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eHealth Literacy Skills Across Genders: A Comparative Insight for the Pakistani Undergraduate Students

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Abstract:
The world is moving towards eHealth /digital health. In this regard, efforts are also being made in Pakistan. However, there is no comprehensive concept of e-health literacy among the Public. The study was conducted to analyze students' e-health literacy in Pakistan. The cross-sectional survey included undergraduate students from universities located in Islamabad from May 2024 to December 2024. Participants were divided by gender, age range, educational discipline (Arts & Humanities, Science, Social Science, and Others), and local language. Given the distribution of local languages, the research population was representative of Pakistan's diverse regions. The survey incorporated the eHLQ questionnaire as a key tool, along with socio-demographic information. The Mann–Whitney U test was used to analyze the data. The results showed that the digital health literacy levels were moderate and balanced across the seven dimensions of eHLQ. (3.61 to 3.34 out of 5).

Keywords: e-Health literacy; eHealth Literacy Framework (eHLF); Gender Difference in e-HL

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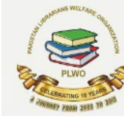
1. Introduction

eHealth literacy is a broader form of health literacy, and according to the Health Promotion Glossary compiled by the WHO, health knowledge is the cognitive and social ability of individuals to understand the information about their health (Nutbeam, 1986). The internet makes it easy to search for a wide range of information, including health-related topics (Feng, 2025). Access to health information has been transformed by internet, and online health information sources (OHIS) are now commonplace resources for people worldwide (Eysenbach et al., 2002). People are gradually shifting away from conventional health information sources (such as newspapers, periodicals, and doctors' offices) and toward the Internet as its accessibility is steadily increasing



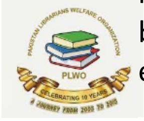
(Alshammari et al., 2025; Wang et al., 2022). As a result, people are increasingly using it to support self-care, improve their family's health, and reduce medical expenses (Feng, 2025). Research shows that people often search online for health and medical information and use this to become more involved in their treatment. However, concerns about the trustworthiness of online health resources persist. While the variety of sources has increased, many still contain inaccurate and misleading information, especially since the COVID-19 pandemic. (Abdulai et al., 2021). These discoveries underscore the urgent need to equip people with the skills to critically assess online health information. To address health misinformation, researchers recommend promoting e-Health literacy among the general population. Enhancing these competencies would empower individuals to identify reliable sources of health information on the Internet and make informed decisions, thereby improving population health outcomes. (Dib et al., 2022). Individuals require access to reliable online resources to maintain their health; however, the proliferation of inaccurate health information necessitates prompt, transparent interventions to mitigate its harmful effects (Wang et al., 2022). Additionally, the individual's limited ability to distinguish between true and false health knowledge can also complicate health-related decisions. Thus, timely access to accurate, up-to-date online health information is essential, and eHealth literacy should also be promoted. Increased eHealth literacy would allow people to competently locate, analyze, and understand health-related information, especially in social media contexts. (Dib et al., 2022).

In 2006, (Norman & Skinner, 2006) were the first to officially define electronic health literacy (e-Health literacy). They define it as the ability to search, find, understand, and evaluate health information from digital resources and apply this knowledge to prevent or solve health problems. They elaborated that eHealth literacy is a meta literacy with six key skills (1) Traditional literacy and numeracy- understanding text and numbers, (2) Health literacy- processing and understanding health information, (3) Computer literacy- using computer hardware and software, (4) Science literacy understanding scientific texts and facts, (5) Media literacy- assessing the quality of media content, and (6) Information literacy-processing information and knowing how knowledge is organized.

(Parker & Ratzan, 2010) described the concept of health literacy as the level of understanding of the necessary health information and services, as well as the ability of individuals to obtain, process, and comprehend this information. In this regard, the authors have emphasized the importance of considering contextual variables that inform health information. They highlight the importance of prioritizing health literacy, particularly in relation to the channels through which health resources can be accessed. These incorporate interactive behavior change instruments, informational websites, and telephone-based services, which are distributed worldwide to deliver healthcare in the contemporary health information environment.

