Article

Assessing Internet Surfing Behaviours and Digital Health Literacy among University Students in Ghana during the COVID-19 Pandemic

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Abstract: This study assessed the internet surfing behaviours and digital health literacy (DHL) among university students in Ghana during the COVID-19 pandemic. The research was guided by three major objectives: (1) examine the online information searching behaviours of university students during the COVID-19 pandemic, (2) investigate the thematic areas university students searched during COVID-19, and (3) examine the DHL level of university students. The study conveniently sampled 1014 university students to solicit their responses through questionnaire administration. Using frequency and percent counts, multiple response analysis, as well as mean and standard deviation, the study revealed that the predominant platforms university students used were search engines ($n = 954$, 94.1%), social media ($n = 950$, 93.7%), and WhatsApp ($n = 950$, 93.7%). Predominant themes among the thematic areas university students searched during COVID-19 were symptoms of COVID-19 ($n = 701$, 81.7%), COVID-19 vaccines ($n = 689$, 80.3%), and transmission routes of the coronavirus ($n = 664$, 77.4%). Further, other results showed that students enrolled in health-related programmes showed significantly higher levels of DHL compared to those in non-health-related programmes. The findings suggest the need to implement health education measures to strengthen students' health literacy capacities and their DHL ability. This finding requires governments and health authorities to implement evidence-informed health communication strategies to provide valid and reliable health information concerning the COVID-19 pandemic and support individuals to make health-promoting decisions.

Keywords: COVID-19; digital health literacy; health information; internet surfing behaviours

1. Introduction

Globally, an unprecedented public and social health crisis due to the COVID-19 pandemic has contributed to great uncertainty in the world's population. Millions of people have been infected with the virus worldwide, hospitalized, and/or died due to the disease [1,2]. During this period, surfing the internet for health-related information or seeking health information online increased because many people desired to know more about the disease, its symptoms, prevention measures, and risk communication [3,4]. In

the context of this study, internet surfing behaviour and online health information-seeking behaviour are used interchangeably. Internet surfing behaviour is a concept that explains how people seek health-related information from the internet or online [5].

During the pandemic, the internet and social media platforms (Facebook, Twitter, Instagram) became important sources of health-related information on COVID-19 and protective behaviours among citizens [6–8]. A study in Germany revealed that university students used search engines (e.g., Google), news portals, social media, video portals, and websites of public bodies, official institutions, doctors, pharmaceutical companies, and health insurance companies to search for web-based health and COVID-19-related information [7]. Some topical or thematic areas that the students searched during the COVID-19 period were the current spread of the disease, restrictions, recommendations and risk assessments, symptoms of the disease, and the psychological consequences of the epidemic [7]. Similar studies established that university students in America [9], Europe [10,11], and Asia [12–14] often used the internet, search engines (e.g., Google, Bing, Yahoo), Wikipedia, social media platforms (e.g., Facebook, Instagram, YouTube, Twitter), news portals (e.g., newspapers, TV stations), and websites of public bodies/official institutions. Some of the information searched during the pandemic were the latest updated news on the pandemic, disease symptoms, restrictions, current spread of the disease, preventions, and vaccines. Similar findings were reported in Denmark [15], Finland [8], Indonesia [16], Lebanon [17], Vietnam [18], Malaysia [19], and Egypt [20]. Studies have also reported that students across different nations also had concerns about the accuracy of online information because unverified information could lead to unnecessary tension [19,21]. More specifically, students in Malaysia were confident about the accuracy of the information they read about COVID-19 on social media [19]. Other university students in Asia (e.g., China, Malaysia, Philippines, and Vietnam) perceived information on COVID-19 to be important and were satisfied with the online information about COVID-19 [12,18,22]. However, some students in Germany felt less informed about COVID-19 and were confused by the amount of information [23].

