



# Exploring the Coverage of Cyberchondria Addiction in Newspapers: A Perspective from the USA

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**Keywords:** Cyberchondria; Online medical information seeking; Health anxiety; News media; News frames.

## Abstract

**Objectives:** The purpose of this study is to investigate how US newspapers reported cyberchondria from 2009 to 2021. Cyberchondria shares similarities with addiction, making it imperative to delve into its representation in media. Cyberchondria refers to an issue of excessive and repetitive internet searches for health information often accompanied by obsessive-compulsive behavior. The goal of this research is to locate the frames that appear in cyberchondria coverage, look at how the frames have changed over the given time span, and assess the emotions that the news frames portray.

**Method:** After collecting the relevant news items, the study applies correspondence analysis, sentiment analysis, and co-occurrence network analysis. The NRC word-emotion lexicon is used for sentiment analysis, while the Fruchterman and Reingold algorithm is used for co-occurrence network analysis.

**Results:** The co-occurrence network analysis reveals six frames in cyberchondria coverage. The frames depict themes such as defining cyberchondria, the impact on healthcare providers, health information-seeking behavior, internet diagnosis, and the exaggeration of health concerns. Sentiment analysis reveals that the predominant feeling, which reflects both the positive and negative elements of cyberchondria, is trust, followed by fear. Coding strategies validate the covering themes' consistency during the years under examination. Correspondence analysis indicates a consistent framing pattern over the years, and we can see an increasing focus on academic studies addressing cyberchondria.

**Conclusions:** The results point to the necessity of ongoing public awareness campaigns, health literacy initiatives, and stakeholder collaboration to effectively address the problems associated with cyberchondria addiction in the digital age. Policymakers and media practitioners can benefit greatly from the study's insightful contributions in reducing the negative effects of cyberchondria addiction on society.



## Introduction

To obtain health information, people are increasingly turning to the Internet. Individuals search online to look for symptoms that they might have or someone else they know might have, like family members or friends [1]. Given that plenty of health information is available online, and almost everyone has access to an Internet connection, these developments are unsurprising. However, online health information seeking brings concerns. Sometimes the search becomes excessive and repeated, which increases health anxiety. The phenomenon that causes unwarranted health concerns from online searches about health information now has a clinical label, cyberchondria [2].

Cyberchondria is not officially classified as an addiction in the same way as substance abuse, or other recognized addictions. But some aspects of cyberchondria share similarities with addictive behaviors. People with cyberchondria often exhibit compulsive behavior. They repeatedly search for health information even when they know it may be excessive. Similar to addictive behaviors, the act of searching for health information online might provide temporary relief to individuals who have cyberchondria. However, this relief is often short-lived. It often leads to a cycle of repeated behavior. Negative effects of excessive internet use include inadequate sleep, difficulty finishing assignments, and subpar academic achievement [3]. If a fixation with health issues and incessant internet browsing gets in the way of job/study, relationships, and everyday living, it is comparable to how addictions can affect several facets of a person's life.

In addition, the reliability and quality of online health information is not uniform because credible health information sources appear along with a myriad of opinions and misinformation. Misinformation has the potential to increase complications for those with a medical ailment but can also increase the anxiety of those with cyberchondria because they will undoubtedly receive mixed messages as they encounter accurate information from reliable high quality medical sources as well as less reliable input from less than credible sources. Cyberchondria has consequences both individually and socially. People who suffer from cyberchondria are skeptical about the country's health system, which can seriously impact the relationship between physicians and patients. Relationships with medical providers are further compromised when a patient brings a litany of misinformation to their appointment [4]. When patients mistrust health professionals, they may challenge medical diagnoses and treatments. Mistrust in the health system has two contradictory consequences. On one hand, people begin to avoid discussing their health concerns with their health care providers. Self-diagnosis by using Google is a concern [5]. On the other hand, some people request unnecessary medical tests to evaluate whether their medical diagnosis is correct.

The news media plays a critical role in disseminating information and influencing the public perception of important topics [6]. Public perception of cyberchondria depends on how the news media portrays it. Even though newspaper readers may interpret the language in the news articles differently, it is still important to consider aspects that influence the interpretation of cyberchondria by the public. Therefore, to better understand how US news media portrays cyberchondria, we explore the following research questions:

1. What are the existing frames in cyberchondria coverage of US newspapers between 2009 and 2021?

2. How have the frames changed between 2009 and 2021?
3. How are the emotions depicted in news frames of cyberchondria coverage?

