rural areas tend to have lower health literacy scores, as shown in previous studies. The results of similar studies in China stated that this is related to the level of economic development of a region including the imbalances in health resources affecting the accessibility of health information (Ran et al., 2018). This holds true for students having parents that graduated from elementary school, the health literacy score in this group was the lowest compared to others. This is due to parents in developing countries having a smaller chance of getting higher education, which negatively affects the health literacy of themselves and their children (Bridges, Parthasarathy, Wong, & et al, 2014; Fleary, Joseph, & Pappagianopoulos, 2018; Hoa et al., 2020; Zhang et al., 2016).

Health-Related Behaviour and Health Literacy

Health literacy is defined as an ability to obtain and understand basic health information and services needed to make health-related decisions (Chang, 2011; Chisolm, Manganello, Kelleher, & Marshal, 2014; Ghaddar, Valerio, Garcia, & Hansen, 2012; Hoffman, Marsiglia, Nevarez, & Porta, 2017). Meanwhile, electronic health literacy involves an individual's ability to search, evaluate, and use health information from electronic sources to solve an issue or problem (Chang et al., 2015). Therefore, health literacy simply involves an individual's ability to seek information beneficial to their health. Various studies have proven that health literacy is related to health outcomes, health status, and health-related behavior (Connor, Mantwill, & Schulz, 2013).

The BMI and smoking behavior variables showed a significant difference in the health literacy score of students. Students with normal BMI tend to have significantly higher literacy skills than other BMI groups. However, these results need to be further analyzed to determine the contributing factors, such as the adoption of a healthy diet or lifestyle. Likewise, non-smoking students have significantly higher health literacy scores than the others which smoke. This result agrees with research of Rababah et al. (2019) which showed disparities in students' smoking status. Research also states that a person's ability to understand and apply information related to the dangers of smoking will most likely make the decision to quit (Panahi, Ramezankhani, Tavousi, & Niknami, 2018). Consequently, enhancing a person's health literacy ability can change their behavior related to tobacco consumption (Atri et al., 2018).

For the other variables, including the frequency of medical examinations and physical activity, the scores varied, but were not significantly different. Therefore, it is assumed that good health literacy skills enable an individual to make the right health-related decisions. Likewise, low health literacy will open up opportunities for unhealthy actions such as smoking (Schmidt, 2012), choosing an unhealthy diet (Deliens, Clarys, Bourdeaudhuij, & Deforche, 2013), and not doing physical activity as recommended (Wald, Muennig, O'Connell, & Garber, 2014). The long-term impact of this habit will be very detrimental, as it leads to chronic diseases such as metabolic syndrome (Fernandes & Lofgren, 2011), cardiovascular disease (Goldstein, Xie, Hawkins, & Hughes, 2015), and even mental health problems (Wu, Tao, Zhang, & Tao, 2015).

Nutbeam stated that there are three types/domains in health literacy, namely functional, communicative/interactive, and critical (Nutbeam, 2008). Functional health literacy refers to the basic skills of reading and writing, while the communicative involves the ability to extract information and derive meaning from various forms of communication. Meanwhile, critical health literacy is the ability to critically

evaluate the health information obtained. Other definitions of health literacy include translating knowledge into behavior, which emphasizes the importance of communicative/interactive and critical health literacy. However, regarding the instruments used in this study, health literacy is emphasized only in knowledge dimensions, precisely the ability to access and understand the information obtained. Therefore it is not possible to measure whether the knowledge gained is actually practiced by students in their health behavior. These reasons underlie the results of this study, in which several health-related behavior variables did not show significant differences and relationships as in previous studies. However, the results obtained from this study provide sufficient evidence that the link between health literacy and health-related behavior requires further study.

CONCLUSION

The result of this study showed that the health literacy of university students is not influenced by any socio-demographic factor. Moreover, a higher health literacy score may contribute to an improvement in health-related behaviour, especially from smoking. The disparities in health literacy based on various demographic characteristics and health variables provide sufficient information regarding the importance of health literacy on improving health outcomes among university students. This finding should not be generalized arbitrarily, considering that the subjects involved are still very limited both in terms of number and coverage area. For this reason, it is necessary to investigate further with a wider scope of area as well as a more representative number of subjects.

ACKNOWLEDGEMENT

This study was funded by Non-tax revenue (PNBP) of State University of Surabaya. The author is grateful to all respondents that supported and participated in this study. Without their contribution, the data collection process may have been impossible.

CONFLICT OF INTEREST

The authors declare no competing interests in this study.

