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*Review article*

# Cyberchondria among University Students: A Scoping Review of Individual Psychological Determinants and Digital Mechanisms

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## Abstract

Cyberchondria typified by incessant and disproportionate digital seeking of health-related information that culminates in heightened health anxiety has emerged as a salient concern among university students. This group is characterised by high digital autonomy yet does not always possess critical health literacy, rendering students particularly susceptible to maladaptive dynamics between individual psychological vulnerabilities and the digital information ecosystem. This review aims to map scientific evidence on the individual psychological determinants and digital mechanisms that contribute to the emergence of cyberchondria among university students, and to identify implications for students' mental health, particularly within the Indonesian higher-education context. A scoping review was conducted in accordance with the Arksey and O'Malley framework and Joanna Briggs Institute (JBI) recommendations, and is reported according to PRISMA-ScR guidelines. A comprehensive literature search was performed across four databases Web of Science, Scopus, PubMed, and Garuda yielding 76 initial references. Following deduplication and independent double-screening, 12 studies in which university students constituted the primary population were selected for inclusion. Data analysis was conducted thematically and narratively. Across 12 cross-sectional and mixed-methods studies conducted predominantly in Asian and Middle Eastern contexts (2021-2025), cyberchondria was consistently associated with individual psychological vulnerabilities encompassing intolerance of uncertainty, health anxiety, anxiety sensitivity, death anxiety, rumination, and deficient digital self-regulation. These determinants do not operate in isolation; rather, they interact bidirectionally with digital mechanisms, including maladaptive online information exposure and search patterns, online reassurance-seeking, and echo chambers and information rabbit holes, through a cognitive-affective amplification process that sustains and escalates the cyberchondria cycle. Cyberchondria among university students constitutes a multifactorial phenomenon in which individual psychological vulnerabilities and digital mechanisms operate as mutually reinforcing amplifiers within a cognitive-affective regulation and metacognitive framework. The primary theoretical contribution of this review lies in its integrative mapping of how these two domains interact, an approach that remains notably absent from prior scoping reviews in this literature. The findings carry practical implications for the enhancement of digital health literacy, the integration of cyberchondria screening within campus mental health services, and the cultivation of institutional academic cultures that build tolerance for informational uncertainty.

Keywords: cyberchondria; university students; intolerance of uncertainty; reassurance-seeking behaviour; digital mental health.

## 1. Introduction

In contemporary society, individuals experiencing atypical physical symptoms are less inclined to seek counsel from a healthcare professional as a primary course of action. Digital media has emerged as the first point of contact for obtaining health information in the initial stages of individual decision-making (Bujnowska-Fedak & Węgierek, 2020; Jacobs et al., 2017; Zhao & Zhang, 2017). This phenomenon exemplifies a fundamental transformation within the domain of global health communication, (McMullan et al., 2019). This phenomenon is referred to as Online Health Information Seeking (OHIS). A contemporary phenomenon, the global search for health information has been observed across diverse age groups and social contexts (Montagni et al., 2016).

In the Indonesian context, the habit of OHIS has also grown rapidly, supported by high internet and social media usage and gaps in formal health services (Khairina et al., 2021; Pratama et al., 2021). As indicated by data from the Indonesian Internet Service Providers Association (2025), Indonesia exhibits a high rate of internet penetration, with 80.66% of the total national population being internet users. This paradigm shift is largely attributable to the advent of digital media, which has rendered information readily accessible at any moment. Consequently, digital media has emerged as the preeminent source for individuals seeking health-related information in an informal setting. The advent of digital health information has concomitantly introduced challenges, as such information is often uncurated, ambiguous, and involves direct user participation (Swire-Thompson & Lazer, 2020; Wynn, 2019). This phenomenon has the potential to induce a range of pertinent psychological symptoms, and its rigorous investigation is imperative.

Among the various potential psychological symptoms arising from OHIS, one maladaptive symptom is the emergence of the phenomenon of cyberchondria. This phenomenon, characterized by proclivity to incessantly digital information searches, has been shown to intensify feelings of anxiety or distress regarding health concerns (Schenkel et al., 2021; Starcevic & Berle, 2013). Research has demonstrated that individuals who are repeatedly exposed to unfiltered medical information may develop a tendency to interpret such information in a catastrophic manner. This tendency is characterized by the experience of ambiguous physical sensations and can contribute to an escalation in stress and anxiety regarding health concerns (McElroy & Shevlin, 2014; McMullan et al., 2019).

When evaluated within a comprehensive framework, cyberchondria has been demonstrated to play a significant role in the overuse of healthcare services, thereby exacerbating the existing burden on healthcare systems (Kobryn & Duplaga, 2024; Mathes et al., 2018; Starcevic et al., 2020). It has been demonstrated that university students are among the social groups susceptible to the development of psychological symptoms.

Among the social groups particularly susceptible to these psychological dynamics are university students. Situated within the developmental phase of *emerging adulthood* (ages 18-25), this period is characterised by identity exploration, heightened autonomy, and independent health-related decision-making in the absence of direct parental supervision (Arnett, 2000). On the other hand, university students, as digital natives, generally exhibit high digital efficacy; however, this is not always accompanied by critical health literacy and ideal emotional maturity when evaluating comprehensive health information (Doherty-Torstrick et al., 2016; Montagni et al., 2016). This susceptibility is further reinforced by the findings Pertiwi et al. (2022), which demonstrate that reliance on social media functions as a negative predictor of psychological well-being and mediates the relationship between individual factors such as self-esteem and psychological outcomes. Furthermore, the motivations underlying digital media use influence these effects, whereby engagement oriented toward specific social relations may either amplify or attenuate the negative impact on psychological well-being. This indicates that digital media use is not merely instrumental in nature, but is also bound to individual psychological conditions, thereby potentially shaping the manner in which university students respond to information including in the context of digital health information seeking.

University students are confronted with academic demands, the drive for digital efficiency, and the culture of instant gratification in the digital ecosystem they inhabit (Chvanova, 2024; Morze et al., 2023; Timotheou et al., 2023). These demands necessitate the mastery of digital literacy, digital efficacy, and self-directed learning as integral components of independent academic engagement. The findings of Akbar & Anggraeni (2017) indicate that digital literacy plays a supportive role in fostering independent learning through the utilisation of technology, albeit challenges in its application remain. In this context, the intensity of digital technology use as the primary medium for academic activities has the potential to extend this reliance into other domains, including the seeking of health information. Consequently, digital searches have emerged as the first reliable point of contact for rapidly acquiring health information in response to abnormal physical symptoms (Rahman et al., 2025). This pattern illustrates how technology use that is initially adaptive within academic contexts can evolve into maladaptive behaviour when applied to health information seeking particularly when not accompanied by critical information evaluation and adequate emotional regulation.