The notion of eHealth literacy emerges from the realms of social and information sciences, encompassing the competencies required for the utilization of electronic health services (Griebel et al., 2018).

Literature indicates that digital health literacy and eHealth literacy are equivalent. The World Health Organization (WHO) emphasizes that digital health literacy involves using ICTs to access, understand, and evaluate health information to address a healthcare problem. With "digital," this shift



leads to more reliable health information, better healthcare, and lower healthcare expenses (World Health Organization, 2019).

In 2021, the WHO released its "(*Global Strategy on Digital Health 2020-2025*, 2021)". They described their vision of health within the context of the Sustainable Development Goals (SDGs). The aim is to enhance the health of everybody through accelerating the creation and integration of digital health solutions. These solutions should be viable, readily available, cheap, scalable and sustainable. They are designed to be people-centred and support the prevention, detection, and response to epidemics and pandemics. This includes the development of infrastructure and instruments that would allow countries to utilize health data. The ultimate goal is to use this health data to enhance the health and well-being of the population. The global strategy seeks to create an interoperable digital or eHealth ecosystem for digital health or eHealth solutions. This ecosystem will be a digital, interoperable information technology infrastructure that the healthcare community primarily uses across all care settings, particularly by healthcare professionals, health service workers, patients, and other stakeholders. The smooth and secure exchange of health information between users, healthcare professionals, managers of health systems, and health data services should be possible in an interoperable digital health or eHealth ecosystem (*Global Strategy on Digital Health 2020-2025*, 2021).

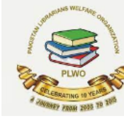
The growth of online and social media health information is driven by the digitization of healthcare and the increasing availability of web-based and mobile health applications. These developments necessitate new "literacies" to effectively navigate the evolving information landscape (Falk Erhag et al., 2022).The World Health Organization (WHO) has also recognized that digital health technologies have the potential to enhance health outcomes for both individuals and communities. To better understand and improve digital engagement and the community's ability to utilize eHealth resources effectively, a new field of study has emerged in recent years, known as digital health literacy or eHealth literacy.

E-health has many advantages for health advancement and disease prevention, but realizing the benefits of e-health requires that the community be educated in e-health literacy (Milanti et al., 2023).

It is indispensable to empower individuals/students to improve their health and to equip them with eHealth literacy to apply the latest digital health technologies, especially in developing countries where access to health education is limited. The literature review showed that numerous resources are available to empower patients in a digital environment, such as personal health information (PHI), enabling them to take control of their health. Patient-centred health information exchanges (HIEs) and clinically integrated networks (CINs) can help bridge the gap between patients and their health data (Kan, 2024).

Electronic Medical Records (EMRs). An EMR system provides a real-time digital health record for patients, enhancing the patient experience by offering a better user interface and displaying all investigations and information through specialised tabs that are easily understandable. Improving eHealth literacy is a crucial step in enabling patients to engage effectively with their medical records (Sham et al., 2024).

Recent initiatives by the Government of Punjab to digitize health data through HMIS represent a major step forward for Pakistan's healthcare infrastructure. This application empowers medical staff to access and manage their patients' Electronic Medical



Records (EMR) efficiently. However, for such systems to truly empower individuals, a high degree of digital health literacy is required (*Health and Population Department*, 2026; *User Manual: Hospital Management Information System (HMIS)*).

Digital technologies are identified as a crucial determinant of health together with factors such as socioeconomic status, "income, education, age, race, ethnicity, and gender". (Van Kessel et al., 2022). As more people use the internet to look up health information due to technological advancements, it is now crucial to critically assess and understand this information. A person's health outcomes may be affected by low eHealth literacy, as it can lead to inaccurate information and misinterpretation of medical conditions. In the current digital era, there is increasing concern about the prevalence of low eHealth literacy.

The primary aim of this research.

1. To explore the relationship between health literacy (HL) and influencing factors among undergraduate students in Pakistan's federal universities, based on the eHealth Literacy Framework (eHLF)
2. To ascertain whether there are any differences in the perceived eHealth literacy (eHL) skills between males and females, or between respondents.