REFERENCES

Ardianca, A., Kanca, I. N., & Wijaya, M. A. (2021). Survei pemahaman pola hidup sehat di masa pandemi covid-19 pada peserta didik kelas X MAN 4 Kediri Jawa Timur. *JPOK Undiksha*, *9*(3), 71–79. http://dx.doi.org/10.23887/jjp.v9i3.43940

Atri, S. B., Sahebihahgh, M. H., Jafarabadi, M. A., Behshid, M., Ghasempour, M., & Abri, F. (2018). The Relationship between Health Literacy and Stages of Change in Smoking Behavior among Employees of Educational Health Centers of Tabriz University of Medical Sciences (2016). *International Journal of Preventive Medicine*, *9*(91), 1–7. https://doi.org/10.4103/ijpvm.IJPVM_259_17

Ayunin, E. N., Handayani. S., & Musniati, N. (2021). "Indeks Literasi Kesehatan Mahasiswa Universitas Muhammadiyah Prof . Dr . Hamka (UHAMKA) Kampus A Jakarta Health Literasi Index of Student Collage in Muhammad. *Arkesmas*, *6*(1), 32–38.

Badura, P., Geckova, A. M., & Sigmundova, D. (2015). When children play, they feel better: Organized activity participation and health in adolescents. *BMC Public Health*, *15*(1), 1-8. https://doi.org/10.1186/s12889-015-2427-5

Baker, D. W. (2006). The Meaning and The Measure of Health Literacy. *Journal of General Internal Medicine*, *21*(8), 878–883. https://doi.org/10.1111/j.1525-1497.2006.00540.x

Beauchamp, A., Buchbinder, R., Dodson, S., Batterham, R. W., Elsworth, G. R., Mcphee, C., … Osborne, R. H. (2015). Distribution of health literacy strengths and weaknesses across socio-demographic groups: A cross-sectional survey using the Health Literacy Questionnaire (HLQ). *BMC Public Health*, *15*(1), 678. https://doi.org/10.1186/s12889-015-2056-z

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low Health Literacy and Health Outcomes: An Updated Systematic Review. *Annals of Internal Medicine*, *155*(2), 97–107. https://doi.org/10.7326/0003-4819-155-2-201107190-00005

Bodie, G. D., & Dutta, M. J. (2008). Understanding Health Literacy for Strategic Health Marketing: eHealth Literacy, Health Disparities, and the Digital Divide. *Health Marketing Quarterly*, *25*(2), 175–203. https://doi.org/10.1080/07359680802126301

Bodur, A. S., Filiz, E., & Kalkan, I. (2017). Factors Affecting Health Literacy in Adults: A Community Based Study in Konya, Turkey. *International Journal of Caring Sciences*, *10*(1), 100–109.

Bridges, S. M., Parthasarathy, D. S., Wong, H. M., & et al. (2014). The relationship between caregiver functional oral health literacy and child oral health status. *Patient Education and Counseling*, *94*(3), 411–416. https://doi.org/10.1016/j.pec.2013.10.018

Chang, F. C., Chiu, C. H., Chen, P. H., Miao, N. F., Lee, C. M., Chiang, J. T., & Pan, Y. C. (2015). Relationship between parental and adolescent ehealth literacy and online health information seeking in Taiwan. *Cyberpsychology, Behavior, and Social Networking*, *18*(10). https://doi.org/10.1089/cyber.2015.0110

Chang, L. C. (2011). Health literacy, self-reported status and health promoting behaviours for adolescents in Taiwan. *Journal of Clinical Nursing*, *20*(1–2), 190–196. https://doi.org/10.1111/j.1365-2702.2009.03181.x

Chisolm, D. J., Manganello, J. A., Kelleher, K. J., & Marshal, M. P. (2014). Health literacy, alcohol expectancies, and alcohol use behaviors in teens. *Patient Education and Counseling*, *97*(2), 291–296. https://doi.org/10.1016/j.pec.2014.07.019

Cho, Y. I., Lee, S. Y. D., Arozullah, A. M., & Crittenden, K. S. (2008). Effects of Health Literacy on Health Status and Health Service Utilization amongst The Elderly. *Social Science and Medicine*, *66*(8), 1809–1816. https://doi.org/10.1016/j.socscimed.2008.01.003

Connor, M., Mantwill, S., & Schulz, P. J. (2013). Functional health literacy in Switzerland — Validation of a German, Italian, and French health literacy test. *Patient Education and Counseling*, *90*(1), 12–17. https://doi.org/10.1016/j.pec.2012.08.018

