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Digital Health Literacy for Bachelor Program Students at Indonesia University Year 2022

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Article Info

Abstract

Currently, it is easier for people to access information through various devices connected to internet technology. However, this raises many new concerns, including the spread of false or inaccurate information. To overcome this, a more specific literacy approach is needed, namely digital health literacy. This study aims to determine the relationship between personal determinants of digital health literacy in bachelor program students at Indonesia University. This study uses secondary data analysis with a cross-sectional design. Data was collected through a survey conducted by a research team from the Faculty of Public Health, University Indonesia, using the eHEALS instrument about digital health literacy. The analysis uses multiple linear regression with health literacy as the dependent variable and social determinants including gender, age, science groups, and pocket money as independent variables. The results showed that the level of digital health literacy in bachelor program students was in a good category (M=3.14; SD=0.501). The results of the unadjusted model regression test show that the variables age (ß=0.205; 95% CI = 0.015-0.396) and pocket money (ß=1.011; 95% CI = 0.140-1.882) are significantly related to digital health literacy, while the results of the adjusted regression test the model shows that no variable has a confounder effect. The conclusion of this study is that age and pocket money affect the level of digital health literacy in bachelor program students at Indonesia University. Therefore, efforts are needed to develop health education programs that can reach students from various backgrounds.

INTRODUCTION

Currently, most health information can be accessed easily by the public through Internet technology. As the use of the internet as a source of information continues to increase, the health information obtained is also often not credible or does not come from trusted experts (Wijaya & Kloping, 2021), so it can lead to inaccurate and reliable information for the public. Kessler found that 40% of the 112 million posts related to COVID-19 information on social media came from untrusted sources (Bin Naeem & Kamel Boulos, 2021). A different health literacy approach is needed, namely digital health literacy. Norman, as a pioneer, defines digital health literacy as the ability to seek, find, understand, and assess health information from electronic sources and apply the knowledge gained to overcome or solve health problems (Norman & Skinner, 2006). Not many studies related to digital health literacy have been conducted in Middle and Low-Income Countries, including Indonesia.

Digital health literacy can be an approach to measure the level of health in the community, especially for people who routinely use various new technologies to solve their health problems. The current student group is part of Z generation, born in 1997-2012. Generation Z has the characteristic of being more fluent

in using technology than the previous generation. Previous research found that 57% of Generation Z use the internet for more than 8 hours per day (Maulidina & Ridho, 2020). Measuring the level of digital health literacy is still minimal in Indonesia. Previous research has focused more on measuring health literacy, mental health literacy, and nutritional literacy. Based on the research results, measuring digital health literacy using the eHEALS instrument in Indonesia, especially with the target population, namely college students only found in Semarang (Nurjanah & Rachmani, 2015) and Bandung (Sjamsuddin & Anshari, 2023). The two studies have something in common. The population comes from college students at the Faculty of Public Health. The research conducted by researchers is expected to provide an overview of digital health literacy for students with various backgrounds. This research also observes various determinants that affect the level of digital health literacy.

Increasing digital health literacy at the population level can address health inequalities, the digital divide, and public awareness of using health technology. This phenomenon occurred during the COVID-19 pandemic, where digital health literacy was key in finding information on COVID-19 through internet-based media (Yang et al., 2022). One model that can be used to explain health literacy is the Pawlak model. Pawlak described health literacy as influenced by social determinants such as age, genetics, cognition, language, race and ethnicity, culture, education, employment, socioeconomic status, and access to health services and information technology (Pawlak, 2005). Meanwhile, Paige, in her research, stated that the social determinants that influence digital health literacy skills include personal, relational, knowledge, and technology determinants (Paige et al., 2018). We used a modified (Pawlak, 2005) and (Paige et al., 2018) model as a research conceptual framework. The personal determinants used in this study include gender, age, academic background, and pocket money. The previous research found that gender (Mitsutake et al., 2012; Norman & Skinner, 2006), age, education (Tennant et al., 2015), and economic status (Neter & Brainin, 2012) have a relationship with the level of digital health literacy. Based on

these facts, it is important to understand digital health literacy in students by examining various determinants related to digital health literacy as a basis for solving health problems in the present and reducing the impact of disease in the future. The determinants studied included gender, age, science groups, and pocket money. Gender and age are physical personal attributes attached to each individual. The science groups were studied to find variations in digital health literacy among students of the health and non-health groups. While pocket money is a reflection of an indicator of the economic ability. This study aims to provide an overview of digital health literacy in University Indonesia students and the personal determinants that influence digital health literacy. We choose Indonesia University because it's one of the best state universities in Indonesia. We hoped that the results of this research can encourage other universities in Indonesia, both public and private, to be interested in research related to digital health literacy.

