The relationships between health anxiety, online health information seeking, and cyberchondria: Systematic review and meta-analysis

Ryan D. McMullan[1]*, David Berle[2,3], Sandra Arnáez[4], Vladan Starcevic[5]

1. Australian Institute of Health Innovation, Macquarie University, Sydney, Australia.
2. Discipline of Clinical Psychology, University of Technology Sydney, Australia.
3. School of Psychiatry, University of New South Wales, Sydney, Australia.
4. Departamento de Personalidad, Evaluacion y Tratamientos Psicologicos, University of Valencia, Spain.
5. Discipline of Psychiatry, Sydney Medical School, Nepean Clinical School, Faculty of Medicine and Health, University of Sydney, Australia.

* *Corresponding author.*
Telephone: +61 (2) 9850 2452
Email: ryan.mcmullan@mq.edu.au
Address: Australian Institute of Health Innovation, Level 6, 75 Talavera Road, Macquarie University, NSW 2109, Sydney, Australia.

Abstract

Background: Cyberchondria refers to an abnormal behavioral pattern in which excessive or repeated online searches for health-related information are distressing or anxiety-provoking. Health anxiety has been found to be associated with both online health information seeking and cyberchondria. The aims of the present systematic review and meta-analysis were to examine the magnitude of these associations and identify any moderator variables.

Methods: A systematic literature search was performed across several databases (PsycINFO, PubMed, Embase) and reference lists of included studies.

Results: Twenty studies were included across two independent meta-analyses, with 7373 participants. Random effects meta-analyses showed that there was a positive correlation between health anxiety and online health information seeking [$r = 0.34$, 95% CI (0.20, 0.48), $p < .0001$], and between health anxiety and cyberchondria [$r = 0.62$, 95% CI (0.52, 0.71), $p < .0001$]. A meta-regression indicated that the age of study participants [$Q(1) = 4.58$, $p = .03$] was partly responsible for the heterogeneity found for the relationship between health anxiety and cyberchondria.

Limitations: The generalizability and validity of our findings are restricted by the methodological limitations of the primary studies, namely, an over-reliance on a single measure of cyberchondria, the Cyberchondria Severity Scale.

Conclusions: Our review found a positive correlation between health anxiety and online health information seeking, and between health anxiety and cyberchondria. Further research should aim to explore the contexts for these associations as well as address the identified limitations of the extant literature.

Keywords: health anxiety, cyberchondria, internet, online seeking, systematic review, meta-analysis

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The growth of the internet has led to health information being more accessible than ever before. In the United States, more than 100 million internet users search for health information online (Fox & Duggan, 2013). Health-related information is free to access anonymously on the internet and it is available any time on a range of devices (e.g., desktop or laptop computers, tablets, smartphones). In 2016, 51% of adults in Great Britain used the internet to search for health information, compared to 18% in 2007 (Prescott, 2016). The large and ever-increasing numbers of people obtaining health information online suggest that it might have become the most popular method by which to attain such information (Dobransky & Hargittai, 2012).

Access to health information online has potential benefits insofar as educating people about the nature, causes, prevention, and treatment of specific health conditions. However, for some people who are distressed or anxious about their health, the internet may be accessed for the purpose of self-diagnosing or obtaining reassurance (White & Horvitz, 2009). Indeed, people who are more anxious about their health appear to search the internet for health information more frequently (Baumgartner & Hartmann, 2011; Eastin & Guinsler, 2006; Muse et al., 2012) and for greater amounts of time (Singh & Brown, 2014). Consensus has not been reached as to the directionality of the relationship between online health information searching and health anxiety (Starcevic & Berle, 2015). That is, distress and anxiety about health could be a primary motivator for searching for health information online. Alternatively, searching online for health information in the absence of any significant anxiety could be a precursor to increased health anxiety. Moreover, health anxiety resulting from online searches may in turn precipitate further or more detailed searches. The direction of the relationship between searching online for health information and health anxiety may also vary from one person to another.