The study was specifically designed to examine the relationship between eHealth literacy and health outcomes among undergraduate University students in Pakistan. Research shows that most students actively use the Internet for healthcare questions, with 74 per cent of University students engaging with Web 2.0 sites like Twitter and Facebook for health-related content (Islam Md. Mohaimenul et al., 2017). However, the accuracy of this information is questionable, and assessing its credibility is also an issue (Chen et al., 2025). (Rasheed et al., 2025) stated that their study, which included 320 web pages, focused on oral health misinformation. They found that 193 web pages published misinformation, while 185 published without a professional background.

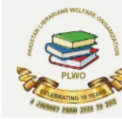
2. Materials and Methods

2.1 Research design and Method

The study is grounded in a quantitative research design to understand e-health literacy Skills among undergraduate University students in the Islamabad Capital Territory of Pakistan. Quantitative research is a significant methodological approach in the social sciences, including education, sociology, information science, and anthropology. The survey research method was used for the study. Surveys are the most common approach used by researchers in quantitative research design to collect data and answer the research questions. It empowers the researcher to collect data in an efficient and standardized manner from a large population. Multiple methods are used in surveys like questioners, observation, and interviews (Murphy, 2023)

2.2 Theoretical and conceptual frameworks

Various models and theoretical and conceptual frameworks are employed to assess eHealth literacy, including the Lily Model, the eHealth Literacy Scale (eHEALS), the Digital Health Literacy Instrument (DHLI), and the eHealth Literacy Framework (eHLF). Based on the eHLF, the eHealth Literacy Questionnaire (eHLQ) was developed as the most current instrument for eHL assessment. This is a validated tool that assesses multiple dimensions of digital health literacy and consists of a 35-item assessment encompassing seven domains of eHealth literacy. It evaluates multiple aspects of eHealth literacy, including the utilization of technology to process health information,



comprehension of electronic health data, identification of trustworthy electronic health sources, and engagement with digital health services, assurance of security when utilising eHealth resources, and motivation to participate n digital health activities (Al-Qerem et al., 2025). This research has utilized the eHealth Literacy Questionnaire (eHLQ) to examine the relationship between eHealth literacy and health outcomes among undergraduate University students in Pakistan. Notably, this study is the first to investigate eHealth literacy in Pakistan using the eHLQ.

2.3 Data Collection

Purposive sampling was used to collect data from the population. The data were gathered from participants after obtaining approval and permission from the universities. A cross-sectional survey was conducted across 26 universities in Islamabad. The Higher Education Commission of Pakistan has approved and officially recognized these universities to offer undergraduate, graduate, and postgraduate programs in various fields, including engineering, arts and humanities, sciences, social sciences, computing, agriculture, veterinary medicine, pharmacy, and law.

2.4 Statistical Analysis

Data for this study were gathered using purposive sampling. A total of 1,000 questionnaires were distributed, and 541 complete responses were received. Data were analyzed using the Statistical Package for the Social Sciences (SPSS Version 24) The data analysis process began with data screening and descriptive statistics to understand the demographic makeup and initial distribution patterns of the responses.

Before the inferential tests were performed, the assumption of normality was tested to determine whether parametric tests were appropriate. To this end, the Kolmogorov-Smirnov and Shapiro-Wilk tests have been used. Both tests yielded statistically significant results ($p < .05$), indicating that the data were not normally distributed. In light of this deviation from normality, non-parametric alternatives were considered more suitable. Consequently, the Mann–Whitney U test was used in place of parametric procedures such as the independent-samples t-test or ANOVA.