METHOD

This research analyzed secondary data from the Health Literacy Study 2022 with a cross-sectional design. Data collection took time in December 2022 using an online questionnaire with the Google Form application. Links to online questionnaires were distributed to the batch coordinators in each faculty to be shared through their communication network. The following process, namely, secondary data analysis, will be carried out in 2023. The sample size calculation is carried out to calculate the power study size. Based on power study calculations, we obtained a minimum sample size of 390 people in this study. The sample of respondents collected was 680 respondents. Respondents who did not meet the inclusion criteria were 22 respondents (3.6%).

The data collection instruments used in this study consisted of 2 types, namely the respondent's personal data questionnaire and the eHEALS questionnaire. The first instrument included questions to respondents about the respondent's gender, age, faculty, and the amount of pocket money the respondent received every week. The eHEALS instrument was adapted from (Norman & Skinner, 2006)

Table 1. Distribution of Bachelor Program Student Respondents based on Gender Characteristics, Science Groups, Type of Class, and Pocket Money

Demography Characteristics (n=658)	Frequency (n)	Percentage (%)
Student Gender		
Male	147	22,3
Female	511	77,7
Science Group		
Health Science Group	390	59,3
Non-Health Science Group	268	40,7
Type of Class		
Reguler Class	609	92,4
Paralel Class	31	4,7
Employee class	17	2,6
International Class	2	0,3
Pocket Money		
Student allowance ≤ IDR 500 thousand per week	563	85,5
Student allowance > IDR 500 thousand per week	95	14,4

yet there remain few tools available to assess consumers' capacity for engaging in eHealth. Over 40% of US and Canadian adults have low basic literacy levels, suggesting that eHealth resources are likely to be inaccessible to large segments of the population. Using information technology for health requires eHealth literacy - the ability to read, use computers, search for information, understand health information, and put it into context. The eHealth Literacy Scale (eHEALS research and has been translated into Indonesian to make it applicable. This instrument consists of 8 questions about the respondent's ability to search, find, understand, and assess health information from electronic sources and apply

Table 2 Distribution of Respondents based on Age Characteristics

Variable	Mean	Median	SD	Min-Max	95% CI
Age	19,61	19,00	1,612	17-28	19,49-19,73

Table 3. Distribution of Respondents' Answers based on the eHEALS Questionnaire Items

No	Questions	Mean	SD
eHEALS 1	I know how to find helpful health resources on the Internet	3,31	0,639
eHEALS 2	I know how to use the Internet to answer my health questions	3,24	0,638
eHEALS 3	I know what health resources are available on the Internet	3,25	0,585
eHEALS 4	I know where to find helpful health resources on the Internet	3,23	0,596
eHEALS 5	I know how to use the health information I find on the Internet to help me	3,21	0,582
eHEALS 6	I have the skills I need to evaluate the health resources I find on the Internet	3,07	0,643
eHEALS 7	I can tell high quality from low-quality health resources on the Internet	3,07	0,663
eHEALS 8	I feel confident in using information from the Internet to make health decisions	2,76	0,756
Average of All Questions		3,14	0,501

the knowledge obtained to overcome or solve health problems. This instrument has also been previously tested on 130 students of higher education public health study programs in Bandung. The criteria for the trial sample were students who were active in September 2022. The trial results showed sufficient inter-item reliability values (Cronbach Alpha = 0.789) and had a positive association with health literacy (HLS-EU-Q16) as an indicator of criterion validity (r= 0.183, p=0.037) (Sjamsuddin & Anshari, 2023). This research has also gone through ethical review procedures at the Research Ethics and Community Service Commission, Faculty of Public Health, University Indonesia, and declared feasible to be carried out, with the issuance of an ethical approval certificate Number Ket-433/UN2.F10.D11/PPM.00.02/2023.