Some researchers reported that adolescents and young adults in schools experienced challenges in surfing the internet for COVID-19-related information [4,7,10,11,15,24]. However, these students may have had limited searching skills or problems with literacy and other issues that may have made it difficult for them to locate and understand authoritative information. To effectively deal with complex and intricate health information, one requires adequate digital health literacy (DHL) [7,9,11,15,25–27]. Digital health literacy (DHL), a dimension of health literacy (HL), is the ability to find, understand, evaluate, appraise, integrate, and apply health information in daily decision-making towards health-promoting behaviours [28,29]. DHL measures include a focus on interactivity on the web, including adding self-generated content and protecting privacy [30]. DHL has become a core competency and necessity for navigating web-based information and health service environments within the realm of the COVID-19 pandemic and the associated "infodemic" [31,32].

A plethora of investigations on COVID-19 DHL have revealed that university students have a low to high level of DHL. Particularly, investigators in Germany [7,23], Italy [24], Portugal [10], and East and South-East Asia [China, Malaysia, Philippines] [12] found that their university students had a high level of DHL for online health information seeking. Comparable conclusions were drawn in Slovenia [11], Denmark [15], Vietnam [18], Pakistan [4], Malaysia [19], and Saudi Arabia [13]. The capability to retrieve health information is crucial in preserving good health. Higher self-reported DHL among students leads to better health and positive health behaviours, such as preventing and managing chronic diseases, and increasing procedural health knowledge [9,18,30,33]. However, examinations in the USA [9,34], Germany [35], Spain [36], Lebanon [17], and Egypt [20] found that university students had low levels of HL/DHL during the pandemic for online health information-seeking. People with limited DHL usually find it more difficult to comprehend health information [37]. Health illiteracy affects how people understand their health and renders them ignorant [4]. A recent study in Australia revealed that university students with inadequate DHL had poorer knowledge and understanding of COVID-19 symptoms,

experienced more difficulties in finding information and understanding messaging about COVID-19, and were less able to identify common symptoms of COVID-19 infection to help prevent the spread of the infection compared to individuals with sufficient HL [38].

In Ghana, the government endorsed a public health communication strategy by all health agencies at national and local levels [39]. This correspondence system included public broadcasting agencies, which launched web-based media campaigns, official websites for COVID-19, and official social media platforms. The basic goal of this approach was to furnish residents with important information on COVID-19 and what it meant for individuals' wellbeing. Despite this approach, there were several fake news, reports and misinformation during the period which required the capacity of people to be able to access, navigate, understand, use, and critically evaluate information and services in ways that supported healthy and protective behaviours during the COVID-19 crisis. Previous studies in Ghana have found that the citizens, including adolescents and young adults in schools, have limited health literacy [40–44]. With this limited level of HL, citizens might have difficulties in dealing with health-related information and thus experience challenges when seeking reliable online information.

This issue is particularly critical for university students, who consist of a significant proportion of adolescents and young adults in Ghana. University students comprise the population that primarily uses digital technologies and web-based health information. Many adolescents and young adults use the internet as their primary source of health information, spend a large amount of time online, utilize more and different social media networks, and show trust in digital information [45,46]. Therefore, it is vital to understand online health information-seeking behaviours and DHL among university students in Ghana during the COVID-19 pandemic. To date, research about university students' internet surfing behaviours and COVID-19 DHL in Ghana is lacking compared to Europe [7,10,11,15,24], the USA [9], and Asia [4,12,16,18]. Besides, due to cultural, contextual, and/or geographical disparities as well as population characteristics, the findings may not be applicable in the Ghanaian context. This study assessed how university students in Ghana searched, found, and used digital health-related information about the COVID-19 pandemic. Specifically, the study (1) examined the online information searching behaviours, (2) investigated the thematic health-related areas university students searched, and (3) assessed the COVID-19 DHL levels of university students during the COVID-19 pandemic.