To address these questions, we have several goals in our research, which distinguish it from existing studies. The first is to use co-occurrence network analysis and sentiment analysis of news items that mention cyberchondria-related key-terms from 2009 to 2021. The second is to conduct sentiment analysis of the relevant news articles to understand better how US newspapers portray this issue. By nature, the analysis of news content is very intricate. An elaborate perception will be elusive if the analysis is made from one disciplinary viewpoint. Thus, using an interdisciplinary approach, we assess the portrayal of cyberchondria in the text data format in newspapers so that efforts to curb cyberchondria can be tailored.

## Background

### Cyberchondria traits

News media first proposed the term cyberchondria and popularized the term [6]. Currently, many people search for medical information online. But when this search becomes excessive, it becomes more hazardous as a result of the prevalence of misinformation available on unmonitored sites, and it can generate additional health anxiety [7]. Many people have concerns about their health from time to time. It negatively impacts people's lives when health concerns lead to other disorders—like, hypochondriasis, defined as the development of acute health anxiety which drives the individual to a state of constant dread of contracting a significant medical ailment [8]. About forty percent of people who use the Internet to get health information reported feeling more anxious about their health [9]. Exploring the Internet exposes people to many medical materials, and the trustworthiness of this information is difficult to evaluate [10]. Not all people who use the Internet as a medium for medical information suffer from cyberchondria. One can search the Internet for health information, but if the person fails to relieve the anxiety and the search becomes excessive, it can lead to cyberchondria.

### Role of cyberchondria in diminished life quality

Cyberchondria has both individual and societal implications. People with cyberchondria have no control over the amount of time they spend repeatedly seeking medical information. Therefore, they neglect the duties they need to perform at home or in their professional lives [11]. The loss of this productive time has consequences on their social relationships. Symptoms of obsessive-compulsive disorder are often present in individuals with cyberchondria [11], which indicates that unreasonable fear dominates their lives. Because they use the internet to self-diagnose or take medication that is not appropriate for them [12], there can be severe consequences to their health. Cyberchondria also has negative implications on the country's economy because people with cyberchondria request needless scans and medical tests, leading them to squander health expenses over the period.

### Data collection

The news articles were collected from the database 'News Bank'. This database has collections of national and local US newspapers. We considered the date range from 2009 to 2021. USA Today, The Miami Herald, San Francisco Chronicle, Pittsburgh Post-Gazette, and Houston Chronicle are some of the

newspapers covering cyberchondria. The newspaper articles were identified by using the search query: “cyberchondria” OR “hypochondria” OR “health anxiety” along with “internet” OR “online” OR “web” [6].

We selected these keywords because cyberchondria refers to unnecessary online searches for health information due to health anxiety [13]. Hypochondria, which means fear of falling sick [14] worsens because of the Internet. Next, the news items were screened, and we discarded duplicates and articles that were not relevant. After this evaluation, a total of 91 news articles were retained.

### Methodology

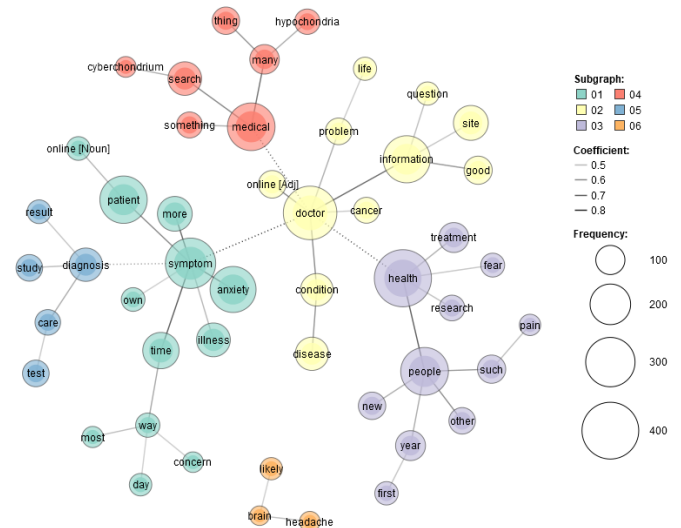
First, we took a series of preprocessing steps to prepare the data. Typical words included in news articles, like auxiliary verbs and articles, were also excluded from the analysis without affecting the news corpora. We used a co-occurrence network analysis, which processes words that often co-occur in the existing news pieces. We used the “Fruchterman and Reingold algorithm” (algorithm for sketching force-directed graphs) to place words inside every single cluster [15]. Every cluster is also associated to the next by edges, revealing how every cluster of words is linked to the others. Subsequently, we explored whether the frames shifted between 2009 and 2021 in cyberchondria coverage in US newspapers. For this purpose, correspondence analysis was used to compress news reporting into ‘concepts’ to interpret the articles. Finally, we performed sentiment analysis. We used the NRC word-emotion lexicon in this research. The NRC Lexicon, developed by the National Research Council of Canada, is the most extensive dictionary available, with over fourteen thousand entries related to emotions [16]. The NRC lexicon provides sentiment ratings for eight basic emotions in addition to polarity. It was posited that these eight emotions consist of (“anticipation”, “fear”, “anger”, “disgust”, “trust”, “joy”, “surprise”, and “sadness”) [17].

