New challenges in facing cyberchondria during the coronavirus disease pandemic☆

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Cyberchondria (CYB) is characterized by excessive online searching for medical information and is associated with increasing levels of distress, anxiety, and interference with daily activities. As the use of digital devices and the Internet as a source of everyday information has increased, particularly during the current coronavirus disease (COVID-19) pandemic, so has CYB, becoming an object of interest to clinicians and researchers. The present review will provide an overview of the latest updates in CYB research. Emerging evidence draws attention to various vulnerability factors for developing CYB, including personal characteristics such as female gender, younger age, or a history of mental disorder, as well as engagement in particular forms of online behavior, such as increased use of social media, increased acceptance of online information, and information overload. Additionally, recent studies suggest that CYB may itself act as a mediating factor for increased COVID-19-related psychological burden. However, the data are still very sparse. Knowledge gaps include a universally accepted definition of CYB, severity thresholds to help differentiate nonpathological online health searches from CYB, as well as robustly evidence-based interventions.

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Introduction

The Internet has become the most frequently used popular resource for queries about health. In recent surveys of the general population, up to 90% of participants used the Internet for this purpose [1,2]. Online provision of health-related information has many theoretical advantages, representing a convenient and potentially cost-effective method for educating and empowering people about their health, especially those who are poorly served by medical services, providing them with useful information about symptoms to aid clinical help-seeking, as well as anonymous access to medical information for those who are reluctant to see a clinician in-person [3]. On the other hand, information available online is often overabundant, conflicting, or ambiguous, and not all the information online is trustworthy or verified, with a potential risk of harm resulting from self-diagnosis and treatment. A recent systematic review and meta-analysis, including more than 11 000 websites delivering medical or health-related information, reported that none received a category of 'excellent' in quality, 37–79% were rated as 'good', and the rest were rated as 'poor quality' [4]. Additionally, online health-related information is often ambiguous, some-

times contradictory, and not easy to understand by someone without a clinical background.

Most people using the Internet to search for health-related information do so in a nonpathological or even in an adaptive way, however, a subgroup searches online repeatedly and excessively and experiences a significant increase in distress or anxiety as a consequence of these searches. This behavior has been described as cyberchondria (CYB) [5]. The current coronavirus disease (COVID-19) pandemic raises new and obvious challenges in relation to this problem. As large sections of the global population were instructed to self-isolate at home and access to health professionals became more difficult, the Internet remained the only rational information source for many people to answer questions about health. Indeed, in the early stages of the COVID-19 outbreak, the Internet became an essential conduit for vital public health and safety information. However, by increasing Internet exposure, under conditions of great uncertainty and risk, the pandemic is likely to have exposed greater numbers of people to the risk of developing CYB. As the Internet becomes ever more deeply integrated in our daily life (for communicating, working, etc.), users should be made properly aware of the potential risks of using medical platforms for self-diagnosis and treatment and guidance on how to use these resources safely.

In this paper, we will summarize the accumulating knowledge about the measurement of CYB, its natural history, the impact of the COVID-19 pandemic on CYB risk, and new evidence for prevention and therapeutic strategies.

Measurement of cyberchondria

A few instruments have been developed for detecting CYB: the Cyberchondria Severity Scale (CSS, [6]) is the most frequently used. The CSS is a self-reported scale that can be used as a screening tool to assess CYB-symptom severity. It provides a quantitative measure of the extent of the behavior, but no reliable-scale cutoff has been thus far proposed to distinguish adaptive online health searches from CYB.

The original CSS (33 items) evaluates behaviors and emotions generated from a review of the contemporary literature on CYB and similar anxiety disorders and provides scores on five-dimensional subscales: compulsion, distress, excessiveness, reassurance, and mistrust of medical professionals. The CSS-33 showed a very good-to-excellent reliability and validity and has been translated into several languages [7•]. The CSS-33 has been used mostly to measure CYB-symptom severity in general population surveys — and to evaluate severity in patients seeking treatment for psychiatric disorders [8•]. The CSS-33 has also demonstrated sensitivity to change in CYB severity in a randomized controlled trial (RCT) [9•]. Modifications of the original version have been introduced to refine its conceptual foundation (mainly omitting the 'mistrust of medical professionals' subscale, which may not assess the same overarching construct of CYB as the other CSS subscales) and to improve its utility in clinical and research setting, by making it shorter (with 30, 15, and 12 items) [7•]. The reliability and validity of the shortened versions remain to be established with certainty.

