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Unveiling the relationships between cyberchondria and psychopathological symptoms

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ABSTRACT

Cyberchondria is a clinical entity of excessive and repetitive online health-related searches, associated with health anxiety, obsessive-compulsive symptoms and intolerance of uncertainty. Its relationships with depressive and somatic symptoms have not yet received much attention. The purpose of this study was to examine the individual and comparative effects of several psychopathology constructs on the severity of cyberchondria. Through an online platform, participants (N = 749) completed specific self-report measures assessing the severity of cyberchondria, anxiety, intolerance of uncertainty, depressive, somatic, and obsessive-compulsive symptoms. Standard and hierarchical multiple regression analyses were used to assess how well the independent variables influenced the levels of cyberchondria, before and after controlling for age, education, and sex. When measures of all constructs were included in the analysis, all were significant predictors of cyberchondria levels, except for anxiety. Health anxiety made the strongest contribution. When age, education and sex were controlled for, all measures except for anxiety were also significant predictors of cyberchondria severity. Our study confirms that health anxiety, obsessive-compulsive symptoms and intolerance of uncertainty are all associated with cyberchondria severity, with health anxiety making the strongest unique contribution. Depression and somatic symptoms also predicted cyberchondria severity. These findings have important implications for research and clinical practice.

1. Introduction

The number of people who search online for health-related information is rapidly increasing.

Among the advantages of this behavior are quick and easy access to health information with little to no cost (Starcevic, 2017) and a sense of empowerment when interacting with health care professionals (Starcevic and Berle, 2014). Among the drawbacks of using the internet for health searches are the varying quality and reliability of online information and the problems with interpretation and use of this information (Caiata-Zufferey et al., 2010; Kirby et al., 2018; Lee, 2008).

Almost 40% of individuals who engage in online health searches report an increase in their levels of anxiety (White and Horvitz, 2009), with worries focusing mainly on their health. The duration of online health searches and the intensity of the consequent health anxiety have been related to a wide range of negative consequences and interference with daily life functioning (Mathes et al., 2018).

The term cyberchondria describes repetitive online searches for

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health-related information that lead to an escalation of health anxiety. Cyberchondria seems to be a distinct, syndrome-like construct (Fergus, 2013; Starcevic and Berle, 2014). Its features include prolonged and repetitive online health searches, negative emotional and physiological responses occurring as a result of these searches, experience of the searches as undesirable and compulsive, reassurance seeking, and ambivalence about trusting one's own physician or the information found online (McElroy and Shevlin, 2014; Norr et al., 2015c). Cyberchondria seems to have important repercussions in terms of healthcare service utilization and has been linked to psychological distress and functional impairment (Mathes et al., 2018; Starcevic et al., 2020b). Therefore, cyberchondria has been considered an emerging public-health risk by many authors (Makarla et al., 2019; Mathes et al., 2018).

Cyberchondria is often defined in the context of health anxiety. Many studies report a moderate to strong relationship between the two constructs, with correlation coefficients ranging between 0.50 and 0.67 (Fergus and Russell, 2016; Fergus and Spada, 2017; Starcevic et al., 2019). Cyberchondria has also been associated with hypochondriasis (Keller et al., 2008; Sakai et al., 2010). Conversely, a weaker relationship between cyberchondria and health anxiety has also been reported (Selvi et al., 2018), while others have suggested that health anxiety and cyberchondria are two distinct constructs, even though they are closely linked (Fergus and Russell, 2016; Mathes et al., 2018).

Some authors approach cyberchondria through the prism of obsessive-compulsive disorder (OCD). Compulsions are repetitive behaviors that usually follow rigid rules, aiming to reduce anxiety or avoid unwanted consequences (Chamberlain and Menzies, 2009; Vismara et al., 2020) Some features of cyberchondria seem compulsive, e.g., repetitive reassurance-seeking behavior that persists despite an increase in health anxiety and other negative emotional responses (Starcevic et al., 2019; Starcevic and Berle, 2014). Moreover, compulsivity is often fed by intolerance of uncertainty. A moderately strong relationship has been found between cyberchondria and OCD symptoms ($r = 0.49$) (Fergus, 2014), with the strength of the relationship varying and depending on the specific components of cyberchondria and specific OCD symptoms (Fergus and Russell, 2016; Norr et al., 2015c).

Intolerance of uncertainty has also been linked to cyberchondria (Starcevic and Berle, 2014). After health-related online searches, an increase in the feeling of uncertainty has been observed, especially when information seems dubious. Uncertainty leads to even more searches in the hope of arriving at a clear answer. Intolerance of uncertainty seems to be an important predictor of health anxiety appearing in the context of online searches for health information (Fergus, 2013; Starcevic et al., 2019). A moderately strong relationship between cyberchondria and the inhibitory type of intolerance of uncertainty (interpretation of uncertainty as paralyzing) has been found, with correlation coefficients of 0.47 (Fergus, 2015), 0.50 (Norr et al., 2015a), and 0.52 (Fergus and Spada, 2017). Cyberchondria is less strongly related to prospective intolerance of uncertainty (intolerance of uncertainty with regard to the future), with correlation coefficients of 0.33 (Fergus, 2015), 0.38 (Norr et al., 2015a), and 0.44 (Fergus and Spada, 2017).

Online health information seeking may function as a coping strategy for individuals experiencing distress (Oh and Song, 2017). Some studies suggest that depression is associated with an increase in online health information seeking and health-related social media use (Oh and Song, 2017; Sam Oh and Jung, 2020). Depression and somatic symptoms are closely related (Simon et al., 1999). The presence of a chronic illness like breast cancer (Perrault et al., 2020) and orthopedic conditions (Blackburn et al., 2019), as well as the severity of somatic symptoms, can also predict engagement in online health information seeking, with cyberchondria being situated at the pathological end of the spectrum of online health information seeking behaviors (Blackburn et al., 2019; Oh and Song, 2017; Perrault et al., 2020).

In summary, cyberchondria has been construed as a transdiagnostic digital compulsive syndrome (Vismara et al., 2020) and related to several psychopathology constructs. Most studies so far focus on its bivariate relationships with health anxiety, OCD symptoms and intolerance of uncertainty (Berle et al., 2020; Vismara et al., 2020). Its association with depressive and somatic symptoms has not yet attracted sufficient attention, but examination of this relationship is well justified (Blackburn et al., 2019; Starcevic et al., 2019). According to the existing literature, none of the aforementioned variables seems to be more central to the development and severity of cyberchondria, and there is still no consensus in this domain (Starcevic et al., 2019; Vismara et al., 2020). To the best of our knowledge, no research has considered the interaction of all these constructs in their relationships with the severity of cyberchondria. Therefore, our study aims to examine the relative effect of each construct on the severity of cyberchondria, compared to all the other psychopathology constructs.