### Results

As we can see from **Figure 1**, the co-occurrence network detects six clusters from cyberchondria coverage in US newspapers. Frame 1 provides us with how cyberchondria is defined. When a patient feels a “symptom”, he/she searches online for information, but the anxiety and fear exacerbate as a result of this search. Although the initial curiosity was innocent, it became compulsive, and the individual began to search for additional information over time. In addition to anxiety, the high cost of medical care can also lead to cyberchondria because of dependency on the Internet sources for answers. Therefore, the words ‘symptom, “patient”, “more”, “illness”, “time,” and “online” provide us with the cyberchondria concept. When a patient has some symptoms, she or he begins to search the internet for more information, and over time that search becomes excessive, which causes more anxiety.

The implication of cyberchondria on ‘the physician that is discussed in frame 1 is most evident in frame 2 analysis because this keyword is connected with frame 1. This frame provides us with what doctors need to discuss most with patients visiting them. Physicians need to spend a significant amount of time explaining to the individuals who think they have a particular disease. They must first educate the patient about why they are unlikely to have that diagnosis before determining the actual cause of the symptoms. The words “online”, “information,” or “cancer” represent whatever information people get on the in-

ternet; they bring the information to their doctors, and the doctors must then explain to them why they do not have cancer or the other disease they suspect they have.



**Figure 1:** Co-occurrence network.

Frame 3 displays the way that people should approach health concerns as we can see the keyword “health” is connected with other words like “research”, “people”, and “treatment”. This frame is connected to frame 2 because this frame mentioned the way doctors perceive acquiring online medical information. While physicians advise individuals to be knowledgeable about their physical conditions, some people go too far or obtain information from low-quality or clinically unreliable sources. Individuals must approach their search intelligently and objectively. Health information seeking using Google has limited value, by serving to increase patient involvement in and responsibility for their health. Finally, the internet should not replace a physician, who has the requisite knowledge and experience to provide quality health information to a patient and to provide information that results in reliable diagnosis of symptoms, their roots, and remedies.

Frame 4 shows the relationship with hypochondria. The words “hypochondria”, “cyberchondria”, and “search” with ‘medical’ imply the association between cyberchondria and hypochondria. People with hypochondria are obsessed with their health, and in this Internet era, they fulfill that obsession by searching on the Internet. This frame has a connection with frame 2 because, as is already mentioned, doctors should not be replaced by medical information found online.

Frame 5 portrays internet diagnosis or self-diagnosis. During the developmental years of the Internet, if someone input symptoms into Web MD, they would assume they confirmed a deadly diagnosis. These information seekers were grownups who, due to their fear and hypochondria, received incorrect diagnoses. Today people are susceptible to the same response. The words “result”, “study”, and “care” imply that different studies have confirmed the findings that people misdiagnose themselves through Internet search results, and these studies also recommend some solutions to relieve anxiety. These people also complain that the medical care they receive is not adequate, and some people even begin to avoid health care providers because they are afraid physicians will confirm their frightening self-diagnosis. Therefore, diagnosis as a result of poor-quality information or even information out of context via the Internet can lead to two opposite results: Excessive care

and lack of care. Patients who think more care is better care begin to request more diagnostic tests to confirm their diagnosis. They are reluctant to hear about the source of their physical ailments. Frame 6 portrays exaggeration of health concerns. In this frame, we can see connections among the words “likely”, “brain”, and “headache”. It represents people who are likely to have minor health concerns, minor headaches, and they suspect it to be brain tumors. The headache is most likely from stress, lack of sleep, or caffeine withdrawal.