RESULT AND DISCUSSION

The data collection obtained 658 respondents with demographic characteristics including gender, science groups, type of class, allowance (Table 1), and age (Table 2). The data processing showed more female respondents (77.7%) than male respondents (22.3%). Most respondents came from the health sciences group (60.1%) and the rest from the non-health sciences group (39.9%), namely the technology science group and the humanities social sciences group. Based on the type of class taken by student respondents, most respondents came from the regular class (91.3%), and the rest came from parallel, employee, and international classes. Most respondents have pocket money of less than or equal to 500 thousand rupiah per week (85.5%), and the rest are students who have pocket money of more than 500 thousand rupiah per week. Table 2 shows that the average age of student respondents is 19.61 years, with a variation of 1.612 years. The youngest student respondent is 17 years old, while the oldest is 28 years old. The analysis concluded that 95% of the student respondents who participated in this study were in the age range of 19.49 years to 19.73 years.

Table 3 shows the highest answer value is in the first question, with an average value of 3.31 and a variation value of 0.639. The lowest answer value is found in the eighth question, with an average value of 2.76 and a variation value of 0.756. When viewed from all questions, the average value obtained is 3.14 with a variation of 0.501. The first to fifth questions each have an average score that is greater than the average score of all questions, while the sixth to eighth questions each have an average score that is lower than the average score of all questions. Based on these average values, the level of digital health literacy in bachelor program students at Indonesia University can be categorized as leading to a good or high score with an average percentage of 78.5%. These results were obtained based on a comparison of the average percentage with previous research, namely Nurjanah (Nurjanah & Rachamni, 2015) at 75% (good category) and Salehi (Salehi & Arani, 2021) at 65.2% (moderate category). Based on Table 4, most respondents answered Agree (S) on each eHEALS question item. The answer choice Strongly Agree (SS) is the second most in the acquisition of each question, except for the eighth question found the answer Disagree (TS) is the second most answer

Table 4 Proportion of Respondents' Answers based on the eHEALS Questionnaire Items

Questions Item	Strongly Agree		Agree		Disagree		Strongly Disagree	
	n	%	n	%	n	%	N	%
e-HEALS 1	12	1,8	28	4,3	364	55,3	254	38,6
e-HEALS 2	11	1,7	40	6,1	385	58,5	222	33,7
e-HEALS 3	6	0,9	33	5,0	411	62,5	208	31,6
e-HEALS 4	7	1,1	37	5,6	410	62,3	204	31,0
e-HEALS 5	6	9,0	38	5,8	424	64,4	190	28,9
e-HEALS 6	13	2,0	76	11,6	422	64,1	147	22,3
e-HEALS 7	11	1,7	91	13,8	399	60,8	157	23,9
e-HEALS 8	32	4,9	191	29,0	340	51,7	95	14,4

Tabel 5 Digital Health Literacy Regression Analysis with Age, Gender, Science Group, and Pocket Money

Variables	Mean	SD	Unadjusted model		Adjusted model	
			ß	95% CI	ß	95% CI
Age	19,61	1,612	0,205	0,015 – 0,396	0,191	0,001 - 0,382
Gender						
Female	25,13	3,917	Ref		Ref	
Male	25,15	4,341	-0,019	-0,756 – 0,719	-0,096	-0,851 – 0,658
Science Groups						
Non-Health Group	24,87	4,178	Ref		Ref	
Health Group	25,32	3,889	-0,442	-1,067 – 0,182	-0,478	-1,118 – 0,161
Pocket Money						
≤ IDR 500 thousand per week	24,99	3,898	Ref		Ref	

choice (29.0%). Univariate analysis of digital health literacy found an increase in the choice of Disagree (TS) answers from the sixth to the eighth question.

Table 5 shows that the average digital health literacy score for men (M=25.15; SD = 4.341) is slightly higher than that of women (M=25.13; SD=3.917). Respondents from the health sciences group had an average score of greater digital health literacy (M=25.32; SD=3.889) than respondents from the non-health sciences group (M=24.87; SD=4.178). Based on student pocket money as an indicator of student economic ability, respondents who have pocket money of more than 500 thousand rupiahs per week have an average score of higher digital health literacy (M=26.00; SD=4.559) than respondents who have less pocket money or equal to 500 thousand rupiahs per week (M=24.99; SD=3.898).

