Cyberchondria: a Growing Concern During the COVID-19 Pandemic and a Possible Addictive Disorder?

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Abstract

Purpose of Review The main purpose of this narrative review is to provide a brief overview of the current empirical evidence regarding the conceptualization, assessment, and treatment of cyberchondria, with a focus on the potential classification of cyberchondria as a behavioral addiction. Although cyberchondria has been widely associated with anxiety, it has also been suggested that it may be linked to obsessive–compulsive features. A less explored proposal is the categorization of cyberchondria as a behavioral addiction. The present review explores the existing literature with respect to the possible classification of cyberchondria as a behavioral addiction by considering cyberchondria with respect to components of the interaction of person, affect, cognition and execution model.

Recent Findings There is a lack of consensus regarding the definition and conceptualization of cyberchondria. The empirical evidence available to date suggests that cyberchondria is a multifactorial construct that operates transdiagnostically, particularly with respect to obsessive–compulsive-related disorders and health-related anxiety. The extent to which the condition may reflect a behavioral addiction as a form of problematic use of the internet also warrants consideration. Cyberchondria may have become more prevalent during the COVID-19 pandemic, with particular populations prone to health-related anxiety likely having greater vulnerability. Existing data in part support the potential classification of cyberchondria as a behavioral addiction, although many gaps in understanding currently exist.

Summary Cyberchondria appears to be a growing concern. However, there is not yet enough empirical evidence to determine whether this clinical condition has enough similarities with behavioral addictions to be considered as one. Likewise, psychometric instruments that exist to date have not been designed from the theoretical framework of behavioral addictions, so most of the factors that they evaluate may be preferentially related to anxiety. Finally, there is still no consensus on whether cyberchondria should be addressed in the context of health anxiety interventions, OCRD, or behavioral addictions; thus, more empirical evidence is needed.

Keywords Cyberchondria · COVID-19 · Treatment · Assessment · Compulsive behaviors · Addictive behaviors

Introduction

The internet has been used for multiple purposes, including searching for health-related information. A growing number of people have been using the internet for such purposes. In 2010, 88% of US adults using the internet reported searching for health-related information online [1], while in 2013, more

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than 100 million reported such searches [2]. The internet has therefore become a common tool for health-related searches due to, among other factors, its speed, low or no cost, anonymity, and availability [3].

Online searches for health-related information may be beneficial in educating the public about the nature, etiologies, and existing prevention and treatment approaches for specific diseases. This may lead to individuals feeling empowered [4]. However, online health information may lead to high levels of uncertainty and anxiety, as there are typically different medical possibilities leading to a differential diagnosis, and within this differential diagnosis there may be infrequent yet potentially catastrophic illnesses [5•]. As such, repeated use of the internet for health-related searches may become anxiety-provoking and problematic, perhaps especially for health-conscious and anxiety-prone individuals. Furthermore, such searches may be used for self-diagnoses that may be inaccurate or worrisome to individuals. Such search processes may be considered cyberchondria, and together with cyberbullying, cybersuicide, or cybersex, it may reflect a reconfiguration of different behaviors and/or psychiatric entities given the growth of digital technologies [6].

The precise etiology and classification of cyberchondria are in early stages of understanding. Many existing models and assessments have been constructed within obsessive–compulsive (OC) and OC-related disorder (OCRD) frameworks. However, much literature on problematic use of the internet (PUI) has been conceptualized within an addiction framework, with terms like internet addiction having been frequently used for decades, main models for internet use behaviors and disorders having been developed based on addiction frameworks and main nomenclature systems (the Diagnostic and Statistical Manual and the International Classification of Diseases) having considered internet-use-related disorders (e.g., gaming disorder, as well as online forms of gambling disorder) as disorders due to addictive behaviors [7–11]. As such, the extent to which cyberchondria may represent a behavioral addiction warrants closer consideration.

The present brief narrative review aims to explore the current empirical evidence regarding cyberchondria, its association with anxiety, OC, and addictive features, and other clinical factors, as well as its assessment and treatment. Multiple conceptual frameworks (e.g., OCRD versus behavioral addiction) will be considered, as will possible changes during the COVID-19 pandemic.

Cyberchondria

Conceptualization of Cyberchondria

Different ways to conceptualize cyberchondria include a long severity spectrum that may involve the general performance of health-related online searches and searches generating interference rising to the level of a mental disorder. In recent years, the latter option has been gaining more consensus. However, cyberchondria may also be considered a new psychiatric condition or as a specific form of hypochondriasis or health-related anxiety [3]. Alternate conceptualizations may also include an addictive behavior or disorder.

The term "cyberchondria" is derived from the words "cyber" and "hypochondriasis" [3]. However, due to lack of consensus in the conceptualization of cyberchondria and possible different forms, multiple definitions have been proposed [12]. The main features are the presence of excessive or repeated online searches for health-related information, as well as the existence of anxiety about health [13]. For example, some definitions may be (a) cyberchondria as a repeated/excessive online searching for health-related information, in order to alleviate distress or anxiety surrounding health, with the paradoxical result of worsening anxiety [6] and (b) "tendencies by some people to believe that they have a disease that they have read about online" [3].