Deliens, T., Clarys, P., Bourdeaudhuij, I. De, & Deforche, B. (2013). Behaviour Related Correlates of Academic Performance in First Year University Students. *Nutrition Journal*, *12*(1), 162. https://doi.org/10.1186/1475-2891-12-162

Dolezel, D., Shanmugam, R., & Morrison, E. E. (2020). Are college students health literate? *Journal of American College Health*, *68*(3), 242–249. https://doi.org/10.1080/07448481.2018.1539001

Duong, V. T., Lin, I., Sorensen, K., Pelikan, J. M., Broucke, S. Van Den, Lin, Y., & Chang, P. W. (2015). Health Literacy in Taiwan: A Population-Based Study. *Asia Pasific Journal of Public Health*, *27*(8), 871–880. https://doi.org/10.1177/1010539515607962

Fernandes, J., & Lofgren, I. E. (2011). Prevalence of Metabolic Syndrome and Individual Criteria in College Students. *Journal of American College Health*, *59*(4), 313–321. https://doi/abs/10.1080/07448481.2010.508084

Fleary, S. A., Joseph, P., & Pappagianopoulos, J. E. (2018). Adolescent health literacy and health behaviors: a systematic review. *Journal of Adolescence*, *62*(1), 116–127. https://doi.org/10.1016/j.adolescence.2017.11.010

Geidne, S., Quennerstedt, M., & Eriksson, C. (2013). The youth sports club as a health-promoting setting: an integrative review of research. *Scand J Public Health*, *41*, 269–283. https://doi.org/10.1177/1403494812473204

Ghaddar, S. F., Valerio, M. A., Garcia, C. M., & Hansen, L. (2012). Adolescent Health Literacy: The Importance of Credible Sources for Online Health Information. *Journal of School Health*, *82*(1), 28–36. https://doi.org/10.1111/j.1746-1561.2011.00664.x

Goldstein, C. M., Xie, S. S., Hawkins, M. A., & Hughes, J. W. (2015). Reducing risk for cardiovascular disease: negative health behaviors in college students. *Emerging Adulthood*, *3*(1), 24–36. https://doi.org/10.1177/2167696814536894

Hoa, H. Van, Giang, H. T., Vu, P. T., Van Tuyen, D., & Khue, P. M. (2020). Factors Associated with Health Literacy among the Elderly People in Vietnam. *BioMed Research International*, *2020*. https://doi.org/10.1155/2020/3490635

Hoffman, S., Marsiglia, F. F., Nevarez, L., & Porta, M. (2017). Health literacy among youth in Guatemala city. *Social Work in Public Health*, *32*(1), 30–37. https://doi.org/10.1080/19371918.2016.1188741

Hsu, W. C. (2019). The Effect of Age on Electronic Health Literacy: Mixed-Method Study. *JMIR Human Factors*, *6*(2), e11480. https://doi.org/10.2196/11480

Hsu, W. C., Chiang, C. H., & Yang, S. C. (2014). The Effect of Individual Factors on Health Behaviors Among College Students: The Mediating Effects of eHealth Literacy. *Journal of Medical Internet Research*, *16*(12). https://doi.org/10.2196/jmir.3542

Islam, M. M., Touray, M., Yang, H. C., Poly, T. N., Nguyen, P. A., Li, Y. C., & Abdul, S. S. (2017). E-Health Literacy and Health Information Seeking Behavior among University Students in Bangladesh. *Studies in Health Technology and Informatics*, *245*, 122–125. https://doi.org/10.3233/978-1-61499-830-3-122

Juvinyà-Canal, D., Suñer-Soler, R., Porquet, A. B., Vernay, M., Blanchard, H., & Bertran-Noguer, C. (2020). Health literacy among health and social care university students. *International Journal of Environmental Research and Public Health*, *17*(7), 1–10. https://doi.org/10.3390/ijerph17072273

Lee, H., Lee, J., & Kim, N. (2015). Gender Differences in Health Literacy among Korean Adults: Do Women Have a Higher Level of Health Literacy Than Men? *American Journal of Men's Health*, *9*(5), 370–379. https://doi.org/10.1177/1557988314545485

Lee, P. H., Mcfarlane, D. J., Lam, T. H., & Stewart, S. M. (2011). Validity of The International Physical Activity Questionnaire Short Form (IPAQ-SF): A Systematic Review. *International Journal of Behavioral Nutrition and Physical Activity*, *8*(115), 1–11. https://doi.org/10.1186/1479-5868-8-115