Natural history of cyberchondria

CYB is a relatively new phenomenon and consequently research is still in its infancy. It is still debated whether CYB represents a new and independent form of mental disorder or whether it is simply a contemporary manifestation of hypochondriasis — a disorder currently classified with the obsessive–compulsive and related disorders (OCRDs) in the last edition of the International Classification of Diseases (ICD-11). ICD-11 hypochondriasis is defined as the persistent preoccupation or fear about the possibility of having one or more serious, progressive, or life-threatening illnesses, and is characterized by compulsive checking for evidence of illness, spending inordinate amounts of time searching for information about the feared illness, and repeatedly seeking reassurance. Compulsivity refers to a tendency toward repetitive, habitual actions, repeated, despite adverse consequences [10]. In the case of OCRDs, compulsions, such as repetitive checking, are stereotyped behaviors, performed according to rigid rules and designed to reduce or avoid unpleasant consequences, such as relieving distress or anxiety (as opposed to gaining a reward) [11]. However, in reality, the compulsive behaviors do not provide the intended relief and instead, by undermining healthy habituation of anxiety, promote further compulsive engagement. This model can also be applied to CYB, whereby repetitive checking online for medical information designed to achieve relief or reassurance about one's health status instead increases anxiety and promotes further fruitless checking. The correlation with CYB and health anxiety, broadly defined, is corroborated by recent systematic reviews and meta-analyses [12,13]. However, a core preoccupation or fear of serious, progressive, or life-threatening illnesses is not always associated with CYB. In some circumstances, CYB is driven by symptoms more consistent with obsessive–compulsive disorder (OCD), as repeated searches for medical information may function as a safety behavior designed to alleviate obsessive responsibility for preventing harm, somatic obsessions, or other contamination concerns. Additionally, the need for certainty, or the need for things to be 'perfect' or 'done right', which drives some forms of CYB, may reflect an underlying obsessive–compulsive

personality disorder, which has been reported to accompany hypochondriasis. Last, in some other circumstances, online health searches may be compulsively performed without the aim of detecting a specific feared health outcome (describing subjects with a low degree of insight, akin to 'poor-insight' OCD). In the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), the concept of hypochondriasis is partly reflected in illness-anxiety disorder and partly in somatic-symptom disorder, two separate disorders within the grouping of somatic symptom and related disorders (for an additional focus on the differences between the ICD-11 and DSM-5 conceptualization of hypochondriasis, we suggest the paper from van den Heuvel and colleagues [14]). This nosological classification and definition is somehow confusing as the role of somatic symptoms is not completely clear in the conceptualization of hypochondriasis (illness-anxiety disorder) in DSM-5. The ICD-11, on the contrary, took a different approach by keeping the name 'hypochondriasis' and by including this disorder in the OCRD grouping for its compulsive nature and its negative reinforcement. We believe that the ICD-11 classification is more useful than the DSM-5, one, both for diagnosis and treatment and for research purposes. The prominence of somatic symptoms may be not predominant nor present in CYB. Additionally, the DSM-5 criteria require a high level of anxiety about health and the individual to be easily alarmed about personal health status. Though somatic symptoms may drive CYB in some cases, investigations have shown that excessive online searches and clinically significant CYB is also associated with low level of health anxiety in subjects not worried about their health before engaging in online searches [15,16]. Hence, for some cases of CYB, a diagnosis of ICD-11 hypochondriasis or DSM-5 illness-anxiety disorder may not apply.