In addition to the attempt to define cyberchondria, different core characteristics of this multidimensional condition have been proposed [14]: (a) excessiveness: excessive online searches for health-related content, (b) compulsiveness: presence of behavioral interference of online searches in other activities of the individual's daily life, (c) distress: elevated levels of anxiety and distress derived from online searches, and (d) reassurance: seeking professional opinion to be sure of the information found online. These behaviors typically continued despite adverse consequences such as psychological distress or impairment, which has been considered as a core feature of behavioral addictions.

Most studies on cyberchondria to date have used nonclinical, convenience samples, especially university students (Table 1). Studies on clinical populations are scarce. However, it has been suggested that cyberchondria could be a transdiagnostic factor present in several clinical conditions such as PUI, health-related anxiety that may present as generalized anxiety disorder, hypochondriasis, and OC disorder (OCD) [15]. However, few studies have considered to date cyberchondria as a potentially addictive behavior, although frameworks such as the interaction of person, affect, cognition, and execution (I-PACE) may apply to cyberchondria as it does other addictive disorders [9, 10], as might the designation of "other specified disorder due to addictive behaviors" listed in the eleventh revision of the International Classification of Diseases [11].

Cyberchondria, Health Anxiety, and Hypochondriasis

The term hypochondriasis is controversial given potential stigma and other factors and has recently tended to be replaced by health

Table 1 Main studies investigating COVID-19 and cyberchondria identified on PubMed (sorted by country, last searched June 18, 2022)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Maftei et al. [45]	Neuroticism, optimism	Romania	880	General population (age from 15 to 67 years)	Age, neuroticism, and being female were positively associated with cyberchondria during the COVID-19 pandemic Optimism was associated with cyberchondria, but this effect was qualified by a significant interaction with age (the effect of optimism was significant only in older adults) Among older adults, the psychologically protective influence of optimism against cyberchondria emerged as larger than the opposing effect of neuroticism
Jungmann et al. [49]	Health-related anxiety, coping (emotion regulation)	Germany	1615	General population (16 years or older)	Cyberchondria during the COVID-19 pandemic showed a positive association with current virus anxiety, and this relationship was moderated by trait-like health-related anxiety An inverse relationship was found between the perception of being informed about COVID-19-related phenomena and virus-related anxiety, with adaptive emotion regulation being a significant moderator for this association
Oniszczenko [61]	Anxious temperament, fear of COVID-19 infection	Poland	499	General population (age from 18 to 72 years)	Small to medium positive associations were found between cyberchondria and depressive, cyclothymic, irritable, and anxious temperaments Small to medium positive associations were found between depressive and anxious temperaments and COVID-19-related fears No association was observed between cyberchondria and hyperthymic temperament Cyberchondria was positively associated with both COVID-19 fear scales Only anxious temperament and COVID-19 fear of self-infection were significant statistical predictors of cyberchondria

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Ciułkowicz et al. [71]	Health-related anxiety	Poland	538	General population (adult internet users)	Professional inactivity, having a chronic mental disorder, and subjectively limited access to healthcare due to the COVID-19 pandemic were related to health-related anxiety and cyberchondria
Rahme et al. [50]	Quality of life, fear of COVID-19, depression, anxiety, stress, obsessive–compulsive behavior	Lebanon	449	General population (18 years or older)	Stress, fear of COVID-19, and (to a lesser extent) OCD mediated the association between cyberchondria severity and physical quality of life Anxiety, stress, and fear of COVID-19 mediated the association between cyberchondria severity and mental quality of life
Wu et al. [66]	Fear and anxiety related to COVID-19, anxiety sensitivity, intolerance of uncertainty	Currently living in Iran (fluency in the Persian language)	694	General population (18 years old or older)	Fear and anxiety generated by COVID-19 statistically predicted cyberchondria Anxiety-related sensitivity and intolerance of uncertainty mediated the association between fear and anxiety generated by COVID-19 and cyberchondria Females obtained higher scores for cyberchondria, COVID-19-related anxiety, and anxiety sensitivity in comparison to males
Han et al. [67]	Perceived severity of COVID-19, lockdown experience, depression, anxiety, stress	China	486	General population (age from 14 to 50 years)	Positive links between perceived severity of the COVID-19 pandemic and depression, anxiety, and stress were mediated by cyberchondria The direct effects of perceived severity of the COVID-19 pandemic on anxiety, and stress were moderated by lockdown experience The indirect effects of cyberchondria on depression and anxiety were moderated by lockdown experience

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Peng et al. [73]	Health-related anxiety, eHealth literacy, COVID-19-related online information-seeking behavior	China	674	General population	Health-related anxiety total score, use of general search engines, and searching for information on how to diagnose COVID-19 were independent factors linked to cyberchondria Searching lasting less than 10 min each, use of traditional media digital platforms, and professional medical communication platforms were independent protective factors mitigating against cyberchondria
Seyed Hashemi et al. [68]	Anxiety sensitivity, problematic use of the Internet, metacognitive beliefs, fear of COVID-19	Iran	651	General population (age from 13 to over 60 years)	Fear of COVID-19 was significantly and directly statistically predicted by cyberchondria and anxiety sensitivity The association between problematic use of the internet and cyberchondria with fear of COVID-19 was mediated by anxiety sensitivity and metacognitive beliefs
Ahorsu et al. [76]	Fear of COVID-19, risk perception, problematic use of social media, intention to get a COVID-19 vaccine	Iran	10,843	General population (18 years or older)	There was no direct association between problematic use of social media and intention to get a COVID-19 vaccination Cyberchondria, fear of COVID-19, and COVID-19-related risk perception (each or serially) mediated associations between problematic use of social media and intention to get a COVID-19 vaccination
Ambrosini et al. [69]	Anxiety, depression, quality of life, obsessive–compulsive symptoms, internet addiction	Italy	572	General population (age from 18 to 77 years)	Obsessive–compulsive symptoms and internet addiction were found to partially mediate cyberchondria-health anxiety and cyberchondria-anxiety associations Obsessive–compulsive symptoms and internet addiction were found to mediate the cyberchondria-depression and cyberchondria-quality of life associations COVID-19-related anxiety was found to moderate the association between cyberchondria and anxiety