Li, S. J., Yin, Y. T., Cui, G. H., & Xu, H. L. (2020). The Associations among Health-Promoting Lifestyle, eHealth Literacy, and Cognitive Health in Older Chinese Adults: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, *17*(7), 1–10. https://doi.org/10.3390/ijerph17072263

Luo, Y. F., Yang, S. C., Chen, A. S., & Chiang, C. H. (2018). Associations of eHealth Literacy With Health Services Utilization Among College Students: Cross-Sectional Study. *Journal of Medical Internet Research1*, *20*(10). https://doi.org/10.2196/jmir.8897

Meganck, J., Scheerder, J., & Thibaut, E. (2015). Youth sports clubs' potential as health-promoting setting: profiles, motives and barriers. *Health Educ J*, *74*, 531–543. https://doi.org/10.1177/0017896914549486

Nakayama, K., Osaka, W., Togari, T., Ishikawa, H., Yonekura, Y., Sekido, A., & Matsumoto, M. (2015). Comprehensive health literacy in Japan is lower than in Europe: A validated Japanese-language assessment of health literacy. *BMC Public Health*, *15*(1), 1–12. https://doi.org/10.1186/s12889-015-1835-x

Norman, C. D., & Skinner, H. A. (2006). e-HEALS: The e-Health Literacy Scale. *Journal of Medical Internet Research*, *8*(4). https://doi.org/10.2196/jmir.8.4.e27

Nugroho, A. P. T., Priyono, B., & Wahyudi, A. (2014). Model permainan bola voli tanah panas untuk materi bola voli penjasorkes siswa kelas v sekolah dasar. *Journal of Physical Education, Sport, Health and Recreation*, *4*(2), 102–108.

Nutbeam, D. (2008). The evolving concept of health literacy. *Social Science & Medicine*, *67*(12), 2072–2078. https://doi.org/10.1016/j.socscimed.2008.09.050

Panahi, R., Ramezankhani, A., Tavousi, M., & Niknami, S. (2018). Health literacy and smoking status. *Journal of Research & Health*, *8*(1), 3–4. https://doi.org/10.29252/acadpub.jrh.8.1.1

Park, A., Eckert, T. L., Zaso, M. J., Scott-Sheldon, L. A. J., Vanable, P. A., Carey, K. B., … Carey, M. P. (2017). Associations between Health Literacy and Health Behaviors Among Urban High School Students. *Journal of School Health*, *87*(12), 885–893. https://doi.org/10.1111/josh.12567

Park, H., & Lee, E. (2015). Self-Reported e-Health Literacy among Undergraduate Nursing Students in South Korea-A Pilot Study. *Nurse Education Today*, *35*(2), 408–413. https://doi.org/10.1016/j.nedt.2014.10.022

Parker, R. M., & Ratzan, S. C. (2010). Health Literacy: A Second Decade of Distinction for Americans. *Journal of Health Communication: International Perspectives*, *15*(S2), 20–33. https://doi.org/10.1080/10810730.2010.501094

Protheroe, J., Whittle, R., Bartlam, B., Estacio, E. V., Clark, L., & Kurth, J. (2017). Health literacy, associated lifestyle and demographic factors in adult population of an English city: A cross-sectional survey. *Health Expectations*, *20*(1), 112–119. https://doi.org/10.1111/hex.12440

Quartuccio, M., Simonsick, E. M., Langan, S., Harris, T., Sudore, R. L., Thorpe, R., & Rosano, C. (2019). The relationship of health literacy to diabetes status differs by sex in older adults. *Journal of Diabetes and Its Complications*, *32*(4), 368–372. https://doi.org/10.1016/j.jdiacomp.2017.10.012.

Rababah, J. A., Al-Hammouri, M. M., Drew, B. L., & Aldalaykeh, M. (2019). Health Literacy: Exploring Disparities among College Students. *BMC Public Health*, *19*(1), 1–11. https://doi.org/10.1186/s12889-019-7781-2

Ran, M., Peng, L., Liu, Q., Pender, M., He, F., & Wang, H. (2018). The association between quality of life(QOL) and health literacy among junior middle school students: A cross-sectional study. *BMC Public Health*, *18*(1), 1–10. https://doi.org/10.1186/s12889-018-6082-5

Rorrer, J. M. (2015). *Knowledge of Health Literacy among Athletic Trainers*. Marshall University.

