



Cyberchondriasis: Fact or fiction? A preliminary examination of the relationship between health anxiety and searching for health information on the Internet

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ABSTRACT

This study examined the relationship between health anxiety and searching for health information online, a phenomenon dubbed 'cyberchondria'. The majority of those with 'high' ($n = 46$) and 'low' ($n = 36$) levels of health anxiety reported seeking health information online. However, those with higher levels of health anxiety sought online health information more frequently, spent longer searching, and found searching more distressing and anxiety provoking. Furthermore, more responses in the high than low health anxiety group related to searching for information on diagnosed and undiagnosed medical conditions, descriptions of others' experiences of illnesses and using message boards/support groups, although the largest proportion of responses in both groups was accounted for by seeking information on symptoms. Linear regression ($n = 167$) revealed significant relationships between health anxiety and the frequency, duration and distress and anxiety associated with searching for health information online. This preliminary data suggests that searching for health information online may exacerbate health anxiety.

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1. Introduction

The advent of the Internet has provided the general public with easy access to over 100,000 health information websites (Eysenbach, Sa, & Diepgen, 1999), ranging from government regulated information sites (e.g. NHS direct, NIH) and websites run by medical professionals (e.g. Patient UK, NetDoctors), to commercial search facilities (e.g. Boots WebMD, Healthline) and patient-led groups (e.g. Health Boards). The majority of the US and UK population have access to the Internet (Fox & Jones, 2009; Office for National Statistics, 2010) and research indicates that it is a popular source of health information used by 60–80% of Internet consumers (Fox, 2011; Office for National Statistics, 2010). Indeed, seeking for health information is one of the most popular online pursuits, exceeded only by the use of and search engines (Fox, 2011).

Although the Internet provides a useful source of health information for many, it has been suggested that searching online for health information can fuel health anxiety, a phenomenon dubbed 'cyberchondria' (Ryan & Wilson, 2008; Stone & Sharpe, 2003; Taylor, 1999, 2002, 2010; White & Horvitz, 2009). Severe health anxiety, or 'hypochondriasis' (DSM-IV-TR: American Psychiatric Association, 2000), affects up to 5% of the population (Asmundson,

Taylor, Sevgur, & Cox, 2001; Gureje, Üstün, & Simon, 1997) and is characterized by a persistent pre-occupation with the fear that one has or will develop a serious disease. Health anxiety not only causes great suffering for the patient and those around them but is also costly in terms of higher medical care utilization (Barsky, Ettner, Horsky, & Bates, 2001). Hence, it is a priority for the sake of both patients and healthcare service providers to understand factors that contribute to health anxiety. Whilst the concept of 'cyberchondria' has attracted a great deal of media attention (e.g. BBC News, 2001; Meriden, 2000; Omaha, 2010; Osborne, 2009; Valley, 2001; WebMD, 2002), there is a paucity of research investigating whether seeking health information online does in fact fuel health anxiety. This exploratory study therefore seeks to examine the relationship between health anxiety and searching for health information online.

Cognitive behavioral models specify reassurance seeking by repetitively checking sources of medical information as a maintaining factor in health anxiety (Salkovskis & Warwick, 1986; Taylor & Asmundson, 2004; Warwick & Salkovskis, 1990). Whilst there are many sources of medical information (e.g. books, magazines, medical journals), anecdotal clinical observations suggest that patients with health anxiety are increasingly using the Internet as a source of medical information (Taylor & Asmundson, 2004). Consistent with this observation, a study investigating the use of a Canadian health website found that participants who showed a greater concern for their personal health used the site more frequently (Lemire, Paré, Sicotte, & Harvey, 2008). Additionally, individuals with somatoform illnesses (e.g. indigestion, irritable bowel, back pain) also report

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more frequent use of online health information sources (Haviland, Pincus, & Dial, 2003). Hence, there is some evidence to suggest that individuals with higher levels of health anxiety may use the Internet to seek health information more frequently.

