

Digital Health Literacy and the Risk of Following Misinformation About Common Diseases Among University Students: A Narrative Review

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Abstract

Background: University students rely heavily on the internet and social media for health information. At the same time, health misinformation about vaccines, infectious diseases and everyday conditions circulates widely online. Digital health literacy (DHL) is widely proposed as a protective skill, but the evidence linking DHL to resistance against misinformation in students has not been brought together.

Objective. To synthesise evidence on (1) the concept and measurement of DHL, (2) the scale and consequences of health misinformation, (3) the level of DHL and the misinformation-related behaviour of university students, with attention to Pakistan, and (4) interventions that may reduce students' vulnerability.

Methods. A narrative review based on targeted searches of open-access biomedical, public health and communication sources, supplemented by reference tracing. Systematic reviews, cross-sectional studies, intervention studies and landmark conceptual papers were included. The review is not a systematic review, and no meta-analysis was attempted.

Results. Three consistent themes emerge. First, students generally report moderate to high confidence in finding health information online, but confidence in judging its quality and usefulness is lower, and most DHL research relies on self-report rather than performance tests. Second, health misinformation is common, its measured proportion on social media varies widely across studies, and its documented harms include vaccine hesitancy and delayed care; a 2019 polio vaccine rumour in Pakistan illustrates how quickly harm can follow. Third, students in several countries report meeting and passing on misinformation, and students in health fields are not immune. Educational interventions, especially those building evaluation skills and those using inoculation approaches, are promising, but the evidence base for health outcomes is thin. Direct evidence on misinformation about specific common diseases such as diabetes, hypertension, dengue or hepatitis among students is scarce.

Conclusions. Self-rated DHL should not be treated as proof that students can resist misinformation. Universities should teach and assess appraisal skills for all disciplines, and

future studies should pair self-report scales with performance-based tests and disease-specific misinformation measures.

Keywords: digital health literacy; eHealth literacy; health misinformation; infodemic; university students; vaccine misinformation; media literacy; Pakistan

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1. Introduction

Searching online is now one of the first things many young adults do when they feel unwell, worry about a symptom or hear a health claim from a friend. The internet gives rapid access to reliable guidance, but it also carries rumours, commercial promotion and deliberately false content. The World Health Organization (WHO) uses the word *infodemic* for an overabundance of information, accurate and inaccurate, that makes it hard for people to find trustworthy guidance during a health event [7].

University students are a particularly important group. They are heavy users of social platforms, they are forming lasting health habits, and they influence the health decisions of relatives. A subset will become health professionals and sources of information themselves. Yet being comfortable with technology is not the same as being able to evaluate health claims. (Muzammil et al. 2026) A systematic review of college students' eHealth literacy concluded that although students feel at ease using the internet to find health information, their eHealth literacy skills were generally weak [8].

Digital health literacy (DHL), also called eHealth literacy, is usually defined as the ability to seek, find, understand and appraise health information from electronic sources and to apply what is learned to a health problem [1]. A frequently proposed idea is that students with higher DHL are less likely to believe and act on health misinformation. This idea is plausible, and it drives many university programmes and public campaigns. However, the evidence behind it is scattered across fields (health informatics, public health, communication, library science and education) and across contexts (Europe, East Asia, the Middle East, South Asia).

This review brings that evidence together with a specific focus on university students and on misinformation about common diseases. It asks four questions:

1. How is DHL defined and measured, and what are the limits of current measures?
2. How common and how harmful is health misinformation?

3. What do we know about students' DHL and their behaviour toward misinformation, including in Pakistan?
4. Which interventions appear promising, and what should future research do?

2. Review Methods

This is a **narrative review**, chosen because the topic spans several disciplines and study designs that cannot be pooled statistically. Targeted searches were run in October 2026 using combinations of the terms *digital health literacy*, *eHealth literacy*, *eHEALS*, *health misinformation*, *infodemic*, *university students* and *Pakistan*, along with disease and platform terms (for example, vaccine, polio, social media, WhatsApp). Searches covered open-access biomedical and public health journals, publisher sites and institutional repositories. Reference lists of key papers were traced for further sources.