2. Materials and Methods

2.1. Participants' Characteristics

This research forms part of the global COVID-19 HL network (www.covid-hl.org, accessed on 4 March 2021). The study was conducted at a public university in Ghana, situated in the southern region. Residential and non-residential students in the university were involved in the study. We employed a descriptive cross-sectional survey design and a convenience-sampling method. Participants were 1014 university students ($n = 290$, 28.6% females and $n = 724$, 71.4% males), between the ages of 18 and 40. Their ages were categorized into 4: 18 to 25 ($n = 471$, 46.5%), 26 to 30 ($n = 281$, 27.7%), 31 to 35 ($n = 192$, 18.9%), and 36 to 40 ($n = 70$, 6.9%) respectively. The number of semesters each participant had spent in the university included 1 ($n = 56$, 5.5%), 2 ($n = 40$, 3.9%), 3 ($n = 687$, 67.8%), 4 ($n = 45$, 4.4%), 5 ($n = 115$, 11.3%), 6 ($n = 40$, 3.9%), and 8 ($n = 31$, 3.1), with no student reporting to be in her or his 7th semester. Each participant was enrolled in either a health-related programme ($n = 812$, 80.1%) or otherwise ($n = 202$, 19.9%).

2.2. Data Collection Instrument

A pretested questionnaire was used for the data collection. The demographic variables measured were sex, age, number of semesters spent, and study programme of each student. To measure COVID-DHL levels among the participants, we used a revised version of the validated DHL instrument [7,43], which fits the context of the COVID-19 disease in Ghana. The instrument has 5 subscales and 15 items. Meanwhile, some validation studies [45,47]

have confirmed a COVID-19 DHL instrument that includes 4 subscales (information searching, reliability, self-generated content, and relevance) and 12 items (3 on each subscale) with a greater validity [45,47]. Each subscale was measured on 3 levels: 1—sufficient, 2—problematic, and 3—inadequate. The reliability coefficient values for the newly validated DHL instrument using the McDonald Omega ω method ranged between 0.735 and 0.869, which is considered acceptable with good usability in Ghana [45]. Information-searching platforms of participants were measured by asking each participant to "indicate how often you currently use these sources of information or otherwise relating to COVID-19". Response options included "search engine (Google, Bing, Yahoo)", "social media (e.g., Facebook, Instagram, Twitter)", "WhatsApp", "news portals (newspapers, television stations)", "health portals", "Wikipedia", "websites of public bodies (MOH, GHS, FDA)", "YouTube", "blogs on health topics", and "websites of doctors or health insurance companies". Additionally, the thematic areas of information searched by participants during the COVID-19 era were measured. Each participant was asked to "please indicate the specific topics you are searching for in the context of the coronavirus and if necessary, you can select multiple response options". Response options included: "symptoms of COVID-19", "COVID-19 vaccines", "transmission routes of the coronavirus", "individual measures to protect against infections", "dealing with psychological stress caused by COVID-19", "economic and social consequences of the COVID-19 restrictions", and "current situation assessment and recommendations". The respondents were also asked "Have you searched the internet in the last 4 weeks for information about COVID-19", with responses being "yes" or "no".

2.3. Procedure

Following ethical approval from the Ethical Review Board (ERB), University of Education, Winneba, with reference number DAA/P.1/Vol.1/39, we sought further endorsement from the Heads of Departments and Deans of Faculties to conduct the research. All undergraduate students at all levels (first years to final years) were qualified to participate in the study since they could all write, speak, understand, and read the English Language fluently. We employed two trained research assistants to help with data collection. As part of the training, each item on the questionnaire was thoroughly explained to the research assistants to ensure the proper administration of the survey instrument. Prior to data collection, informed consent forms were obtained from all participants who were willing to be involved in the survey. The recruitment process was initiated by officially meeting with the authorities of the university to explain the rationale of the study and agreeing on suitable dates for the data collection whilst establishing a good rapport at the same time.