How people with health anxiety typically use the Internet to seek health information has yet to be examined. Existing research indicates that the most common method of obtaining online health information is via general search engines (Eysenbach & Köhler, 2002; Morahan-Martin, 2004; Ybarra & Suman, 2006), and that individuals typically seek information about symptoms of concern (Nelson, Murray, & Kahn, 2010; Nicholas, Huntington, Gunter, Withey, & Russell, 2003; Rice, 2006). However, White and Horvitz (2009) found that searching for non-specific symptoms on general search engines provided a disproportionate amount of information on serious and rare medical explanations, and that 70% of individuals who initially search for common, innocuous symptoms progress to searching for information on rarer, more serious conditions. Although it is not known what impact this had on participants' health anxiety, these results suggest that using search engines as a diagnostic tool is likely to disproportionately expose users to information about serious, chronic, life-threatening illnesses and thus has the potential to exacerbate health anxiety.

Compared to other health information sources (e.g. medical textbooks, health information leaflets), the Internet contains a large amount of unregulated health information. Indeed, the majority of studies examining health websites report significant problems with the quality, accuracy and completeness of the information (Eysenbach & Diepgen, 1998; Kunst, Groot, Latthe, Latthe, & Khan, 2002; Rajani, Mukherjee, & Chambers, 2007). Using the Internet as a source of health information may therefore increase the likelihood that users will be exposed to conflicting or confusing information or to unreliable, inaccurate or outdated information. Despite the prevalence of misinformation, most Internet users fail to check basic credentials such as the validity of the source or the date of publication (Eysenbach & Köhler, 2002; Morahan-Martin, 2004) and view online health information as reliable and of 'good' or 'excellent' quality (Diaz et al., 2002; Murray et al., 2003; Peterson & Fretz, 2003). Given that individuals with high levels of health anxiety have been shown to attribute greater accuracy to diagnostic information (Hadjistavropoulos, Craig, & Hadjistavropoulos, 1998), this positive view of online health information may be further inflated in individuals with health anxiety. Hence, individuals seeking health information online may not only be exposed to unreliable misinformation but may fail to recognize it as such, resulting in unnecessary worry and anxiety.

In summary, although there is some evidence to suggest that individuals with high levels of health anxiety may seek health information online more frequently and that this behavior could serve to fuel health anxiety, this has yet to be explicitly examined. Hence the current study utilizes an analogue sample to (i) investigate the relationships between participants' level of health anxiety and the frequency, impact and methods of searching for health information online and (ii) examine whether there were any differences between the frequency, impact and methods of searching for health information online in participants with high and low levels of health anxiety.

Specifically, the study had 5 aims:

1. Use of the Internet as a source of health information:

To determine whether participants with high health anxiety are more likely to use the Internet to seek health information than those with low health anxiety, and whether the reasons for choosing not to search online for health information differs between those with high and low health anxiety.

2. Frequency and duration of searching for health information online:

Within those participants that do report using the Internet to search for health information, to determine whether those with high health anxiety search for health information online more frequently or for longer periods than those with low health anxiety, and whether there is a relationship between participants' level of health anxiety and the frequency and duration of searching online for health information.

3. Impact of seeking health information online:

To determine whether, compared to those with lower health anxiety, participants with high health anxiety experience more distress and anxiety when searching for health information online, and whether there is a positive relationship between participants' health anxiety and the levels of distress and anxiety experienced when searching for health information online.

4. Type and source of health information sought online:

To determine whether there is any difference between those with high and low levels of health anxiety in the type of health information sought online and/or the sources used to access health information online.

5. Perceived accuracy of online health information:

To determine whether there is any difference between those with high and low health anxiety in how accurate they perceive online health information to be, and whether there is a relationship between participants' level of health anxiety and the perceived accuracy of health information obtained online.