Inclusion. Peer-reviewed systematic and scoping reviews; cross-sectional, pre-post and experimental studies in university student populations; foundational conceptual papers on eHealth literacy; and case studies on health misinformation in Pakistan.

Exclusion. Opinion pieces without data, and work on non-health misinformation.

Appraisal. No formal risk-of-bias scoring was applied. Instead, the review prioritises systematic reviews and flags where evidence comes from a single study, a thesis or a conference output. Where sources report numbers, they are given as reported by the original authors.

Limitations of the method. Because the search was not exhaustive and not conducted in multiple bibliographic databases with a registered protocol, some relevant studies will have been missed and the selection may favour English-language, open-access work. The conclusions should therefore be read as an informed synthesis, not as a definitive systematic estimate.

3. Conceptual Foundations

3.1 From health literacy to digital health literacy

Norman and Skinner proposed the “lily model” of eHealth literacy, in which six literacies (traditional, health, information, scientific, media and computer) combine to support engagement with electronic health resources [1]. The authors argued that electronic health tools offer little benefit when users lack the skills to engage with them. In a 2011 update, Norman noted that the original model and scale were created before social media became prominent, and discussed the challenges of applying them in the new context [2]. A more recent paper presents “eHealth Literacy 3.0”, which revises the model for today’s expanded digital ecosystem and links it to a revised 10-item version of the eHEALS scale [3].

This evolution matters for the present topic. Much of the DHL research on students used the original eHEALS, which was built for an earlier internet. Misinformation today spreads mostly through social feeds and messaging apps, where skills such as recognising persuasive design, judging sources in short videos, and resisting social pressure to share may matter more than searching skills.

3.2 Misinformation and related terms

A scoping review of systematic reviews found that definitions of misinformation and related terms (disinformation, fake news, infodemic, malinformation) vary considerably across the health literature [6]. A systematic review of reviews of the COVID-19 period produced a framework with six domains for analysing health misinformation: sources, drivers, content, dissemination channels, target audiences and health-related effects [5]. This review adopts a practical definition: **health misinformation is any health-related claim that is false or misleading according to the best available evidence, regardless of intent.** Disinformation, where there is intent to deceive, is treated as a subset.

3.3 Measurement problem

DHL is most often measured with self-report scales such as the eHEALS. A doctoral thesis that included a scoping review of eHealth literacy measures reported that nearly 90% of the studies it identified measured eHealth literacy using only self-report rather than performance tests [22]. Researchers in Taiwan addressed this gap by building a digital health literacy assessment from the eHEALS and a performance test to classify people into high-, medium- and low-risk groups for misinterpreting health information [13]. This is a methodological caution that runs through the rest of the review: scores on a perceived-skills scale may say little about what a student actually does when confronted with a false claim.

4. The Misinformation Landscape

4.1 Prevalence

A systematic review of reviews published in the *Bulletin of the World Health Organization* identified 31 systematic reviews on infodemics and health misinformation. The proportion of health-related misinformation on social media ranged from 0.2% to 28.8% across the included work, and Twitter, Facebook, YouTube and Instagram were important in rapid dissemination [4]. The wide range reflects differences in topic, platform, time period and definitions, and the reviewers also noted the generally poor quality of studies published during health crises [4].

4.2 Consequences

The same review identified the most negative consequences as misleading or incorrect interpretations of the available evidence, effects on mental health, misallocation of health resources and increased vaccine hesitancy, and further noted delays in care provision [4]. The authors concluded that countermeasures should be multisectoral, including legal policies, awareness campaigns, better health content in mass media and increased digital and health literacy [4]. A systematic review of how the WHO and others have responded to the COVID-19 infodemic describes “infodemic management” as the systematic use of risk- and evidence-based analysis and approaches to manage the infodemic and reduce its impact [7].