In a broader context, the phenomenon of cyberchondria, experienced by university students, can be understood as a reciprocal relationship between individual psychological sensitivity and the characteristics of an unintegrated digital environment. This dynamic interplay between these two factors has been extensively researched and documented (Starcevic et al., 2020; Vismara et al., 2020). The pursuit of health information by individuals seeking certainty, maladaptive emotion regulation strategies, and digital media that address their information needs is driven by various vulnerabilities in individual dynamics (Carleton, 2016; Fergus, 2013). The pervasive influence of digital media, characterized by its tendency to disseminate alarmist and sensationalist information, necessitates the direct involvement of individual university students. This involvement serves to reinforce the repetitive behavior of seeking certainty from digital health information sources (Schäfer et al., 2021). In this case, there is a meeting point between the two, where digital mechanisms are no longer passive media, but dynamic media that encourage and integrate the symptoms of cyberchondria, specifically when individuals require psychological regulation. Digital media respond by maintaining anxiety through the information they present (Cinelli et al., 2021; Vismara et al., 2020). This underscores the necessity to adopt an integrative approach in

understanding the phenomenon of cyberchondria, which entails the examination of the interrelationship between individual psychological determinants and digital mechanisms.

In a global context, attention to cyberchondria has continued to garner momentum, marked by a rapid proliferation of scientific publications particularly since 2019 (Baysan & Palanbek Yavaş, 2025). Historically, the conceptual foundations and development of primary measurement instruments, such as the Cyberchondria Severity Scale (CSS), were constructed on samples drawn from the United Kingdom and the United States (Fergus, 2014; McElroy & Shevlin, 2014), rendering the cyberchondria construct initially deeply rooted in an Anglo-Saxon context. Nevertheless, the subsequent empirical trajectory of the literature has revealed a markedly different direction: the most recent scoping review identifies that studies on cyberchondria are now dominated by non-Western contexts, with Türkiye as the most prolific country, followed by other Asian and Middle Eastern nations (Miezah et al., 2026). This development suggests that the construct originating from an Anglo-Saxon context may not hold universally, and that generalising findings across cultural settings necessitates methodological caution (Muthukrishna et al., 2020).

Notwithstanding this geographical expansion, a persistent conceptual gap remains in the extant literature: studies conducted in both Western and non-Western contexts continue, in large part, to examine individual psychological determinants in isolation, without integrating them with the digital mechanisms that directly shape health information search behaviour in digital media (Ambrosini et al., 2022; Arsenakis et al., 2021; Schenkel et al., 2021). Research specifically targeting university students as the primary population remains considerably limited (Dagar et al., 2019; Kanganolli & N, 2020).

In the Indonesian context, studies on cyberchondria also present numerous limitations, as they focus predominantly on the general context by examining simple correlational relationships between psychological constructs (Arumsari et al., 2025; Juniar et al., 2025; Rahman et al., 2025). This finding aligns with the broader characteristics of studies conducted in developing countries, wherein exploratory investigations of psychological symptoms for digital mental health rarely integrate psychological determinants with digital mechanisms in a more complex manner (Montagni et al., 2016). This discrepancy has the potential to compromise the comprehensive conceptual development and the creation of mental health interventions that are contextually relevant and scientifically based within the Indonesian higher education environment.

This gap constitutes the central motivation for the present review. While prior scoping reviews and systematic reviews and meta-analyses of cyberchondria, including the broad-spectrum scoping review by Miezah et al. (2026), the scoping review on quality of life by Yang & Xu (2025), the systematic review and meta-analysis by Schenkel et al. (2021), and the meta-analysis by McMullan et al. (2019), have collectively documented correlational patterns between individual psychological constructs and cyberchondria severity across diverse populations, none has systematically integrated individual psychological determinants with the digital mechanisms that directly shape health information searching within a single theoretically grounded framework applied specifically to university students. This integrative approach, situating both classes of factor within the cognitive-affective regulation model of cyberchondria (Starcevic & Berle, 2013) and the metacognitive model (Fergus & Spada, 2018), constitutes the primary novelty of the present review relative to the existing literature. This study was therefore conducted with the aim of addressing this critical gap by examining the following research question: How do individual psychological determinants and digital mechanisms jointly contribute to the emergence of cyberchondria among university students? Guided by the PCC (Population-Concept-Context) framework, this review focuses on: (1) university students as the population, (2) cyberchondria and health anxiety as the core concepts, and (3) the digital media environment, including social media, search engines, and generative artificial intelligence as the context.

## 2. Research Methods

### 2.1 Research Design

The present study employed a scoping review approach to systematically map the individual psychological determinants and digital mechanisms that contribute to cyberchondria among university students. These are salient given their pertinence to the subject of cyberchondria, a concept that is both evolving and fragmented. They facilitate the identification of key concepts and study characteristics without imposing limitations on analysis and evaluation of rigorous methodological quality (Arksey & O'Malley, 2005). This review process was conducted in accordance with the Arksey and O'Malley framework, taking into consideration the

recommendations outlined in the Joanna Briggs Institute (JBI) update, and was reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) to ensure comprehensiveness and reproducibility of the reporting (Peters et al., 2024; Tricco et al., 2018). This scoping review was not registered in a formal registry. No previously published protocol was available.

## 2.2 Data Sources and Search Strategy

A systematic literature search was conducted in October 2025 across four databases: Web of Science, Scopus, PubMed, and Garuda (Indonesian national database). Search terms were constructed using the PCC (Population, Concept, Context) framework, combined with Boolean operators (AND, OR) and truncation symbols (*) to maximize retrieval sensitivity. The temporal scope was set at 2013 to 2025, reflecting the period from algorithmic social media expansion to the emergence of generative AI-mediated health information environments (Starcevic & Berle, 2013). The PCC components and corresponding keywords are detailed in Table 1.

