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The development and initial validation of the cyberchondria severity scale (CSS)

Eoin McElroy*, Mark Shevlin*

School of Psychology, Faculty of Life and Health Sciences, University of Ulster at Magee, Londonderry BT48 7JL, Northern Ireland, United Kingdom

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ABSTRACT

Cyberchondria is a form of anxiety characterised by excessive online health research. It may lead to increased levels of psychological distress, worry, and unnecessary medical expenses. The aim of the present study was to develop a psychometrically sound measure of this dimension. A sample of undergraduate students ($N = 208$; 64% female) completed a pilot version of the cyberchondria severity scale (CSS) along with the short form version of the depression, anxiety and stress scale (DASS-21). Exploratory factor analysis identified a correlated five factor structure that were labelled 'Compulsion', 'Distress', 'Excessiveness', 'Reassurance Seeking' and 'Mistrust of Medical Professional'. The CSS demonstrated good psychometric properties; the subscales had high internal consistency, along with good concurrent and convergent validity. The CSS may prove useful in a wide variety of future research activities. It may also facilitate the development and validation of interventions for cyberchondria.

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1. Introduction

Due to the rapid developments in information and communications technology the internet has become a popular source of health information amongst the general public. It has been estimated that 80% of Americans use the internet to access health information, making it the fifth most common online activity (Pew Internet & American Life Project, 2012). Health related websites continue to see a steady growth in traffic. For example, WebMD saw user traffic increase by 28% between 2011 and 2012 (Howell, 2013). This equates to 117.4 million unique visitors a month and total page views of 2.57 billion (Howell, 2013). There are numerous reasons why the internet has become such a popular means of accessing health information; it is quick, easy to use, anonymous and relatively inexpensive (Starcevic & Berle, 2013).

Online health research (OHR) may lead to positive and preventative activities such as exercise, healthier eating habits, improved adherence to medication and empowered health decisions (Huberty, Dinkel, Beets, & Coleman, 2012; Lemire, Sicotte, & Paré, 2008). On the other hand, such practices present a challenge when used as a diagnostic device by laypersons (Aiken, Kirwan, Berry, & O'Boyle, 2012). While the internet provides access to a large body of information it is a crude means of self-diagnosis as it fails to take age, gender, lifestyle and other subtleties into account (White & Horvitz, 2009a,b). Research also indicates that the quality of online health information is mixed and that few searchers check the reliability of their sources (Benigeri & Pluye, 2003).

Cyberchondria refers to an increase in anxiety about one's own health status, as a result of excessive reviews of online health information (Muse, McManus, Leung, Meghreblian, & Williams, 2012; Baumgartner & Hartmann, 2011; Bessière, Pressman, Kiesler, & Kraut, 2010; White & Horvitz, 2009a,b; Aiken & Kirwan, 2012; White & Horvitz, 2009a,b). Although research in this area is still in its infancy, studies have shown that OHR represents a reliable risk factor for heightened anxiety regarding subjective health status. Correlational studies have identified a statistically significant association between OHR and increased medical anxiety (Muse et al., 2012; White & Horvitz, 2009b). Experimental research has also demonstrated that OHR can lead to negative emotional responses such as fear and a sense of being over-whelmed (Lauckner & Hsieh, 2013). A longitudinal study by Bessière et al. (2010) found that health related internet use was associated with a small but reliable increase in depression over an 8 month period. This anxiety may manifest itself in impaired functionality; a large survey study by White and Horvitz (2009a,b) found that approximately 60% of respondents reported interruptions to both online and offline activities as a result of worrying health searches.

While it is clear that OHR can have an anxiety provoking effect, cyberchondria is also characterised by an element of excessiveness. This may occur in the form of repeated or lengthy searches for heath information (Starcevic & Berle, 2013). For example, a survey of over 500 people found that 60% of respondents queried a specific health

* Corresponding authors. Tel.: +44 28 71675471/+44 28 71375619; fax: +44 28 9536 7278.
E-mail addresses: mcelroy-e1@email.ulster.ac.uk (E. McElroy), m.shevlin@ulster.ac.uk (M. Shevlin).