2. Method

2.1. Participants

Non-clinical, largely student, participants ($n=187$) were recruited through advertisements at local Universities. In addition, in order to extend the range of those with significant health anxiety, individuals ($n=55$) from a database of people who had previously participated in a randomized controlled trial of Mindfulness-based cognitive therapy or treatment-as-usual for health anxiety within the University (McManus, Surawy, Muse, & Williams, submitted for publication) were invited to participate, and 32 of the 55 accepted the invitation, making a total of $N=219$ participants. In order to establish 'high' and 'low' health anxiety groups, participants' scores on the SHAI were rank-ordered and the bottom and top quartiles of participants were identified using cut-off scores of <9 and >17 respectively. The demographic and clinical characteristics for the 'high' ($n=55$) and 'low' ($n=53$) health anxiety groups, and the sample as a whole, are outlined in Table 1. There were no significant differences between the high and low health anxiety groups in age, gender ratio or level of education. As expected, the high health anxiety group scored significantly higher than the low health anxiety group on the measure of health anxiety (short health anxiety inventory: SHAI). The mean SHAI score of participants in the high health anxiety group (25.51) was just below those reported in samples of patients with a clinical diagnosis of hypochondriasis (e.g. 30 reported in Wattar et al., 2005). The mean SHAI score of participants in the low health anxiety group (6.19) was below mean scores reported in non-clinical samples (e.g. 10.36 reported in Fergus & Valentiner, 2009).

2.2. Measures

2.2.1. Short health anxiety inventory (SHAI)

The SHAI (Salkovskis, Rimes, Warwick, & Clark, 2002) consists of 18 self-report items measuring health anxiety, each rated on a Likert scale from 0 to 3. This scale has been shown to have high internal consistency and to have good sensitivity and specificity (Abramowitz, Deacon, & Valentiner, 2007; Salkovskis et al., 2002)

Table 1
Demographics and clinical characteristics of participants in the high vs. low health anxiety groups and the sample as a whole.

	Low health anxiety group (n=53)	High health anxiety group (n=55)	Statistic	All participants (N=219)
Age in years, mean (SD)	25.96 (8.94)	29.84 (11.64)	$t = -1.93$	26.90 (10.36)
Females: n (%)	29(54.7)	39(70.9)	$\chi^2 = 3.04$	143 (65.3)
Ethnic origin: n (%)			$\chi^2 = 2.39$	
Caucasian	42(79.2)	42(76.4)		173 (79)
Black	1(1.9)	2(3.6)		3(1.4)
Pacific Asian	6(11.3)	5(9.1)		24(11.0)
Indian/Pakistani/Bangladeshi	3(5.7)	2(3.6)		9(4.1)
Other	1(1.9)	4(7.3)		8(3.7)
Missing	0(0.0)	0(0.0)		2(0.9)
Level of education: n (%)			$\chi^2 = 7.77$	
Postgraduate	9(17.0)	6(10.9)		35 (16.0)
Degree	13(24.5)	23(41.8)		62(28.3)
A-level	30(56.6)	21(38.2)		108(49.3)
GCSE	1(1.9)	5(9.1)		12(5.5)
No formal qualification	0(0.0)	0(0.0)		2(0.9)
SHAI ^a , mean (SD)	6.19 (1.94)	25.51 (6.25)	$U = .00^*, b$	14.35 (7.91)

^a Short health anxiety inventory.

^b Due to non-normal distributions in the high and low health anxiety groups, a Mann–Whitney *U*-test was conducted.

* $p < .001$.

and in the current study the Cronbach's α for the SHAI was .904, indicating good internal consistency.

2.2.2. Internet use questionnaire

Participants were given a questionnaire designed to examine the following five areas.

2.2.2.1. Use of the Internet as a source of health information. Participants were asked whether they used the Internet as a source of information about their own health (Yes/No). Participants who reported using the Internet to seek health information were asked to continue with the questionnaire. Participants who reported that they did not use the Internet to seek health information were asked to choose from four explanations as to why this was: (i) no access to the Internet, (ii) have no need to look up health information, (iii) prefer other ways of seeking health information (e.g. GP) and (iv) 'other'. Participants were asked to mark all options that applied to them and to give details of their reason for not using the Internet if they selected the 'other' option.