In previous work, our group tentatively proposed a 'working' definition of CYB [17] — based on existing definitions of CYB — reflecting three key components: 1) the compulsive nature of online health searching; 2) an increase in anxiety or distress during or after the searching; 3) the negative impact on other online and offline activities. This definition reflects a conceptualization of CYB as a compulsive form of Problematic Usage of the Internet (PUI) [18•,19], an emerging group of disorders that are currently conceptualized within a framework of behavioral addiction and in which framework loss of inhibitory cognitive control over impulsive as well as compulsive responding is emphasized. Indeed, CYB and PUI share in common the distressing loss of control over urge-driven online activity, resulting in time-consuming, compulsive behavior, that is continued, despite acknowledgment of negative consequences and that ultimately causes distress or impairs functioning. Indeed, CYB shares phenomenological similarities with a subgroup of problematic use of the Internet in which individuals spend excessive amounts of time-seeking information in the online context, usually news or documentary-related information. A recent investigation dubbed this behavior as 'online news addiction' that emerged to be associated with high level of future anxiety and with low level of interpersonal trust, two factors that could likely predispose also CYB [20]. Exploratory investigations supported by the relationship between CYB and symptom severity of Internet addiction or PUI [21,22], were even stronger than the one between CYB and health anxiety [23]. Although in some circumstances, CYB might resemble a behavioral addiction, it seems not to manifest the full set of potential diagnostic criteria for these disorders, in particular, symptoms of tolerance or withdrawal that have been proposed in the DSM-5 prototype definition of Internet gaming disorders. Importantly, however, tolerance and withdrawal are not considered essential criteria for a diagnosis of behavioral addiction in the ICD-11 [24].

Thus far, mostly cross-sectional investigations have reported an association between CYB-symptom severity and various sociodemographic and clinical variables, mainly based on studies of the general or university student population. Female gender showed a higher expression of CYB in some studies [25–29], but not all [8•,30,31], while younger individuals also seem more predisposed to CYB [28,32,33] — though this might simply reflect increased use of electronic devices in this age group. Indeed, as many as 23.3% of university students reported a significant CYB (score on the CSS-33 above the 75th percentile) in a survey-based study conducted before the COVID-19 pandemic [30]. Another recent investigation reported CYB in 16.3% of 300 outpatients attending two general hospitals (this study considered the presence of any CSS factors as being indicative of CYB) [34]. Additional investigations are needed to determine the age of onset and the influence of culture or geography on CYB. Furthermore, the course of CYB is not well understood as there have been no prospective long-term studies.

A few studies have investigated CYB in clinical samples. In a recent study performed by our group [8•], CYB was investigated in a sample of 77 outpatients with various psychiatric disorders, including OCD, anxiety disorders, and major depressive disorder. CYB, when defined using the three criteria listed above, was present in just 1.3% of the sample. However, if a less-restrictive definition was applied (omitting the disability criterion), CYB was reported in 10–20% of patients, with a slightly higher (not significant) rate in patients with anxiety disorders (19.2%) than major depressive disorder (15.4%) or OCD (12%). The sample size was admittedly small, and therefore, the study may not have been powered sufficiently to show a statistical difference.

Taken together, these data suggest that CYB represents a relatively common transdiagnostic syndrome, occurring in population-based and clinical samples, including, but not exclusively, those with a range of mental disorders such as OCD, anxiety, or major depressive disorder. The broad range of clinical syndromes associated with CYB implies a multifactorial etiology and it is reasonable to hypothesize that variable subtypes of CYB might manifest. Indeed, CYB is sometimes driven by symptoms more consistent with hypochondriasis, sometimes with OCD, and sometimes with a form of behavioral addiction involving PUI. Future studies investigating latent phenotypes may provide a greater understanding of the underpinning psychobiological mechanisms. For example, prominence of latent phenotypes reflecting perfectionism and cognitive inflexibility may indicate a close relationship with OCD, whereas phenotypes denoting poor impulse control may indicate a closer relationship to behavioral addiction.