1.1. Research questions

The present study was conducted in order to investigate how well the measures of health anxiety, anxiety, intolerance of uncertainty, depression, OCD symptoms, and somatic symptoms predict cyberchondria severity (research question 1); ascertain which among the aforementioned measures is the best predictor of cyberchondria severity (research question 2); and evaluate whether our set of independent variables is still able to predict a significant amount of the variance in cyberchondria severity when we take into account the possible effect of age, education, and sex (research question 3). Based on the previous research, we hypothesized that cyberchondria had a particularly strong relationship with health anxiety, although we were mindful of the fact that the concept of cyberchondria was constructed around health anxiety and that other constructs have been investigated much less than health anxiety.

2. Methods

2.1. Participants and procedure

We used an online crowdsourcing platform named Prolific (https://www.prolific.ac/) to recruit participants. An advantage of the Prolific when compared to other platforms such as Amazon MTurk (Palan and Schitter, 2018), is that members of the Prolific have an interest in participating in research studies, thus decreasing the likelihood that they are primarily motivated by financial incentives. Prolific has several advantages over other platforms such as being dedicated to research studies, selecting participants based on their commitment and pre-screening participants (e.g., their country or language) (Palan and Schitter, 2018). Questionnaires for this study were administered from both Sydney, Australia, and Geneva, Switzerland. For this reason, this project had to receive approval by both the Australian Nepean Blue Mountains Local Health District Human Research Ethics Committee (LNR/17/NEPEAN/88) and the Swiss Cantonal Research Ethics Committee, Geneva (2018–00055). Each individual who took part in this survey gave informed consent. In order to minimize linguistic, sociocultural and economic heterogeneity and bias, both the Swiss and Australian sites recruited only adult (over 18 years of age) English-speaking individuals from Australia, Canada, Ireland, New Zealand, the United Kingdom, and the United States of America were able to participate in this research (inclusion criterion 1). Another requirement was their prior registration with Prolific. All participants of this study had searched online for health information during the three months prior to the completion of the questionnaires (inclusion criterion 2). Their median age was 34 years (ranging between 18 and 75 years), 67.6% were women and 61.5% had a university degree. A previously published network analysis of the construct of cyberchondria was based on part of the same dataset (Starcevic et al., 2019).

2.2. Questionnaires

For the purpose of this study, seven self-report instruments were administered to evaluate the relevant constructs:

2.2.1. The cyberchondria severity scale (CSS; McElroy and Shevlin, 2014)

This instrument uses 33 items to measure the severity of cyberchondria, conceptualized via its multiple dimensions (i.e., subscales). Each item is rated on a 5-point scale, from 1 (''never'') to 5 (''always'') with total scores ranging from 33 to 165 and higher scores indicating a greater severity of cyberchondria. The CSS is composed of five subscales (compulsion, distress, excessiveness, reassurance and lack of trust in medical professionals), which correspond to the main, previously described characteristics of cyberchondria. As far as its psychometric properties are concerned, the CSS is considered a reliable instrument (Fergus, 2014). However, in some studies, the mistrust of medical professionals subscale was considered separate (Norr et al., 2015b), so several researchers excluded this subscale and used 30 items (instead of 33) when calculating the total CSS score (Fergus and Spada, 2017; Mathes et al., 2018). In our study sample, the internal consistency (Cronbach's α) of the 33-item CSS was 0.95.

2.2.2. The Short Health Anxiety Inventory (SHAI; Salkovskis et al., 2002)

This is an 18-item instrument used to measure health anxiety. Each item is composed of four statements regarding the probability, the repercussions and other aspects of disease, and participants are invited to choose the statements that best describe their feelings during the past 6 months. The items are scored on a 4-point Likert scale from 0 to 3, with total scores ranging from 0 to 54 and higher scores indicating a greater severity of health anxiety. This inventory has demonstrated a good convergent validity (Abramowitz et al., 2007) and is a solid detector of high levels of health anxiety (Salkovskis et al., 2002). In this sample, the internal consistency (Cronbach's α) of the SHAI was 0.91.

2.2.3. The Obsessive-Compulsive Inventory Revised (OCI-R; Foa et al., 2002)

This instrument contains 18 items, measuring the intensity of various OCD symptoms. It includes, among others, the symptoms of checking, washing, and collecting that occurred during the last month. For each item, there is a 5-point scale ranging from 0 to 4 (from "not at all" to "extremely"), with total scores ranging from 0 to 72 and higher scores indicating a greater severity of OC symptoms. This scale has also been reported as having a good convergent validity (Abramowitz and Deacon, 2006; Hajcak et al., 2004) and being capable of distinguishing well between OCD and other specific anxiety disorders (Abramowitz and Deacon, 2006). In our study sample, the internal consistency (Cronbach's α) of the OCI-R was 0.93.

2.2.4. The Intolerance of Uncertainty Scale, Short-Form, 12-item version (IUS-SF; Carleton et al., 2007)

This measure evaluates both types of intolerance of uncertainty (inhibitory and prospective) using different subscales. It consists of 12 items that are rated on a 5-point scale, from 1 to 5, with total scores ranging from 12 to 60 and higher scores indicating a greater severity of intolerance of uncertainty. Scores show strong correlations with the scores on the original 27-item version of the same scale and with measures of anxiety and worrying (Carleton et al., 2007). The internal consistency (Cronbach's α) of the IUS-SF in the present sample was 0.93.

2.2.5. The Patient-Reported Outcomes Measurement Information System Emotional Distress – Short Form Questionnaire (PROMIS; Pilkonis et al., 2011)

This scale assesses general emotional distress during the last 7 days. It evaluates symptoms of anxiety, but also of anger and depression, constructs among which there is a large correlation. The 8 items of the PROMIS are rated on a Likert-type scale from 1 to 5 (corresponding to "never'' and "always'', respectively), with total scores ranging from 8 to 40 and higher scores indicating greater severity of anxiety. The scores on the PROMIS correlated strongly with scores on other anxiety measures (Pilkonis et al., 2011). In our study sample, the internal consistency (Cronbach's α) of the PROMIS was 0.94.