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concern over multiple online sessions (White & Horvitz, 2009a,b). An analysis of thousands of online interaction logs found that 13.5% of searchers entered the exact same health related terms into a search engine on more than one occasion over an 11 month period (White & Horvitz, 2009a,b). It has been suggested that these excessive searches only serve to fuel a person's original anxiety (Starcevic & Berle, 2013).Aside from causing unwarranted levels of worry and distress, there may also be economic costs to cyberchondria. While no studies have examined the costs directly related to online health searches, there is evidence that those who are generally health anxious represent a significant economic burden. Healthcare costs and productivity losses associated with medically unexplained symptoms cost the UK economy an estimated £ 3 billion in 2008 alone (Bermingham, Cohen, Hague, & Parsonage, 2010). Cyberchondria is likely responsible for a significant proportion of this amount as an analysis of anonymised search logs found that those who searched for health information on line frequently ended their search sessions with queries about local healthcare services (White & Horvitz, 2010). Research has also suggested that OHR can lead to a deterioration in the doctor–patient relationship (Ravdin, 2008; Keller, Padala, & Petty, 2008; Lamberty, 2008). This in turn may lead to further healthcare costs (e.g. visits to multiple doctors, known as 'doctor shopping'). It is important, therefore, that our understanding of this new trend is increased in order to inform strategies to minimise its negative consequences.

Cyberchondria appears to be a multi-dimensional construct, reflecting both anxiety and an element of compulsiveness. While there are a number of validated scales used to measure similar forms of anxiety, such as health anxiety and general anxiety. However such instruments are not appropriate to assess the unique anxieties that occur as a result of OHR. Indeed, much of the early research has relied on single items to measure cyberchondria. Single item scales have questionable reliability and do not take the multidimensional nature of a construct into account (Gliem & Gliem, 2003; McCormack, Horne, & Sheather, 1988). The aim of this study was to develop a reliable, multidimensional measure of cyberchondria. The development of such a scale will have important implications in both the research and treatment of cyberchondria.

The primary aim of this study was to develop and evaluate the psychometric properties of a self-report measure of anxiety as a result of online searches for health information, the cyberchondria severity scale (CSS). It was predicted that the CSS would be multidimensional, reflecting anxiety and excessive searching behaviours. This study also aimed to assess the initial validity of the CSS. To this end, the concurrent and convergent validity of the CSS were examined. Concurrent validity was assessed by correlating CSS scores with a validated measure of anxiety, depression and stress and it was predicted that the CSS would correlate positively and significantly with these scores. Convergent validity is demonstrated when scores on a measure correlate with scores from other established measures, to varying degrees, depending on how theoretically similar the constructs are (Lamping et al., 2002). It was predicted that the CSS would demonstrate good convergent validity; i.e. total scores on the CSS will correlate highest with an established measure of anxiety, and with lower correlation for depression and stress. Also, it was predicted that any identified subscales would correlate in a theoretically predictable manner with established measures of depression, anxiety and stress.

2. Method

2.1. Respondents

An opportunity sample of university undergraduate students ($N = 208$) was recruited (133 females, 73 males, 2 unspecified). The majority of the sample (67%) were Psychology students, while the remainder (33%) were Business Studies students. The age range of respondents was between 18 and 60 years ($M = 24.19$, SD = 8.2).

2.2. Measures

Cyberchondria was measured by the preliminary version of the cyberchondria severity scale (CSS). The baseline version of the CSS consisted of 43 items. Each item consisted of a 5 point Likert-scale indicating frequency (1 'Never', 2 'Rarely', 3 'Sometimes', 4 'Often' and 5 'Always'). The baseline questionnaire asked participants for information about how they conducted OHR (e.g. 'When researching symptoms or medical conditions online I visit both trustworthy websites and user-driven forums'), how distressing they found OHR (e.g. 'I feel more anxious or distressed after researching symptoms or perceived medical conditions online') and how OHR affected both their online and offline activities (e.g. 'Researching symptoms or perceived medical conditions online interrupts my offline social activities'). The CSS was designed to be a continuous measure of distress, not a categorical measure for the purpose of diagnosis.