4.3 What kinds of claims circulate

A scoping review noted that systematic reviews had identified several main categories of health misinformation on social media, with vaccination among them [6]. Much of the published evidence concerns COVID-19 and vaccines because of the pandemic. Evidence on specific chronic or endemic conditions (diabetes, hypertension, hepatitis, tuberculosis, dengue) is thinner in the sources found for this review, which is itself a finding and a research gap (see Section 9).

5. Digital Health Literacy Among University Students

5.1 Overall pattern

Across regions, students tend to report moderate to high confidence in locating health information online, with lower confidence in evaluating it. Table 1 summarises representative studies.

Table 1. Selected studies of DHL / eHealth literacy among university students

Study (setting)	Design and sample	Main finding relevant to this review
Stellefson et al., 2011 (systematic review, multiple countries) [8]	Review of studies of college students aged 17 to 26	Students are comfortable using the internet for health information but their eHealth literacy skills are generally weak; calls for tailored instruction
Florence, Italy, 2023 (medical students) [11]	Pre-post study of a DHL informatics course	Baseline IT-eHEALS mean 2.9 (SD 0.9); confidence in finding information 3.4 (SD 1.1) but doubts about its usefulness 2.0 (SD 1.0); score rose to 4.2 (SD 0.6) after the course; 94.5% valued the tool
Florence, Italy (communication students) [12]	362 students	Moderate baseline confidence in e-health literacy
Taiwan, 2020 [13]	Development of an eHEALS-based assessment with a performance test	Classifies participants into risk groups for misinterpreting online health information
China, 2025 [14]	Cross-sectional, eHEALS across four COVID-19 phases (2019 to 2023)	Examines how public health emergencies shaped e-health literacy and risk perception; calls for targeted digital health education
Indonesia, 2022 [15]	Survey of bachelor students using eHEALS	Age and pocket money were associated with DHL
Pakistan, engineering students, 2020 [9]	Web survey; 505 of 900 invited (56.1%)	High confidence in finding health information online; perceived eHealth literacy not associated with physical activity or supplement use
Pakistan, undergraduates, 2024 [10]	1,557 students; eHEALS plus self-care tool	Moderate perceived eHL, positively associated with physical, psychological and emotional self-care; authors note potential susceptibility to health risks
Lahore, Pakistan [16]	Survey across 16 universities	Education level significantly associated with both practice and competence in online health literacy

5.2 Confidence is not competence

The Florence data are especially informative: even at baseline, medical students felt reasonably confident about finding information but doubted how useful it was [11]. The Pakistani engineering student study found high confidence but no association between perceived eHealth literacy and two health behaviours [9]. The larger Pakistani sample showed only moderate perceived skills [10]. Together with the observation that most DHL studies use self-report only [22], these findings suggest that **self-rated DHL is a necessary but insufficient indicator of protection against misinformation.**

5.3 Do health students differ?

Intuition suggests that students in medicine, pharmacy and nursing should resist misinformation better. The evidence is mixed. In a study of 500 pharmacy students in Tabriz, Iran, the authors examined beliefs about COVID-19 and concluded that false beliefs can persist even among educated people in the health sector, and pointed to gaps in health literacy and critical understanding of scientific information [19]. A survey of Moroccan university students found that the difference in involvement in COVID-19 misinformation dissemination between medical and non-medical students was not statistically significant [17]. These findings caution against assuming that disciplinary training alone protects students.

6. Students' Exposure and Behaviour Toward Misinformation

6.1 Exposure and sharing

In a survey of 295 Moroccan university students, 91.2% reported encountering misinformation during the pandemic, online news outlets were the most commonly named source (77.2%), and 36.6% said they had passed on misinformation at least once [17]. A study of 407 undergraduates at Sultan Qaboos University applied the theory of reasoned action to understand why students share unverified COVID-19 information and found that multiple factors, including attitudes toward verification and beliefs, shaped sharing behaviour [18].

6.2 What the behavioural evidence implies

Sharing is not purely a knowledge problem. Attitudes, social norms and the wish to help friends and family influence whether students verify before forwarding a message [18]. This matters for intervention design: teaching students how to check a claim is necessary but may not be sufficient unless it also addresses the social motives for sharing.