3. Finding/ Results

3.1 Demographic Information Gender (n=541)

From the response, 541 respondents participated. The majority were male (320, 59.1%), and 221 (40.9%) were female. Within this group, 396 (73.2%) were aged 20- 25 years. 108 (20.0%) of the group were under 20 years old, 24 (4.4%) were 25-30 years old, while only 13 (2.4%) were aged 31 years or older. The analysis of the results indicates a probable overrepresentation of young people in the sample, with over 92% of respondents 25 years old or younger, according to the academic discipline where most of them belong, Social Science 328 (60.6%), and a good number of respondents from the Science (32.5%). A considerably lesser number are from Arts & Humanities (only 2.2% respondents) and Others (4.6% respondents). Based on the provided data, the results regarding native language are as follows: 39.7% speak Urdu as their first language, 25.0% speak Punjabi, and 14.8% speak Pashto. Other languages include Saraiki at 6.3%, Sindhi at 1.7%, Balochi at 0.9%, and others at 11.6%.

Table 3.1: Details about the respondents' demographics

	Frequency	Percent
Respondents' gender		
Male	**320**	**59.1**
Female	**221**	**40.9**
Respondent' age		
less than 20 Years (>20)	**108**	**20**
20-25 Year	**396**	**73.2**
25-30 Year	**24**	**4.4**
More than 30 Years (<30)	**13**	**2.4**
Discipline		
Arts & humanities	**12**	**2.2**
Science	**176**	**32.5**
Social Science	**328**	**60.6**
Others	**25**	**4.6**
Mother Tongue		
Urdu	**215**	**39.7**
Punjabi	**135**	**25**
Pashtu	**34**	**6.3**
Sindhi	**80**	**14.8**
Balochi	**5**	**0.9**
Others	**63**	**11.6**

3.2 Gender-wise Differences in the eHLQ

Each item of the eHLQ includes five statements; however, item number 6 has six, and item 7 contains four. Here, we perform a statistical analysis of each item to explore gender differences. The first item is

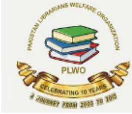
3. 2.1 Using technology to process health information (n=541)

The statement consisted of five items, and the results showed no statistically significant gender differences across any of the items, the first item, *"I use technology to find information about health,"* no significant difference between males Mean Rank = 270.14, N = 320) and females (Mean Rank = 272.24, N = 221), U = 35085.000, p = .869, Similarly, for the second item, *"I often use technology to understand health problems,"*

males (Mean Rank = 270.31) and females (Mean Rank = 272.00) showed no significant difference, U = 35139.000, p = .894, . The third statement, *"Technology helps me decide what healthcare is best for me,"* also showed no significant gender difference, with males (Mean Rank = 266.17) and females (Mean Rank = 277.99), U = 33815.000, p = .362. For the fourth statement, *"I use technology to share information about my health,"* no significant difference was found between males (Mean Rank = 268.15) and females (Mean Rank = 275.13), U = 34447.500, p = .597. Finally, for the fifth statement, *"I use technology to organise my health information,"* the Mann–Whitney U test again showed no significant gender difference, U = 35260.500, p = .954, with males (Mean Rank = 270.69) and females (Mean Rank = 271.45) reporting similar use of technology to manage personal health records. Overall, these findings indicate strong gender equality in all aspects of technology use for health management.

Table 3.2.1 Gender-wise Differences in the eHLQ Item 1. Using technology to process health information (n=541)

Statement	Gender	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
I use technology to find information about health	Male	320	270.14	86445.00	35085.000	.869
	Female	221	272.24	60166.00		
	Total	541				
I often use technology to understand health problems	Male	320	270.31	86499.00	35139.000	.894
	Female	221	272.00	60112.00		
	Total	541				
Technology helps me decide what health care is best for me	Male	320	266.17	85175.00	33815.000	.362
	Female	221	277.99	61436.00		
	Total	541				
I use technology to share information about my health	Male	320	268.15	85807.50	34447.500	.597
	Female	221	275.13	60803.50		
	Total	541				
I use technology to organize my health information	Male	320	270.69	86620.50	35260.500	.954
	Female	221	271.45	59990.50		
	Total	541				