Having investigated the portrayed frames, we can now focus on the correspondence analysis (Figure 2) of the cyberchondria news coverage. Because most of the terms are gathered around the center, we can say there is no notable significant shift in news frames of cyberchondria over the years. The US newspapers apply similar terms to define cyberchondria and portray its consequences. The only difference that is noteworthy is that over the years, several academic studies have been done on cyberchondria. Therefore, the US newspapers began to increase awareness of these different studies over the years to make people aware of cyberchondria.

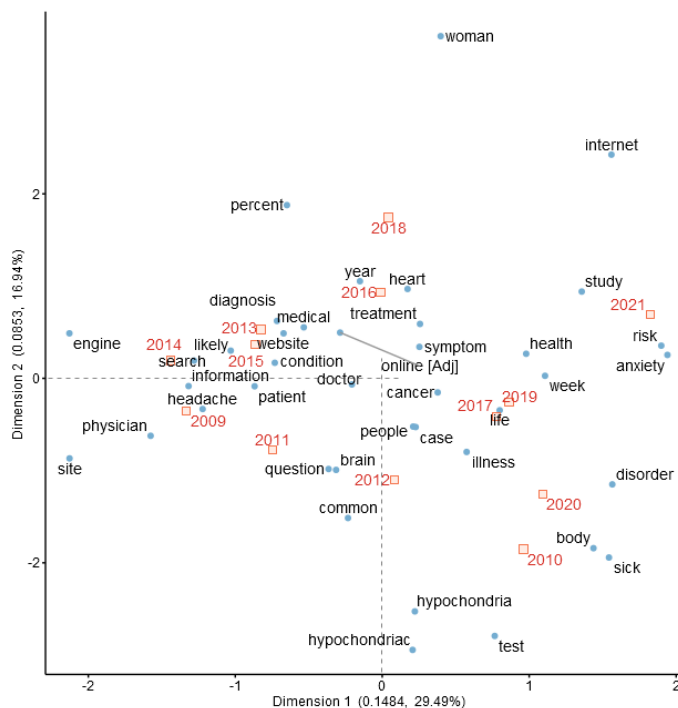


Figure 2: Correspondence analysis of the cyberchondria coverage.

This research used coding techniques to categorize news stories published each year to prove that there was no significant shift in cyberchondria coverage in the newspapers (Figure 3). This approach started with creating five codes based on our preliminary findings. The codes include symptoms, anxiety, diagnosis, hypochondria, and internet. We did a crosstab map of the codes throughout the years. Each square in Figure 3 represents the proportion/percentage of the articles containing the codes. Every square’s color concentration is standardized residuals that evaluate the scale of differences from previous years. We can see that symptom, anxiety, diagnosis, hypochondria, and the internet were common topics throughout all of the years under examination. Although the coverage of anxiety was less in 2015 and coverage of diagnosis was somewhat less in 2010 and 2020, hypochondria in coverage was sporadic. There are no other notable significant differences.

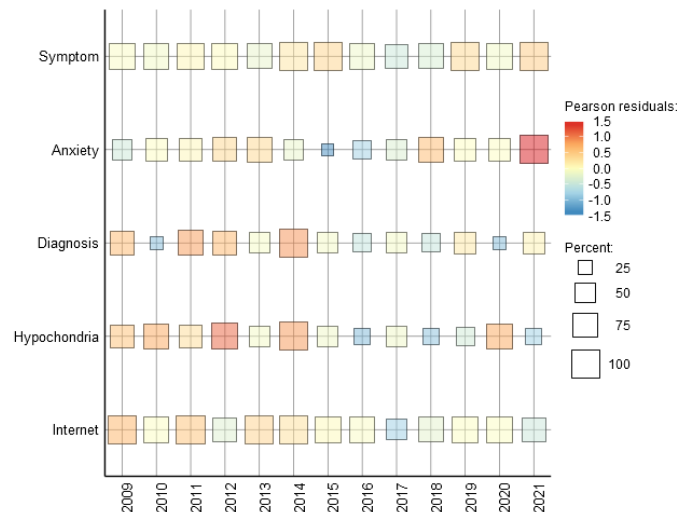


Figure 3: Crosstab map between 2009 and 2021.