Depression, anxiety and stress levels were assessed by the short form version of the depression, anxiety and stress scale (DASS-21). The DASS-21 consists of 21 self-report questions. Three 7-item subscales measure anxiety, depression and stress with using a 4-point Likert scale, ranging from '0—Never' to '3—Almost Always'. Responses are summed producing possible subscale ranging from 0 to 21 with higher scores indicating higher level on each dimension. Responses on all 21 items can also be summed (possible scores 0 to 63) to assess general psychological distress (Henry & Crawford, 2005). Studies have shown that the DASS has high internal reliability and validity in both clinical and non-clinical samples (Osman et al., 2012; Henry & Crawford, 2005). For example, Crawford and Henry (2003) found that Cronbach's alpha was .897 for the anxiety scale, .947 for the depression scale, .933 for the stress scale and .966 for the total score in a large non-clinical sample.

2.3. Procedure

First, an initial pool consisting of 43 items was developed for the CSS. Items were generated based on a review of existing literature on cyberchondria and conceptually similar anxiety disorders. In writing the items, the guidelines of McColl et al. (2001) were followed; items were designed to be clear, concise and easy to understand. Following approval from the University of Ulster Research Ethics Committee, the initial item pool was reviewed by two academics at the University of Ulster; an expert in psychometrics and an experienced health psychologist. After collecting feedback regarding item clarity, poorly worded items were corrected. At this stage a preliminary item pool of 43 items formed the baseline for the CSS. The Flesch–Kincaid Grade Level of the items at this point was 10.1, meaning the questionnaire was appropriate for those with a 10th grade reading level (i.e. appropriate for mid-to-late adolescence and above). It was concluded that this was an acceptable level of readability, as it can be assumed that moderate literacy is required to understand medical information found online. The baseline CSS was compiled with an information sheet, a consent form and the DASS-21 to create a self-report questionnaire booklet. The questionnaire booklets were distributed to the sample of undergraduate participants prior to lectures.

2.4. Initial item deletion

A process of item deletion was undertaken based on the guidelines of Lamping et al. (2002). First, any item that had 5% or more

Table 1
Raw data eigenvalues, and mean and percentile random data eigenvalues for parallel analysis of CSS items.

Factor	Eigenvalue from actual data	Mean eigenvalue from random data	95th Percentile eigenvalue from random data
1.0	**14.73**	**1.30**	**1.43**
2.0	**2.82**	**1.17**	**1.26**
3.0	**2.40**	**1.07**	**1.16**
4.0	**1.66**	**.99**	**1.07**
5.0	**1.46**	**.92**	**.99**
6.0	.91	.86	.92
7.0	.84	.79	.86
8.0	.66	.74	.79
9.0	.62	.68	.74
10.0	.49	.63	.68

Note: First 10 factors only shown; factors to retain in bold; PAF/common factor analysis & raw data permutation; number of cases 190; number of variables 43; number of data sets generated 1000; percentile 95.

missing data was removed. Next, to eliminate floor and ceiling effects, items that had 80% or more of answers in one category were eliminated.

2.5. Statistical analysis

Exploratory factor analysis (EFA) was conducted to identify items for possible elimination due to weak psychometric performance. To determine the optimal number of factors to extract, a parallel analysis was conducted using an open source syntax developed by O'Connor (2000). At this stage any item that did not have a primary factor loading of .3 or above was removed along with any items that had cross loadings of .3 or above. Following this item deletion process, EFA was used to examine the underlying factor structure of the final solution. Scores on the CSS were then correlated with scores on the DASS-21 to assess concurrent and convergent validity.

3. Results

3.1. Initial item elimination

No items were removed as a result of the first and second exclusion criteria (missing data; floor and ceiling effects).

3.2. Exploratory factor analysis

Prior to the EFA, a parallel analysis (PA) was conducted in order to determine the number of factors to retain. Although rarely used in scale development, research indicates that parallel analysis is the most robust method for determining the number of factors to retain (Matsunaga, 2010; Williams, Onsman, & Brown, 2010; Henson & Roberts, 2006; Heaton, Allen, & Scarpello, 2004). PA involves the generation of random data sets with the same sample size and number of variables as the real data set. These data sets then undergo EFA, and the eigenvalues obtained are recorded. This procedure is repeated many times (in this case 1000). The mean and 95th percentile eigenvalues from the 'parallel data' are then compared to those from the original data. If the eigenvalue of a factor from the original data is greater than the 95th percentile eigenvalue of the parallel factor, that factor is retained (Heaton et al., 2004). The PA indicated that five factors should be retained (Table 1).