Cyberchondria during the coronavirus disease pandemic

Starcevic and colleagues [35•] proposed a theoretical five-factor model to describe how the current pandemic may have affected CYB. Factors include: 1) heightened perception of threat and fear of a newly identified and poorly understood disease; 2) difficulty coping with uncertainty associated with the pandemic; 3) lack of authoritative and trustworthy sources of relevant health information; 4) difficulty coping with abundance of information that is often confusing, conflicting, unverified, and constantly updated, along with a decreased ability to filter out unnecessary information; and 5) inability of excessive online health information seeking to provide the necessary information and deliver reassurance. This model could help to understand the hypothesized rise in CYB during public health emergencies and to formulate a framework for prevention of CYB and effectively responding to it, however, it needs to be further validated in subjects manifesting pathological levels of CYB during the pandemic.

Recently, researchers have investigated CYB during the COVID-19 outbreak, however, the results remain preliminary and inconclusive. A recent online survey of 300 students reported exceptionally high rates of CYB — only 1.3% scored within the normal range in all the five constructs of the CSS-15, while the remaining 98.7% were either moderately or severely affected by one or the other constructs of CYB [36]. Another investigation of 674 community residents in China showed that 21.9% scored at or above the 75th percentile on the CSS-12, again reflecting increased severity of CYB [37]. However, these investigations are cross-sectional and adopted an arbitrary cutoff on less-well validated versions of the CSS to define rates of CYB. Therefore, studies with stronger methodology and more data are needed before we can confidently compare rates of CYB in studies conducted before and after the pandemic.

CYB has impacted public mental health under coronavirus in several ways. CYB has been reported as a contributing factor for 'Coronavirus anxiety' [38], 'fear of COVID-19' [39], and in a correlation analysis was associated with greater COVID-19-related concerns and safety behaviors [40]. In a recent study of 486 participants recruited from the general population, CYB was also found to partially mediate the association between perceived severity of COVID-19 and depression, anxiety, and stress [41]. Moreover, during the COVID-19 pandemic, higher expression of CYB was associated with a poorer quality of life, directly [28] or indirectly, mediated by stress and fear of COVID-19 [42].

During the pandemic, the subjects most at risk of manifesting increased expression of CYB were females [26•,28,29], younger individuals, who were living alone, and those suffering from a physical/psychiatric illness [8•]. Having contracted the virus was not associated with greater expression of CYB [28,29]. Moreover, greater expression of CYB seemed to be related to trust and acceptance of online information [26•,43], information overload [26•,31], and perceived vulnerability to COVID-19 [31]. The use of social media as the main source of information and the time spent on these platforms also reflected higher CYB-symptom severity [43,44]. Recently, CYB has been associated with COVID-19 vaccine hesitancy, as investigations have outlined a mediating role for CYB in the relationship between information overload and vaccine scepticism [45] and between problematic social media use and intention to get a COVID-19 vaccine [46]. These data underline the need to improve online health-information literacy among the public, and suggest that targeting CYB represents a rational goal for preventative public health strategies.

Prevention of cyberchondria

Conceptualizing CYB as a public health problem, most of the available literature recommends strategies rooted in primary preventative approaches. However, it must be noted that these preventive strategies lack a robust evidence base and remain largely conjectural, also in the field of CYB. The overarching focus has been to improve online health-information literacy among the public as a whole, in order to reduce vulnerability in 'at-risk' groups. Of particular relevance during the pandemic era, a key goal is to ensure medical information is accessed from reliable, reputable, and trustworthy sites. It has been suggested, for example, that guidance to distinguish between trustworthy and nontrustworthy sites for the population as a whole should be developed by public

health or academic organizations [47]. The content of this guidance should be simple and nontechnical in order to be available for diverse educational and cultural backgrounds. Educational strategies that help patients critically appraise online health information and understand the impact of such information on the likelihood of performing further searches may also be of value [17]. However, it needs to be noted that, despite considerable investment, popular prevention programs involving educational interventions directed at young people with compulsive substance-use behaviors resulting in addiction have to date not on the whole proved efficacious in driving behavior change [48]. Therefore, there is a strong argument for investigating the effectiveness of such programs in CYB prevention.