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Bottesi et al. [72]	Psychological distress, intolerance of uncertainty, health-related anxiety, problematic use of the Internet	Italy	Study 1: 556 Study 2: 575	General population (age from 18 to 81 years)	Intolerance of uncertainty was associated with health-related anxiety and psychological distress. Cyberchondria partially mediated the association between intolerance of uncertainty and health anxiety. Problematic use of the internet partially mediated the association between intolerance of uncertainty and psychological distress. The association between cyberchondria and psychological distress was significant in sample 2 but not in sample 1
Vismara et al. [65]	COVID-19-related anxiety, health anxiety, depression, meta cognitions, Internet addiction, obsessive–compulsive symptoms, self-esteem, quality of life	Italy	572	General population (mean age 33.6 ± 14.6 years)	Females, younger participants, students, and those suffering from a physical/psychiatric illness showed more severe cyberchondria. Cyberchondria showed a positive correlation with different aspects of anxiety (i.e., anxiety about COVID-19, health-related anxiety, general anxiety, and metacognitive beliefs about anxiety) and with depression, obsessive–compulsive symptoms, and problematic use of the internet. Quality of life and self-esteem showed negative correlations with cyberchondria

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Kurcer et al. [70]	Health-related anxiety, have had COVID-19, use of herbal supplements to treat COVID-19	Turkey	794	General population (university students)	Health-related anxiety was significantly higher in individuals who lived alone, had chronic disease, searched for symptoms online, and took herbal supplements to treat COVID-19. Measures of health-related anxiety, cyberchondria, and anxiety-increasing factors were higher in students who believed they had had COVID-19 were significantly lower compared to those who believed they had not had COVID-19 -Women and people living alone and in cities had high cyberchondria scores
Durmuş et al. [74]	COVID-19 fear, stress	Turkey	425	General population (18 years or older)	Fear of COVID-19 had a significant effect on perceived stress/distress, and this was mediated by cyberchondria Fear of COVID-19 did not have a significant effect on perceived insufficient self-efficacy Cyberchondria did not have a mediating role in this effect

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Yalçın et al. [62]	Health-related anxiety, fears, obsessions, sleep quality, negative affect	Turkey	8276	General population (age from 18 to 65 years)	Perceived vulnerability to disease was positively associated with cyberchondria, poor sleep quality, health-related anxiety, and obsessive–compulsive symptoms Negative affect was positively linked with obsessive–compulsive symptoms, fear of COVID-19, cyberchondria severity, and poor sleep quality Fear of COVID-19 was positively associated with health-related anxiety Cyberchondria severity was positively associated with poor sleep quality and obsessive–compulsive symptoms Six latent classes of participants were identified: 1) risk-aversive healthy group, 2) incautious healthy group, 3) infection obsession group, 4) health anxiety group, 5) negative affect group, and 6) general psycho-pathology group
Akgül et al. [63]	Anxiety, emotion regulation through internet use, distress	Turkey	155 adolescents and 155 parents	Adolescents and one of their parents	After controlling for adolescents' gender and emotion regulation, parental cyberchondria and anxiety accounted for an important amount of variance in adolescents' anxiety Parental anxiety and compulsions were positively associated with anxiety Higher distress was associated with lower anxiety Two dimensions of cyberchondria, compulsion, and distress, together with adolescent anxiety, statistically predicted parental anxiety during COVID-19 The dimensions of cyberchondria may relate to anxiety differently among adolescents and their parents

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Honora et al. [77]	Information overload about COVID-19 vaccines, COVID-19 vaccination intentions	Indonesia	310	General population (age from 18 to 35 years)	Information overload positively related to vaccine skepticism through cyberchondria and perceived risks of the vaccine, which subsequently reduced vaccination intention. The negative effect of vaccine skepticism on vaccination intention was weakened by a celebrity endorsement that was considered trustworthy. The celebrity endorsement was more effective in mitigating negative effects of vaccine skepticism on vaccination intention compared to information from government officials and medical experts
Bala et al. [79]	Information overload, perceived vulnerability to COVID-19	India	767	General population (18 years or older)	The mean ± standard deviation scores for cyberchondria and information overload were 9.09 ± 4.05 and 8.69 ± 2.56, respectively. Significant and moderately strong associations were found between cyberchondria, information overload, and perceived vulnerability to COVID-19
Jokic-Begic et al. [97]	Safety/avoidance behaviors, concerns about COVID-19	Croatia	Sample 1: 888 Sample 2: 925	General population (age from 18 to 77)	Between the two waves of research, increased concerns regarding COVID-19 were observed, as were behavioral changes -Cyberchondria moderated these changes. In the first wave, persons with severe cyberchondria were already concerned with safety behaviors. High cyberchondria and high levels of concern about COVID-19 were associated with avoidance behaviors