**Table 1.** The PCC Component and Corresponding Keywords

| PCC Component | Keywords and Search Terms |
|---|---|
| Population | "university student*" OR "college student*" OR "higher education student*" OR undergraduate* OR mahasiswa |
| Concept | cyberchondria OR "health anxiety" OR "problematic online health information seeking" |
| Context | "digital media" OR "online platform*" OR internet OR "search engine*" OR "social media" OR "Generative AI" OR ChatGPT |

The full search string applied across Web of Science, Scopus, and PubMed (with database-specific field adjustments) was: ("university student*" OR "college student*" OR "higher education student*" OR undergraduate*) AND (cyberchondria OR "health anxiety") AND ("digital media" OR "social media" OR "online platform*" OR internet OR "search engine*" OR "Generative AI" OR ChatGPT). Digital-context terms were intentionally included to capture platform-specific dynamics, including algorithmic exposure, social media use, and AI-mediated health information seeking. For Garuda, a simplified string was applied per standard practice for Indonesian national databases: mahasiswa AND cyberchondria. The eligibility criteria applied during screening are detailed in Table 2.

**Table 2.** Inclusion and Exclusion Criteria

| Criteria | Inclusion Criteria | Exclusion Criteria |
|---|---|---|
| Time Range | 2013-2025 | Published prior to 2013 |
| Language | English or Indonesian | Languages other than English or Indonesian |
| Publication Type | Peer-reviewed empirical studies (quantitative, qualitative, mixed-methods); conceptual or technical evaluations | Reviews, meta-analyses, editorials, book chapters, opinion articles, conference abstracts |
| Population | University or college students; undergraduates; higher education students | Non-student populations; studies not reporting disaggregated results for university students |
| Concept | Explicit examination of cyberchondria or health anxiety in a digital context | General anxiety without reference to cyberchondria or online health information seeking |
| Context | Online health information seeking via digital media platforms (internet, social media, search engines, AI-mediated tools) | Exclusively offline health-seeking behaviors |
| Accessibility | Full-text retrievable | Non-retrievable full-text articles |

## 2.3 Screening

A total of 76 literature sources were identified from the four database sources. The relevant literature was subsequently uploaded to the Zotero reference management software. A total of 37 duplicate literature sources were eliminated prior to the selection stage. This process resulted in the re-uploading of a total of 39 literature sources to Rayyan for further screening. The review process was conducted by two individuals who independently performed the screening process in Rayyan. These individuals utilized a hidden feature to prevent selection bias. The selection process entailed a preliminary evaluation of titles and abstracts, subsequently followed by a comprehensive review of the texts. Following the initial screening of titles and abstracts, 27 studies were deemed to have met the established inclusion criteria. However, it was noted that one of the articles was not accompanied by a full text that was readily accessible. Consequently, 26 articles were selected to proceed to the comprehensive text review stage. The final result of this comprehensive review was that 12 articles met the inclusion criteria, thereby making university students the primary subjects to be included in this review. Disagreements between the two reviewers arose primarily at the full-text stage and concerned the interpretation of the

population eligibility criterion, specifically whether studies that included both university students and other adult populations, without reporting disaggregated results for the student subgroup, should be included. These disagreements were resolved through structured discussion between the two reviewers, with reference to the predefined eligibility criteria, until consensus was reached in each case. The aforementioned process was subsequently documented through the utilization of the PRISMA-ScR diagram, as illustrated in Figure 1.

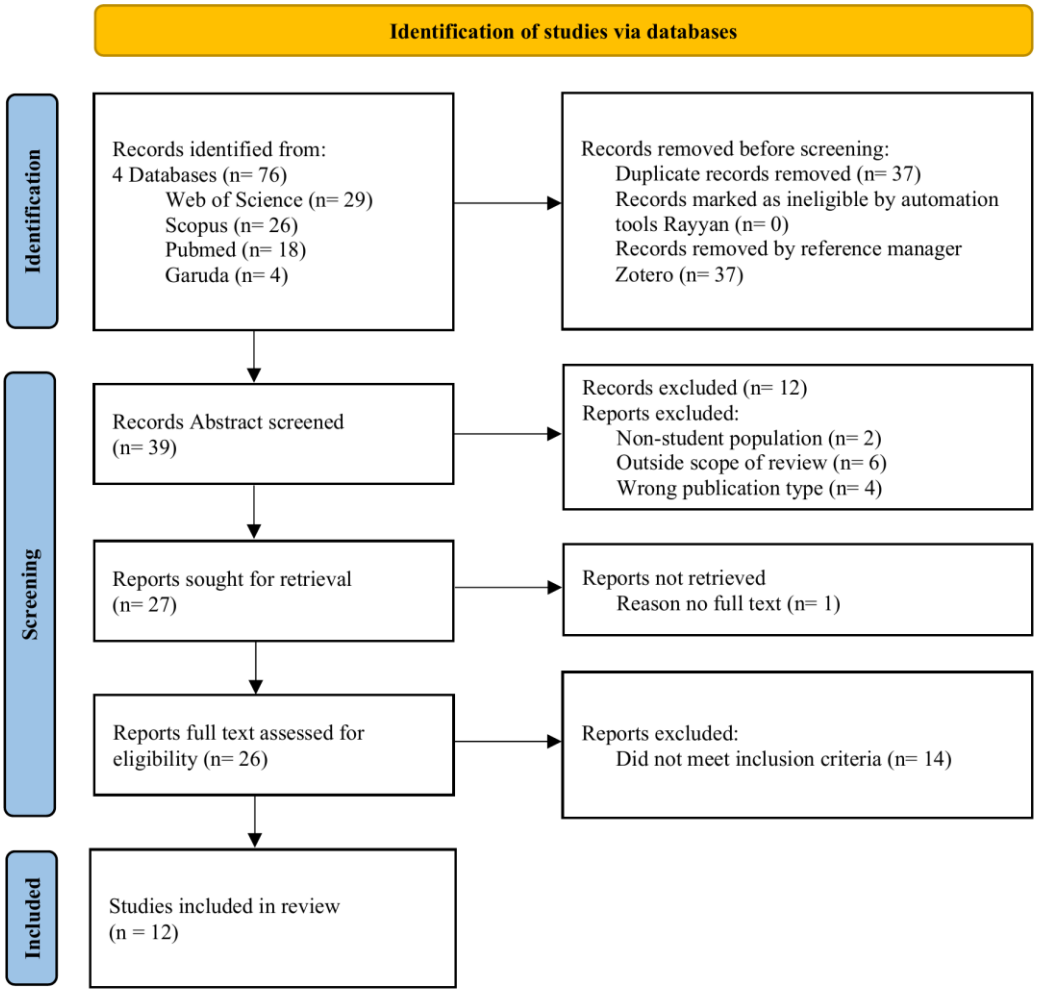


**Figure 1.** PRISMA-Scr Diagram (Page et al., 2021)

## 2.4 Data Extraction

The results of the full-text review selection process were subsequently extracted by two reviewers using extraction tools in accordance with the review objectives. The information extracted included: (1) study identity, including author, year of publication, and country; (2) research methods; (3) theoretical approaches; and (4) main findings consisting of individual psychological determinants and digital platform mechanisms. To ensure the consistency and completeness of the required data, this extraction process was carried out iteratively by two reviewers.