The factorability of the initial 43 items was examined. First, the correlation matrix was inspected and numerous correlations above .3 were observed. Second, the Kaiser–Meyer–Olkin measure of sampling adequacy was .90, above the recommended value of .6, Bartlett's Test of Sphericity was significant ($X^2 = 5584.98$, df = 903, $p < .01$) which indicated that the sample correlation matrix was significantly different from an identity matrix. Third, the communalities were all above .30; therefore, the data was suitable for exploratory factor analysis (EFA).

The initial five factor solution was examined using EFA with maximum likelihood extraction and oblique rotation (promax). An analysis of the scree plot supported the use of a five factor model. At this stage, two items were removed as they failed to have a primary factor loading of .3 or above (CSS-9, CSS-41 from the baseline questionnaire). Eight further items were removed for having cross loadings of .3 or above (CSS-10, CSS-12, CSS-13, CSS-14, CSS-22, CSS-31 CSS-32, CSS-43, from the baseline questionnaire). This left a scale consisting of 33 items. A second EFA, again using maximum likelihood extraction and oblique rotation (promax), was conducted on the remaining items. Table 2 illustrates the factor structure of this final solution. The five factors of this solution explained 39%, 9%, 8%, 5% and 5% of the variance, respectively (66% cumulatively).

The items that loaded onto Factor 1 reflected the many ways in which OHR can interrupt both online and offline activities (e.g. 'Researching symptoms or perceived medical conditions online interrupts my time spent on Facebook/Twitter/other social networks'). These items tapped an unwanted, compulsive element to cyberchondria. This factor was, therefore, labelled 'Compulsion'. All of the items that loaded onto Factor 2 tapped the more subjective, emotional states that were associated with online health research. These items were all positively scored towards a negative emotional state e.g. stress, worry, anxiety, panic and irritation (e.g. 'I find it hard stop worrying about symptoms or perceived medical conditions that I have researched online'). Factor 2, therefore, was labelled 'Distress'.

Items that loaded onto Factor 3 mainly involved searching for information across numerous sources, often repeatedly. These items reflected repetition and an unnecessary amount of time spent researching the same symptoms and health conditions (e.g. 'I read the same web pages about a perceived condition on more than one occasion'). This factor was labelled 'Excessiveness'. All of the items that loaded onto Factor 4 appeared to reflect anxiety manifesting in the need for reassurance from a more qualified person, i.e. a medical professional (e.g. 'Researching symptoms or perceived medical conditions online leads me to consult with my doctor'). This factor was labelled 'Reassurance Seeking'.

Only three items loaded onto Factor 5. They reflected a conflict within participants; whether to trust the expertise of their medical professional over their own research (e.g. 'I trust my GP/medical professional's diagnosis over my online self-diagnosis'). It makes sense that the more severe the level of cyberchondria, the less comfort/reassurance an individual would take from their medical professional. These items, therefore, were reverse coded, with lower scores reflecting a higher score on this subscale. As lower scores reflected lower levels of reassurance from medical professionals, this factor was labelled 'Mistrust of Medical Professional'.

3.3. Factor correlations

Table 3 illustrates the factor correlations of the CSS. Moderate, positive correlations were observed between each of the first four factors, 'Compulsion', 'Distress', 'Excessiveness' and 'Reassurance Seeking'. The 'Mistrust of Medical Professional' factor had small but positive correlations with the 'Compulsion', 'Distress' and 'Excessiveness' factors. A very small, negative correlation was found between the 'Mistrust of Medical Professional' and 'Reassurance Seeking' factors.

Table 2
Rotated factor loadings for exploratory factor analysis of CSS items.