The researchers visited the university on the agreed dates and thoroughly briefed and explained every item on the questionnaire to the participants. The respondents were encouraged to ask questions for more explanations if required. Just before administering the questionnaires, the participants were informed about all ethical considerations being followed, including anonymity, protection of their data, confidentiality, adherence to all COVID-19 safety protocols at the time, and willing involvement and/or withdrawal at any time during the data collection process. Each participant was given the DHL questionnaire to respond to, which required between 15 and 20 min to complete, with the research assistants on standby for assistance in the process when needed. The data collection was undertaken within approximately 2 months.

2.4. Data Analysis

A series of data analytical strategies were employed to analyse descriptively the data collected. To understand the online information-searching behaviours of university students during the COVID-19 pandemic, the frequency and percent count of the responses were summarized and presented using both tables and charts. Similarly, the thematic areas the students searched about COVID-19 were analysed using the multiple response analysis, mainly focusing on the frequency and percent counts. Mean and standard deviation

were used to measure the DHL levels, whereas an independent-sample t-test was used to test for differences in the DHL levels between students enrolled in health-related and other academic programmes. Probability values (*p*-values) less than 0.05 were considered statistically significant.

3. Results

3.1. Demographic Information of the Students

The demographic characteristics of the students explored include sex, age, semester, and programme area (Table 1).

Table 1. Demographic Characteristics of Participants.

Demographic	Levels	Frequency	Percentage
Sex	Male	724	71.4
	Female	290	28.6
Age	18–25	471	46.5
	26–30	281	27.7
	31–35	192	18.9
	36–40	70	6.9
Semester	1.00	56	5.5
	2.00	40	3.9
	3.00	687	67.8
	4.00	45	4.4
	5.00	115	11.3
	6.00	40	3.9
	8.00	31	3.1
Programme	Health-related	812	80.1
	Non-health-related	202	19.9

The demographic information in Table 1 shows that more than half of the participants (71.4%, *n* = 724) were males. The study was dominated by participants between the ages of 18 and 25 years, 471 (46.5%). However, less than 7% (*n* = 70) of the respondents were between 36 and 40 years. The majority of the participants were enrolled in semester 3 (*n* = 687, 67.8%), followed by semester 5 (*n* = 115, 11.3%). However, semester 8 had the lowest number enrolled (*n* = 31, 3.1%). The results further revealed that majority of the respondents (*n* = 812, 80.1%) were students from health-related programmes, while the remaining respondents (*n* = 202, 19.9%) were from non-health-related programmes.

3.2. Online Information Searching Behaviours Exhibited by University Students during the COVID-19 Pandemic
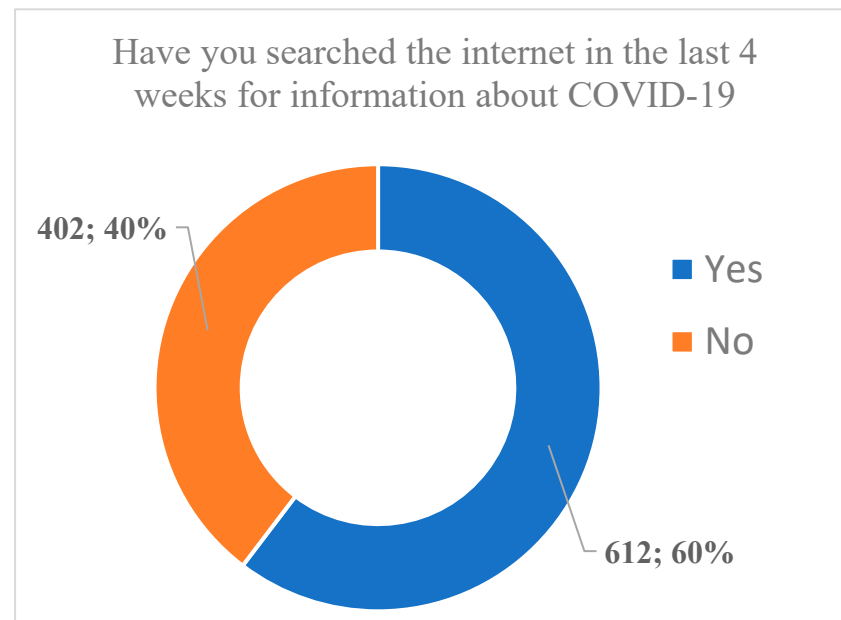
Descriptive analysis of online information searching platforms utilized by university students during the COVID-19 pandemic is indicated as frequencies (counts) and percentages in Table 2.