2.2.2.2. Frequency and duration of searching for health information online. Participants were asked how frequently they searched online for health information on a scale from 0 to 5 where 0 = 'less than once a month', 1 = 'once a month', 2 = 'once a week', 3 = '2–4 times per week', 4 = 'daily', 5 = 'several times a day'. Participants were also asked to estimate how many minutes they typically spent searching for health information online.

2.2.2.3. Impact of searching for health information online. Participants were asked to rate how distressing they had found searching for health information on the Internet on an 11-point Likert scale from 0 = 'not at all' to 10 = 'extremely'. Finally, participants were asked to rate what impact searching for health information online had on their level of anxiety about their health using a 21-point Likert scale from -10 = 'reduces anxiety', through 0 = 'no impact', to +10 = 'increases anxiety'.

2.2.2.4. Type and source of health information sought online. Participants were asked what type of health information they typically searched for online by selecting from the following options: (i) possible causes of symptoms, (ii) information on an undiagnosed medical condition, (iii) information about a diagnosed medical condition, (iv) information on treatment options, (v) information about health services available, (vi) descriptions of others' experiences of illness and (vii) 'other'. Participants were also asked to indicate

which online sources they typically used to search for health information from the following options: (i) general search engines (e.g. Google), (ii) medical search engines (e.g. Healthline), (iii) health websites (e.g. NHS direct), (iv) message boards/support groups and (v) 'other'. For both questions participants were asked to check all options that applied to them and to give further details if they selected the 'other' option.

2.2.2.5. Perceived accuracy of online health information. Participants were asked to rate how accurate they perceived the health information they found online to be on an 11-point Likert scale from 0 = 'not at all accurate' to 10 = 'extremely accurate'.

2.3. Procedure

Ethical approval for the study was granted as part of a larger study administering a number of questionnaire measures. Participants were reimbursed £5 for completing the booklet of questionnaires.

2.4. Statistical analysis

2.4.1. Missing data

There was a small proportion of missing data (>1%) as some items were not completed by all participants. Two continuous variables (accuracy of health information and search duration) were missing one data point, which was imputed from the variable mean of the complete cases within the same health anxiety category (in both cases the high health anxiety group). One categorical variable (reason for choosing not to search for health information online) was also missing three data points. This missing data was included under an additional "missing" category presented in the results.

2.4.2. Demographic covariates

Examination of the relationship between participants' demographic characteristics and the outcome variables ($n = 167$ participants who reported seeking health information online) revealed no significant relationship between (i) gender and frequency of searching ($t[139] = -1.53, p = .13$), duration of searching ($t[165] = -0.83, p = .41$), anxiety ($t[165] = -0.90, p = .37$), distress ($t[165] = -0.86, p = .39$), or accuracy ($t[165] = 0.51, p = .61$), (ii) ethnicity and frequency of searching ($F[4, 160] = 2.05, p = .09$), duration of searching ($F[4, 160] = 2.01, p = .10$), anxiety ($F[4, 160] = 0.82, p = .51$), distress ($F[4, 160] = 1.78, p = .14$), or accuracy ($F[4, 160] = 1.49, p = .21$), or (iii) level of education and frequency

Table 2
Stated reasons for choosing not to search for health information online in the high and low health anxiety groups.

	Low health anxiety group (n = 17)	High health anxiety group (n = 9)	Fisher's exact p
No access to Internet: n (%)	0(0.0)	0(0.0)	
No need to look up health info: n (%)	11(64.7)	1(11.1)	0.14*
Prefer other ways of seeking information: n (%)	4(23.53)	2(22.2)	1.00
Other: n (%)	0(0.0)	5(55.5)	0.00**
Missing: n (%)	2(11.8)	1(11.1)	.961

* $p < .05$.

** $p < .001$.

of searching ($F[4, 162] = 0.67, p = .61$), duration of searching ($F[4, 162] = 0.93, p = .45$), anxiety ($F[4, 162] = 0.69, p = .60$), distress ($F[4, 162] = 0.51, p = .73$), or accuracy ($F[4, 162] = 2.23, p = .07$). Hence, gender, ethnicity and level of education were not included as covariates in subsequent analyses. However, whilst there was no significant relationship between participants' age and their frequency of searching ($r_s[167] = -.07, p = .40$), anxiety ($r_s[167] = .13, p = .10$), or distress ($r_s[167] = .02, p = .81$), age was significantly correlated with perceived accuracy of online information ($r_s[167] = .20, p = .01$) and with the duration of searching ($r_s[167] = .15, p = .05$). Hence, age was included as a covariate in all subsequent analysis examining perceived accuracy of online health information and duration of time spent seeking health information.