## 2.5 Data Analysis

The data analysis process was executed by incorporating narrative and thematic mapping methodologies to identify recurring patterns and themes across diverse literary sources. The psychological determinants and digital mechanisms were classified inductively based on the conceptual and empirical similarities identified from the extracted data. The results of the analysis were presented in summary tables and descriptive narratives, which together provided a comprehensive overview of the extant literature on the subject of cyberchondria among university students.

# 3. Results and Discussion

## 3.1 Results

### 3.1.1 Study Characteristics

In accordance with the PRISMA-ScR flow, the selection of literature sources resulted in 12 studies that satisfied the established inclusion criteria. All studies were published between 2021 and 2025, indicating that cyberchondria among university students is a relatively recent yet rapidly evolving psychological phenomenon. Regarding country of origin, the extant literature is dominated by Asian and Middle Eastern contexts, comprising Türkiye (n = 4), China (n = 2), Egypt (n = 2), Pakistan (n = 1), Indonesia (n = 1), Taiwan (n = 1), and Jordan (n = 1). Notably, no studies originating from North America or Western Europe were identified, underscoring the limited representation of WEIRD contexts in the cyberchondria literature pertaining to university students. In terms of research design, eleven studies employed a quantitative cross-sectional approach, while a single study utilised a mixed-methods design. All studies involved between 319 and 2,744 university students. The Cyberchondria Severity Scale (CSS) and its derivatives have historically dominated the field as instruments for evaluating the severity of cyberchondria. The primary conclusions derived from the extant literature are delineated in Table 3.

**Table 3.** Summary of Findings (Note: D (Study Design); S (Sample); I (Instrument); A (Analysis))

| No | Title (Author, Year) | Country | Method (D/S/I/A) | Theoretical Approach | Key Findings |
|---|---|---|---|---|---|
| 1 | Cyberchondria and smartphone addiction: A correlation survey among undergraduate medical students in Egypt (El-Zoghby et al., 2024) | Egypt | **D:** Cross-sectional<br>**S:** University student (N = 1.435)<br>**I:** SAS, CSS<br>**A:** Regression | Behavioral Addiction Model | **Determinant:** Smartphone addiction<br>**Mechanism:** Compulsive searching for medical symptoms |
| 2 | Addiction to medical websites post COVID-19 pandemic: a predictor of illness anxiety disorder among Arabian youth (Hamid et al., 2023) | Arab | **D:** Cross-sectional<br>**S:** University student (N = 319)<br>**I:** MWAS, HAI<br>**A:** Logistic regression | Behavioral Addiction Model | **Determinant:** Medical search addiction<br>**Mechanism:** Compulsive searching for symptoms |
| 3 | Research and Evaluation of a Cyberchondria Severity Scale in a Chinese Context (Wang et al., 2023) | China | **D:** Psychometric, cross-sectional<br>**S:** University student (N = 805)<br>**I:** CSS, IUS<br>**A:** CFA, regression | Intolerance of Uncertainty & Anxiety Sensitivity Models | **Determinant:** Intolerance of uncertainty; anxiety sensitivity<br>**Mechanism:** Catastrophic interpretation; repetitive searching |
| 4 | Media Usage, Health Literacy, Health Anxiety, and Health Behaviors of University Students During the COVID-19 Pandemic (Demirtepe-Saygili et al., 2021) | Türkiye | **D:** Cross-sectional<br>**S:** University student (N = 392)<br>**I:** Media use scale, HAI<br>**A:** Path analysis | Media Exposure Model | **Determinant:** Exposure to digital media<br>**Mechanism:** Echo chamber of health information |
| 5 | Exploring associations between eHealth literacy, cyberchondria, online health information seeking and sleep quality among university students: A cross-section study (Zhu et al., 2023) | China | **D:** Cross-sectional<br>**S:** University student (N = 2.744)<br>**I:** eHEALS, CSS<br>**A:** Regression, SEM | eHealth Literacy Model; Cyberchondria Framework | **Determinant:** Low digital health literacy<br>**Mechanism:** Excessive OHIS; online reassurance-seeking |
| 6 | The impact of online health information source preference on intolerance to uncertainty and cyberchondria in a youthful generation (Bahadir & Dundar, 2024) | Türkiye | **D:** Cross-sectional<br>**S:** University student (N = 420)<br>**I:** IUS, CSS<br>**A:** Regression | Intolerance of Uncertainty Model | **Determinant:** Intolerance of uncertainty<br>**Mechanism:** Online reassurance-seeking |
| 7 | Hubungan Rumination dan Cyberchondria pada Mahasiswa Rantau (Salim et al., 2024) | Indonesia | **D:** Cross-sectional<br>**S:** Migrant students (N = 337)<br>**I:** RRS, CSS-12<br>**A:** Regression | Cognitive Rumination Model | **Determinant:** Rumination<br>**Mechanism:** Repeated focus on symptoms |