Table 5 also presents the results of the adjusted model regression test for age, gender, science group, and pocket money on the digital health literacy level of student respondents. In general, age (ß=0.205; 95% CI = 0.015-0.396) and pocket money (ß=1.011; 95% CI = 0.140-1.882) have a significant positive effect on the value of the digital health literacy regression coefficient, which means age and money pocket has a relationship to health literacy. Gender (ß=-0.019; 95% CI = 0.756-0.719) and science group (ß=0.442; 95% CI = -1.067-0.182) do not have a significant effect on the digital health literacy regression coefficient, which means that gender and the science cluster has no relationship with digital health literacy. The following analysis is using the adjusted model regression test. After controlling for other variables, the coefficient values for age and pocket did not change, indicating that the relationship between the independent variables and the dependent one was not mutually influenced. These findings show that there are no variables that have a confounder effect.

The discussion will explain about overview of bachelor program students' digital health literacy and relationship between personal determinants and digital health literacy. The results of this study indicate that bachelor program students at the University of Indonesia have a good level of digital health literacy, but still have difficulties in assessing health information obtained from the internet (13.6%), distinguishing between high or low-quality health information (15.5). %), and make decisions based on health information obtained (33.9%). These results are consistent with several previous studies on college students in Semarang (Nurjanah & Rachmani, 2015) and in Iran (Salehi & Keikavoosi-Arani, 2021) that the value of digital health literacy in college students leads to a good score, but still have difficulties in evaluating health information found on the internet, determining the quality or not quality health information and using information obtained from the internet to make decisions about health.

Different results were expressed in (Dashti *et al.*, 2017) research, which mentions the level of digital health literacy among students in Iran in the low category. This difference can be caused by the level of digital health literacy, which continues to increase over time and considering the frequency of internet use. The frequency of internet use can generally be measured based on the level of internet penetration. Indonesia's Internet Profile Data for 2022 shows the

internet penetration rate in Indonesia has reached 77.02% (Asosiasi Penyelenggara Jasa Internet Indonesia, 2022) while the internet penetration rate in Iran in 2017 only reached 55% (Dashti *et al.*, 2017).

Riley divided the eight eHeals question items into 3 dimensions based on social cognitive theory. The first dimension is knowledge about innovation and technology, including knowing various health information and health resources available on the internet, consisting of the first and second questions. This dimension is influenced by environmental factors related to a person's exposure to various sources of electronic information about health information and health resources (Sudbury-Riley *et al.*, 2017). University Indonesia students are generally considered to have been exposed to health information, especially during the COVID-19 pandemic. The student environment, which at that time was still in a pandemic, also encouraged students to use the internet to be more active in seeking information or answers related to health. Previous research found that 91% of Generation Z actively seek health information about COVID-19 (Roselina *et al.*, 2021).

Furthermore, the second dimension is related to the skills needed by someone to access various health information and health resources via the internet, consisting of questions three to six. This dimension is influenced by personal factors such as barriers and motivation (Sudbury-Riley *et al.*, 2017). It is also evidenced by the internet penetration rate at the age range of 19-34 years, reaching 98.64%. (APJII, 2022). Another fact is that Generation Z seeks health information related to certain diseases because of curiosity (71.1%) and wanting to get the latest information (56.5%) (Roselina *et al.*, 2021). It motivates students to use internet-based media in seeking health information behavior. Finally, the third dimension comes from the sixth to eighth eHEALS question items. Perception of belief is firmly visible in this dimension, which relates to a person's belief in utilizing health information obtained from the internet (Sudbury-Riley *et al.*, 2017). It can be due to various reasons, including students who have not been able to utilize the health information they obtain to assist in making decisions related to their health. The role of parents as the closest family is often the final decision-maker regarding the student's health.

Another reason is that students are also considered unable to distinguish between quality and poor health information. Previous research found that the spread of inaccurate health information on social media reached 28.8% (Do Nascimento *et al.*, 2022). Student decisions based on unreliable

sources of information can highly affect their safety and health (Bak *et al.*, 2022). It must be avoided so that students are not trapped in a behavior of self-treatment or self-diagnosis. The study shows that gender is not related to digital health literacy. The results are inconsistent with several previous studies in Iran (Salehi & Keikavoosi-Arani, 2021) and Saudi Arabia (Alhodaib, 2022), that male students have a higher level of digital health literacy than female students. However, the findings in this study are consistent with a study conducted by (Tsukahara *et al.*, 2020) that there is no significant difference in the level of digital health literacy between men and women. In Indonesia, there has also been an increase in access to the internet among men and women. From 49% in 2014 to 77.55% in 2022 in the male group and from 51% in 2014 to 76.48% in 2022 in the female group (Asosiasi Penyelenggara Jasa Internet Indonesia, 2022).