2.2.6. The Patient Health Questionnaire – 9 (PHQ-9; Kroenke et al., 2001)

This measure consists of 9 items that assess depressive symptoms experienced over the previous two weeks. Items are rated on a four-point scale (from 0 to 3, i.e., from "not at all" to "nearly every day", respectively), with total scores ranging from 0 to 27 and higher scores indicating greater severity of depressive symptoms. The PHQ-9 has been demonstrated to possess a good convergent validity, comparing favorably to other self-report measures of depressive symptoms at clinical and sub-clinical levels (Berle and Moulds, 2013). In the present sample, the internal consistency (Cronbach's α) of the PHQ-9 was 0.90.

2.2.7. The Patient Health Questionnaire – 15 Somatic Symptom Severity Scale (PHQ-15; Kroenke et al., 2002)

This instrument measures the severity of common somatic symptoms (abdominal pain, headache, nausea, and others) that may have been experienced during the previous four weeks. Each item is related to a different symptom, and participants can rate on a 3-point scale the degree to which they were bothered by each symptom (with 0 corresponding to "not bothered at all" and 2 to being "bothered a lot"),with total scores ranging from 0 to 30 and higher scores indicating greater severity of somatic symptoms. Scores on the PHQ-15 correlated positively with levels of dysfunction, disability, and symptom-related difficulty (Kroenke et al., 2002). The internal consistency (Cronbach's α) of the PHQ-15 in the present sample was 0.82.

2.3. Statistical analyses

Addressing the first research question required us to conduct a multiple regression using the "Enter" method, with total score on the CSS as the dependent variable and total scores on the SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15 as predictors.

To address the second research question, standardized Beta values were used to evaluate the contribution of each independent variable in the prediction. These coefficients are most appropriate as they have been converted to the same scale, thus allowing meaningful comparisons among predictors.

Finally, for the third research question, a hierarchical multiple regression was used to assess the ability of the SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15 total scores to predict the severity of cyberchondria (CSS score), after taking into account the effects of age, the effects of age, education and sex. The R-square change value was used to evaluate the importance of the independent variables in the regression after taking into account age, education and sex.

While scores on all the instruments, as well as age, were used as continuous variables, education and sex had to be transformed into k −1 dummy variables before consideration in the hierarchical multiple regression model (k being the number of categories of the original variable). Therefore, sex was represented by one dummy variable, whereas education was represented by three dummy variables.

Multiple linear regression makes a number of assumptions about the data including normality, linearity, homoscedasticity and independence of residuals. All these assumptions considered essential were tested at a stroke using the scatter plots of the residuals that are generated as part of the multiple regression procedure. The regression output and the plots generated by the analysis helped visualize the distribution of the data. For example, to determine whether the assumption of linearity, the central element of multiple regression, is met, the graph of the residuals with the predicted dependent variable must be a linear relationship (Tabachnick and Fidell, 2014).

For the detection of multicollinearity, the statistical literature offers

several quantifications with the most common being the Variance Inflation Factor (VIF) and the pairwise correlation coefficient. A VIF value greater than 5 (Sheather, 2009) and a correlation greater than 0.8 (Booth et al., 1994) should be considered an issue. All of these graphs and statistics were preliminary carefully considered before interpreting the results of the prediction itself.

For all analyses, a p-value of 0.05 was considered significant. In this study, we used IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. and R Development Core Team (2008). R: A language and environment for statistical computing. R Foundation for Statistical Computing).

2.4. Missing values

Of the original 1048 IP addresses recorded, there were 27 duplicates, 25 provided no data at all and 245 did not meet either one or both inclusion criteria. They were thus deleted. As far as the remaining 751 participants are concerned, missing data were anecdotal. Only 2 participants failed to provide their age, leading us to proceed with a complete case analysis of 749 participants (Fig. 1) (see Table 1).

3. Results

No violations of key assumptions for conducting multiple regression were detected. There was no multicollinearity between the predictors, as evidenced by VIF values between 1.8 and 2.9. In addition, the pairwise correlation coefficients did not show a value greater than 0.8 (Table 2).

A standard multiple regression was conducted to assess how well the SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15 total scores predicted cyberchondria levels (CSS scores). This model yielded an adjusted R-square of about 57%. While PROMIS did not achieve statistical significance ($p = 0.12$), the other variables were all statistically significant: SHAI ($p < 0.001$), PHQ-9 ($p < 0.001$), OCI-R ($p < 0.001$), PHQ-15 ($p = 0.001$), and IUS-SF ($p = 0.004$) (Table 3). In contrast to the other variables, the regression coefficient for PHQ-9 was negative, suggesting that lower scores on the PHQ-9 predicted higher scores on the CSS.

To find out which of the independent variables contributed most to the prediction of the dependent variable (CSS scores), we relied on the standardized Beta coefficients (Table 3). SHAI appeared to make the

Table 1
Clinical characteristics of the participants (median and range as well as mean and standard deviation.

Sample characteristics	N = 749	
	Median (range)	Mean (SD)
SHAI: The Short Health Anxiety Inventory	16.0 (0–54)	17.9 (8.5)
PHQ-9: The Patient Health Questionnaire – 9	6.0 (0–27)	8.4 (6.4)
PROMIS: The Patient-Reported Outcomes Measurement Information System Emotional Distress – Short Form Questionnaire	17.0 (7–35)	18.2 (6.8)
IUS-SF: The Intolerance of Uncertainty Scale, Short-Form	31.0 (12–60)	32.5 (10.6)
OCI-R: The Obsessive-Compulsive Inventory Revised	12.0 (0–72)	16.3 (14.1)
PHQ-15: The Patient Health Questionnaire – 15 Somatic Symptom Severity Scale	7.0 (0–28)	8.7 (5.1)
CSS: The Cyberchondria Severity Scale	68 (37–153)	73.1 (23.1)

Table 2
Correlation table of questionnaires used.