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Farooq et al. [47]	Information overload, coping perceptions/self-efficacy, self-isolation intentions, social media use	Finland	225	Students, faculty, and employees at a university	Cyberchondria and information overload were related to individuals' threat and coping perceptions, as well as self-isolation intentions. Perceived severity and self-efficacy positively related to self-isolation intentions. Response cost was negatively related to intentions. Cyberchondria and information overload indirectly affected self-isolation intention through the perceptions mentioned above. Using social media as an information source was related to more severe cyberchondria and information overload
Serra-Negra et al. [98]	Age, nationality, gender	Brazil and Portugal	597	Dentists	Younger age, Brazilian nationality, and female gender were related to more severe cyberchondria during the COVID-19 pandemic
Shailaja et al. [64]	Depression, anxiety, stress, and quality of life	India	300	Dental students	98.7% of the students acknowledged one or more aspects of cyberchondria. Cyberchondria was more severe in females than in males and was positively correlated across genders with depression, anxiety, and stress but not quality of life
Yam et al. [75]	Fear of COVID-19, smartphone addiction	Turkey	520	General population (age from 17 to 65 years)	Positive relationships between smartphone addiction, fear of COVID-19, and cyberchondria severity were observed. Cyberchondria severity had both moderating and mediating roles in associations between smartphone addiction and fear of COVID-19

Table 1 (continued)

Reference	Cyberchondria's main associated factors assessed	Country	Sample size	Sample type	Results
Mrayyan et al. [78]	Internet addiction	Jordan	143	General population (university students)	A moderate level of cyberchondria and a mild level of internet addiction were found. Moderate to strong associations were reported among the studied concepts and with the sample's characteristics. Cyberchondria and not having access to the internet at school were statistical predictors of internet addiction

anxiety or health-related anxiety. However, these constructs are not synonymous; for example, hypochondriasis may represent a more severe form of health-related anxiety, although not in all cases [3]. Cyberchondria, on the other hand, may be associated with both constructs, although the links have not been explored in depth [3]. On the one hand, individuals with cyberchondria may present a high probability of fulfilling criteria for hypochondriasis [16]. On the other hand, in a meta-analysis [4], strong associations between cyberchondria and both hypochondriasis and health-related anxiety were demonstrated. The authors further observed that age was a significant moderating factor of the strength of the association between cyberchondria and health-related anxiety. Schenkel et al. [17••], in their systematic review and meta-analysis, observed that the dimensions of cyberchondria correlated significantly with affective components of health-related anxiety, especially with health-related worries.

However, if one considers cyberchondria and health-related anxiety as distinct entities, there is no consensus regarding the direction of possible causality between cyberchondria and health-related anxiety. Some authors have proposed that two situations can occur: (a) in most cases, the presence of health-related anxiety is primary, and cyberchondria becomes the attempt to alleviate it [5•, 18]; or (b) there is no history of health-related anxiety, and the motivation to search online for health content may be due to other causes such as curiosity [19, 20]. However, in both options, the levels of health-related anxiety after the online search are higher than the initial levels. In the face of these higher levels of anxiety following online searches, two situations may occur: (a) avoidance of future searches for health-related information that may generate anxiety or (b) the behavioral pattern of cyberchondria; i.e., continued online search for health-related information seeking to confirm the veracity of the information due to anxiety-reduction efforts [3]. Therefore, the assessment of cyberchondria should be performed even in cases where there are no pre-disposing health anxiety symptoms. Furthermore, it should be noted that cyberchondria maybe both a predisposing and a maintaining factor for health-related anxiety [21].

It should be noted that affective concerns are not distinct from addictions as frequent co-occurrence exists between mood and anxiety disorders and both substance and behavioral addictions. Furthermore, such relationships may be stronger for women as compared to men, with stronger co-occurring relationships and negative reinforcement motivations (i.e., engaging in the addictive in attempts to cope with negative affective states) more frequently acknowledged in females versus males [22, 23].

Cyberchondria and Obsessive–Compulsive Features

Although empirical evidence links cyberchondria with health-related anxiety, its association with anxiety-related

psychiatric conditions such as OCD has been less explored [24]. OCD is a mental disorder characterized by persistent and recurrent thoughts and/or images that generate distress and repetitive behaviors to reduce the associated anxiety. Although the content of obsessions and compulsions is heterogeneous, contamination obsessions, which may be associated with the fear of contracting a disease, are common [7]. OCD shares with hypochondriasis several criteria that are especially relevant in the case of cyberchondria, such as the presence of obsessive thoughts related to the disease, as well as compulsive behaviors such as reassurance-seeking and checking. However, the main difference is that individuals with hypochondriasis perceive their symptomatology as ego-syntonic and reasonable, while those with OCD usually perceive it as irrational and ego-dystonic [25••]. Such ego-syntonic/ego-dystonic relationships were taken into consideration when classifying gambling disorder as an addictive disorder and warrant further examination in cyberchondria [26].