6.3 Evidence gap

Most student-level studies identified here concern COVID-19. Studies that test students' acceptance of false claims about other common diseases, or that link DHL scores directly to belief in such claims, were not found in the sources searched. This is the central gap motivating the research agenda in Section 9.

7. The Pakistani Context

Pakistan offers a clear example of how misinformation can damage public health outcomes. On 22 April 2019, false rumours about polio vaccine side effects spread quickly across Facebook, X, WhatsApp and YouTube, and the authors of a 2024 essay describe the resulting damage to polio eradication efforts, including vaccine refusals and erosion of trust in public health institutions [20]. A First Draft case study of the same incident reports that the polio campaign was suspended on 27 April, five days after the misinformation surge, and that the National Emergency Operations Center dashboard recorded 990,000 vaccine refusals in April [21]. The case study highlights the role of videos and memes, which spread from closed channels such as WhatsApp groups to open networks and professional media [21]. The 2024 essay recommends engaging all stakeholders, supporting independent fact-checking and increasing health literacy among target populations about vaccine risks and benefits [20].

Within universities, the available Pakistani studies describe confident or moderately skilled internet users whose perceived eHealth literacy does not clearly translate into healthier behaviour [9, 10]. The Lahore study links online health literacy to educational level and recommends that universities be better equipped with hardware and human resources to facilitate students [16]. As these studies mostly measured perceived skills and general health behaviours, they cannot show whether students would accept or reject false claims about specific diseases.

8. Interventions

8.1 What is being tried

An integrative systematic review of interventions for laypeople found that media literacy interventions were the most common type, that procedural and navigation or evaluation skills-building interventions were significantly effective in the studies reviewed, and that few studies measured effects on patient health outcomes [23]. A systematic review restricted to higher education students identified only nine articles on health literacy interventions with health outcomes, and concluded that such interventions can improve health outcomes in this group [24]. A scoping review of 27 articles (2012 to 2024) on educational interventions against misinformation in university students described a focus on critical thinking and mindful information use, with inoculation theory and educational video games as prominent approaches, and recommended standardised methods and context-aware, sustained and culturally relevant designs [25].

The Florence course shows that a targeted informatics module can raise self-rated DHL substantially among first-year medical students, with high satisfaction [11].

8.2 Strengths and weaknesses of the evidence

Table 2 summarises the main intervention types and what the evidence suggests.

Table 2. Intervention approaches for university students

Approach	Core idea	Evidence summary	Main limitation
Course-based DHL training	Teach searching, source evaluation and appraisal	Pre-post gains in self-rated DHL in medical students [11]	Self-report outcome; no control group in the cited study; unclear effect on belief or behaviour
Media and information literacy	Teach how media and platforms work	Most common intervention type among laypeople [23]	Few studies measure health outcomes [23]
Inoculation and games	Pre-expose students to weakened examples of manipulation tactics	Prominent in student interventions [25]	Methods not yet standardised [25]
Health literacy programmes in higher education	Broader health literacy content	Small evidence base (9 articles) with positive health outcome effects [24]	Heterogeneous designs
Platform and policy measures	Fact-checking, labelling, collaboration with platforms	Recommended in WHO review [4] and in Pakistan [20]	Collaboration judged inadequate for persistent polio