The results showed that the university students used a variety of platforms to search for COVID-19-related information (Table 2). Particularly, the predominant platforms used were search engines (*n* = 954, 94.1%), social media (*n* = 950, 93.7%), and WhatsApp (*n* = 950, 93.7%). Other platforms were mentioned, which include health portals (*n* = 873, 86.1%), YouTube (*n* = 849, 83.7%), and news portals (*n* = 934, 92.1%), while the least utilized information-searching platforms were blogs on health topics (*n* = 808, 79.7%) and websites of doctors (*n* = 738, 72.8%).

Regarding the information-surfing behaviours, our results revealed that majority of the students (*n* = 612, 60%) had searched the internet in the previous 4 weeks (see Figure 1).

Table 2. Distribution of responses on the sources of information-seeking platforms (*n* = 1014).

Sources	Used, *n* (%)	Not Used, *n* (%)
Search engine (e.g., Google, Bing, Yahoo!)	954 (94.1)	60 (5.9)
Social media (e.g., Facebook, Instagram, Twitter)	950 (93.7)	64 (6.3)
WhatsApp	950 (93.7)	64 (6.3)
News Portals (e.g., newspapers, TV stations)	934 (92.1)	80 (7.9)
Health Portals	873 (86.1)	141 (13.9)
Wikipedia	869 (85.2)	145 (14.3)
Websites of public bodies (e.g., Ministry of Health, Ghana Health Service, Food and Drugs Authority)	864 (85.2)	150 (14.8)
YouTube	849 (83.7)	165 (16.3)
Blogs on health topics	808 (79.7)	206 (20.3)
Websites of doctors or health insurance companies	738 (72.8)	276 (27.2)
Total	1014	100.0

Figure 1. Responses on internet search in the last 4 weeks.

We also examined whether the university students were concerned about the accuracy of COVID-19-related information searched online (Table 3).

Generally, the students were concerned about the accuracy of information searched online. An overwhelming number of students reiterated that whenever they searched for COVID-19 information online, they checked whether: "the information is up to date" (99.0%), "the information comes from official sources" 985 (97.1%), "the information is verified" 984 (97.0%), "different opinions are represented" 960 (94.7%), and they "quickly learn the most important things" 985 (97.1%). Surprisingly, a larger proportion of the students reported that it was not important to them whether "the subject is dealt with comprehensively" 604 (59.6%).

3.3. Thematic Health-Related Areas University Students Searched during the COVID-19 Period

The multiple-response analysis revealed the thematic areas university students searched during the COVID-19 period (Table 4).

Table 3. Responses on information accuracy concerns.

How Important Is It to You That . . .	Important, *n* (%)	Not Important, *n* (%)
the information is up to date?	1004 (99.0)	10 (1.0)
you quickly learn the most important things?	985 (97.1)	29 (2.9)
the information comes from official sources?	985 (97.1)	29 (2.9)
the information is verified?	984 (97.0)	30 (3.0)
different opinions are represented?	960 (94.7)	54 (5.3)
the subject is dealt with comprehensively?	410 (40.4)	604 (59.6)

Table 4. Thematic areas university students searched during the COVID-19 period.