Figure 4 presents the emotions in the cyberchondria news coverage of US newspapers. Trust is a positive emotion. Figure 4 shows words related to trust occurred most often (more than 1500 words) in cyberchondria new coverage. Cyberchondria in nature is negative. The explanation behind the positive emotion trust is that although these news articles portray the negative side of cyberchondria, they also discuss coping strategies or how people can deal with cyberchondria. As expected, words that portray the emotion fear are the second dominant. Because many news articles talk about health anxiety and distress of having diseases and ailments, this emotion becomes dominant after trust.

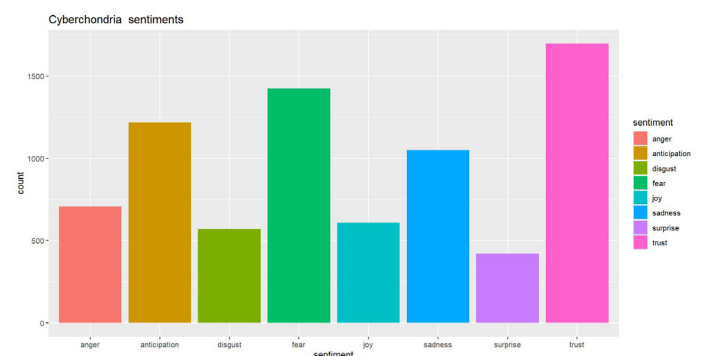


Figure 4: Number of words in the cyberchondria coverage that are related for each sentiment.

Figure 5 presents the word distribution of each emotional valence for cyberchondria topic in US newspapers. Besides the word distributions of eight primary emotional valences, the positive and negative words are also shown in the diagrams. We mentioned before that besides the eight primary emotions, NRC can also portray the polarity words in textual data or words that have positive and negative emotions. Therefore, there are now a total of ten diagrams. As expected, the most prevalent words that are present in trust emotion are “medical”, “doctor”, “diagnosis”, “found” and “advice” etc. Newspapers did not only mention the negative side-effects of cyberchondria, but a significant number of news articles also provided advice or guidelines. For example, no matter what, the job of doctors should not be replaced, and only physicians should perform diagnosis. This is why these words carry trust and emotion among them. Similarly, in anticipation emotion, we can see “medical”, “anxiety”, “time”, “diagnosis” etc., as there are some news pieces covering the expectation that things will start to get better if people can

understand themselves and take control of how they pass their time, the anxiety and worry about health concerns will get better. The internet diagnosis problem will be reduced.