Item	Factor				
	CM	DS	EX	RE	MS
Researching symptoms or perceived medical conditions online interrupts my online leisure activities (e.g. streaming movies)	**.974**				
Researching symptoms or perceived medical conditions online interrupts my time spent on Facebook/Twitter/other social networks	**.934**				
Researching symptoms or perceived medical conditions online interrupts my offline work activities	**.896**				
Researching symptoms or perceived medical conditions online distracts me from reading news/sports/entertainment articles online	**.795**				
Researching symptoms or perceived medical conditions online interrupts or slows my online communication (e.g. Instant Messaging, Skype)	**.762**				
Researching symptoms or perceived medical conditions online interrupts my work (e.g. writing emails, working on word documents or spreadsheets)	**.759**				
Researching symptoms or perceived medical conditions online interrupts my offline social activities (reduces time spent with friends/family)	**.720**			.265	
Researching symptoms or perceived medical conditions online interrupts other research (e.g. for my job/college assignment/homework)	**.699**				
I have trouble relaxing after researching symptoms or perceived medical conditions online		**1.004**			
I find it hard stop worrying about symptoms or perceived medical conditions that I have researched online		**.974**			
I have trouble getting to sleep after researching symptoms or perceived medical conditions online		**.789**			
I feel more anxious or distressed after researching symptoms or perceived medical conditions online		**.782**			
I start to panic when I read online that a symptom I have is found in a rare/serious condition		**.652**			
I think I am fine until I read about a serious condition online?		**.556**			
I am more easily annoyed or irritated after researching symptoms or perceived medical conditions online		**.514**			
I lose my appetite after researching symptoms or perceived medical conditions online		**.466**			
I read different web pages about the same perceived condition			**.886**		
I read the same web pages about a perceived condition on more than one occasion			**.703**		
I enter the same symptoms into a web search on more than one occasion			**.650**		
When I research a symptom online, I feel the ranking of the web search results reflects how common an illness is, with more likely medical conditions appearing higher up on the result page?			**.608**		
When researching symptoms or medical conditions online I visit both trustworthy websites and user-driven forums			**.586**		
When researching symptoms or medical conditions online, I visit forums where diagnosed or concerned individuals discuss their medical conditions, symptoms and experiences			**.453**		
If I notice an unexplained bodily sensation I will search for it on the Internet			**.443**		
I visit trustworthy sources only (e.g. NHS.co.uk) when researching symptoms or perceived medical conditions online			**.313**		
I discuss my online medical findings with my GP/health professional				**.924**	
Discussing online info about a perceived medical condition with my GP reassures me				**.812**	
Researching symptoms or perceived medical conditions online leads me to consult with other medical specialists (e.g. consultants)				**.770**	
Researching symptoms or perceived medical conditions online leads me to consult with my doctor (GP)				**.746**	
I find myself thinking: "I would not have gone to the doctor if I had not read about that symptom/condition online"				**.599**	
I suggest to my GP/medical professional that I may need a diagnostic procedure that I read about online (e.g. a biopsy/a specific blood test)				**.521**	
I trust my GP/medical professional's diagnosis over my online self-diagnosis					**.861**
I take the opinion of my GP/medical professional more seriously than my online medical research					**.732**
When my GP/medical professional dismisses my online medical research, I stop worrying about it					**.623**
Eigenvalue	12.50	2.42	2.25	1.30	1.24
% Variance explained	38	7	7	4	4

Note: Highest factor loading shown in bold; factor loadings <.25 not shown; extraction method: maximum likelihood; rotation method: promax with Kaiser normalisation. CM—compulsion, RE—reassurance, DS—distress, MS—mistrust of medical professional, EX—excessiveness.

Table 3
Factor correlations of the CSS.

Factor	Compulsion	Distress	Excessiveness	Reassurance	Mistrust of medical professional
Compulsion	1.000				
Distress	.559	1.000			
Excessiveness	.537	.670	1.000		
Reassurance	.539	.563	.519	1.000	
Mistrust of medical professional	.230	.173	.134	−.041	1.000

Table 4
CSS subscales and total correlations with DASS-21 subscales and total scores.