	CSS	SHAI	PHQ9	PROMIS	IUS	OCI-R	PHQ15
CSS	1	0.66	0.40	0.50	0.52	0.63	0.52
SHAI	0.66	1	0.52	0.60	0.52	0.51	0.57
PHQ9	0.40	0.52	1	0.76	0.54	0.58	0.67
PROMIS	0.50	0.60	0.76	1	0.62	0.56	0.64
IUS	0.52	0.52	0.54	0.62	1	0.59	0.44
OCI	0.63	0.51	0.58	0.56	0.59	1	0.59
PHQ15	0.52	0.57	0.67	0.64	0.44	0.59	1

Glossary of abbreviations for the questionnaires used: 1) CSS: The Cyberchondria Severity Scale; 2) IUS: The Intolerance of Uncertainty Scale, Short-Form, 12-Item Version; 3) OCI-R: The Obsessive-Compulsive Inventory Revised; 4) PHQ9: The Patient Health Questionnaire – 9); 5) PHQ15: The Patient Health Questionnaire – 15 Somatic Symptom Severity Scale; 6) PROMIS: The Patient-Reported Outcomes Measurement Information System Emotional Distress – Short Form Questionnaire); 7) SHAI: The Short Health Anxiety Inventory.

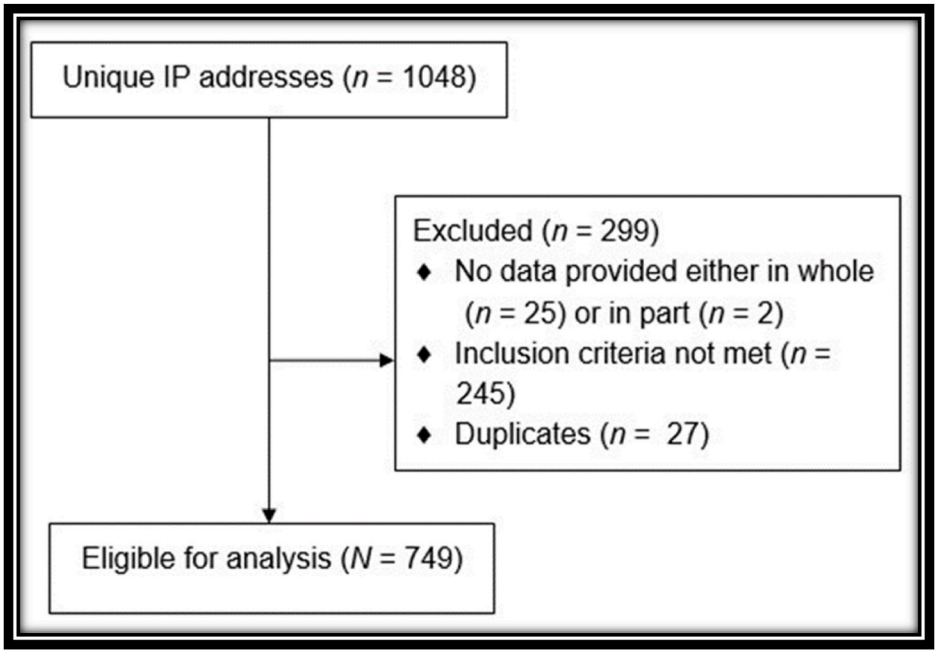

Fig. 1. - Study flowchart.

Table 3
Results of standard multiple regression[a)].

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% CI for B		Collinearity Statistics
	B	Std. Error	Beta			Lower Bound	Upper Bound	VIF
1 (Constant)	33.36	2.09	–	15.94	<0.001	29.25	37.47	–
SHAI	1.14	0.09	0.42	13.09	<0.001	0.97	1.31	1.76
PHQ-9	−0.70	0.14	−0.19	−4.90	<0.001	−0.99	−0.42	2.72
PROMIS	0.22	0.14	0.06	1.57	0.12	−0.06	0.49	2.91
IUS-SF	0.21	0.07	0.10	2.86	0.004	0.07	0.35	1.92
OCI-R	0.61	0.06	0.37	11.06	<0.001	0.50	0.72	1.97
PHQ-15	0.54	0.17	0.12	3.27	0.001	0.22	0.86	2.32

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[a] With CSS total score as dependent variable and SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R and PHQ-15 as predictors.

strongest unique contribution to explaining the dependent variable when the variance explained by all other variables in the model was controlled for. The contribution by SHAI is followed by the contributions of the OCI-R, PHQ-9, PHQ-15, IUS-SF, and PROMIS.

A hierarchical multiple regression was used to assess the ability of the independent variables (SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, PHQ-15) to predict the levels of cyberchondria (CSS) after controlling for age, education, and sex. The last three variables, entered at step 1, explained about 5% of the variance in cyberchondria. After entry at step 2 of the predictors of interest, the total variance explained by the model as a whole resulted in an adjusted R-square of about 58.0%. This means that the SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15 explained an additional 53% of the variance in cyberchondria when the effects of age, education and sex were controlled for. In the final model, except for PROMIS, all the other predictors were statistically significant, namely, SHAI ($p < 0.001$), PHQ-9 ($p < 0.001$), OCI-R ($p < 0.001$), PHQ-15 ($p = 0.001$), and IUS-SF ($p = 0.01$) (Table 4).

Finally, except for the controversial Mistrust of Medical Professional subscale (Starcevic et al., 2020a), the same analyses were repeated for the other four subscales of the CSS (specific tables not shown).

For Compulsion subscale, the total variance explained was 44.2% and that explained by age, education and sex was 5.7%. This means that SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15 explained an additional 38.5% of the variance when the effects of age, education and sex were controlled for. In this model, except for PROMIS and IUS-SF, all the other predictors were statistically significant, namely, SHAI ($p < 0.001$), PHQ-9 ($p < 0.001$), OCI-R ($p < 0.001$), and PHQ-15 ($p = 0.002$).

For Distress subscale, the total variance explained was 54.0% and that explained by age, education and sex was about 5%. This means that SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15 explained an additional 49.0% of the variance when the effects of age, education and sex were controlled for. In this model, PHQ-15 was not a significant predictor of Distress. All the other predictors reached statistical significance: SHAI ($p < 0.001$), PHQ-9 ($p < 0.001$), PROMIS ($p = 0.005$), IUS-SF ($p = 0.03$), and OCI-R ($p < 0.001$).

Regarding Excessiveness subscale, of 44.4% the total variance, 2.5%

Table 4
Results of hierarchical multiple regression[a].