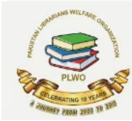


3.2.2 Item 2. Understanding of health concepts and language (n=541)

Results showed no statistically significant gender differences across all five items the first item, *"The knowledge I have helps me to have good conversations about health,"* no significant difference was found between males (Mean Rank = 275.60, N = 320) and females (Mean Rank = 264.34, N = 221), U = 33888.500, p = .382. For the second item, *"I have enough information to take part in conversations about my health,"* males (Mean Rank = 278.57) and females (Mean Rank = 260.04) also showed no significant difference, U = 32937.000, p = .149, for the third item, *"I understand medical results about me,"* no significant difference emerged between males (Mean Rank = 270.53) and females (Mean Rank = 271.67), U = 35211.000, p = .929, reflecting comparable perceived ability to interpret medical results. The fourth item, *"Overall, I understand how my body works,"* showed no significant gender difference, with males (Mean Rank = 279.28) and females (Mean Rank = 259.02), U = 32712.000, p = .110. Finally, for the fifth item, *"I use measurements about my body to help me understand my health,"* the results again showed no significant difference between males (Mean Rank = 276.77) and females (Mean Rank = 262.65), U = 33514.500, p = .280.

Table 3.2.2 Item 2. Understanding of health concepts and language (n=541)

Statement	Gender	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
The knowledge I have helps me to have good conversations about health	Male	320	275.60	88191.50	33888.500	.382
	Female	221	264.34	58419.50		
	Total	541				
I have enough information to take part in conversation about my health	Male	320	278.57	89143.00	32937.000	.149
	Female	221	260.04	57468.00		
	Total	541				
I understand medical results about me	Male	320	270.53	86571.00	35211.000	.929
	Female	221	271.67	60040.00		
	Total	541				
Overall, I understand how my body works	Male	320	279.28	89368.00	32712.000	.110
	Female	221	259.02	57243.00		
	Total	541				
	Male	320	276.77	88565.50	33514.500	.280



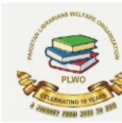
I use measurements about my body to help me understand my health	Female	221	262.65	58045.50		
	Total	541				

3.2.3 Item 3. Ability to actively engage with digital services (n=541)

The Mann–Whitney U test results showed no statistically significant gender differences for four out of five items assessing self-reported competence in using technology for health purposes. Only one item, the first one, "I know how to use technology to get the health information I need," showed a significant difference. No significant difference was found between males (Mean Rank = 277.01, N = 320) and females (Mean Rank = 262.30, N = 221), U = 33438.000, p = .246. Similarly, for the second item, "I know how to make technology work for me," males (Mean Rank = 273.51) and females (Mean Rank = 267.36) reported comparable abilities, U = 34555.500, p = .627. For the third item, "I can enter data into health technology systems," no significant gender difference was observed, U = 32808.000, p = .138, with males (Mean Rank = 278.98) and females (Mean Rank = 259.45) reporting similar confidence in entering personal health data. In contrast, the fourth item, "I quickly learn how to find my way around new technology," showed a small but statistically significant difference (U = 32015.000, p = .047), with males (Mean Rank = 281.45) reporting slightly higher adaptability to new technology compared to females (Mean Rank = 255.86). The fifth item, "I easily learn to use new health technologies," showed no significant difference between males (Mean Rank = 276.78) and females (Mean Rank = 262.63), U = 33510.500, p = .279, indicating similar perceived ease in learning new health technologies.

Table 3.2.3 Item 3. Ability to actively engage with digital services (n=541)

Statement	Gender	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
I know how to use technology to get the health information I need	Male	320	277.01	88642.00	33438.000	.246
	Female	221	262.30	57969.00		
	Total	541				
I know how to make technology work for me	Male	320	273.51	87524.50	34555.500	.627
	Female	221	267.36	59086.50		
	Total	541				
I can enter data into health technology systems	Male	320	278.98	89272.00	32808.000	.138
	Female	221	259.45	57339.00		
	Total	541				



I quickly learn how to find my way around new technology	Male	320	281.45	90065.00	32015.000	.047
	Female	221	255.86	56546.00		
	Total	541				
I easily learn to use new health technologies	Male	320	276.78	88569.50	33510.500	.279
	Female	221	262.63	58041.50		
	Total	541				