	n	Percent	Percent of Cases
Symptoms of COVID-19	701	14.8	81.7
COVID-19 vaccines	689	14.5	80.3
Transmission routes of the coronavirus	664	14.0	77.4
Individual measures to protect against infection	596	12.6	69.5
Dealing with psychological stress caused by the coronavirus	541	11.4	63.1
Economic and social consequences of the coronavirus	529	11.2	61.7
Restrictions	524	11.0	61.1
Current situation assessments and recommendations	499	10.5	58.2
Total	4743	100.0	–

The distribution of responses showed that different themes were searched about COVID-19 on the internet. Predominant among the thematic areas searched during COVID-19 were symptoms of COVID-19 (*n* = 701, 81.7%), COVID-19 vaccines (*n* = 689, 80.3%), transmission routes of the coronavirus (*n* = 664, 77.4%). The least searched thematic areas during the COVID-19 pandemic were current situation assessments and recommendations (*n* = 499, 58.2%).

3.4. COVID-19 DHL Levels among University Students in Ghana

The research assessed the dimensions and overall digital health literacy of COVID-19 among university students. In addition, the differences in the DHL levels of students offering health-related and non-health-related programmes were examined (Table 5). DHL values were evaluated based on three levels, namely: sufficient DHL (≥ 3.0), problematic DHL (>2.5 or <3.0), and inadequate DHL (≤ 2.5).

Table 5. COVID-19 Digital health literacy of university students based on programme area.

	Programme	Overall M $\pm$ SD	M	SD	*t*	*df*	*p*
Information searching	Non-Health-related	1.66 $\pm$ 0.55	1.58	0.517	-2.457	1012	0.014 *
	Health-related		1.68	0.561			
Self-generated content	Non-Health-related	1.72 $\pm$ 0.52	1.79	0.692	1.757	247.22	0.080
	Health-related		1.70	0.461			
Reliability	Non-Health-related	1.89 $\pm$ 0.53	1.83	0.528	-1.960	1012	0.051
	Health-related		1.91	0.531			
Determining relevance	Non-Health-related	1.75 $\pm$ 0.61	1.48	0.525	-7.830	352.67	0.000 *
	Health-related		1.82	0.617			
DHL Overall	Non-Health-related	1.75 $\pm$ 0.33	1.67	0.326	-4.209	1012	0.000 *
	Health-related		1.78	0.328			

* significant at *p* < 0.05.

The overall mean scores of DHL ranged from 1.0 to 4.0, where higher scores depict high practice, whereas lower scores depict low practice of DHL (Table 5). Generally, DHL was found to be inadequate among the student population. This level of DHL inadequacy was consistent across all domains of DHL. Relatively, among the dimensions of DHL, competency regarding judging the reliability of online information searching was the highest ($M = 1.89$, $SD = 0.531$), while information searching competency was the lowest ($M = 1.66$, $SD = 0.554$).

Despite the inadequate DHL levels, it was found that students reading health-related programmes showed significantly higher levels of DHL compared to those reading non-health-related programmes ($t = -4.209$, $p < 0.001$). Particularly, the analysis showed that students with health-related backgrounds exhibited significantly higher levels of information searching ($t = -2.457$, $p = 0.014$) and determining information relevance competencies ($t = -7.830$, $p < 0.001$) than those with non-health-related backgrounds. Competencies related to self-generated content and judging information reliability were not different for those with health-related backgrounds and those without.