Model 1: R-square = 0.05	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% CI for B		Collinearity Statistics
	B	Std. Error	Beta			Lower Bound	Upper Bound	VIF
1 (Constant)	86.82	2.87	–	30.24	<0.001	81.18	92.45	–
Age	−0.34	0.07	−0.17	−4.75	<0.001	−0.48	−0.20	1.01
Education1 (not completed high school)	3.16	5.73	0.02	0.55	0.6	−8.09	14.41	1.01
Education2 (completed vocational training)	6.83	3.39	0.07	2.02	0.04	0.19	13.48	1.03
Education3 (completed high school)	3.03	1.91	0.06	1.58	0.11	−0.73	6.78	1.04
Sex	−4.63	1.79	−0.09	−2.58	0.03	−8.14	−1.12	1.01
Model 2: R-square = 0.58								
2 (Constant)	40.40	3.02	–	13.36	<0.001	34.46	46.34	–
Age	−0.16	0.05	−0.08	−3.22	0.001	−0.25	−0.06	1.08
Education1 (not completed high school)	1.01	3.87	0.01	0.26	0.8	−6.58	8.59	1.03
Education2 (completed vocational training)	4.50	2.29	0.05	1.97	0.049	0.01	8.98	1.05
Education3 (completed high school)	1.16	1.29	0.02	0.90	0.4	−1.37	3.68	1.05
Sex	−1.66	1.23	−0.03	−1.35	0.2	−4.08	0.75	1.07
SHAI	1.16	0.09	0.42	13.35	<0.001	0.99	1.33	1.74
PHQ-9	−0.78	0.15	−0.22	−5.40	<0.001	−1.07	−0.50	2.78
PROMIS	0.22	0.14	0.07	1.69	0.1	−0.05	0.49	2.93
IUS-SF	0.19	0.07	0.09	2.55	0.01	0.04	0.33	1.93
OCI-R	0.60	0.06	0.37	10.66	<0.001	0.49	0.71	2.03
PHQ-15	0.56	0.17	0.12	3.39	0.001	0.24	0.89	2.32
Delta R-square = 0.53								

Glossary of abbreviations for the questionnaires used:1)CSS: The Cyberchondria Severity Scale; 2)IUS: The Intolerance of Uncertainty Scale, Short-Form, 12-Item Version; 3)OCI-R: The Obsessive-Compulsive Inventory Revised; 4)PHQ9: The Patient Health Questionnaire – 9); 5)PHQ15: The Patient Health Questionnaire – 15 Somatic Symptom Severity Scale; 6)PROMIS: The Patient-Reported Outcomes Measurement Information System Emotional Distress – Short Form Questionnaire); 7) SHAI: The Short Health Anxiety Inventory.

[a] With CSS total score as dependent variable, age, education and sex as control variables and SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R and PHQ-15 as predictors.

was explained by age, education and sex, while about 42% were explained by SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15. Except for PROMIS, all the other predictors were statistically significant: SHAI ($p < 0.001$), PHQ-9 ($p < 0.001$), IUS-SF ($p < 0.001$), OCI-R ($p < 0.001$) and PHQ-15 ($p = 0.001$).

As for the Reassurance Seeking subscale, the variance explained was the lowest: 32.4%. After substituting the 1.8% due to age, education and sex, SHAI, PHQ-9, PROMIS, IUS-SF, OCI-R, and PHQ-15 explained the remaining 30.6%. As with Compulsion, SHAI ($p < 0.001$), PHQ-9 ($p = 0.002$), OCI-R ($p < 0.001$) and PHQ-15 ($p < 0.001$) reached statistical significance, whereas this was not the case for PROMIS and IUS-SF ($p = 0.7$ and $p = 0.6$, respectively).

Again, multicollinearity was not present among the predictors, as attested by VIF (variance inflation factor) values ranging between 1.01 and 2.9.

4. Discussion

To the best of our knowledge, the present study is the first to apply multiple regression analyses to investigate simultaneously the relationships between cyberchondria severity and a range of psychopathology constructs. Moreover, this study is the first to compare the relative effects of each of these constructs on cyberchondria severity, when controlling for basic demographic characteristics.

Our first objective was to determine whether and to what extent each of the investigated constructs (as independent variables) predicted the severity of cyberchondria (as a dependent variable). With the exception of anxiety (as measured by the PROMIS), we found that all other constructs predicted cyberchondria severity. This predictive ability was strongest for health anxiety, obsessive-compulsive symptoms and depression, followed by somatic symptoms and intolerance of uncertainty. Interestingly, depression was negatively associated with cyberchondria severity. In contrast to anxiety, which is a motivating factor that drives people to engage in behaviors aiming to eliminate threat or attain certainty, depression may have the opposite effect and lead people to adopt an attitude of passivity, resignation, or surrender (e.g., when facing a possible illness) (Durisko et al., 2015; Eysenck and Fajkowska, 2018). Further investigation of the relationship between depression and cyberchondria severity is needed.

Our second objective was to test whether the investigated constructs could explain a significant amount of the variance of cyberchondria (CSS) and ascertain which among the aforementioned measures was the best predictor of cyberchondria severity. We found that health anxiety, obsessive-compulsive symptoms, depression, somatic symptoms, and intolerance of uncertainty explained about 57% of the variance of cyberchondria. Health anxiety, obsessive-compulsive symptoms, and depression had the strongest ability to predict cyberchondria severity. Similarly, we found a total explained variance of about 53% when age, education, and sex were controlled for (third objective of the study).

These findings confirm reports of previous studies about the strength of the relationship between health anxiety and cyberchondria (Bajcar and Babiak, 2019; Barke et al., 2016; Fergus, 2014, 2015; Fergus and Spada, 2017, 2018; Gibler et al., 2019; Norr et al., 2015a), including one systematic review and meta-analysis (McMullan et al., 2019). In addition, our findings support the notion that OCD symptoms and intolerance of uncertainty have an important relationship with cyberchondria (Fergus and Russell, 2016; Keller et al., 2008; Norr et al., 2015a; Oh and Song, 2017; Sakai et al., 2010; Sam Oh and Jung, 2020; Starcevic, V. et al., 2020). A significant relationship between depression and somatic symptoms on one hand and cyberchondria on the other has not been reported before. It remains to be ascertained whether there are direct links between these constructs or whether their relationships can be better explained via shared links with constructs that are more strongly related to cyberchondria.

When compared to all other variables, general anxiety showed no significant association with cyberchondria, which is in sharp contrast to the specific and strong relationship between health anxiety and cyberchondria. This finding is important because it suggests that cyberchondria is an anxiety-related behavioral pattern to the extent that such anxiety pertains to one's health. In other words, forms of anxiety that are not specific to one's health may not be significantly associated with cyberchondria.