2.4.3. All participants

Linear regression analyses were used to examine the relationship between participants' level of health anxiety (as measured by the SHAI) and (i) the frequency of searching for health information online, (ii) the impact of searching for health information online on distress, and (iii) the impact of searching for health information online on anxiety. Stepwise linear regression was used to examine the relationship between participants' level of health anxiety (as measured by the SHAI) and (i) the duration of searching for health information online, (ii) the perceived accuracy of online health information, with participants' age entered as a predictor in addition to the SHAI.

2.4.4. Comparison of high vs. low health anxiety groups

Independent t -tests were used to compare the high and low health anxious groups' frequency of searching for health information online and perceived impact of seeking online health information on levels of distress and health anxiety. An ANCOVA was used to compare the perceived accuracy of online health information and the duration spent seeking health information online in the high and low health anxiety groups, with age included as a covariate. Chi-square tests were used for comparing categorical data. For all 2×2 comparisons, Yates' continuity correction was used as being conservative. Where cells had an expected count less than 5, Fisher's exact test p -values were used to assess statistical significance.

3. Results

3.1. Regression analysis

Of the 219 participants who took part in the study, 167 (76%) reported seeking health information online and were therefore included in the regression analysis. Linear regression analyses revealed that participants' SHAI scores were a significant predictor of how frequently they sought health information online ($\beta = 0.06, p < .001$) and the level of distress ($\beta = 0.12, p < .001$) and anxiety about health ($\beta = 0.10, p < .05$) participants experienced as a result of searching for health information online. Stepwise linear regression entering both SHAI scores and age as predictors for duration of search yielded a significant model ($F[1, 165] = 6.79, p = .01$), with

age being removed from the model ($\beta = 0.90, t = 1.14, p = .26$) and SHAI scores being a significant predictor of duration spent seeking health information online ($\beta = 0.43, t = 2.61, p = .01$). However, whilst stepwise linear regression entering both SHAI scores and age as predictors for perceived accuracy also yielded a significant model ($F[1, 165] = 10.29, p = .002$), SHAI scores were removed from the model ($\beta = 0.85, t = 1.08, p = .28$) whilst age was a significant predictor of the perceived accuracy of online health information ($\beta = 0.43, t = 3.21, p = .002$).

3.2. Comparison of high vs. low health anxiety groups

3.2.1. Use of the Internet as a source of health information

A greater proportion of participants in the high health anxiety group ($n = 46, 83.6\%$) reported seeking health information online than in the low health anxiety group ($n = 36, 67.9\%$), although this difference narrowly missed significance ($\chi^2[1, N = 108] = 3.66, p = .06$).

Table 2 outlines high and low health anxious participants' reasons for choosing not to search for health information online. There was no significant difference between high and low health anxiety groups in the proportion of people who stated a preference for 'seeking health information via means other than the Internet (e.g. GP)'. A significantly larger proportion of the low than the high health anxiety group said they had 'no need to look up health information'. A significantly greater proportion of the high than the low health anxiety group chose 'other', with four participants (50%) stating that seeking health information online would cause them to worry excessively about their health, whilst one stated that there is 'too much information online'.

All subsequent analysis refers only to those in the high ($n = 46$) and low ($n = 36$) health anxiety groups who did report using the Internet to seek health information.