Cyberchondria may be related to OC symptoms [3]. Cyberchondria may be characterized by obsessive doubts and the presence of compulsive online searching behavior, factors characteristic of OCD. Fergus [27] examined the association between cyberchondria and overall OC symptoms. The author observed that both clinical entities were positively associated, suggesting that they may co-occur. Similarly, Bajcar et al. [28] also observed an association between cyberchondria components and OC symptoms. However, it should be noted that OC features have been linked to multiple disorders beyond OCD, including behavioral addictions like gambling disorder [29]. Additionally, compulsivity has been described as a transdiagnostic feature relating to multiple disorders including addictions [30]. Thus, the investigation of cyberchondria in multiple clinical populations appears warranted.

Two OC features that may be especially related to cyberchondria include contamination/washing and checking symptom domains, although others such as ritualistic behaviors warrant consideration, especially given relationships with other addictive behaviors [29]. Cyberchondria may involve health obsessions and related compulsive behaviors. The obsessions may increase motivations to conduct health-related online searches to try to address current somatic concerns or prevent future illnesses [24]. Exploring this association between cyberchondria and OC symptoms, Norr et al. [24] found that contamination/washing OC symptoms were positively related to all dimensions of cyberchondria. Likewise, harm avoidance/checking symptoms were also associated with all dimensions of cyberchondria, except for the dimension of reassurance-seeking from medical professionals. This dimension of cyberchondria was also the least related to contamination/washing symptoms, so it

may be the least related to emotional distress related to OC symptoms. Fergus and Russell [31] also identified a significant association between cyberchondria and OC symptoms. More specifically, cyberchondria correlated more significantly with harm avoidance than with unacceptable thoughts or symmetry. Likewise, cyberchondria was more significantly associated with contamination than with symmetry and presented a shared statistically equivalent association with responsibility for harm and contamination. In addition, other authors have also highlighted the compulsive component of cyberchondria [32], and this feature may speculatively be linked to addictive behaviors.

OC symptoms have also been evaluated relative to associations between self-esteem and cyberchondria. Bajcar and Babiak [33] observed that low self-esteem statistically predicts, through OC symptoms, the presence of cyberchondria. Therefore, individuals with lower levels of self-esteem may experience obsessive thoughts, for example, related to health, which may consequently increase cyberchondria symptomatology.

Vismara et al. [34] evaluated cyberchondria in clinical samples that included individuals with OCD, anxiety disorders, and major depression disorder. These clinical samples, compared to controls, showed higher levels of cyberchondria severity. Furthermore, levels of cyberchondria, and specifically the distress dimension, were higher in individuals with versus without OCD. The authors suggested that higher levels of cyberchondria in individuals with OCD may be due to the presence of somatic obsessions and checking compulsions. However, because individuals with OCD did not score higher than controls on excessiveness and compulsion dimensions, these may not be the sole determinants.

In addition to the association between cyberchondria and OCD, an association between cyberchondria and OCRDs has been suggested. For example, cyberchondria may contribute to the development and maintenance of body dysmorphic disorder (elevated preoccupation with body disfigurement) and olfactory reference syndrome (elevated preoccupation with smelling, particularly things with foul odors) [25••]. However, more empirical evidence is needed, and other alternate conceptualizations and related conditions (e.g., an addiction framework and disorders due to substances or addictive behaviors) should also be systematically examined.

Although associations between cyberchondria and OC symptoms appear supported, the nature is incompletely understood. Several options have been proposed [17••]: (a) OC symptoms are an essential part of cyberchondria, (b) OC features contribute to the maintenance of cyberchondria, or (c) redundancy between constructs, in which health-related internet use may be a component of both cyberchondria and OC symptoms. These and other possibilities warrant direct examination.

Cyberchondria as a Potential Addictive Behavior

Some authors have suggested that cyberchondria may be associated with behavioral addictions or, specifically, with PUI, being a specific form of PUI. However, there have been limited studies examining this possibility within existing theoretical frameworks [3, 35, 36]. Some have suggested similarities between online behavioral addictions and cyberchondria may involve impaired control over internet use, the presence of mental and behavioral preoccupation, mood modification, and the use of cyberchondria-related behaviors to reduce distress [33, 37].

Here, the interaction between person, affect, cognition and execution (I-PACE) model has been used as a reference to systematically consider possible similarities between cyberchondria and behavioral addictions. The I-PACE model focuses on addictive processes related to specific internet-use behaviors and disorders, considering their development and maintenance [9, 10]. The core components of the I-PACE model include (a) predisposing variables, (b) affective and cognitive responses to internal or external stimuli, (c) executive and inhibitory control, (d) decision-making behavior resulting in the use of certain internet applications/sites, and (e) consequences of using the internet applications/sites of choice [9, 10].

Predisposing variables

Biopsychological constitution Predisposing variables refer to individual characteristics that may remain stable over time, such as genetic or ontogenetic factors. Likewise, certain biopsychological factors such as negative early childhood experiences (e.g., trauma, abuse, and social isolation) may make individuals more vulnerable to develop behavioral addictions. These negative events may promote insecure attachment styles that, in turn, may promote engagement in addictive behaviors [9, 10].

In the specific case of cyberchondria, to the best of our knowledge, no study has yet examined possibly related genetic factors. At a neurobiological level, some authors have proposed that cyberchondria may involve alterations in reward-processing and top-down executive control [38]. However, to our knowledge, there are no empirical studies examining neurobiological factors associated with cyberchondria.