The analyses were also performed at the level of the various subscales of the CSS, except for the Mistrust of Medical Professional subscale, due to its inconsistent and generally poor psychometric performance (Starcevic et al., 2020). For the Compulsion, Distress, Excessiveness and Reassurance Seeking subscales, the results showed similar trends overall. For instance, similar associations were found for health anxiety, obsessive-compulsive symptoms and depression. General anxiety, as measured by PROMIS, was not associated with subscale scores, except for the Distress subscale. The items of the Distress subscale refer to having "trouble relaxing, feeling "more anxious or distressed", "starting to panic" and "finding it hard to stop worrying" after performing online health searches. Given the nature of these items, it can only be expected that the Distress subscale will correlate with a measure of general anxiety. This is in accordance with the findings of a recent study that showed higher levels of cyberchondria among people with anxiety disorders (Vismara et al., 2021). The Distress subscale was not associated with somatic symptoms, as assessed by the PHQ-15, possibly suggesting that distress could be experienced without prominent somatic symptoms. Intolerance of uncertainty was not associated with the Compulsion subscale, which may initially seem counterintuitive because of the close link between intolerance of uncertainty and OCD symptoms. However, Compulsion subscale of the CSS was found to refer to difficulties in inhibition control that is related to an addictive propensity (Khazaal et al., 2021). The Reassurance Seeking subscale showed a lower level of explained variance, which may suggest that reassurance seeking is not directly connected with the "core" cyberchondria construct. Also, intolerance of uncertainty was not associated with the Reassurance Seeking subscale, possibly indicating that people who have trouble tolerating uncertainty do not necessarily resort to reassurance seeking to alleviate uncertainty.

The present study has several limitations. We used a sample that was recruited online, which is not necessarily representative of the general population. However, the Prolific may provide quite representative samples of the Internet population (Palan and Schitter, 2018). In other words, while the representativeness of our study sample of the general population may be somewhat limited by the high proportion (more than 90%) of participants with high school or university education, the sample may be representative of the Internet population. We believe that the latter is potentially relevant because of the nature of our study, i.e., examination of cyberchondria as an Internet-mediated behavior. Nevertheless, future studies of cyberchondria should be conducted in samples that are more diverse with regards to education level so that their findings would be more applicable to the general population. Moreover, we did not take into consideration the type of health-related websites visited by study participants. It is possible that the quality and layout of the content of these websites (e.g., whether they are more evidence-based or more oriented towards facilitating self-diagnosis) played a role in the development and severity of cyberchondria. Finally, we did not collect information on the patterns of online health information seeking, including the frequency of this behavior and other circumstances surrounding it. These and other factors may help explain the remaining 47% of the variance of cyberchondria that could not be accounted for by the variables examined in the present study. They include media and internet health literacy (Levin-Zamir and Bertschi, 2018), as well as compulsive and addictive aspects of internet use (Khazaal et al., 2020).

Study limitations notwithstanding, we conclude that health anxiety, obsessive-compulsive symptoms and intolerance of uncertainty are strongly associated with cyberchondria severity, with health anxiety providing the strongest, unique contribution to the relationship with

cyberchondria. Therefore, individuals scoring high on health anxiety, obsessive-compulsive and/or somatic symptoms should also be screened for cyberchondria. We suggest that depression and somatic symptoms are also linked to the severity of cyberchondria, which deserves further investigation. These findings contribute to a better understanding of cyberchondria and have clinical implications in terms of highlighting the correlates of and potential risk factors for cyberchondria. In that sense, specific approaches should be developed for prevention, psychoeducation and early detection of high-risk individuals. With regards to treatment, there is evidence that cognitive behavior therapy for health anxiety, which includes components that directly address excessive online health searches, may also reduce cyberchondria severity (Newby and McElroy, 2020). Future research should aim to better understand the complex relationships between cyberchondria and other psychopathology constructs and abnormal behavioral patterns. Such research should investigate these relationships using a prospective design that would allow elucidation of any causal links between cyberchondria and other variables. As other studies have already suggested (e.g. Mathes et al., 2018), research into genetic aspects, as well as further investigations of biological and psychological factors related to online health searches, are also important directions for future research.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments and comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Authorship statement

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material has not been and will not be submitted to or published in any other publication before its appearance in the Journal of Psychiatric Research.

Declaration of competing interest

The authors declare that they have no conflict of interest.

References

Abramowitz, J.S., Deacon, B.J., 2006. Psychometric properties and construct validity of the Obsessive-Compulsive Inventory–Revised: replication and extension with a clinical sample. J. Anxiety Disord. 20 (8), 1016–1035. https://doi.org/10.1016/j.janxdis.2006.03.001.

Abramowitz, J.S., Deacon, B.J., Valentiner, D.P., 2007. The short health anxiety inventory: psychometric properties and construct validity in a non-clinical sample. Cognit. Ther. Res. 31 (6), 871–883. https://doi.org/10.1007/s10608-006-9058-1.

Bajcar, B., Babiak, J., 2019. Self-esteem and cyberchondria: the mediation effects of health anxiety and obsessive–compulsive symptoms in a community sample. Curr. Psychol. https://doi.org/10.1007/s12144-019-00216-x.

Barke, A., Bleichhardt, G., Rief, W., Doering, B.K., 2016. The cyberchondria severity scale (CSS): German validation and development of a short form. Int. J. Behav. Med. 23 (5), 595–605. https://doi.org/10.1007/s12529-016-9549-8.

Berle, D., Moulds, M.L., 2013. An experimental investigation of emotional reasoning processes in depression. Br. J. Clin. Psychol. 52 (3), 316–329. https://doi.org/10.1111/bjc.12019.

Berle, D., Starcevic, V., Khazaal, Y., Viswasam, K., Hede, V., McMullan, R.D., 2020. Relationships between online health information seeking and psychopathology. Gen. Hosp. Psychiatr. 62, 96–97. https://doi.org/10.1016/j.genhosppsych.2019.04.006.

Blackburn, J., Fischerauer, S.F., Talaei-Khoei, M., Chen, N.C., Oh, L.S., Vranceanu, A.M., 2019. What are the implications of excessive internet searches for medical information by orthopaedic patients? Clin. Orthop. Relat. Res. 477 (12), 2665–2673. https://doi.org/10.1097/corr.0000000000000888.

Booth, G.D., Niccolucci, M.J., Schuster, E.G., Intermountain Research, S., 1994. Identifying Proxy Sets in Multiple Linear Regression : an Aid to Better Coefficient Interpretation.

Caiata-Zufferey, M., Abraham, A., Sommerhalder, K., Schulz, P.J., 2010. Online health information seeking in the context of the medical consultation in Switzerland. Qual. Health Res. 20 (8), 1050–1061. https://doi.org/10.1177/1049732310368404.