3.2.4 Item 4. Feel safe and in control (n=541)

The results showed no statistically significant gender differences for any of the items related to feeling safe and in control. The first item, "I am sure that my health data are being used only by those who are supposed to use it," had males (Mean Rank = 269.03, N = 320) and females (Mean Rank = 273.85, N = 221) who did not differ significantly, U = 34730.500, p = .715. Similarly, for the second item, "My electronic healthcare data are being stored safely," there was no significant gender difference between males (Mean Rank = 273.21) and females (Mean Rank = 267.80), U = 34653.500, p = .682. The third item, "I have a clear understanding of how healthcare providers use my data," also showed no significant difference between males (Mean Rank = 263.60) and females (Mean Rank = 281.72), U = 32990.500, p = .169. Although not significant, females had a slightly higher mean rank, indicating a trend toward greater perceived understanding. The fourth item, "I am sure that only authorized people can access my health data," also showed no significant gender difference, with males (Mean Rank = 269.63) and females (Mean Rank = 272.98), U = 34923.000, p = .799, reflecting similar confidence levels in data access restrictions. Lastly, for the item "I am confident that healthcare providers use my data appropriately," no significant gender difference was observed, with males (Mean Rank = 277.63) and females (Mean Rank = 261.41), U = 33240.000, p = .209. Although males had a slightly higher mean rank, the difference was not statistically significant, indicating comparable perceptions across genders.

Table 3.2.4 Item 4. Feel safe and in control (n=541)

Statement	Gender	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
I am sure that my health data is being used only by those who are supposed to use it	Male	320	269.03	269.03	34730.500	.715
	Female	221	273.85	273.85		
	Total	541				
	Male	320	273.21	273.21	34653.500	.682

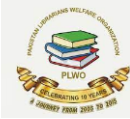
My electronic healthcare data are being stored safely	Female	221	267.80	267.80		
	Total	541				
I have a clear understanding of how healthcare providers use my data	Male	320	263.60	263.60	32990.500	.169
	Female	221	281.72	281.72		
	Total	541				
I am sure that only authorized people can access my health data	Male	320	269.63	269.63	34923.000	.799
	Female	221	272.98	272.98		
	Total	541				
I am confident that healthcare providers use my data appropriately	Male	320	277.63	277.63	33240.000	.209
	Female	221	261.41	261.41		
	Total	541		269.03		

3.2.5 Item 5. Motivated to engage with digital services (n=541)

The results showed that, for most items, males and females did not differ significantly in their views. For item one, *“Technology makes me feel actively involved with my health,”* no significant gender difference was observed between males (Mean Rank = 274.04, N = 320) and females (Mean Rank = 266.60, N = 221), U = 34387.00, p = .564. A significant difference emerged for the item two *"I find technology helps me to take care of my health,”* with males (Mean Rank = 281.52, N = 320) scoring higher than females (Mean Rank = 255.77, N = 221), U = 31994.00, p = .048, indicating that males were more likely to perceive technology as helpful for managing their health. For item third, *"I find I get better services from my health professionals when I use technology,”* no significant difference was found between males (Mean Rank = 276.79) and females (Mean Rank = 262.62), U = 33508.00, p = .269, suggesting similar views on technology’s role in improving service quality. Likewise, for item four, *“Technology improves my communication with health professionals,”* males (Mean Rank = 272.89) and females (Mean Rank = 268.26) reported comparable perceptions, U = 34754.00, p = .716. The item five, *"I find technology helpful for tracking my health,”* showed no significant difference between males (Mean Rank = 280.77) and females (Mean Rank = 256.86), U = 32234.00, p = .068, although the trend approached significance, with males showing slightly greater appreciation of technology for health monitoring.