Another approach has been to target 'at risk' individuals. It has been suggested, for example, that self-diagnosis should be discouraged. Providing better access to primary care health physicians and general practitioners, especially for those identified at high risk of CYB, to filter information, provides a reliable and trustworthy diagnosis alongside reassurances that are clear, unequivocal, and evidence-based, which may be helpful, in some individuals, to limit compulsive online searching. Moreover, the public should also be advised to recognize and resist the urge to repeatedly check the Internet for reassurance, as this is often responsible for maintaining the illness behavior. However, there have been no studies of these interventional approaches and so it remains uncertain as to whether they are efficacious or cost-effective, and for whom they might work best. Alternative theoretical approaches designed to identify and intervene in those at high risk, before they develop CYB, also remain untested.

New treatment approaches

Little research has been conducted on treatment for CYB, and so interventions used for other forms of PUI (e.g. motivational approaches, cognitive behavioral therapy (CBT) for behavioral addiction) adapted for CYB have been proposed [49]. Alternatively, as 'health anxiety' and hypochondriasis have been subject to systematic research, this work could also provide a rational basis for the development of therapeutic interventions. The reclassification of hypochondriasis as an OCRD in ICD-11 may help in this respect. In a recent meta-analysis [50], hypochondriasis or health anxiety were found to respond to CBT. The magnitude of the effect size depended upon the choice of control condition [51,52]. Exposure and response prevention appeared at least as effective as other forms of CBT [53–55], and in one study, the residual effect of CBT endured for at least two years [56], although in this study, CBT lacked cost-effectiveness.

To date, only one RCT has been conducted on treatments specifically addressing CYB [9•]. In this study, the authors analyzed secondary data from a RCT comparing Internet-delivered CBT (N = 41) to an active control involving psychoeducation, monitoring, and clinical support (N = 41) in patients with a DSM-5 diagnosis of illness-anxiety disorder and/or somatic-symptom disorder. The CBT group showed a significantly greater reduction in CYB compared with the control group, with large differences at post treatment on the CSS (Hedges' g = 1.09), and the compulsion, distress, and excessiveness subscales on the CSS (Hedges' g = 0.8–1.13). Mediation analyses that showed improvements in health anxiety (measured through the Short Health Anxiety Inventory) in the CBT group were mediated by improvements in all of the CSS subscales, except for the mistrust of medical professional subscale.

Other work in hypochondriasis suggests that medication with a selective serotonin-reuptake inhibitor (SSRI) might be effective in CYB. There have been three positive RCTs [57–59] showing that SSRI reduces symptoms of hypochondriasis with some preliminary evidence of an advantage for combining SSRI with CBT and for higher SSRI dosages [59]. However, CYB was not specifically measured in these studies.

Conclusions and future directions

CYB, manifesting as distressing and time-consuming repetitive online searching, affects certain vulnerable groups and appears to have increased under the COVID-19 pandemic, though the evidence is as yet inconclusive. The impact of CYB on functioning remains poorly defined, but emerging evidence links CYB as a risk factor for poor quality of life, both directly and indirectly, and may represent one of the mechanisms whereby fear of COVID-19 increases stress, depression, and anxiety. As digitalization continues apace and the number of people opting for digital forms of healthcare provision increases in tandem, it is expected that rates of CYB will rise in

Table 1

Future research goals in facing CYB.

Future research goals
1. Improve CYB conceptualization and adopt a universally accepted definition
2. Reach consensus on the optimal screening and severity-rating scales
3. Define a threshold to distinguish adaptive from problematic online searching for medical information
4. Identify frequency, course, and impact of CYB across sociodemographic groups in longitudinal studies
5. Identify risk factors, including latent phenotypes to aid early recognition and intervention
6. Develop and validate effective preventive strategies (e.g. methods for teaching generic skills to distinguish reliable and unreliable health information)
7. Test the effectiveness of new therapeutic interventions (e.g. CBT with ERP, SSRI) in a definitive RCT

the near future. Despite the growing research interest in CYB, robust evidence is still very sparse. There are no firmly established evidence-based interventions, though one positive RCT suggests that online CBT is effective. Looking into the future, Table 1 highlights some of the key research goals expected to advance the field.

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