Carleton, R.N., Norton, M.A., Asmundson, G.J., 2007. Fearing the unknown: a short version of the intolerance of uncertainty scale. J. Anxiety Disord. 21 (1), 105–117. https://doi.org/10.1016/j.janxdis.2006.03.014.

Chamberlain, S.R., Menzies, L., 2009. Endophenotypes of obsessive-compulsive disorder: rationale, evidence and future potential. Expert Rev. Neurother. 9 (8), 1133–1146. https://doi.org/10.1586/ern.09.36.

Durisko, Z., Mulsant, B.H., Andrews, P.W., 2015. An adaptationist perspective on the etiology of depression. J. Affect. Disord. 172, 315–323. https://doi.org/10.1016/j.jad.2014.09.032.

Eysenck, M.W., Fajkowska, M., 2018. Anxiety and depression: toward overlapping and distinctive features. Cognit. Emot. 32 (7), 1391–1400. https://doi.org/10.1080/02699931.2017.1330255.

Fergus, T.A., 2013. Cyberchondria and intolerance of uncertainty: examining when individuals experience health anxiety in response to Internet searches for medical information. Cyberpsychol., Behav. Soc. Netw. 16 (10), 735–739. https://doi.org/10.1089/cyber.2012.0671.

Fergus, T.A., 2014. The Cyberchondria Severity Scale (CSS): an examination of structure and relations with health anxiety in a community sample. J. Anxiety Disord. 28 (6), 504–510. https://doi.org/10.1016/j.janxdis.2014.05.006.

Fergus, T.A., 2015. Anxiety sensitivity and intolerance of uncertainty as potential risk factors for cyberchondria: a replication and extension examining dimensions of each construct. J. Affect. Disord. 184, 305–309. https://doi.org/10.1016/j.jad.2015.06.017.

Fergus, T.A., Russell, L.H., 2016. Does cyberchondria overlap with health anxiety and obsessive-compulsive symptoms? An examination of latent structure and scale interrelations. J. Anxiety Disord. 38, 88–94. https://doi.org/10.1016/j.janxdis.2016.01.009.

Fergus, T.A., Spada, M.M., 2017. Cyberchondria: examining relations with problematic Internet use and metacognitive beliefs. Clin. Psychol. Psychother. 24 (6), 1322–1330. https://doi.org/10.1002/cpp.2102.

Fergus, T.A., Spada, M.M., 2018. Moving toward a metacognitive conceptualization of cyberchondria: examining the contribution of metacognitive beliefs, beliefs about rituals, and stop signals. J. Anxiety Disord. 60, 11–19. https://doi.org/10.1016/j.janxdis.2018.09.003.

Foa, E.B., Huppert, J.D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., Salkovskis, P.M., 2002. The Obsessive-Compulsive Inventory: development and validation of a short version. Psychol. Assess. 14 (4), 485–496.

Gibler, R.C., Jastrowski Mano, K.E., O'Bryan, E.M., Beadel, J.R., McLeish, A.C., 2019. The role of pain catastrophizing in cyberchondria among emerging adults. Psychol. Health Med. 24 (10), 1267–1276. https://doi.org/10.1080/13548506.2019.1605087.

Hajcak, G., Huppert, J.D., Simons, R.F., Foa, E.B., 2004. Psychometric properties of the OCI-R in a college sample. Behav. Res. Ther. 42 (1), 115–123. https://doi.org/10.1016/j.brat.2003.08.002.

Keller, G.L., Padala, P.R., Petty, F., 2008. Clinical pearls to manage cyberchondriacs. Prim. Care Companion J. Clin. Psychiatry 10 (1), 75–76. https://doi.org/10.4088/pcc.v10n0113e.

Khazaal, Y., Chatton, A., Rochat, L., Hede, V., Viswasam, K., Penzenstadler, L., Berle, D., Starcevic, V., 2020. Compulsive Health-Related Internet Use and Cyberchondria. European addiction research, pp. 1–9. https://doi.org/10.1159/000510922.

Khazaal, Y., Chatton, A., Rochat, L., Hede, V., Viswasam, K., Penzenstadler, L., Berle, D., Starcevic, V., 2021. Compulsive health-related internet use and cyberchondria. Eur. Addiction Res. 27 (1), 58–66. https://doi.org/10.1159/000510922.

Kirby, P.L., Reynolds, K.A., Walker, J.R., Furer, P., Pryor, T.A.M., 2018. Evaluating the quality of perinatal anxiety information available online. Arch Womens Ment Health 21 (6), 813–820. https://doi.org/10.1007/s00737-018-0875-5.

Kroenke, K., Spitzer, R.L., Williams, J.B., 2001. The PHQ-9: validity of a brief depression severity measure. J. Gen. Intern. Med. 16 (9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x.

Kroenke, K., Spitzer, R.L., Williams, J.B., 2002. The PHQ-15: validity of a new measure for evaluating the severity of somatic symptoms. Psychosom. Med. 64 (2), 258–266. https://doi.org/10.1097/00006842-200203000-00008.

Lee, C.J., 2008. Does the internet displace health professionals? J. Health Commun. 13 (5), 450–464. https://doi.org/10.1080/10810730802198839.

Levin-Zamir, D., Bertschi, I., 2018. Media health literacy, eHealth literacy, and the role of the social environment in context. Int. J. Environ. Res. Publ. Health 15 (8). https://doi.org/10.3390/ijerph15081643.

Makarla, S., Gopichandran, V., Tondare, D., 2019. Prevalence and correlates of cyberchondria among professionals working in the information technology sector in Chennai, India: a cross-sectional study. J. Postgrad. Med. 65 (2), 87–92. https://doi.org/10.4103/jpgm.JPGM_293_18.

Mathes, B.M., Norr, A.M., Allan, N.P., Albanese, B.J., Schmidt, N.B., 2018. Cyberchondria: overlap with health anxiety and unique relations with impairment, quality of life, and service utilization. Psychiatr. Res. 261, 204–211. https://doi.org/10.1016/j.psychres.2018.01.002.

McElroy, E., Shevlin, M., 2014. The development and initial validation of the cyberchondria severity scale (CSS). J. Anxiety Disord. 28 (2), 259–265. https://doi.org/10.1016/j.janxdis.2013.12.007.

McMullan, R.D., Berle, D., Arnáez, S., Starcevic, V., 2019. The relationships between health anxiety, online health information seeking, and cyberchondria: systematic review and meta-analysis. J. Affect. Disord. 245, 270–278. https://doi.org/10.1016/j.jad.2018.11.037.