The results of this study indicate that age is significantly related to digital health literacy. The older the age, the higher the level of digital health literacy. These results are in line with a study conducted by (Alhodaib, 2022) on high school-aged children in Saudi Arabia. However, these two studies show a different direction of relationship where the younger age has a higher level of digital health literacy than the older age. Another study (Nurjanah & Rachmani, 2015) found no significant relationship between age and digital health literacy. The results are probably due to the population only semester 1 students. Students registered at Indonesia University are considered to have sufficient basic knowledge about health because of their good educational background, so these students are also considered to have good health information retrieval abilities. The older the student, the better the level of knowledge. This level of knowledge can affect a person's ability to search and find various health information on the internet (Sudbury-Riley *et al.*, 2017).

The results of this study indicate that the science groups are not significantly related to digital health literacy. The results are inconsistent with research conducted by (Hsu *et al.*, 2014) that students from the health sciences group have a higher level of digital health literacy than students from the non-health sciences group. The results of a study conducted by (Schäfer *et al.*, 2021) on students in Germany also found that there was an increase in the frequency of searching for health information at least once a day before and during the COVID-19 pandemic, which was 7% before the pandemic (June-July 2019) to 33.3% during the pandemic (June-July 2020). The COVID-19 pandemic has encouraged students, both from the health sciences and non-health sciences, to actively seek the health

information they need.

Pocket money in this study can be considered an indicator of economic ability for students. The results of this study found that there was a significant relationship between pocket money and student digital health literacy. The results are consistent with several previous studies in Tiongkok (Liu *et al.*, 2022) and in Israel (Neter & Brainin, 2012) that respondents with higher economic status have a higher level of digital health literacy than respondents with lower economic status. Liu, in his research, revealed that respondents whose family income is higher have a higher level of digital health literacy than respondents whose family income is lower (Liu *et al.*, 2022). A person can get pocket money in different amounts related on their family income (Mukhtar & Javaid, 2018). Slightly different results were found in (Dashti *et al.*, 2017) research on university students in Iran. This difference is likely due to differences in pocket money in Indonesia and Iran. The lowest amount of pocket money for students in Iran ($ 160 / month = IDR 595,000 / week) is equal to the highest amount of pocket money for students in Indonesia (> Rp 500.00,-). This amount of money can be used as a benchmark for the student's economic ability to access health information via the internet.

Pocket money as an indicator of a student's economic ability can be used as a description of the economic status of the student's family. There will probably be an increasing trend of students with high and medium economic backgrounds and a decrease in students with low economic backgrounds. Students with low economic backgrounds still get free internet access from the university but cannot use it regularly. Students with lower pocket money will allocate it for more vital needs, such as daily meals and housing costs. Previous research found that students spend their pocket money on education (43.8%), then food and clothing (38.2%), and the rest for other needs such as the internet (18%) (Mukhtar & Javaid, 2018). In contrast, students who have higher allowances tend to be able to allocate their pocket money for internet quota needs and don't even use their pocket money allocation. Generally, these students live in apartments that provide internet for 24 hours.

CONCLUSION

The digital health literacy level of bachelor students at the University of Indonesia is categorized as good. Students still have difficulties in assessing and differentiating the quality of health information obtained from the internet and applying this information to make health-related decisions. Male students have higher digital health literacy than female students. The older the student, the better the digital health literacy score for students. Students from the health sciences group have higher digital health literacy than students from the non-health sciences group. The greater the pocket money students receive, the better the value of digital health literacy for students. Gender and science group variables do not have a significant effect on digital health literacy. The variables of age and pocket money significantly affect digital health literacy and do not show that there are variables that have a confounder effect. We recommend future research to involve other factors potentially related to digital health literacy, such as asset ownership or the amount of Single Tuition Fee (UKT) as an indicator of determining socioeconomic status in students. We hope that the population selection in the next study will be able to take a wider population and different age groups to provide a better picture of digital health literacy. Future research is also expected to adjust measurement instruments according to technological developments and current dissemination of health information and use other instruments as alternatives in measuring digital health literacy.

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