Links between traumatic childhood experiences and cyberchondria have not yet been studied. Attachment has been little explored in the case of cyberchondria. Some authors have proposed that, in the case of adolescents, they may experience physical somatization as a response to stress generated by family dysfunction linked to suboptimal (poorly organized or insecure) attachment styles. Such somatization may promote online health searches, which may generate or worsen cyberchondria [39]. Likewise, it has been suggested that insecure attachment styles may be associated with needs for control and intolerance to uncertainty, so these individuals may show poorer coping strategies to deal with uncertainty [40]. Therefore, attachment may be associated, at least indirectly, with cyberchondria.

Psychopathological features, personality, and social cognitions Considering co-occurrences between addictive behaviors and psychiatric disorders, attention deficit/hyperactivity disorder and depression and anxiety disorders may warrant particular consideration [9, 10]. In the case of cyberchondria, it remains unclear whether it constitutes an independent disorder or should be considered a syndrome present in different disorders. Thus, determining possible psychiatric comorbidities is complex. Regarding possible associations, the link between cyberchondria and health anxiety has arguably been the most studied, although relationships with OCD, OC personality disorder, and PUI have also been explored [38].

Regarding personality features, a relevant association has been described between behavioral addictions and impulsivity, neuroticism, procrastination, shyness, low self-esteem, and low self-direction [9, 10, 41]. Of these, neuroticism has arguably received the most attention in the case of cyberchondria. It has been proposed that neuroticism may be a predictor of health-related information seeking [42]. Some authors have found a positive association between cyberchondria and neuroticism [43, 44], although it has been suggested that this link may be mediated by other vulnerability factors such as intolerance of uncertainty and defensive pessimism [43]. Other studies have reported that neuroticism may be a significant factor related to cyberchondria across age groups [45]. Of note, some scales include impulsiveness under a neuroticism factor [46]. As such, when considering relationships with neuroticism, impulsivity may be an underlying entity [41].

Other factors that have been highlighted as relevant in behavioral addictions are feelings of isolation and loneliness, as well as perceived lack of social support [9, 10]. These factors have been little explored in the case of cyberchondria. However, some studies focusing on cyberchondria during the COVID-19 pandemic have suggested that cyberchondria may have an impact on self-isolation. Specifically, individuals with cyberchondria may have engaged in self-isolation early in the pandemic [47], and such behaviors may have generated loneliness and promoted cyberchondria-related behaviors.

Finally, similar to behavioral addictions, it has been observed that self-esteem may directly statistically predict cyberchondria, suggesting that low self-esteem may be a risk factor for developing cyberchondria [33]. However, other studies have found a weak association between self-esteem and cyberchondria [48].

Affective and cognitive responses to external or internal stimuli

Coping The use of the internet as a coping strategy for stressful life events has also been considered as potentially contributing to the development of behavioral addictions [9, 10]. In the case of cyberchondria, the specific role of health information searches as a coping strategy during the COVID-19 pandemic (stressful event) has been explored. Some authors have suggested that excessive online health searches may have been undertaken to better cope with the discomfort and uncertainty associated with the pandemic. However, excessive health-related searches may generate elevated levels of anxiety [49–51]. Other studies have suggested that creative coping, along with social support, may moderate the relationships between fear of COVID-19, cyberchondria, and general stress [52].

Internet-related cognitive biases False beliefs and expectancies about the effects of using certain online applications or sites are also common in behavioral addictions [9, 10]. Although these beliefs have been little explored in cyberchondria, some studies have focused on metacognitive beliefs. It has been hypothesized that metacognitive beliefs may contribute to maladaptive forms of self-regulation, such as cyberchondria or PUI, which may worsen the negative emotions experienced [36].

Cue reactivity, craving, urge and mood regulation, and attentional biases Both craving and approach and avoidance tendencies have been observed in individuals with behavioral addictions [9, 10]. However, except for relationships with anxiety, these factors have not been explored in depth in the case of cyberchondria.

Executive functions, inhibitory control, and decisions to use certain applications/sites

Executive functions, as well as inhibitory control, and decision-making have been explored in the context of behavioral addictions [9, 10]. Among these infrequently examined domains studied to date, some authors have suggested that one similarity between cyberchondria and addictive behaviors may involve poor inhibitory control. In cyberchondria, as in other behaviors involving PUI, poor control over engagement in online behaviors may lead to large consumptions of time and generate distress (due to content, time, or both), leading to overall negative experiences and interference in domains of functioning [38].

Consequences resulting from using the internet applications/sites of choice

In behavioral addictions, an evolution from more voluntary and impulsive behaviors to more compulsive and habitual

ones has been proposed [9, 10]. Therefore, compulsivity may be a transdiagnostic feature of addiction. In the case of cyberchondria, different studies have described high levels of compulsivity that, so far, have been attributed to the conceptualization of cyberchondria as an OCRD [3, 27, 28]. Further research is therefore required to know whether cyberchondria may better be categorized as a behavioral addiction as compared to an OCRD.