4. Discussion

This descriptive cross-sectional study was conducted to examine the internet surfing or online information searching behaviours and the thematic areas university students searched during COVID-19. To our knowledge, this study is the first to investigate DHL and information-seeking behaviours among university students during the COVID-19 outbreak in Ghana. The DHL levels of COVID-19 among university students were also measured and compared for differences between students studying health-related and non-health-related programmes. The study findings indicate that a significant majority (60%) of the university students used a variety of digital platforms (73 to 94%) to search for COVID-19 information, such as search engines, social media, news portals, health portals, Wikipedia, websites of public institutions, YouTube, blogs on health, and websites of doctors or health insurance companies, which was also reported among medical students in Iran [48]. Similarly, studies in the USA [9], Portugal [10], Slovenia [11], China/Malaysia/Philippines [12], Saudi Arabia [13], and Vietnam [14] established that university students often used the internet, search engines (e.g., Google, Bing, Yahoo), Wikipedia, social media platforms (e.g., Facebook, Instagram, YouTube, Twitter), news portals (e.g., newspapers, TV stations), and websites of public bodies/official institutions to obtain information about COVID-19 during the pandemic. These observations were similarly reported in a study among undergraduate college students in America [49] who also used various search engines and multiple websites to find health information, albeit not specifically for COVID-19-related information. This observation points to a growing tendency for the use of digital sources of health information among students, whether it is for a pressing individual health need or a general societal health challenge at any point in time. Vietnamese respondents, including students surveyed during the early stages of the pandemic, were reported to have used the internet, online newspapers, and digital social networks as the most dominant channels for accessing COVID-19-related information [50]. It appears that even though most users of digital platforms to access information about COVID-19 or other health-related information were concerned about the credibility of these varieties of information channels, the convenience and probably ease of access to health information via digital channels made them the most preferred. Moreover, some level of restrictions imposed on residents in most countries during various periods of the pandemic may have contributed to the increased use of digital platforms to search for COVID-19-related information as reported in a study in Germany [51]. At the time of the study, online and hybrid modes of teaching had become quite common on university campuses in Ghana [52] and thus may also have increased the online surfing skills and access of students to digital platforms.

The majority (95 to 99%) of the students were concerned about the accuracy of the COVID-19-related information they searched for on the internet. Issues related to the credibility of the health information searched were crucial considerations for surfers. The impact

of misleading COVID-19-related information on the mental health of people cannot be underestimated [37,53]. The COVID-19 pandemic was accompanied by a deluge of complex and changing information, resulting in an "infodemic"—an overabundance of information rife with misinformation and hoaxes [25–27]. During the pandemic, people found themselves overwhelmed with news containing fake reports and mis- or disinformation concerning topics such as diagnosis, protective behaviours, statistics, and recommendations from experts. They also had neither the time nor the competencies to understand this COVID-19-related information correctly [28–31]. This is because online communication channels are vulnerable to the spread of incorrect information, and many social media news feeds are refreshed automatically with similarly misleading content [25,26,32]. The COVID-19 "infodemic" not only potentially led to confusion and uncertainty, but was also associated with adverse health outcomes. Thus, citizens (including adolescents and young adults in schools) with higher social media use were more often affected by adverse COVID-19 mental health outcomes such as fear, panic, anxiety, depression, and stress [33–38].

The types of COVID-19 information accessed and used by university students were reported to be significantly associated with anxiety. About half of the university students in Germany [7,23], Italy [24], Portugal [10], Slovenia [11], Pakistan [4], and Denmark [15] reported difficulties in assessing, judging, and/or evaluating the quality, reliability, or trustworthiness of information from online or social media sources. Difficulties in finding the correct information on specific health-related topics, and problems in finding information of interest and selection for use among all of the information found about COVID-19, were also reported. These challenges or difficulties could be attributed to several factors, including students' ability and confidence to surf the internet/social media and the "infodemic" during the pandemic.

The most common thematic areas of interest to the students during surfing online for COVID-19-related information were symptoms of COVID-19 (82%), COVID-19 vaccines (80%), and transmission routes of the virus (77%). The period of the pandemic may have influenced what students searched for. In the early stages of the pandemic, when much less was known about the disease, the priorities of online users, including students, surfing for health information were more likely to be about the unknowns and those themes that were perceived as urgently needed to mitigate the possibility of any of the adverse health outcomes of COVID-19. The thematic area which was of the least interest to the students was the current situation assessment and recommendations (58%). This observation was in contrast to a report by Le et al. [14], wherein the most requested information by a wide range of Vietnamese respondents was the latest updated news on the pandemic. It is plausible that the type of COVID-19-related information that university students searched for, understood, and used may be varied at different time points during the pandemic depending on the most pressing health threats and levels of uncertainty in the government's intervention measures under implementation.