		DASS 21 depression subscale	DASS 21 anxiety subscale	DASS 21 stress subscale	DASS 21 total
CSS compulsion subscale	Pearson's *r*	.344**	.488**	.358**	.455**
	Sig. (1-tailed)	.000	.000	.000	.000
	N	202	201	203	198
CSS distress subscale	Pearson's *r*	.209**	.344**	.319**	.332**
	Sig. (1-tailed)	.001	.000	.000	.000
	N	204	203	205	200
CSS excessiveness subscale	Pearson's *r*	.201**	.299**	.267**	.289**
	Sig. (1-tailed)	.002	.000	.000	.000
	N	200	199	201	196
CSS_Reassurance subscale	Pearson's *r*	.231**	.288**	.341**	.331**
	Sig. (1-tailed)	.000	.000	.000	.000
	N	201	200	202	197
CSS_Mmistrust of medical professional subscale	Pearson's *r*	.091	.144*	.164**	.148*
	Sig. (1-tailed)	.098	.020	.009	.018
	N	205	204	206	201
CSS total score	Pearson's *r*	.244**	.425**	.369**	.397**
	Sig. (1-tailed)	.000	.000	.000	.000
	N	190	189	191	186

** Correlation is significant at the .01 level (1-tailed).
* Correlation is significant at the .05 level (1-tailed).
'Mistrust of medical professional' items reverse coded.

3.4. Internal reliability

Internal reliability was high for both the 'Compulsion' (Cronbach's alpha = .95) and 'Distress' (Cronbach's alpha = .92) subscales. Both the 'Excessiveness' (Cronbach's alpha = .85) and 'Reassurance Seeking' subscales (Cronbach's alpha = .89) had good internal reliability. Cronbach's alpha for the 'Mistrust of Medical Professional' subscale was acceptable (.75). Cronbach's alpha for the total scale was .94, indicating high overall internal reliability.

3.5. Construct and criterion validity

CSS scores, total and subscale, were correlated with scores on the DASS-21 (Table 4). Total scores on the CSS had significant and positive correlations with the three DASS-21 subscales and the DASS-21 total. These correlations ranged from small to moderate, suggesting good concurrent validity. The CSS 'Compulsion', 'Distress', 'Excessiveness', and 'Reassurance' subscales all correlated in a theoretically predictable manner (i.e. significantly and positively) with the three DASS-21 subscales and the DASS-21 total scores. The effect sizes were low to medium, meaning they were not so high as to suggest redundancy. The 'Compulsion', 'Distress', and 'Excessiveness' subscales all correlated highest with the DASS-21 anxiety subscale, signifying good convergent validity. The CSS 'Reassurance' subscale correlated highest with the DASS-21 Stress subscale, again suggesting convergent validity. The CSS 'Mistrust of Medical Professional' subscale did not significantly correlate with the DASS-21 depression subscale. It did have a significant and positive correlation with the DASS-21 anxiety and stress scores, although the effect sizes were low. The differences in correlations suggest an element of unique predictive validity to each subscale. Overall, these results indicate that the CSS has good concurrent and convergent validity.

4. Discussion

The aim of this study was to develop and validate a measure of anxiety regarding subjective health status as a result of excessive online health research (OHR) called the cyberchondria severity scale (CSS). Preliminary analysis indicated that the sample data were suitable for factor analysis and the results suggested that the CSS scores have good psychometric properties. There was also evidence of good concurrent and convergent validity, as demonstrated by moderate correlations with an established measure of depression, anxiety and stress. Internal consistency was high for both the subscales and the overall 33 item scale. Moderate inter-factor correlations were also observed. As such, the CSS subscales appear to tap both a general factor of cyberchondria, along with sub-dimensions of this construct. This supports the use of both subscale scores and an overall CSS score.

Each subscale of the CSS reflects a previously identified element of cyberchondria. The 'Compulsion' subscale suggests that anxiety as a result of OHR can impede both online and offline activities, supporting an earlier finding of White and Horvitz (2009a,b). The fact that these searches interrupted other activities suggests that cyberchondria is an unpleasant experience, yet hard to avoid. The 'Distress' subscale reflects the more subjective, inner feelings of distress associated with online health research. This supports previous research that has identified a strong association between online health research and negative emotional states (Lauckner & Hsieh, 2013; Muse et al., 2012; Bessière et al., 2010; White & Horvitz, 2009a,b). The 'Excessiveness' subscale reflects multiple and repeated online searches for health information. It supports the previously identified excessive, escalatory nature of cyberchondria (White & Horvitz, 2009a,b; Gray, Klein, Noyce, Sesselberg, & Cantrill, 2005). The 'Reassurance' subscale reflects an element of increased anxiety which may drive people to consult with their doctor. This supports earlier research of White and Horvitz (2010)