3.2.2. Frequency and duration of searching for health information online

Participants in the high health anxiety group reported searching online for health information significantly more frequently than those in the low health anxiety group (respective means [SD] on a 0–5 scale 1.30 [1.19] vs. 0.17 [0.38], $t[80] = 5.52, p < .001$) (see Table 3). Only 16.7% of the low health anxiety group reported using the Internet to seek health information at least once a month, whereas 73.9% of the high health anxiety group reported using the Internet to seek health information at least once a month. Similarly, none of the low health anxiety group reported using the Internet to seek health information once a week or more, whereas 32.6% of the high health anxiety group were using the Internet to seek health information this frequently.

Furthermore, an ANCOVA (between-subjects factor: high vs. low health anxiety group, covariate: age) revealed that participants in the high health anxiety group spent significantly longer searching for health information online than those in the low health anxiety group (mean minutes [SD] respectively 26.78 [20.41] vs. 17.43 [11.41], $F[1, 79] = 3.88, p < .05$).

Table 3
Frequency of online health searches for those in the high and low health anxiety groups.

Frequency of online health information searches: n (%)	Low health anxiety group (n = 36)	High health anxiety group (n = 46)
Several times a day	0 (0.0)	1 (2.2)
Daily	0 (0.0)	1 (2.2)
2–4 times per week	0 (0.0)	6 (13.0)
Once a week	0 (0.0)	7 (15.2)
Once a month	6 (16.7)	19 (41.3)
Less than once a month	30 (83.3)	12 (26.1)

3.2.3. Impact of searching for health information online

The high health anxiety group rated the impact of searching for health information online as significantly more distressing than the low health anxiety group (means [SD] respectively 4.09 [2.26] vs. 1.75 [1.61], $t[80] = -5.25$, $p < .001$). Furthermore, the high health anxiety group reported that searching for health information online had a significantly more negative impact on how anxious they felt about their own health than did the low health anxiety group (means [SD] respectively 1.16 [4.49] vs. -0.92 [3.67], $t[80] = -2.23$, $p < .05$).

3.2.4. Type and source of health information sought online

Table 4 shows the type and source of online health information sought by participants in the high and low health anxiety groups. As the category options for the type of information sought on the Internet were not mutually exclusive, the number of responses per participant was significantly higher in the high health anxiety group (mean = 3.15 [SD 1.74], 46 participants gave a total of 145 responses) than in the low health anxiety group (mean = 2.06 [SD 1.07], 36 participants gave a total of 74 responses), $t(76) = -3.52$, $p < .001$. There were no significant differences between the high and low health anxiety groups in the number of responses accounted for by 'information about health services', 'possible causes of symptoms', 'information on treatment options', or 'other', with possible causes of symptoms being the most common type of information sought by both groups. Searching for 'information on diagnosed' and 'undiagnosed' medical conditions and 'looking for descriptions of other people's experiences of illnesses' accounted for a significantly greater proportion of responses in the high health anxiety group than in the low health anxiety group. Of those who chose 'other', the participant in the low health anxiety group sought 'nutrition information', whilst in the high health anxiety group, two participants sought information on 'side effects of medications' and one participant sought information on 'scientific background'.

As the category options for the source of information sought on the Internet were not mutually exclusive, the mean number of responses selected per participant in the high health anxiety group was 1.63 (SD 0.77, 46 participants gave a total of 75 responses), whilst the number of responses selected per participant in the low health anxiety was 1.39 (SD 0.60, 36 participants gave a total of 50 responses). There were no significant differences between the high and low health anxiety groups in the number of responses accounted for by 'general search engines', 'medical search engines', 'health websites', or 'other', with general search engines being the most common source of information in both groups (see Table 4). Of those who chose 'other', two participants in the low health anxiety group used Wikipedia whilst one participant in high health anxiety group used Science Direct. As shown in Table 4, message boards/support groups accounted for significantly greater proportion of responses in the high health anxiety group than in the low health anxiety group.

3.2.5. Perceived accuracy of online health information

An ANCOVA (between-subjects factor: high vs. low health anxiety group, covariate: age) revealed that there was no significant difference between the high and low health anxiety groups' ratings of the accuracy of online health information (means [SD] respectively 5.53 [1.87] vs. 5.56 [1.90], $F[1, 79] = 0.19$, $p = .67$), with both groups perceiving online health information to be moderately accurate.