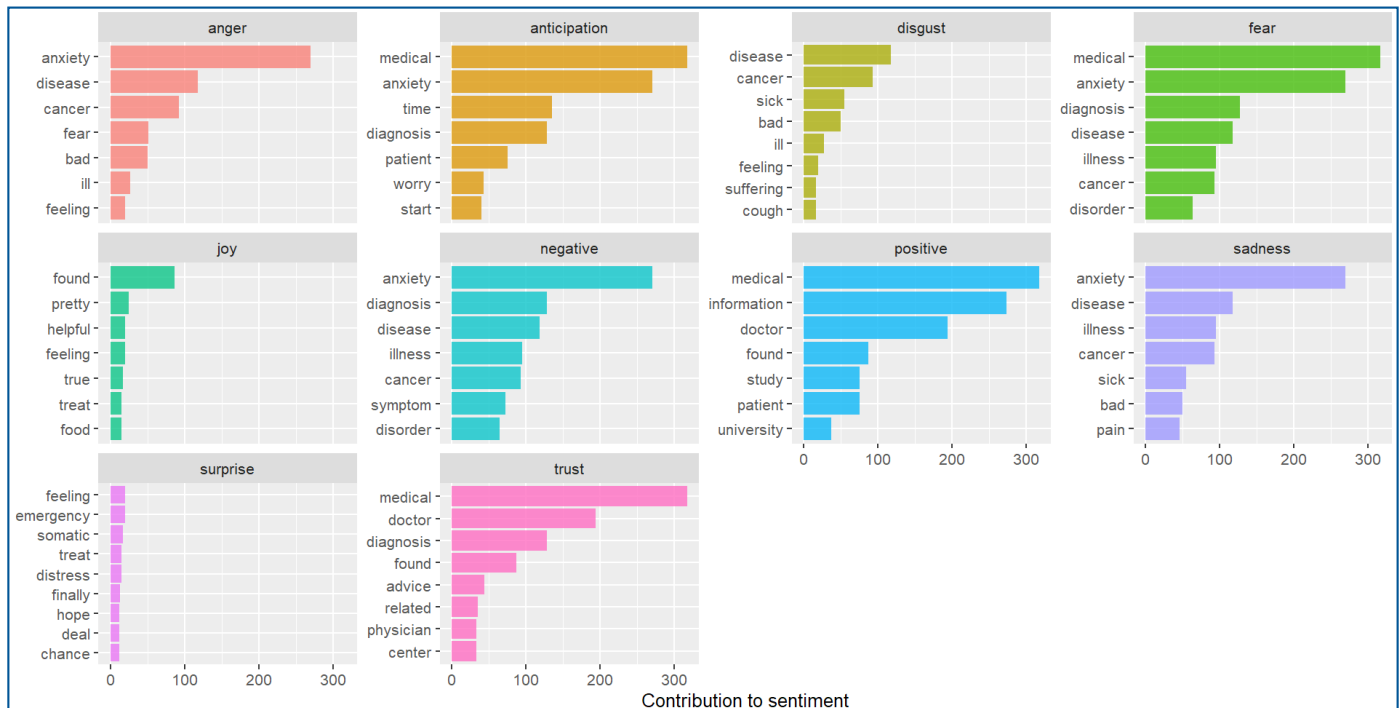


Figure 5: Word counts of each emotional valence.

### Discussion

Many health concerns that we have stem from our “anxiety,” and the more we try to figure this out, the more anxiety escalates [18]. When fear grows after an individual reads the information on the internet, she or he becomes fixated on self-diagnosis and their physicians need to work extra hard to move them away from their inaccurate self-diagnosis. This type of behavior is called cyberchondria [19]. After searching for information on the internet, the patient self-diagnoses, but the diagnosis is often incorrect. This “patient” also goes to physicians with the printouts of medical information found, and doctors need to waste time evaluating them [20]. The news [21] also clearly mentions that a little bit of anxiety is not necessarily bad because sometimes it prompts cautionary steps & occasionally, the patient may be proven right. However, the question is, then, when does it cross the line [21]. This is the moment that prompts cyberchondria as well as a critical opportunity for the health care provider to explain how and where to obtain quality health information online, in the form of an Information Prescription. Prescriptions, in particular, evidence-based information to manage health concerns are known as Information Prescriptions [22]. An Information Prescription should be peer-reviewed, referenced, up-to-date, user-friendly, evidence-based, and devoid of commercial bias. It is recommended that taking assistance from local support groups can reduce hypochondria. Professionals warn that if health searches take up hours every day, the patient may be a cyberchondriac who is invested in online self-diagnosis by searching their symptoms on the Internet. According to psychiatrists, up to ninety percent of individuals who have hypochondria incessantly search the Internet for information on symptoms and illnesses [23].

Because the Internet has become so ubiquitous, young people who still have not reached adulthood are diving deeply into online networks. Consequently, young people are also falling prey to misdiagnoses. Based on videos that they view on Tik Tok

website, youngsters are improperly diagnosing themselves with serious psychological health issues [24]. Reports show that people suspect they have pancreatic cancer because of belly pains. However, indigestion may be behind belly pains. Hence, Harshman, M. [25] raises the question of why people try to relate to life-threatening sicknesses. Some doctors believe that the Internet is to blame [25]. While the Internet can be educational, some doctors believe it can also be dangerous.

The findings of this study reconfirmed that, indeed, repeated internet searches about health issues escalate health anxiety. This increase in anxiety is further exacerbated because of the likelihood of being misinformed when a myriad of information is presented to a patient who does not differentiate quality information from reliable sources from less reliable information from questionable sources. This study also highlighted that just because health information seeking on the internet can lead to anxiety, physicians are not opposed to having their patients seeking health information online. The essence is selective reading from trustworthy, reliable, and high-quality sources. The efficiency of analyzing news articles in understanding the consecutive progress of cyberchondria on national and local levels was also validated in this study. As observed by Li et al [26] and Macanamara [27], depictions in news media can facilitate discovering popular ideas and viewpoints about a phenomenon. It is also possible to get a reflection on whether the subject matter has become significant to the public or not [28].