The level of COVID-19 DHL was generally inadequate and consistent across the four dimensions of DHL assessed. However, the overall level of COVID-19 DHL was significantly higher among students who were studying health-related programmes than those reading non-health-related programmes. Health literacy was generally reported to be higher among people who felt well-informed about COVID-19-related information than among those who felt inadequately informed [23]. Specifically, DHL levels were significantly different between students studying health-related and non-health-related programmes on the information searching and relevance dimensions of DHL, but not the reliability and self-generated content dimensions. It is logical to infer that students studying health-related programmes would feel more informed and competent to use information about COVID-19 than those studying non-health-related programmes. Notwithstanding, their abilities to assess the reliability of the COVID-19-related information sourced from online or digital sources were unlikely to be influenced by their academic backgrounds. The low COVID-19 DHL observed among university students was similarly observed

among university students in Germany, especially in the dimensions of health-related information reliability and the ability to determine whether the information was written with commercial interests [7]. These dimensions of DHL would require deliberate interventions to upscale the skill levels needed to exhibit higher DHL among university students as suggested by Okan et al. [23]. Given the adverse implications of low DHL generally [54], the dimensions of DHL for which university students exhibited much lower competencies need to be addressed as a matter of priority. The need for more accurate public health information about COVID-19 and on regulated platforms could help to provide user-friendly, timely, useful, and evidence-based information to guide appropriate behaviour changes needed to mitigate the potentially debilitative effects of the pandemic and similar widespread infections among students in the future.

4.1. Limitations

Our study has some limitations which are noteworthy for cautious interpretation, inferencing, and practical application. The convenience sampling method used for the data collection may have resulted in a less representative sample of the population of interest in this study. Thus, this also decreases the generalizability of the findings to all university students in Ghana, given that the study was conducted in only 1 of over 30 public and 15 private universities in Ghana. Besides the fact that self-reported data collection is vulnerable to recall and social desirability biases, the nature of descriptive cross-sectional study designs limits the possibility of alluding to causal relationships between online surfing behaviours and DHL.

4.2. Practical Implications

The outcome of this investigation suggests the need to implement health education measures to strengthen students' health literacy capacities and also strengthen their DHL ability. The outcome of this study informs governments and health authorities to implement a well-reasoned and evidence-informed health communication strategy to provide valid and reliable health information concerning the COVID-19 pandemic and support individuals to make health-promoting decisions, especially among adolescents and young adults. Given the widespread nature of mis- and/or disinformation across the world and especially the high level of vulnerability among students who frequently use the internet and other online platforms to search for and use health-related information, targeted educational interventions would be needed by students. Universities can provide courses on DHL and health information to their students and can also disseminate reliable news on COVID-19 and other public health information through their censored web-based channels.

5. Conclusions

The internet surfing behaviour or online health information searching behaviours of university students during the COVID-19 pandemic were exhibited in their use of various digital platforms such as search engines, social media, news portals, health portals, wikipedia, websites of public institutions, YouTube, blogs on health, and websites of doctors or health insurance companies. The predominant COVID-19-related information themes searched for were symptoms of COVID-19, COVID-19 vaccines, and transmission routes of the virus. The overall COVID-19 DHL level among university students was generally classified as low or inadequate based on the four sub-scales of DHL. However, even though the reliability and self-generated content dimensions of DHL had higher scores among the university students, it was rather the information-searching and relevance-determination dimensions of DHL that were significantly different between students studying health-related and non-health-related programmes.

Institutional Review Board Statement: The study was approved by the Institutional Review Board of the University of Education, Winneba, Ghana, with a reference number: DAA/P.1/Vol.1/39.

Informed Consent Statement: Written informed consent was taken from all study participants before data collection.

Data Availability Statement: Anonymized data are available upon reasonable request through the corresponding author.

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