Heightened health anxiety or distress associated with excessive or repeated searches online for health-related information is referred to as cyberchondria (Starcevic & Berle, 2013). The distinction between online health information seeking and cyberchondria relates to the reasons for the behavior and its consequences (Starcevic & Berle, 2013). That is, cyberchondria not only refers to online health information seeking, but involves excessive searches that are driven by and/or lead to distress and anxiety. Thus, rather than simply lying on a continuum of behavior, online health information seeking and cyberchondria have different aims (learning about a condition versus relieving anxiety about a condition). While online health information seeking is not in and of itself "maladaptive", cyberchondria involves spending an excessive amount of time online (to the expense of more productive activities) and experiencing an increase in anxiety after searching.

Cyberchondria is considered an abnormal behavioral pattern, rather than a condition or diagnostic entity (Starcevic, 2017) and is thought to be especially common among people with high levels of health anxiety (Starcevic & Berle, 2013). Studies have shown that searching for health information may indeed increase levels of distress and uncertainty about one's feared condition (Baumgartner & Hartmann, 2011; Doherty-Torstrick, Walton, & Fallon, 2016; Singh & Brown, 2016; White & Horvitz, 2009), and potentially lead to greater functional impairment (Doherty-Torstrick, Walton, & Fallon, 2016) providing preliminary indirect support for the construct.

A key contributing factor related to cyberchondria is the ambiguity of online health information, such that it is often inaccurate, misleading, or incomplete (Eysenbach, Powell, Kuss, & Sa, 2002). Individuals seeking reassurance about their health may spend much of their time attempting to determine the validity of health-related information. This process contributes to the cycle in which repeated online searches increase distress and anxiety (Starcevic & Berle, 2013).

There appears to be variation in the literature regarding the magnitude of the association between health anxiety and online health information seeking, and between health anxiety and cyberchondria. For instance, some studies have found small to moderate (e.g., r = 0.21) relationships between internet use and health anxiety (e.g., Fergus & Dolan, 2014), whereas others have found a strong relationship (e.g., r = 0.5; Baumgartner & Hartmann, 2011). Similarly, there is variation in the strength of the relationship between health anxiety and cyberchondria, such that one study reported a small relationship (r = 0.23; Selvi, Turan, Sayin, Boysan, & Kandeger, 2018), whereas other studies have found a strong relationship (e.g., r = 0.62; Fergus, 2015). It is critical that we have a good understanding of the magnitude of the association between both health anxiety and online health information seeking, and health anxiety and cyberchondria, so that possible mechanisms and maintaining factors can then be explored in future research. It would also be important to conduct an integrative review to quantify the magnitude of these relationships and identify their moderators and covariates.

Further to these considerations, we conducted the present systematic review and meta-analysis with the following aims: (a) to examine the relationship between health anxiety and online health information seeking, (b) to examine the relationship between health anxiety and cyberchondria, and (c) to identify potential moderator variables that may influence these relationships. Improving our understanding of these relationships is important for determining in what ways health anxiety might be associated with problems related to Internet use (excessive time spent online or life interference arising from searching online), as well as for gaining insight into the relationship between health anxiety and the counter-productive behaviors which are thought to characterize cyberchondria.

Material and Methods

This systematic review and meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standard (Moher, Liberati, Tetzlaff, & Altman, 2009). The protocol for our systematic review and meta-analysis was pre-registered at PROSPERO (CRD42017069599).

Literature search

One author (RDM) searched PsycINFO, PubMed, and Embase from database inception to March 21, 2018 for relevant literature. The following Boolean expressions were used in PsycINFO and Embase: "(cyberchondria OR online OR internet OR web) AND (search* OR seek* OR brows* OR reassur*) AND (health anxiety OR illness anxiety OR hypochondri*)". The following Boolean expressions were used in PubMed: "cyberchondria"[All Fields] OR (online[All Fields] OR ("internet"[MeSH Terms] OR "internet"[All Fields]) OR web[All Fields]) AND (search*[All Fields] OR seek*[All Fields] OR brows*[All Fields]) OR reassur*[All Field]) AND ("health anxiety"[All Fields] OR "illness anxiety"[All Fields] OR (("hypochondr*"[MeSH Terms] OR "hypochondr*"[All Fields])).