When it came to techniques for dealing with these challenges, the news items showed a multifaceted approach that included patients, clinicians, and technology. Numerous newspapers have called for gaining health literacy to navigate health websites when it comes to individual coping tactics. According to the news articles, one should be skeptical of self-diagnosis grounded on the medical information available on the Internet. Instead, individuals should realize that medical specialists may perform a more objective investigation of their ailment and rule

out many conditions that are not related to it. As a result, rather than leveraging the Internet to solve health concerns, the news items stressed the role of physicians.

Based on this research, cyberchondria therapy is one crucial part that has to be further investigated. The fundamental objective of cyberchondria treatment is for individuals to get pertinent health information to resolve their health problems without having to be concerned about them [29]. The news stories about coping mechanisms may tell readers that cyberchondria should be tackled by concerted initiatives from a variety of stakeholders including clinicians, online health information providers, and technology. As a result, health policymakers may promote collaboration among various stakeholders to establish successful cyberchondria treatment options.

While the news media might provide helpful treatment options for cyberchondria, medical professionals should be aware that media portrayal of cyberchondria may differ from clinical perceptions. To bridge the information gap between academic circles & the general public, health experts should provide the current state of cyberchondria. It is also necessary to convey to news editors and reporters what cyberchondria is. The methods and findings employed in this study can offer valuable insights for the potential advancement of controlling cyberchondria because newspapers are a beneficial resource for documenting civic reactions to policy modifications and patterns across a time period [30].

This study has some practical implications as well. First, to reduce the adverse effects of the Internet era, US newspapers should continue providing awareness about cyberchondria among the general public. Cyberchondria bears both personal and social consequences. So, newspapers must play a role in diminishing the adverse effects of cyberchondria. Newspapers also need to shape policymakers' minds to take the necessary steps to deal with this issue. If the higher health costs and other aspects of the health system make people cyberchondriac, these problems need attention. Policymakers must work with technologists to design internet algorithms so that only reliable sites appear first when people search for a health condition. As some profit-seeking health companies are marketing their products, policymakers also need to pay attention. The moderators of health blogs and forums should monitor if someone posts unreliable information. People must be trained to assess unmonitored online health information. The DISCERN instrument is beneficial but is not well known. DISCERN is a tool for evaluating the quality of written health information. This instrument will also help create evidence-based medical knowledge [31,32].

Although some reputable websites are trying to help patients by using evidence-based methods, unaccountable reports or unreliable experience anecdotes of patients health forums outnumber them. Health literacy programs can change people's mindsets after they become aware of how to lead a healthy lifestyle and learn how to avoid misinformation. Health literacy programs can also help people who are intolerant of uncertainties. People who cannot tolerate uncertainties like to gather information. The leaflets and guidebooks for diseases they will get from the literary campaigns can be valuable assets for them. Entry to social media websites should be age restricted. Because many teenagers cannot evaluate the health information that they find in an online search, they are affected by the misinformation spread by social media. Physicians must deal with patients who show up for appointments with their no-

tions about what is wrong with their health and how to solve it. Drug corporations and for-profit healthcare companies also take advantage of this because they can use search-engine advertising for advertising pricey and useless items to uninformed Internet users in this digital era [33]. It is all too simple for someone searching for health information on the internet to be tricked into trusting false information regarding symptoms, drugs, or other aspects of the medical procedure that health professionals should evaluate. Hence, news media in the USA should make a concerted effort to curb & manage cyberchondria.

### Future directions & conclusion

A number of constraints limit the outcomes of this investigation. First, this paper only investigates cyberchondria coverage in US newspapers. Future research can explore how cyberchondria is covered in electronic news media. Second, coverage of cyberchondria in international news media also needs attention. Comparing cyberchondria coverage in US newspapers with other countries' news media will provide new insights. In addition, the framing of cyberchondria across local & national newspapers should be compared to understand whether any subtle difference exists in portraying cyberchondria. The application of different computational techniques should also be taken into consideration. These questions and processes need to be referred to in the future to address this public health issue and for scholarly development of the cyberchondria research field. A possible area for future research that is suggested from the current study is how medical professionals can inform patients about the best approach to obtain high quality information from online sources.

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