| No | Title (Author, Year) | Country | Method (D/S/I/A) | Theoretical Approach | Key Findings |
|---|---|---|---|---|---|
| 8 | COVID-19 era-related e-learning: A cross-sectional web-scale study of cyberchondria, internet addiction and anxiety-related symptomatology among university nursing students (Mrayyan et al., 2023) | Jordan | **D:** Cross-sectional<br>**S:** Nursing students (N = 333)<br>**I:** IAT, CSS<br>**A:** Logistic regression | Problematic Internet Use Model | **Determinant:** Internet addiction<br>**Mechanism:** Repeated information-seeking |
| 9 | eHealth Literacy and Cyberchondria Severity Among Undergraduate Students: Mixed Methods Study (Hsu, 2025) | Taiwan | **D:** Mixed-methods<br>**S:** University student (N = 802)<br>**I:** eHEALS, CSS<br>**A:** Regression; thematic | eHealth Literacy & Cognitive Behavioral Framework | **Determinant:** Low digital health literacy, Rumination<br>**Mechanism:** Reassurance-seeking; source confusion |
| 10 | The Relationship Between E-Health Literacy, Health Anxiety, Cyberchondria, and Death Anxiety in University Students That Study in Health Related Department (Kefeli Col et al., 2025) | Türkiye | **D:** Cross-sectional<br>**S:** Health students (N = 568)<br>**I:** CSS, eHEALS<br>**A:** SEM | Cognitive-Affective Anxiety Model | **Determinant:** Health anxiety; death anxiety<br>**Mechanism:** Repeated reassurance-seeking |
| 11 | The effect of the COVID-19 pandemic on health anxiety and cyberchondria levels of university students (Kurcer et al., 2022) | Türkiye | **D:** Cross-sectional<br>**S:** University student (N = 794)<br>**I:** CSS, HAI<br>**A:** Correlation, difference test | Health Anxiety Framework | **Determinant:** Health anxiety<br>**Mechanism:** Intensive exposure to health information |
| 12 | Prevalence of cyberchondria among university students: an emerging challenge of the 21st century (Sabeen Sabir & Naqvi, 2023) | Pakistan | **D:** Cross-sectional<br>**S:** University student (N = 500)<br>**I:** CSS<br>**A:** Descriptive | Descriptive Epidemiological Approach | **Determinant:** -<br>**Mechanism:** Online self-diagnosis |

### 3.1.2 Individual Psychological Determinants

#### Intolerance of Uncertainty (IU)

Four studies consistently identified intolerance of uncertainty (IU) as the most consistently contributing psychological determinant to cyberchondria among university students. A study by Wang et al. (2023) reports that university students with low tolerance for uncertainty predominantly engage in repeated health information seeking, with IU directly predicting an increase in cyberchondria. Similarly, Bahadir & Dundar (2024) found that elevated IU scores among university students were proportional to elevated cyberchondria scale scores ($r = 0.39$; $p < 0.001$), with a mean CSS score of 81.5. These results are further substantiated by a recent study by Hsu (2025), which reports IU as the strongest individual driver of repetitive digital health information-seeking behaviour contributing to the emergence of cyberchondria ($r = 0.46$-$0.75$). Zhu et al. (2023), based on the largest sample (N = 2,744), reported that the distress and excessiveness dimensions of cyberchondria were positively correlated with the frequency of online information seeking, mediated by IU (OR = 1.545).

#### Anxiety Sensitivity

The findings pertaining to anxiety sensitivity as an individual psychological determinant are as follows. As reported in the study by Wang et al. (2023), an increase in ambiguous physical symptoms was demonstrated to significantly drive emotional responses directly related to anxiety sensitivity, propelling repetitive information-seeking behaviour that contributes to the emergence of cyberchondria. The study further reports that a propensity toward anxiety sensitivity among university students fosters a greater overinterpretation of ambiguous physical symptoms as serious medical conditions. Additionally, Sabeen Sabir & Naqvi (2023) identified anxiety sensitivity as a significant correlate of cyberchondria among 500 Pakistani university students, with 50.4% classified in the moderate category and 23.8% in the high category. It has been further documented that prolonged and repeated exposure to information searches can lead to an escalation in stress and anxiety levels among university students (Kefeli Col et al., 2025).

### Health Anxiety

The studies reviewed also found that health anxiety is the most closely related determinant to the phenomenon of cyberchondria among university students (n = 4 studies). Kefeli Col et al. (2025) reported that university students with elevated levels of health anxiety exhibited elevated scores on the Cyberchondria Severity Scale across all measured dimensions (CSS $\alpha = 0.89$; HAI $\alpha = 0.91$), with a mean cyberchondria score of $86.30 \pm 18.28$. The study by Demirtepe-Saygili et al. (2021) elucidates that social media use is positively associated with an increase in health anxiety ($\beta = 0.11$; $p < 0.05$). Concurrently, Kurcer et al. (2022) offers a distinctive account of the surge in cyberchondria among university students during the pandemic, which was influenced by health anxiety, with higher scores observed among students living alone, those with chronic illnesses, and those who actively searched for symptoms online ($p < 0.05$). Mrayyan et al. (2023) also identified the relationship between health anxiety and cyberchondria among nursing students, with 57% of students experiencing moderate-level anxiety.

### Death Anxiety

A study by Kefeli Col et al. (2025) identified determinants directly related to death anxiety as a response to existential fear, with a mean death anxiety score of $7.34 \pm 2.14$. These apprehensions are then exacerbated by exposure to ambiguous and alarmist digital health information, leading to an increase in cyberchondria among university students. As indicated in this study, the phenomenon of cyberchondria is driven by death anxiety as a life-threatening concern, with digital information serving as a source of comfort for university students who seek it. Death anxiety was reported to be significantly elevated among female students ($p < 0.05$).

### Rumination

In consideration of the cognitive determinants, the findings identify rumination as a significant contributor to the prevalence of cyberchondria among university students (Salim et al., 2024). In this study (N = 337; RTSQ $\alpha = 0.934$; CSS-12 $\alpha = 0.92$), a strong positive correlation was found between rumination and cyberchondria ($r = 0.681$; $p < 0.001$), with a mean cyberchondria score of 39.61 (moderate category). The advent of university students' convictions that the acquisition of digital information is their obligation to address feelings of uncertainty is correlated with a marked increase in the prevalence of cyberchondria. These findings are further substantiated by a study conducted by Hsu (2025), which asserts that the convergence of cognitive beliefs and rumination significantly amplifies the prevalence of cyberchondria among university students.

### Individual Digital Regulation

The individual digital regulation findings also report on individual determinants, with a particular focus on the self-regulation strategies employed by university students. It has been posited that insufficient digital health literacy can precipitate an escalation in digital health information seeking, an inclination to misconstrue credible health information sources, a proclivity to accept information without critical scrutiny, and an inclination toward self-diagnosis (Hsu, 2025; Zhu et al., 2023). In the study by Zhu et al. (2023), eHealth literacy was measured using the eHEALS ($\alpha = 0.962$), demonstrating high reliability as a predictor. Furthermore, the phenomenon of diminished regulatory capacity has been identified as a catalyst for the development of patterns of dependence, including internet addiction, smartphone addiction, and medical information search addiction as determinants of cyberchondria arising from inadequate self-regulation among university students. El-Zoghby et al. (2024) reported a smartphone addiction prevalence of 57.6% and a moderate-level cyberchondria prevalence of 85.8% among 1,435 Egyptian medical students (SAS-SV $\alpha = 0.79$-$0.91$); Hamid et al. (2023) reported a strong correlation between medical website addiction and hypochondria ($r = 0.69$) among 319 Arab students; and Mrayyan et al. (2023) identified internet addiction among Jordanian nursing students (N = 333).