All articles retrieved were uploaded to Covidence (Covidence, 2018), which is an online screening and data extraction tool. After the removal of duplicates, two authors (RDM and SA) screened titles and abstracts. Studies that were not relevant were excluded. The two authors then assessed the full text of articles to judge their eligibility in accordance with the inclusion criteria. The same two authors (RDM and SA) also inspected the reference lists of selected studies for remaining relevant studies. Disagreement between the two authors was resolved through discussion.

Inclusion criteria

Studies were included in the current systematic review if they fulfilled the following criteria: (a) the study (observational or experimental) investigated the relationship between

health anxiety and online health information seeking or cyberchondria, (b) the study included both a measure of health anxiety and online health information seeking or cyberchondria, (c) the study was published in a peer-reviewed journal (d) the study was published in English.

Quality assessment

One author (RDM) assessed the quality of the included studies by using an adapted version of the Quality Assessment Tool for Quantitative Studies developed by the Effective Public Health Practice Project (Ávila, Lucchetti, & Lucchetti, 2017). This tool consists of 19 items that assess 8 criteria: (a) study design, (b) blinding, (c) representativeness – selection bias, (d) representativeness – withdrawals and dropouts, (e) confounders, (f) data collection methods, (g) data analysis, and (h) reporting. The rating for each criterion ranges from 1 (low risk of bias; strong) to 3 (high risk of bias; weak). Studies can have between 4 and 8 component ratings based on the 8 criteria. A global rating is assessed according to the component ratings. For example, a study with 6 ratings could be rated as "strong" if there are no WEAK ratings and at least 3 STRONG ratings, "moderate" if there is one WEAK rating or less than 3 STRONG ratings, or "weak" if there are two or more WEAK ratings.

Data extraction

One author (RDM) developed a data extraction form that was used to extract relevant information from included studies. This information included: first author, journal, publication year, country, study design, sample size, cyberchondria or online health information search measure, health anxiety measure, whether confounding variables were controlled, mean age of participants, Pearson's *r* value, and quality assessment rating. Authors of eligible studies were contacted when studies did not provide effect sizes or essential statistics for effect size calculation.

Statistical analysis

The statistical analysis was conducted using R statistical software version 3.4.3 (R Core Team, 2016). In order to normalize the distribution of the raw data (Pearson's *r* values), these values were transformed to Fisher's *z* scale and its variance (Borenstein, Higgins, & Rothstein, 2009). Synthesis of individual effect sizes to summary effect sizes was completed by conducting random effects meta-analyses using a restricted maximum likelihood method. Results were converted back from Fisher's *z* to Pearson's *r* for interpretation. Heterogeneity and variance among effect sizes of studies were examined by calculating the *Q* statistic, which is the standardized sum of the squared deviations of all effects about the mean (Borenstein, Higgins, Hedges, & Rothstein, 2015) and the I^2 statistic, which reflects the proportion of true to total variance (Borenstein et al., 2015). A Bajaut plot was visually inspected to identify sources of heterogeneity. According to Bajaut, Mah, Pignon, and Hill (2002), studies that fall in the top right quadrant of the plot have greater influence on the overall result and contribute most to study heterogeneity. An examination of the characteristics of these studies can allow for the identification of potential moderator variables that contribute to heterogeneity. A moderator analysis using a meta-regression model was conducted in order to identify sources of heterogeneity. Potential moderator variables included age, quality of studies, and control of confounding variables. An outlier and influence diagnostic procedure was used to determine the presence of potential outliers and influential cases (Vierchtbauer & Cheung, 2010). This procedure extends diagnostic procedures from standard linear regression analyses to the context of meta-analysis. Publication bias was examined by visually inspecting both a funnel plot and a contour enhanced funnel plot. Begg's adjusted rank correlation test and Egger's regression test were used to assess publication bias (Begg & Mazumdar, 1994; Egger et al., 1997).

We conducted two separate random effects meta-analyses. The first meta-analysis examined the relationship between health anxiety and internet use (i.e., online health

information seeking) and the second meta-analysis examined the relationship between health anxiety and cyberchondria.