4. Discussion

Seventy-six percent of participants sought health information on the Internet, which is comparable to previous reports of 60–80% of Internet consumers seeking health information online (Fox, 2011; Office for National Statistics, 2010). Although more participants in the high than the low health anxiety group reported searching for health information online (83.6% vs. 67.9% respectively) this difference did not reach statistical significance ($p = .06$), and the majority in both groups reported using the Internet to seek health information. However, participants in the high health anxiety group did report searching for health information on the Internet significantly more frequently, and for significantly longer periods of time, than those in the low health anxiety group. Furthermore, participants' level of health anxiety was positively related to the frequency and duration of searching for health information online. Taken together these results suggest that, whilst the Internet is used as a source of health information by individuals across the spectrum of health anxiety, those with higher levels of health anxiety are more likely to search for health information online more frequently, and for longer.

Participants' levels of health anxiety were positively related to the distress and anxiety about health experienced when searching for health information online, and participants in the high health anxiety group reported searching for health information online to be significantly more distressing, and to have a greater impact on their anxiety about their own health than those in the low health anxiety group. Furthermore, of the 24% of participants who did not search for health information online, the majority of those in the high health anxiety group (73.3%) reported that this was because it caused them to worry excessively about their health, whilst the majority of those in the low health anxiety group (50%) reported that they had no need to seek health information. As these results do not provide evidence of causation, firm conclusions regarding the impact of seeking health information online cannot be drawn. However, the preliminary data reported here suggest that searching for health information online may exacerbate health anxiety, at least for those with higher levels of health anxiety, thus providing initial support for the suggestion that Internet-based health searches serve to fuel health anxiety.

It has been argued that engaging in frequent checking behaviors increases awareness of and preoccupation with bodily sensations and symptoms and perpetuates health-related fears, thereby exacerbating health anxiety (Abramowitz & Moore, 2007; Asmundson, Abramowitz, Richter, & Whedon, 2010; Salkovskis & Warwick, 1986, 2001). Thus it is possible that seeking health information online had a detrimental impact on participants with higher levels of health anxiety due to the increased frequency with which they engaged in this behavior. However, another possible explanation is that individuals with higher levels of health anxiety actually sought different health information online. Indeed, the results of this study suggest that there were some differences in the type and source of health information sought by those with high and low health anxiety – a greater proportion of responses in the high than low health anxiety group related to searching for information on diagnosed and undiagnosed medical conditions,

Table 4
Type and source of health information sought online by those in the high and low health anxiety groups who reported using the Internet to search for health information.

	Low health anxiety group (n = 36)	High health anxiety group (n = 46)	χ^2	Fisher's exact p
Type of health information sought online: Number (% of responses)				
Possible causes of symptoms	28 (37.8)	42 (29.0)	1.97	
Information on undiagnosed medical condition	2 (2.7)	19 (13.1)	11.74***	
Information on diagnosed medical condition	7 (9.5)	23 (15.9)	6.86**	
Information on treatment options	18 (24.3)	26 (17.9)	0.13	
Information about health services available	14 (18.9)	14 (9.7)	0.32	
Descriptions of others' experiences of illness	4 (5.4)	18 (12.4)	6.71*	
Other	1 (1.4)	3 (2.1)		0.38
Online health information source: Number (% of responses)				
General search engines	29 (58.0)	42 (56.0)		0.20
Medical search engines	4 (8.0)	7 (9.3)		0.75
Health websites	15 (30.0)	19 (25.3)	0.00	
Message boards/support groups	0 (0.0)	6 (8.0)		0.03*
Other	2 (4.0)	1 (1.3)		0.58

* $p < .05$.