## 3.1.3 Digital Mechanisms

### Information Exposure and Online Search Patterns

This review found no studies that directly tested digital search algorithms in experimental contexts. However, extant studies have identified an association between the tendency to seek ambiguous, uncurated health information and the phenomenon of health anxiety among university students. A study by Demirtepe-Saygili et al. (2021) found that an increase in negative interpretations of university students' physical symptoms was correlated with repeated exposure to health information on social media ($\beta = 0.11$; $p < 0.05$). This assertion is corroborated by the findings of Zhu et al. (2023), which demonstrate that the distress and excessiveness experienced by university students are a consequence of their recurrent searches for health information on digital media

platforms (OR = 1.545). Bahadir & Dundar (2024) found that students who relied on less reliable information sources (newspaper/magazine websites) exhibited significantly higher CSS and IU scores (OR = 7.24).

#### Online Reassurance-Seeking

A recurrent motif in this review (n = 6 studies) is the tendency to seek reassurance through digital media. As indicated by Zhu et al. (2023), university students utilise digital media as a primary method to acquire health information, thereby achieving a state of temporary psychological respite. The presence of alarmist and ambiguous digital information, however, tends to increase uncertainty rather than the sought-after peace of mind (Bahadir & Dundar, 2024). As elucidated in the study by Hsu (2025), reassurance-seeking mechanisms are associated with an escalation in cyberchondria: university students who engage in repeated searches exhibit higher cyberchondria scores on the obsessive-compulsive hypochondria dimension (mean 2.19 ± 0.77) and the perceived controllability dimension (mean 2.75 ± 0.87). Wang et al. (2023) identified reassurance-seeking as one of three primary dimensions of the C-CSS (α = 0.921), confirming its central role in the cyberchondria construct.

#### Echo Chamber and Health Information Rabbit Hole

The results of this review suggest the existence of echo chamber and rabbit hole mechanisms when university students conduct repeated and escalating information searches (El-Zoghby et al., 2024; Hamid et al., 2023). A study by Demirtepe-Saygili et al. (2021) reported a significant tendency among university students who had previously searched for health information to conduct repeated searches, resulting in exposure to increasingly less varied information that confirmed initial concerns and contributing to catastrophic interpretations of physical symptoms and elevated cyberchondria scores. Sabeen Sabir & Naqvi (2023) reported that internet-based self-diagnosis was significantly associated with a higher prevalence of cyberchondria among 500 Pakistani university students, with female students exhibiting higher mean CSS scores than their male counterparts.

### 3.1.4 Conceptual Synthesis: An Integrated Framework of Psychological Determinants and Digital Mechanisms

Taken together, the findings across all twelve studies converge on an integrative pattern that is best understood through the cognitive-affective regulation model of cyberchondria (Starcevic & Berle, 2013) in conjunction with the metacognitive model proposed by (Fergus & Spada, 2018). Within this integrated framework, cyberchondria is not reducible to a single psychological vulnerability nor to a single digital affordance; rather, it emerges at the intersection where individual metacognitive beliefs about the necessity of health information seeking encounter digital environments structurally conducive to compulsive and repetitive engagement. The individual psychological determinants documented in this review, principally intolerance of uncertainty, health anxiety, and rumination, function as distal vulnerability factors that predispose university students to initiate digital health information searches. Once initiated, however, the search process encounters digital mechanisms, including algorithmic information reinforcement, online reassurance-seeking, and echo chamber dynamics, that transform what begins as an adaptive coping attempt into a self-sustaining and escalating cycle of distress. Intolerance of uncertainty is particularly pivotal in this cycle: as Carleton (2016) articulated, it operates transdiagnostically, simultaneously fuelling the motivation to search (to resolve uncertainty) and the metacognitive conviction that searching is obligatory and controllable. This latter conviction, captured by Fergus & Spada (2018) metacognitive conceptualization, explains why reassurance-seeking fails to terminate the cycle; digital information, precisely because it is uncurated and often alarmist, generates new uncertainty even as it nominally addresses the prior one, thereby sustaining the compulsive loop. The findings of this review extend this theoretical understanding by demonstrating that digital mechanisms are not merely passive conduits through which psychological vulnerabilities are expressed; they are active amplifiers that structurally reinforce the cyberchondria cycle through personalization architectures and the progressive narrowing of information exposure.

## 3.2 Discussion

### 3.2.1 Cyberchondria as a Multifactorial Phenomenon

The body of evidence synthesized in this review is most coherently interpreted through two interrelated theoretical frameworks: the cognitive-affective regulation model of cyberchondria as conceptualized by Starcevic & Berle (2013), and the metacognitive model developed by Fergus & Spada (2018). Starcevic & Berle (2013) posit that cyberchondria arises when health-related

distress, originating from ambiguous physical sensations, triggers digital information seeking as a regulatory strategy. Because the digital environment typically returns incomplete or alarmist information, this strategy fails to resolve the distress, instead escalating it and motivating further searching. Fergus & Spada (2018) extend this account by foregrounding the role of metacognition: cyberchondria is sustained not only by the content of digital information, but by the individual's beliefs about the process of searching itself, specifically the conviction that searching is necessary, controllable, and obligatory. Taken together, these frameworks explain why cyberchondria resists simple behavioral correction and why it emerges with particular salience among university students, whose developmental context of heightened autonomy and reduced parental oversight coincides with intensive digital engagement. The determinants documented across all twelve reviewed studies, spanning intolerance of uncertainty, health anxiety, anxiety sensitivity, death anxiety, rumination, and deficient digital self-regulation, constitute the affective and metacognitive substrate through which these theoretical mechanisms operate Hsu, 2025; Kefeli Col et al., 2025; Kurcer et al., 2022; Wang et al., 2023). These findings align with the broader cross-study conclusion of Szawłoga et al. (2024), Patanapu et al. (2022), and Shailaja et al. (2020), that cyberchondria in student populations is inherently multifactorial and cannot be attributed to any single psychological driver.