Cyberchondria and Other Associated Factors

The internet is not designed to provide exclusively accurate and truthful information. Therefore, health-related online searches may increase health uncertainty [3]. Some authors have stressed that only individuals with lower abilities or tendencies to cope with uncertainty and to differentiate between truthful and untruthful information may ultimately develop cyberchondria [53]. Therefore, factors such as educational level, information processing skills, and skills related to technology use maybe associated with the development and maintenance of cyberchondria [6]. Some factors associated with cyberchondria that have been explored more frequently include smartphone addiction [54], PUI [36], metacognitive beliefs [36, 44, 55], pain catastrophizing [56], intolerance of uncertainty [53, 57], intolerance to distress [58], impairment [59], quality of life [59], and service utilization [59]. Because some of these factors constitute addictive behaviors or disorders or are related to them, the extent to which cyberchondria may include elements of addiction warrants further investigation. For example, the extent to which craving for health information, which may involve positive or negative reinforcement mechanisms, warrants investigation, particularly given ego-syntonic aspects of cyberchondria-related behaviors.

Cyberchondria and associated factors during the COVID-19 pandemic

Studies on cyberchondria and its associated factors may have increased during the COVID-19 pandemic. Fear and uncertainty generated by the pandemic and the considerable increase in unverified online content about COVID-19 may have promoted the development or maintenance of cyberchondria in some individuals [51].

Risk/vulnerability factors associated with the development of cyberchondria may include being female, younger age, history of mental disorders, presence of online behaviors such as the use of social networks, and acceptance of online information [60]. However, features such as optimism, information about the pandemic, and adaptative emotion regulation have been hypothesized as protective factors mitigating against the development of cyberchondria during the pandemic [45, 49].

Other aspects have been explored in relation to cyberchondria during COVID-19, such as coping perceptions and emotion regulation [47, 49], anxious temperament [61], (health-related) anxiety and anxiety sensitivity [49, 50, 62–73], quality of life [50, 64, 65, 69], fear and fear of COVID-19 [50, 61, 62, 66, 68, 71, 74–76], perception and perceived severity/risk of COVID-19 [67, 76, 77], depression [50, 64, 65, 67, 69], stress [50, 64, 67, 74], OC behaviors and obsessional probabilistic inferences [50, 62, 65, 69, 71], lockdown experience [67], smartphone addiction [75], PUI and internet addiction [65, 68, 69, 72, 78], problematic use of social media [76], metacognitive beliefs [68], intolerance to uncertainty [66, 71, 72], psychological distress [63, 72], sleep quality [62], negative affect [62], avoidance behaviors, information overload [79], and intention not to get a COVID-19 vaccination/vaccine skepticism [76, 77]. Together, the findings suggest complex relationships between cyberchondria and environmental factors and individual differences, particularly during the unique circumstances of the COVID-19 pandemic. Further complexities may arise, for example, where elements of the I-PACE model found to support cyberchondria being considered as a behavioral addiction.

Assessment of Cyberchondria

Several psychometric instruments are currently available to assess health anxiety and general anxiety, two constructs similar to cyberchondria. However, these tools may not be entirely suitable for measuring cyberchondria, especially if they focus on a very specific form of anxiety and related behaviors of online health searches. In the absence of diagnostic tools for cyberchondria, multiple studies have designed single items, with biases that they may have given the lack of reliability and the fact that one item alone cannot capture the complexity of this multifactorial construct.

To address these concerns, the cyberchondria severity scale (CSS) was developed, demonstrating good psychometric properties [14]. The CSS is a self-administered instrument that assesses cyberchondria through 33 items grouped into a five-factor structure: (a) "compulsion," assessing the extent to which online health searching and related motivations impair functioning, (b) "distress," assessing negative emotional states associated with online health searches, (c) "excessiveness," evaluating the excessive and escalatory nature of cyberchondria, (d) "reassurance," assessing increases in anxiety that may lead to the need to consult with a health professional, and (e) "mistrust of medical professional," assessing whether possible anxiety and paranoia may interfere with relationships with healthcare providers. However, the usefulness of the last subscale in the measurement of cyberchondria has been questioned [27, 80].

The CSS has become the most internationally used instrument to evaluate cyberchondria and has been translated into several languages such as Italian [81] and Portuguese [82]. Moreover, the CSS psychometric properties have been tested in Polish [28], German [83], and Turkish [84, 85] versions. In addition, short versions of the CSS have been designed with 30, 15, and 12 items [86].

Of the 5 factors included in the CSS, two ("distress" and "excessiveness") may be more related to features of behavioral addictions. On the one hand, negative emotional states derived from online health searches may be similar to the interference generated by other behavioral addictions such as gambling disorder ("Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling") [7]. On the other hand, the escalatory nature of cyberchondria may also be characteristic of behavioral addictions. The factor "excessiveness" included in the CSS may coincide, for example, with the tolerance criterion in the case of gambling disorder ("Needs to gamble with increasing amounts of money in order to achieve the desired excitement") [7]. However, the factor "mistrust of medical professional" has been shown not to correlate with measures of PUI [38].

Other instruments for assessing cyberchondria have been developed in recent years in addition to the CSS, including the cyberchondria scale (CS) [87], the cyberchondria tendency scale (CTS) [88], the short cyberchondria scale (SCS) [89], and the brief cyberchondria scale (BCS) [90]. Some authors have stressed that the emergence of these new instruments developed for non-English speaking populations may be due, at least partially, to the need for culturally specific tools [86], as well as to address the limitations of the CSS, such as its reduced ability to distinguish between nonclinical and clinical levels of cyberchondria [91, 92].