Table 3.2.5 Gender-wise Differences in the eHLQ Item 5. Motivated to engage with digital services (n=541)

Statement	Gender	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value

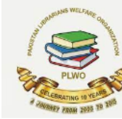


Technology makes me feel actively involved with my health	Male	320	274.04	87693.00	34387.000	.564
	Female	221	266.60	58918.00		
	Total	541				
I find technology helps me to take care of my health	Male	320	281.52	90086.00	31994.000	.048
	Female	221	255.77	56525.00		
	Total	541				
I find I get better services from my health professionals when I use technology	Male	320	276.79	88572.00	33508.000	.269
	Female	221	262.62	58039.00		
	Total	541				
Technology improves my communication with health professionals	Male	320	272.89	87326.00	34754.000	.716
	Female	221	268.26	59285.00		
	Total	541				
I find technology useful for monitoring my health	Male	320	280.77	89846.00	32234.000	.068
	Female	221	256.86	56765.00		
	Total	541		87693.00		

3.2.6. Access to digital services that work (n=541)

The Mann–Whitney U test results for the six statements assessing access to and availability of digital health services revealed that four items showed no statistically significant gender differences, while two items showed significant differences. No significant differences were found for the statements *“Information about my health is always available to those who need it”* male (Mean Rank = 280.77, N = 320) and female (Mean Rank = 256.86, N = 221), U = 32234.000, p = .068. Item two *"My healthcare providers deliver services that I can access through technology"* male (Mean Rank = 276.20, N = 320) and female (Mean Rank = 263.47, N = 221), U = 33695.000, p = .331. The Item four *“All the health technology I use works together”* male (Mean Rank = 275.57, N = 320) and female (Mean Rank = 264.38, N = 221), U = 33898.000, p = .395. And item six *"I have access to health technology that works”* male (Mean Rank = 278.14, N = 320) and female (Mean Rank = 260.66, N = 221), U = 33075.500, p = .179. These findings indicate that male and female respondents reported similar perceptions of information availability, access to technology-enabled services, integration of digital health tools, and the reliability of the technologies they use.

However, two items, Items 3 and 5, showed statistically significant differences. For *“My health data are available to me wherever I am,”* males (Mean Rank = 283.19) scored significantly higher than females (Mean Rank = 253.35), U = 31459.000, p = .023,



suggesting greater confidence among males in the mobility and accessibility of their health data. Similarly, for *"Most of my healthcare providers can be accessed through technology,"* males (Mean Rank = 282.52) reported significantly higher perceptions than females (Mean Rank = 254.32), U = 31674.000, p = .030. Overall, perceptions of general access and functionality of health technologies were similar across genders, but males expressed greater confidence in the mobility of their health data and in the accessibility of healthcare providers via digital means.

Table 3.2.6 Item 6. Access to digital services that work (n=541)

Statement	Gender	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
Information about my health is always available to those who need it	Male	320	280.77	89846.00	32234.000	.068
	Female	221	256.86	56765.00		
	Total	541				
My healthcare providers deliver services that I can access through technology	Male	320	276.20	88385.00	33695.000	.331
	Female	221	263.47	58226.00		
	Total	541				
My health data are available to me wherever I am	Male	320	283.19	90621.00	31459.000	.023
	Female	221	253.35	55990.00		
	Total	541				
All the health technology I use works together	Male	320	275.57	88182.00	33898.000	.395
	Female	221	264.38	58429.00		
	Total	541				
Most of my healthcare providers can be accessed through technology	Male	320	282.52	90406.00	31674.000	.030
	Female	221	254.32	56205.00		
	Total	541				
I have access to health technology that work	Male	320	278.14	89004.50	33075.500	.179
	Female	221	260.66	57606.50		
	Total	541				

3.2.7 Item 7. Digital services that suit individual needs (n=541)

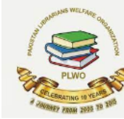
This statement has four items; two showed no statistically significant gender differences, while two showed significant differences. No significant difference was found in items one and four. Item one is "I find that eHealth systems seem to adapt to my skills"—male (Mean Rank = 280.36, N = 320) and female (Mean Rank = 257.45, N = 221), U = 32365.500, p = .078. Item four is “eHealth systems provided me with easy ways to get what I need"—male (Mean Rank = 278.96, N = 320) and female (Mean Rank = 259.48, N = 221) respondents, U = 32813.500, p = .132. The items with significant differences are two and three. Item two is "I find that eHealth systems seem to adapt to my individual needs"—male (Mean Rank = 284.69, N = 320) and female (Mean Rank = 251.17, N = 221) respondents, U = 30978.000, p = .010. Item three is “I find eHealth systems are provided to me in a way that suits me"—male (Mean Rank = 284.38, N = 320) and female (Mean Rank = 251.62, N = 221) respondents, U = 31078.000, p = .012.