The cognitive dimension of these determinants is illuminated most precisely by the metacognitive model. Within this framework, rumination and intolerance of uncertainty do not merely coexist with cyberchondria; they constitute the metacognitive architecture that makes the compulsive search cycle self-sustaining. Rumination, as evidenced by the strong association reported by Salim et al. (2024) ($r = 0.681$; $p < 0.001$), generates perseverative cognitive activity that directs attentional resources toward somatic sensations, while intolerance of uncertainty, documented across four studies as the single strongest individual predictor (Bahadir & Dundar, 2024; Hsu, 2025; Wang et al., 2023; Zhu et al., 2023), motivates the search for diagnostic certainty that digital media structurally cannot provide. Crucially, Fergus & Spada (2018) argue that it is the individual's positive metacognitive beliefs about searching, the belief that it will produce clarity and control, that initiate the cycle, while negative metacognitive beliefs about uncontrollability sustain it once reassurance fails. This framework explains a pattern consistently visible across the reviewed studies: that online reassurance-seeking, far from reducing anxiety, amplifies it, because each search encounter with ambiguous information reinforces the metacognitive imperative to search further. Cyberchondria is thereby most accurately understood not as a disorder of information access but as a disorder of cognitive regulation in which maladaptive metacognitive beliefs are enacted through, and reinforced by, specific affordances of the digital environment.

The affective dimension of this regulatory failure is captured with particular clarity by the cognitive-affective regulation model of Starcevic & Berle (2013). This model positions health anxiety as the primary affective driver that initially motivates digital seeking, while identifying catastrophic interpretation of ambiguous physical information as the mechanism through which brief episodes of searching escalate into entrenched cyberchondriac patterns. The finding that health anxiety is the most frequently implicated determinant across four reviewed studies (Demirtepe-Saygili et al., 2021; Kefeli Col et al., 2025; Kurcer et al., 2022; Mrayyan et al., 2023) is entirely consistent with this theoretical account: health anxiety generates the affective urgency that initiates searching, while the digital environment's characteristic provision of uncurated, probabilistically framed medical information triggers the catastrophic interpretation that sustains it. The inclusion of death anxiety as a documented determinant (Kefeli Col et al., 2025) extends this model in a theoretically coherent direction, suggesting that for some students, the motivational substrate of cyberchondria is existential rather than merely symptomatic, with digital health information serving as a temporary, inevitably inadequate buffer against mortality salience. Furthermore, the findings of Kurcer et al. (2022)and Mrayyan et al. (2023) situating elevated cyberchondria within the COVID-19 context provide natural experimental evidence for the model's predictions: conditions of collective health threat systematically heighten the affective urgency driving health information seeking, while simultaneously saturating the information environment with precisely the ambiguous and alarming content that the model identifies as catalytic.

The theoretical contribution of this review lies substantially in its treatment of digital mechanisms as theoretically active rather than merely contextual. Within both the cognitive-affective regulation model and the metacognitive model, the digital environment has typically been portrayed as an arena in which psychological vulnerabilities find expression. The findings of this review invite a more dynamic account: the digital mechanisms documented across the reviewed studies, including the tendency toward repeated exposure, the structural encouragement of reassurance-seeking, and the algorithmic generation of echo chambers, do not merely provide an occasion for psychological vulnerabilities to manifest. They function as cognitive-affective amplifiers that structurally

reinforce the cyberchondria cycle in ways that exceed any individual's psychological predisposition. As Nasiri et al. (2023) demonstrated, the structural model of cyberchondria encompasses personality traits, health-related metacognition, cognitive bias, and emotion dysregulation operating in concert; to this model, the findings of this review add the argument that the digital environment must be treated as an active variable in this structural equation rather than a passive background condition. The finding by Zhu et al. (2023) that the distress and excessiveness dimensions of cyberchondria were positively predicted by online information seeking frequency (OR = 1.545), and by Bahadir & Dundar (2024) that source unreliability (newspaper and magazine websites) dramatically elevated cyberchondria scores (OR = 7.24), illustrates that the specific character of digital affordances, not simply their presence, shapes the severity of cyberchondriac outcomes.

This active amplifier function is rendered most visible in the echo chamber and information rabbit hole dynamics identified across multiple reviewed studies. The echo chamber is not simply a metaphor for confirmation bias; it is a structurally generated environment in which algorithmic personalization progressively narrows the informational repertoire available to a user, converting the diversity of the broader health information ecosystem into a homogeneous stream that confirms and escalates existing concerns (Cinelli et al., 2021). From the perspective of the metacognitive model, this structural narrowing is particularly consequential: it systematically deprives the individual of the disconfirming information that would be necessary to interrupt maladaptive metacognitive beliefs about the seriousness of health symptoms. Research by Varma & Singh (2023) reinforces this account, demonstrating that algorithmic repetition produces not merely informational redundancy but active confirmation bias. When combined with the individual vulnerability of intolerance of uncertainty, this digital mechanism creates a closed circuit in which the need for certainty motivates searching, searching generates an algorithmically curated response that confirms concern, and the confirmed concern intensifies both the need for certainty and the conviction that continued searching is necessary. This closed circuit, simultaneously psychological and infrastructural, constitutes the distinctive theoretical contribution of the present review to the cyberchondria literature.

The novelty of the present review relative to prior syntheses of cyberchondria literature resides in this integrative focus. The most prominent extant reviews, including the scoping review on prevalence and associated factors by Miezah et al. (2026), the scoping review on quality of life and health outcomes by Yang & Xu (2025), the systematic review and meta-analysis on anxiety spectrum conceptualizations by Schenkel et al. (2021), and the systematic review and meta-analysis on health anxiety and online information seeking by McMullan et al. (2019), have collectively and substantially advanced the empirical foundation of cyberchondria research. However, each of these reviews examines psychological constructs and behavioral outcomes without systematically mapping the mechanisms through which digital environments translate individual vulnerabilities into behavioral and affective outcomes, nor do they address university students as a distinct population with their own developmental and contextual characteristics. Similarly, studies conducted within non-Western contexts, now the dominant geographic locus of the field, have examined psychological and digital factors largely in parallel rather than in interaction. The present review, by explicitly framing both classes of factor within the cognitive-affective and metacognitive theoretical tradition and focusing exclusively on university students, provides a synthesizing model that accounts for cyberchondria as simultaneously a product of individual psychology and a co-production of the digital environment. This theoretical integration carries direct implications for how cyberchondria interventions should be designed: approaches targeting only psychological vulnerability, such as tolerance of uncertainty training or cognitive restructuring, may achieve limited and transient effects if they do not also address the digital infrastructural conditions that continuously re-elicit and reinforce those vulnerabilities. The cross-cultural consistency of findings, with all twelve reviewed studies from Asian and Middle Eastern contexts confirming the same pattern of determinants and mechanisms, further supports the robustness of this integrative framework across diverse sociocultural settings.