Newby, J.M., McElroy, E., 2020. The impact of internet-delivered cognitive behavioural therapy for health anxiety on cyberchondria. J. Anxiety Disord. 69, 102150. https://doi.org/10.1016/j.janxdis.2019.102150.

Norr, A.M., Albanese, B.J., Oglesby, M.E., Allan, N.P., Schmidt, N.B., 2015a. Anxiety sensitivity and intolerance of uncertainty as potential risk factors for cyberchondria. J. Affect. Disord. 174, 64–69. https://doi.org/10.1016/j.jad.2014.11.023.

Norr, A.M., Allan, N.P., Boffa, J.W., Raines, A.M., Schmidt, N.B., 2015b. Validation of the cyberchondria severity scale (CSS): replication and extension with bifactor modeling. J. Anxiety Disord. 31, 58–64. https://doi.org/10.1016/j.janxdis.2015.02.001.

Norr, A.M., Oglesby, M.E., Raines, A.M., Macatee, R.J., Allan, N.P., Schmidt, N.B., 2015c. Relationships between cyberchondria and obsessive-compulsive symptom dimensions. Psychiatr. Res. 230 (2), 441–446. https://doi.org/10.1016/j.psychres.2015.09.034.

Oh, Y.S., Song, N.K., 2017. Investigating relationships between health-related problems and online health information seeking. Computers, informatics, nursing : CIN Plus 35 (1), 29–35. https://doi.org/10.1097/cin.0000000000000234.

Palan, S., Schitter, C., 2018. Prolific.ac—a subject pool for online experiments. Journal of Behavioral and Experimental Finance 17, 22–27. https://doi.org/10.1016/j.jbef.2017.12.004.

Perrault, E.K., Hildenbrand, G.M., McCullock, S.P., Schmitz, K.J., Lambert, N.J., 2020. Online information seeking behaviors of breast cancer patients before and after diagnosis: from website discovery to improving website information. Cancer Treat Res Commun 23, 100176. https://doi.org/10.1016/j.ctarc.2020.100176.

Pilkonis, P.A., Choi, S.W., Reise, S.P., Stover, A.M., Riley, W.T., Cella, D., Group, P.C., 2011. Item banks for measuring emotional distress from the Patient-Reported Outcomes Measurement Information System (PROMIS(R)): depression, anxiety, and anger. Assessment 18 (3), 263–283. https://doi.org/10.1177/1073191111411667.

R Development Core Team, 2008. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, V., Austria, ISBN 3-900051-07-0. URL. http://www.R-project.org.

Sakai, R., Nestoriuc, Y., Nolido, N.V., Barsky, A.J., 2010. The prevalence of personality disorders in hypochondriasis. J. Clin. Psychiatr. 71 (1), 41–47. https://doi.org/10.4088/JCP.08m04838blu.

Salkovskis, P.M., Rimes, K.A., Warwick, H.M., Clark, D.M., 2002. The Health Anxiety Inventory: development and validation of scales for the measurement of health anxiety and hypochondriasis. Psychol. Med. 32 (5), 843–853. https://doi.org/10.1017/s0033291702005822.

Sam Oh, Y., Jung, H., 2020. The relationships between depression and anxiety disorder and online social media for healthcare. Am. J. Health Behav. 44 (4), 409–419. https://doi.org/10.5993/AJHB.44.4.4.

Selvi, Y., Gokce Turan, S., Asena Sayin, A., Boysan, M., Kandeger, A., 2018. The cyberchondria severity scale (CSS): validity and reliability study of the Turkish version. Sleep and Hypnosis - International Journal 241–246. https://doi.org/10.5350/Sleep.Hypn.2018.20.0157.

Sheather, S.J., 2009. A Modern Approach to Regression with R.

Simon, G.E., VonKorff, M., Piccinelli, M., Fullerton, C., Ormel, J., 1999. An international study of the relation between somatic symptoms and depression. N. Engl. J. Med. 341 (18), 1329–1335. https://doi.org/10.1056/nejm199910283411801.

Starcevic, V., 2017. Cyberchondria: challenges of problematic online searches for health-related information. Psychother. Psychosom. 86 (3), 129–133. https://doi.org/10.1159/000465525.

Starcevic, V., Baggio, S., Berle, D., Khazaal, Y., Viswasam, K., 2019. Cyberchondria and its relationships with related constructs: a network analysis. Psychiatr. Q. 90 (3), 491–505. https://doi.org/10.1007/s11126-019-09640-5.

Starcevic, V., Berle, D., 2014. Cyberchondria: towards a better understanding of excessive health-related Internet use. Expert Rev. Neurother. 13 (2), 205–213. https://doi.org/10.1586/ern.12.162.

Starcevic, V., Berle, D., Arnáez, S., 2020a. Recent insights into cyberchondria. Curr. Psychiatr. Rep. 22 (11), 56. https://doi.org/10.1007/s11920-020-01179-8.

Starcevic, V., Berle, D., Arnáez, S., Vismara, M., Fineberg, N., 2020 Apr 30. The assessment of cyberchondria: Instruments for assessing problematic online health-related research. Compr. Psychiatr. https://doi.org/10.1007/s40429-020-00308-w.

Tabachnick, B.G., Fidell, L.S., 2014. Using Multivariate Statistics.

Vismara, M., Benatti, B., Ferrara, L., Colombo, A., Bosi, M., Varinelli, A., Pellegrini, L., Viganò, C., Fineberg, N.A., Dell'Osso, B., 2021. A preliminary investigation of Cyberchondria and its correlates in a clinical sample of patients with obsessive-compulsive disorder, anxiety and depressive disorders attending a tertiary psychiatric clinic. Int. J. Psychiatr. Clin. Pract. 1–12. https://doi.org/10.1080/13651501.2021.1927107.

Vismara, M., Caricasole, V., Starcevic, V., Cinosi, E., Dell'Osso, B., Martinotti, G., Fineberg, N.A., 2020. Is cyberchondria a new transdiagnostic digital compulsive syndrome? A systematic review of the evidence. Compr. Psychiatr. 99, 152167. https://doi.org/10.1016/j.comppsych.2020.152167.

White, R.W., Horvitz, E., 2009. Experiences with web search on medical concerns and self diagnosis. AMIA. In: Annual Symposium Proceedings. AMIA Symposium, vol. 2009, pp. 696–700.