Schmidt, M. (2012). Predictors of self-rated health and lifestyle behaviours in Swedish university students. *Global Journal of Health Science*, *4*(4), 1–14. https://doi.org/10.5539/gjhs.v4n4p1

Soones, T. N., Lin, J. L., Wolf, M. S., Martynenko, M., Wisnivesky, J. P., & Federman, A. D. (2018). Pathways linking health literacy, health beliefs, and cognition to medication adherence in older adults with asthma. *Journal of Allergy and Clinical Immunology*, *139*(3), 804–809. https://doi.org/10.1016/j.jaci.2016.05.043

Sørensen, K., Pelikan, J. M., Rothlin, F., Ganahl, K., Slonska, Z., Doyle, G., … Brand, H. (2015). Health Literacy in Europe: Comparative Results of The European Health Literacy Survey (HLS-EU). *The European Journal of Public Health*, *25*(6), 1053–1058. https://doi.org/10.1093/eurpub/ckv043

Stellefson, M., Hanik, B., Chaney, B., Chaney, D., Tennant, B., & Chavaria, E. A. (2011). eHealth Literacy Among College Students: A Systematic Review With Implications for eHealth Education. *Journal of Medical Internet Research*, *13*(4), e1703. https://doi.org/10.2196/jmir.1703

Sukys, S., Cesnaitiene, V. J., & Ossowsky, Z. M. (2017). Is Health Education at University Associated with Students' Health Literacy ? Evidence from Cross-Sectional Study Applying HLS-EU-Q. *BioMed Research International*, *2017*, 1-9. https://doi.org/10.1155/2017/8516843

Sun, X., Shi, Y., & Zeng, Q. (2013). Determinants of health literacy and health behavior regarding infectious respiratory diseases: A pathway model. *BMC Public Health*, *13*(1), 1-8. https://doi.org/10.1186/1471-2458-13-261

Tubaishat, A., & Habiballah, L. (2016). eHealth Literacy among Undergraduate Nursing Students. *Nurse Education Today*, *42*, 47–52. https://doi.org/10.1016/j.nedt.2016.04.003

Van der Vaart, R., & Drossaert, C. (2017). Development of the digital health literacy instrument: Measuring a broad spectrum of health 1.0 and health 2.0 skills. *Journal of Medical Internet Research*, *19*(1). https://doi.org/10.2196/jmir.6709

Vardavas, C. I., Kondilis, B., Patelarou, E., Akrivos, P. D., & Falagas, M. E. (2009). Health literacy and sources of health education among adolescents in Greece. *International Journal of Adolescent, Medicine, and Health*, *21*(2), 179–186. https://doi.org/10.1515/ijamh.2009.21.2.179

Wald, A., Muennig, P. A., O'Connell, K. A., & Garber, C. E. (2014). Associations between Healthy Lifestyle Behaviors and Academic Performance in U.S. Undergraduates: A Secondary Analysis of the American College Health Association's National College Health Assessment II. *American Journal of Health Promotion*, *28*(5), 298–305. https://doi.org/10.4278/ajhp.120518-QUAN-265

Wang, X., Guo, H., Wang, L., Li, X., Huang, M., Liu, Z., … Anderson, J. L. (2013). Investigation of Residents' Health Literacy Status and Its Risk Factors in Jiangsu Province of China. *Asia Pasific Journal of Public Health*, *20*(10), 1–9. https://doi.org/10.1177/1010539513487012

Wu, X., Tao, S., Zhang, Y., & Tao, F. (2015). Low physical activity and high screen time can increase the risks of mental health problems and poor sleep quality among Chinese college students. *PLoS One*, *10*(3), e0119607. https://doi.org/10.1371/journal.pone.0119607

Yang, S. C., Luo, Y. F., & Chiang, C. H. (2017). The Associations among Individual Factors, eHealth Literacy, and Health-Promoting Lifestyles among College Students. *Journal of Medical Internet Research*, *19*(1). https://doi.org/10.2196/jmir.5964

Yoshida, Y., Iwasa, H., Kumagai, S., Suzuki, T., & Yoshida, H. (2014). Limited Functional Health Literacy, Health Information Sources, and Health Behavior among Community-Dwelling Older Adults in Japan. *ISRN Geriatrics*, *2014*, 1–6. https://doi.org/10.1155/2014/952908

Zhang, Y., Zhang, F., Hu, P., Huang, W., Lu, L., Bai, R., & Zhao, Y. (2016). Exploring health literacy in nursing students of Chongqing, China: a cross-sectional survey using the health literacy. *The Lancet*, *388*(99), S99. https://doi.org/10.1016/S0140-6736(16)32026-8