### 3.2.2 The Implications for Indonesian University Students

The extant literature indicates that a lack of digital literacy is associated with the emergence of cyberchondria in university students (Hsu, 2025; Zhu et al., 2023). This review carries significant consequences for the context of university students in Indonesia, as it emphasizes the necessity of enhancing digital health literacy, the efficacy of on-campus mental health services, and the pivotal role of higher education institutions in these efforts. A closer look at these three implications reveals their potential as a preventative measure for cyberchondria among university students in Indonesia.

In the context of enhancing digital health literacy, university students are encouraged not only to develop the ability to comprehend written material, but also to critically assess, evaluate, and review their understanding probabilistically. Most importantly, they are expected to cultivate a higher tolerance for uncertain medical information, thereby avoiding the perpetuation of a cycle of individual psychological determinants and digital mechanisms (Ali et al., 2024; Baralin et al., 2025). In the Indonesian context, internet penetration has reached 80.66% of the national population (APJII, 2025), indicating a trend toward the internet as the primary point of contact for health information seeking a development that carries the potential to adversely impact well-being through cyberchondria when university students' digital health literacy remains inadequate.

The findings indicate a direct correlation between cyberchondria in university students and health anxiety, rumination, and repetitive worry patterns. These results imply that the phenomenon of cyberchondria experienced by university students has the potential to generate latent problems in terms of the effectiveness of mental health services on campus (Kefeli Col et al., 2025; Kurcer et al., 2022; Salim et al., 2024). This pattern is of critical importance; as such, mental health services on campus must possess the capacity to conduct psychological assessments that take into consideration patterns of digital health information seeking as a means of mitigating the risk of cyberchondria among university students (Abu Khait et al., 2023; Bati et al., 2018).

In the clinical psychology literature, Carleton (2016) posits that intolerance of uncertainty plays a cross-diagnostic role in the escalation of various anxiety disorders. Findings that consistently address intolerance of uncertainty carry implications for the necessity of an approach within educational culture to enhance university students' tolerance of information uncertainty (Bahadir & Dundar, 2024; Hsu, 2025; Wang et al., 2023). In this regard, higher education institutions hold a pivotal role in developing institutional approaches to safeguarding students' mental health (Hapsari et al., 2021). The role of higher education institutions in cultivating an academic culture that fosters certainty in responses and optimal performance including in the context of health will be instrumental as a preventive measure against cyberchondria among university students. An institutional approach to cultivating an academic culture that responds to cyberchondria among university students is ideal. Such an approach would entail promotional and preventive efforts, the development of campaigns for healthy digital media use, and encouragement of collaboration with various professionals to facilitate a forum for university students' needs in dealing with cyberchondria in an ever-evolving digital era (Montagni et al., 2016).

### 3.2.3 Limitations and Potential Future Research Directions

The findings of this review are subject to several limitations that merit consideration for future research. The preponderance of findings derived from cross-sectional research designs and self-report instruments constrains the ability to draw definitive conclusions regarding causal relationships between individual psychological determinants and the phenomenon of cyberchondria among university students. The sole study undertaken by Salim et al. (2024) within the Indonesian context reveals that local research remains considerably constrained, particularly given the emergent and pressing nature of cyberchondria in developing countries such as Indonesia.
Consequently, the optimal trajectory for subsequent research endeavors entails the formulation of longitudinal or experimental studies that encompass local values, such as collectivism, familial influence, and trust in medical authorities. This approach is expected to yield more profound investigations, facilitating the development of intervention strategies and preventive measures against cyberchondria among university students.

## 4. Conclusion

This scoping review advances an integrative account of cyberchondria among university students, framed within the cognitive-affective regulation model and the metacognitive model. Its primary theoretical contribution, and the feature that distinguishes it from prior reviews of this literature, is its systematic mapping of how individual psychological determinants and digital mechanisms do not merely co-occur but mutually constitute and amplify one another. Individual vulnerabilities encompassing intolerance of uncertainty, health anxiety, anxiety sensitivity, death anxiety, rumination, and deficient digital self-regulation function as the metacognitive and affective substrate that initiates cyberchondriac searching; digital mechanisms including online reassurance-seeking, repeated information exposure, and echo chamber architectures function as active amplifiers that sustain and escalate the cycle by structurally denying the disconfirming information that would be necessary to interrupt it. All twelve reviewed studies, originating exclusively from Asian and Middle Eastern contexts between 2021 and 2025, consistently confirm positive associations within this integrative pattern, although the predominance of cross-sectional designs limits causal

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**AI Declaration**

This article is the original work of the authors without using AI-tools for writing sentences and/or creating/editing tables and figures in this manuscript.

**Author Contributions**

**Conceptualization:** First Author, Second Author; **Methodology:** First Author, Second Author; **Investigation:** First Author, Second Author; **Data curation:** First Author, Second Author; **Formal analysis:** First Author; **Writing—original draft preparation:** First Author; **Writing—review and editing:** First Author, Second Author, Third Author; **Supervision:** Third Author; **Validation:** Third Author; **Visualization:** First Author.

**Conflict of interest**

All authors declare that they have no conflicts of interest.

**Data availability**

Dataset is provided in this URL: https://zenodo.org/records/19697520

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inference and calls for longitudinal investigation. Within the Indonesian higher education context, this review identifies three concrete intervention priorities: the development of critical digital health literacy curricula that cultivate probabilistic reasoning and tolerance for informational uncertainty; the integration of cyberchondria screening into campus psychological services as a distinct assessment domain; and the cultivation of institutional academic cultures that normalize uncertainty rather than rewarding the compulsive pursuit of definitive answers. Future research should prioritize experimental and longitudinal designs, incorporate local cultural variables such as collectivism and familial health authority, and examine the specific role of generative AI as an emergent and yet-unstudied digital mechanism in the cyberchondria cycle.

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