Table 3.2.7 Item 7. Digital services that suit individual needs (n=54)

Statement	Gender	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
I find that eHealth systems seem to adapt to my skills	Male	320	280.36	89714.50	32365.500	.078
	Female	221	257.45	56896.50		
	Total	541				
I find that eHealth systems seem to adapt to my individual needs	Male	320	284.69	91102.00	30978.000	.010
	Female	221	251.17	55509.00		
	Total	541				
I find eHealth systems are provided to me in a way that suits me	Male	320	284.38	91002.00	31078.000	.012
	Female	221	251.62	55609.00		
	Total	541				
eHealth systems provided me with easy ways to get what I need	Male	320	278.96	89266.50	32813.500	.132
	Female	221	259.48	57344.50		
	Total	541				

4. Discussion

The research has analyzed gender disparities across different aspects of eHealth literacy, including perceptions of the usefulness of technology, sense of safety and control, self-reported competence, health-related understanding, and access to e-health information. The Mann-Whitney U test consistently showed that the differences between male and female students at the University were not statistically significant. In



general, the findings indicate that the two genders use and benefit from digital health technologies in a very similar manner, with only a few discrepancies noted in certain respects.

Similar to previous studies (Andersson et al., 2023) using the Mann–Whitney U and Kruskal–Wallis tests to analyze Swedish and Polish nursing students' e-health literacy showed no significant gender difference. Acar et al. (2024) it was also found that no gender difference in e-HL, digital, and health literacy levels among 535 Undergraduate students of two universities in Turkey. Using the technology, a systematic review by (Qazi et al., 2022) examine 42 peer-reviewed conference proceedings and empirical research journals on the use of ICT. The research findings indicated no significant difference between the males and females.

Marzo et al. (2022) Research during the COVID-19 pandemic showed no significant difference between males and females, with an overall p-value of 0.05 using the Mann-Whitney U test. However, using the Kruskal-Wallis H test indicated age differences were significant (p-value = 0.001)

5. Conclusion

The research result showed that eHealth literacy among Pakistani university students is moderate, and no significant difference was found between males and females, which indicates that Pakistani students are not well-prepared for using the eHealth facilities. Moreover, Pakistan is transforming toward the digitalizing divers institutional landscapes in the country, driven by the vision "Digital Pakistan," and especially in the health sector, where several key initiatives are operating in the country, for instance, the National Health Management Information System (HMIS).("Understanding HMIS Pakistan," 2026), Pakistan Health Information System (PHIS), is an integrated health services, logistic and surveillance dashboard (*PHIS - Integrated & Analytical Dashboard*, 2026.). Furthermore, the National Immunization Management Service (NIMS), which has been introduced by the Ministry of National Health Services (MNHS) is also aligned with the National Database and Registration Authority (NADRA) to ensure data accuracy (*MINISTRY OF NATIONAL HEALTH SERVICES REGULATIONS AND COORDINATION*, 2025). Other emerging developments, such as Sehat Kahani, Electronic Medical Records (EMR) Initiatives, Pakistan Telehealth Portal (MoITT), Telemedicine & Telehealth Initiatives, and various telemedicine portals, continue to expand the digital health ecosystem in the country. All these initiatives of digital health/eHealth require that the entire population possess adequate eHealth literacy skills. In light of our study, it has become evident that educational institutions should organize different seminars and workshops for eHealth literacy, as well as integrate eHealth literacy into their academic curriculum, so that the skill of eHealth literacy can be enhanced, and students can use digital health/ eHealth resources more efficiently. It will contribute to the implementation of digital health/ eHealth initiatives and overall improve the healthcare systems in Pakistan.

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