who suggested that anxiety as a result of OHR could prompt individuals to consult with a medical professional. Although the 'Mistrust of Medical Professional' subscale consists of only three items, it reflects anxiety and a sense of paranoia. This subscale suggests that, in certain cases, individuals may find their online research so distressing that they fail to take any comfort or reassurance from their medical professional. Although no past research has examined this directly, this could be an important factor in the deterioration of the doctor patient relationship associated with cyberchondria, as highlighted by previous studies (Ravdin, 2008; Keller et al., 2008; Lamberty, 2008).

As this study sought to investigate excessive, unwarranted searches for health information, undergraduate students were an appropriate sample as they are generally computer literate and unlikely to be suffering from severe health problems. The sample size, however, must be addressed. While there is much debate about the minimum number of participants required to conduct factor analysis, a number of guidelines exist. Many scholars argue that a sample size of less than 200 is perhaps not large enough (Matsunaga, 2010). Although 208 respondents completed the baseline questionnaire, 18 cases were excluded from the factor analysis due to missing data. If the above guidelines are to be believed, the number of cases ($N = 190$) analysed was just short of the minimum requirement. It is important to point out, however, that these are only suggested guidelines. Other theorists argue that these rules of thumb are excessive, and that samples of between 50 and 100 can be sufficient when the factor loadings are strong (de Winter, Dodou, & Wieringa, 2009; Sapnas & Zeller, 2002). As the CSS demonstrated generally high factor loadings, the sample size used was likely sufficient. It is also important to note that, while this study examined the impact of subjective health status on anxiety, it did not take objective health status into account. It is therefore possible that the results could have been confounded by actual, diagnosed health problems. Although the chosen sample was relatively young and unlikely to be suffering from serious health concerns, it is possible that some respondents suffered from chronic, manageable health conditions (e.g. asthma, diabetes). Others may have been suffering from short term ailments at the time (e.g. cold, flu). Future research could control for objective health complaints.

The CSS is the first psychometrically derived self-report measure of its kind. The development of the CSS presents a number of opportunities for future research. This was an exploratory study that identified a five factor structure to this measure. Future research could examine this factor structure further; confirmatory factor analysis could be used to determine whether the five factor model identified in this study represents the best model fit. Studies could also further examine the reliability of the CSS. For example, the CSS could be administered to the same sample on more than one occasion in order to assess test-retest reliability. There is also the potential for further item reduction as both the 'Distress' and 'Compulsion' subscales had high internal reliability and a number of items that correlated highly with each other. Although not designed to be a categorical measure of diagnosis, further analyses could be conducted to determine 'cut-off' scores for varying levels of distress associated with the CSS e.g. mild, moderate, severe. The development of the CSS also has important implications within the wider sphere of cyberchondria research. Research up until now has relied on single scale measures of cyberchondria. Such measures lack reliability and fail to take the multi-dimensional nature of cyberchondria into account. The development of the CSS addresses this issue.

The CSS may also be of use in applied settings. There are currently no interventions designed specifically to reduce anxiety as a result of excessive online health research (Starcevic & Berle, 2013). The CSS could be used by clinicians to develop individual treatment plans tailored to the specific needs of the client (e.g. behavioural interventions to reduce excessive searching behaviours, cognitive restructuring to reduce negative emotional symptoms). The CSS could also be used to evaluate the efficacy of any interventions that are developed.

In conclusion, the CSS is a new self-report measure of anxiety as a result of excessive online health research. The CSS is multidimensional; this study suggests a five-factor model comprised of 33 items. Each of the five factors has unique utility, while also tapping a general factor of cyberchondria. The CSS demonstrated good psychometric properties and high internal reliability. There was also evidence of good concurrent and convergent validity. Future psychometric evaluations are recommended along with further investigations into the effects of gender and age on cyberchondria. The CSS has the potential to influence future research and it may also be of significant applied value in terms of interventions.

Note: A copy of the questionnaire is available from the corresponding author.

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