The CS is composed of 5 subdimensions: (a) "anxiety-increasing factors," (b) "compulsion/hypochondria," (c) "anxiety-reducing factors," (d) "physician–patient interaction," and (e) "nonfunctional internet usage" [87]. Most of the subdimensions of the CS focus on the anxious component of cyberchondria. The term "nonfunctional internet usage" may appear similar to the nonfunctional internet usage exhibited by individuals with behavioral addictions and who engage in maladaptive behaviors online. However, the CS defines it as "the use of the internet in a way that results in a serious disease or diagnosis upon utilizing symptoms or medical terms from a health-related condition" [87] and therefore may or may not be considered similar to behavioral addictions. Future studies should consider a closer analysis of this question/factor.

The dimensions "reflection" and "information seeking" in which the CTS is structured [88] also appear not to reflect the symptomatology of behavioral addictions. Similarly, the SCS items [89] do not assess addictive symptomatology. In

fact, the comparison instruments used in the validation of this tool were the "anxiety sensitivity index" and "health anxiety questionnaire" [89], suggesting that the instrument is based on the theoretical basis of health anxiety. The same occurs with the BCS, which is structured in two dimensions: "health anxiety" and "online health information search" and whose comparison instruments were the "generalized anxiety disorder-7" and the "illness anxiety scale" [90].

Therefore, the instruments to assess cyberchondria that currently exist appear to preferentially evaluate cyberchondria as anxiety related. However, no psychometric instrument has yet been developed to assess possible addiction-related factors present in cyberchondria (e.g., high levels of impulsivity, cravings for searching for health-related information), and such information would be helpful to determine whether cyberchondria may be considered a potential behavioral addiction.

Treatment of Cyberchondria

Pharmacological and psychological interventions have been proposed to address health-related anxiety. Selective serotonin reuptake inhibitors (SSRIs) have been proposed (e.g., paroxetine and fluoxetine [93, 94]). Existing research suggests that pharmacological agents may not have greater efficacy than cognitive behavioral therapy (CBT) [21].

Among psychological treatments, some authors suggest the use of the biopsychosocial model to understand predisposing, precipitating, and maintaining factors underlying the distressing use of the internet and focusing on facilitating a more adaptive use of the internet [21]. Some of the proposed aspects to address during the treatment of cyberchondria are OC symptoms, intolerance/fear of uncertainty, PUI, metacognitive beliefs, and perfectionist tendencies [25••]. Other authors highlight three possible situations to consider in addressing cyberchondria: (a) if cyberchondria occurs with associated or underlying psychopathology (e.g., OCD and hypochondriasis), suggesting that treating the associated psychopathology is necessary to alleviate symptoms of cyberchondria; (b) in other cases, if cyberchondria co-occurs with other psychopathology, both cyberchondria and the co-occurring symptomatology should be addressed; (c) finally, as cyberchondria may exist without comorbidities, treatment should focus exclusively on cyberchondria [92].

CBT has been the treatment of choice for health-related anxiety [95] and could also be effective for cyberchondria [3, 13]. However, currently, empirical studies are scarce. The first and, to our knowledge, only randomized controlled trial examining the efficacy of internet-delivered CBT (iCBT) for cyberchondria reported an improvement in the severity of cyberchondria when comparing pre-post measures, and

in comparison to the control group, which only received online anxiety psychoeducation, and clinical monitoring and support [96]. Specifically, iCBT may help individuals with cyberchondria reduce excessive tendencies to perform online health research, as well as reduce associated distress and impact on daily activities. However, more studies are needed to understand the active ingredients of iCBT and their mechanisms of action, and such studies may help classify cyberchondria most appropriately. Further, additional research could help reach more solid conclusions about the most effective approach to cyberchondria. For example, if craving for health-related information was found to be relevant to cyberchondria, approaches to reduce the craving (alternate forms of CBT, medications like mu-opioid receptor antagonists) may help in the treatment of cyberchondria. There remains no consensus on whether cyberchondria should be addressed in the context of health-anxiety interventions, OCRDs, or behavioral addictions; thus, more empirical evidence is needed [36].

Limitations of the Current Literature

Several limitations of current studies investigating cyberchondria exist because the research on this condition is still in its early stages. Current limitations include the (1) lack of consensus in the conceptualization of cyberchondria (including as a stand-alone condition or not or as an OCRD or behavioral addiction), complicating comparisons across studies, (2) scarcity of instruments to assess cyberchondria, with most research using the CSS, a self-report instrument that may carry biases and may not capture the complex nature of cyberchondria, including those particularly relevant to addictions, (3) cross-sectional designs of most studies, limiting the understanding of causal relationships between factors, (4) use of non-clinical and relatively small samples, limiting the understanding of clinical groups, and (5) lack of consensus on conceptualization, potentially hindering the development of effective interventions.

Conclusions

There is a lack of consensus regarding the definition and conceptualization of cyberchondria, and research is still too scarce to determine whether it may be more appropriately understood as a behavioral addiction. However, the empirical evidence available so far suggests that it is a multifactorial and transdiagnostic construct. Therefore, it is essential to have psychometric instruments that allow for a comprehensive assessment of cyberchondria and related constructs, especially in clinical populations, which to date has been underexplored. Additional studies should facilitate

the design and implementation of prevention approaches and clinical interventions to treat cyberchondria. Understanding the most appropriate classification of cyberchondria should help in these efforts.

Declarations

Conflict of Interest The authors declare no competing interests.

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●● Of major importance

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