** $p < .01$.

*** $p < .001$.

looking for descriptions of other people's experiences of illnesses and using message boards/support groups. Furthermore, compared to participants in the low health anxiety group, those in the high health anxiety group reported seeking a greater number of different types of health information online, suggesting that they used a greater variety of sources of health information, thus possibly exposing them to more worrying and conflicting information. However, as has been found in previous research (Morahan-Martin, 2004; Nelson et al., 2010; Nicholas et al., 2003; Rice, 2006; Ybarra & Suman, 2006), the largest proportion of responses in both the high and low health anxiety groups was accounted for by seeking information on symptoms (29% and 37.8% respectively) and using general search engines (56% and 58% respectively). Although this would seem to suggest that the same search strategies were employed by the majority of participants across the spectrum of health anxiety, the current study did not examine which search engine results participants chose to view. As individuals with health anxiety demonstrate an attentional bias towards negative health information, especially that which is consistent with dysfunctional beliefs about health and illness (Karademas, Christopoulou, Dimostheni, & Pavlu, 2008; Lim & Kim, 2005; Pauli & Alpers, 2002; Salkovskis & Rachman, 1996), it is possible that those with more health anxiety will be more likely to notice and attend to negative health information, despite employing the same search strategies. Thus, whilst the current study indicates that there may be some differences in the way in which those with high and low health anxiety use the Internet to seek health information, further research is needed to establish exactly what strategies individuals with health anxiety employ when searching for health information online.

In contrast to previous research (Diaz et al., 2002; Murray et al., 2003; Peterson & Fretz, 2003), participants in the current study perceived online health information to be only moderately accurate, suggesting that all participants recognized that not all health information available online is accurate (Eysenbach & Diepgen, 1998; Kunst et al., 2002; Rajani et al., 2007). Furthermore, although previous research has shown that individuals with high levels of health anxiety attach greater accuracy to diagnostic health information (Hadjistavropoulos et al., 1998), in the current study participants' level of health anxiety was not related to how accurate they perceived online health information to be. This discrepancy with previous findings could be due to a number of factors, e.g. different scales or populations used, previous studies failing to control for the effect of age on perceived accuracy, or that with the advent

of the Internet the general public has become more aware of the potential for inaccuracy.

Results from the current study are in line with the suggestion that seeking online health information may have a detrimental impact on those with health anxiety. A key target of cognitive-behavioral interventions for health anxiety is reducing the frequency of repetitive checking behaviors (Furer, Walker, & Freeston, 2001). Given that those with higher levels of health anxiety sought health information on the Internet more frequently and for longer periods of time, online health information seeking could be addressed within this framework, by conceptualizing it as a form or checking or as a 'safety seeking behavior' (Salkovskis, 1991). The consequent treatment targets would be to demonstrate the detrimental impact of online searching for health information on health anxiety (e.g. using behavioral experiments) and to aim to reduce or postpone the behavior or limit the time spent seeking health information online. Alternatively, recent studies using cognitive bias modification paradigms have suggested that it may be possible to retrain anxious biases (Hirsch, Hayes, & Mathews, 2009; See, MacLeod, & Bridle, 2009) so interventions could focus on modifying the nature of the information attended to when seeking health information online.

Whilst this study provides a novel insight into the association between seeking health information online and health anxiety, the results must be interpreted in the context of the study's limitations. As the study did not measure how much participants typically accessed the Internet, or take into account participants' current health status, the possibility that these factors influenced the results cannot be ruled out. In addition, the participants were predominantly young and highly educated and it cannot be known whether the findings would generalize to populations with different demographic characteristics. It is for example possible that those who are older or less well educated may have less access or ability to use the Internet, or may employ different strategies when seeking health information online. Furthermore, this study utilized non-clinical participants. However, the 'high' group's level of health anxiety was in the clinical range and, as health anxiety is thought to exist on a continuum (Ferguson, 2009), it is likely that the results are relevant to the clinical population. However, further research is needed to establish whether the findings from this study generalize to individuals with a clinical diagnosis of health anxiety (hypochondriasis) and to those with other demographic characteristics. The current study is also limited by its reliance on retrospective self-report measures and future studies could usefully expand on these

preliminary findings. For example: future studies could develop more extensive, multiple item measures of health related Internet use; experimental studies could further examine the impact of searching for health information online on those with health anxiety; and observational or qualitative studies may provide greater understanding of the ways in which individuals with health anxiety use the Internet to seek health information.

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