Results

Search results and study characteristics

After the selection procedure (see Figure 1), 20 studies were included across two independent meta-analyses. The first meta-analysis included 10 studies (Baumgartner & Hartmann, 2011; Doherty-Torstrick, Walton, & Fallon, 2016; Fergus, 2013; Fergus & Dolan, 2014; Lagoe & Atkin, 2015; Lee & Hawkins, 2016; Muse, McManus, Leung, Meghreblian, & Williams, 2012; Singh & Brown, 2014; Singh & Brown, 2016; Tanis, Hartmann, & te Poel, 2016). The second meta-analysis also included 10 studies (Bajcar et al., 2018; Barke, Bleichhardt, Rief, & Doering, 2016; Fergus, 2014; Fergus, 2015; Fergus & Russell, 2016; Fergus & Spada, 2017; Mathes, Norr, Allan, Albanese, & Schmidt, 2018; Norr, Albanese, Oglesby, Allan, & Schmidt, 2015; Norr et al., 2015; Selvi et al., 2018). An overview of the included studies is shown in Table 1.

The overall quality of the included studies ranged from ‘moderate’ to ‘strong’. Eighteen of the 20 studies were observational (cross-sectional) studies. The remaining 2 studies consisted of an experimental study and a randomized-controlled trial. A majority of the studies were conducted in the United States (11 out of 20). Sample sizes ranged from 40 to 731. Most studies used community samples (19 out of 20). The total number of participants across the 20 studies was 7373. The average age of participants was 31.09 years. Ten studies utilized the Cyberchondria Severity Scale (CSS; McElroy & Shevlin, 2014), whereas the other 10 studies used a variety of assessment tools for internet searching such as self-report measures of frequency and duration of online searches and tracking of webpages viewed across five months or during a 15-minute task. The most commonly used measure of health anxiety was the Short Health Anxiety Inventory (SHAI; Salkovskis, Rimes, Warwick,

& Clark, 2002), followed by the Whitely Index (WI; Pilowsky, 1967), and the Health Anxiety Inventory (HAI; Salkovskis et al., 2002). All other measures of health anxiety were used only once.

First meta-analysis – the relationship between health anxiety and online health information seeking

There was a positive correlation between health anxiety and online searching [r = 0.34, 95% CI (0.20, 0.48), $p < .0001$; Figure 2] and a high level of heterogeneity [$Q = 133.93$, $p < .0001$, $I^2 = 92.42\%$, 95% CI (83.24%, 97.67%)]. Examination of the Bajaut plot revealed that 3 studies were located in the upper right quadrant (Figure 3). An examination of these studies did not lead to the identification of potential moderator variables. An outlier and influence diagnostic procedure revealed that none of the studies were identified as outliers or influential cases. A moderator analysis was performed to identify sources of heterogeneity. A meta-regression indicated that age [$Q(1) = 1.64$, $p = .20$], quality of studies [$Q(1) = 0.11$, $p = .75$], and control for confounding variables [$Q(1) = 0.06$, $p = .81$] did not contribute to heterogeneity among effect sizes. We tested the possible influence of publication bias on the results. Neither Egger's test ($p = .97$) nor the rank correlation test were significant ($p = .48$). Inspection of the funnel plot did not reveal asymmetry (Figure 4). However, examination of the contour enhanced funnel plot indicated an over-representation of study effect sizes outside the significance contours, which may suggest publication bias (Figure 5).

Second meta-analysis – the relationship between health anxiety and cyberchondria

There was a positive correlation between health anxiety and cyberchondria [$r = 0.62$, 95% CI (0.52, 0.71), $p < .0001$; Figure 6] and a high level of heterogeneity [$Q = 76.49$, $p < .0001$, $I^2 = 90.13\%$, 95% CI (79.04%, 97.17%)]. Examination of the Bajaut plot revealed that one study was located in the upper right quadrant (Figure 7). A closer examination of this study did not lead to the identification of potential moderator variables. An outlier and