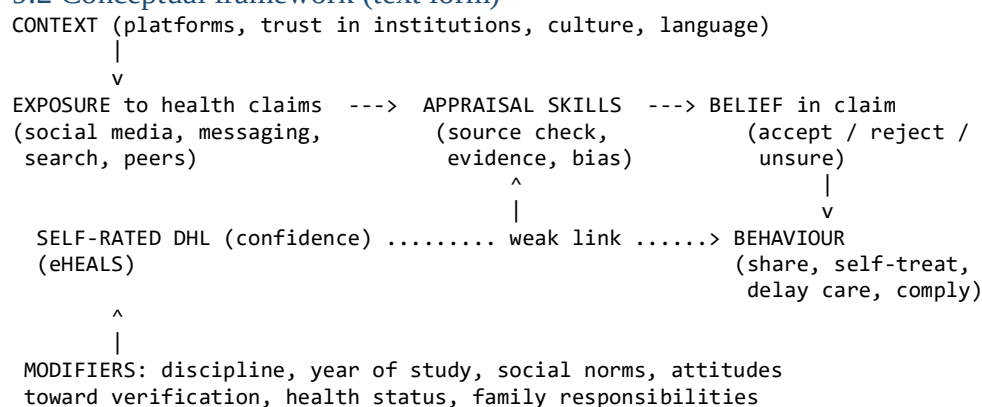
Approach	Core idea	Evidence summary	Main limitation
			misinformation on Facebook [20]

9. Synthesis and Proposed Framework

9.1 Integrating the evidence

The findings point to a layered picture. **Exposure** is high and often unavoidable. **Skills** vary, and self-rated confidence tends to run ahead of appraisal ability. **Motives and norms** influence whether students act on or forward claims. **Context**, including platform design, trust in institutions and history of vaccine hesitancy, shapes the consequences.

9.2 Conceptual framework (text form)



The weak link between self-rated DHL and behaviour reflects the evidence that perceived skills did not reliably predict health behaviours in Pakistani students [9] and that confidence and perceived usefulness diverged in Italian students [11].

9.3 Research agenda

1. **Pair self-report with performance.** Use eHEALS together with credibility-judgement tasks, following the logic of the Taiwanese assessment [13].
2. **Measure disease-specific misinformation.** Build and validate claim sets for common diseases relevant to the local burden (for example diabetes, hypertension, dengue, hepatitis, tuberculosis, influenza), reviewed by clinicians.
3. **Link belief to behaviour.** Track whether students share, self-treat or delay care, not only whether they recognise false claims.
4. **Test interventions with controls and follow-up.** Use randomised or quasi-experimental designs, with outcomes beyond self-rated skill [23, 25].
5. **Include messaging apps and short video.** These channels dominated the 2019 polio rumour [21] but are under-studied in student DHL research.
6. **Study non-health disciplines.** The Pakistani engineering-student evidence suggests a population that is confident but not necessarily protected [9].

10. Implications for Practice

Universities. - Add a short compulsory course on evaluating health information for all first-year students, not only health programmes. The Florence course provides a model [11]. - Assess appraisal ability with tasks, not only confidence scales [13, 22]. - Teach the social side of sharing: how to pause, verify and correct a friend politely, because sharing is shaped by attitudes and norms [18].

Health authorities and professional bodies. - Provide short, verified answers to common false claims in Urdu and local languages, in formats suited to WhatsApp and short video [20, 21]. - Support independent fact-checking and engage all stakeholders, as recommended for polio misinformation [20].

Student health services. - Offer a trusted “ask a doctor” channel and a short list of reliable sources for common conditions.

Researchers. - Report both perceived and performance-based DHL, state definitions of misinformation clearly [6], and use consistent frameworks to allow comparison [5].

11. Strengths and Limitations of This Review

The review integrates evidence from conceptual, epidemiological, behavioural and educational literature and gives specific attention to Pakistan. Its limitations are those of a narrative review: the search was targeted and not exhaustive, no formal quality appraisal was applied, and relevant non-English or paywalled studies may be missing. Much of the student evidence concerns COVID-19, which may not generalise to other conditions. Several included studies rely on self-report and convenience samples. Some findings come from single studies, and readers should treat figures as reported by the original authors rather than as pooled estimates.

12. Conclusion

Digital health literacy is a sensible target for protecting students from health misinformation, but the evidence shows that perceived skill and actual resistance can diverge. Students are exposed, many pass on false claims, and being a health student is not a guarantee of immunity. Universities, health authorities and researchers should shift from measuring confidence to testing and teaching appraisal, from general misinformation to disease-specific claims, and from knowledge alone to the social habits of sharing. Studies that measure DHL, belief in specific false claims and resulting behaviour in the same students would fill the most important gap.

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