influence diagnostic procedure revealed that one study (i.e., Selvi et al., 2018) was identified as a potential outlier. A sensitivity analysis was conducted, which involved re-running the analysis without the identified outlier. The results indicated a similar summary effect size as the original analysis [$r = 0.66$, 95% CI (0.61, 0.71), $p < .0001$]. Consequently, this study was retained in subsequent analyses. A moderator analysis was performed to identify sources of heterogeneity. A meta-regression indicated that age [$Q(1) = 4.58$, $p = .03$] was partly responsible for the heterogeneity. However, quality of studies [$Q(1) = 1.72$, $p = .19$] and control for confounding variables [$Q(1) = 1.72$, $p = .19$] did not contribute to heterogeneity among effect sizes. Neither Egger's test ($p = .71$) nor the rank correlation test were significant ($p = .38$). Inspection of the funnel plot did not reveal asymmetry (Figure 8). However, examination of the contour enhanced funnel plot indicated an over-representation of study effect sizes outside the significance contours, which may suggest publication bias (Figure 9).

Discussion

This review examined 20 studies that explored the relationship between either health anxiety and online health information seeking, or health anxiety and cyberchondria. Improving our understanding of the function and correlates of online health information seeking is important. This understanding is particularly relevant for people who find such searches to be counterproductive and may experience increases rather than decreases in distress and anxiety about their health. To the best of our knowledge, our work is the first integrative review of this area.

Our review found a medium sized positive association between health anxiety and online health information seeking. This finding confirms assertions that one of the predictors of online health information seeking may be the extent to which an individual is experiencing health anxiety (Baumgartner & Hartmann, 2011; Eastin & Guinsler, 2006; Muse et al., 2012;

Singh & Brown, 2014). Additionally, the medium-size strength of the association suggests that other factors might contribute to online health information seeking. That is, online health information seeking may not only be driven by health anxiety. Consequently, there remains scope for more nuanced assessment of the role of health anxiety in online health information seeking. For instance, future research could investigate whether reassurance seeking mediates the relationship between health anxiety and online health information searches.

Despite finding an association between health anxiety and online health information seeking, there appears to be significant variability in the strength of this association across studies. For instance, associations ranged from small (e.g., $r = 0.07$; Lee & Hawkins, 2016) to large (e.g., $r = 0.55$; Doherty-Torstrick, Walton, & Fallon, 2016). A meta-regression indicated that age, quality of studies, and control for confounding variables did not explain such heterogeneity. However, there may be other study-related factors, such as study setting, sample characteristics, language, study design, and outcome measures, which explain the variation in the strength of the relationship between health anxiety and online health information searches. Further research should aim to better characterize the sources of such variation and identify individual differences which predict online health information seeking among people with high levels of health anxiety.

A second focus of our review was on the relationship between health anxiety and the notion of cyberchondria, which implies distressing and counterproductive outcomes from online health information seeking. We found a strong relationship between health anxiety and measures of cyberchondria. This relationship appears stronger than that between health anxiety and online health information seeking, which suggests that while most people search for health information online, people with health anxiety might be especially prone to experiencing counterproductive outcomes from such searches. This also suggests that attempts to seek reassurance about one's health by repeatedly searching online for health-

related information may maintain health anxiety. However, the imperfect associations between symptoms of health anxiety on one hand and online health information seeking and cyberchondria on the other leaves open the possibility that the latter behaviors are somewhat independent from pathological health anxiety. Indeed, as far as health anxiety and cyberchondria are concerned, it has been demonstrated that they are both related and distinct (Fergus & Russell, 2016; Mathes et al., 2018).

With regards to potential moderator variables that may influence the relationship between health anxiety and cyberchondria, there was also heterogeneity in the strength of associations across the relevant studies. A meta-regression indicated that age explained some of this variation. That is, studies with older participants found a stronger association between health anxiety and cyberchondria, which may suggest that younger people with health anxiety find their searches to be relatively more reassuring, or at least, not as escalating of their anxiety. Future research could further investigate the role of age, general health status, and other potential moderator variables that may influence the relationship between health anxiety and cyberchondria.

The limitations of the primary studies in our review serve to limit the strength of our conclusions. For instance, most of the studies relied upon a single measure of cyberchondria (i.e., the CSS). Consequently, the strength of associations reported in the present review rely on the validity and reliability of this measure, which has been criticized for taking a broad approach to cyberchondria by including items that may be irrelevant and non-specific (Starcevic & Berle, 2015). Additionally, the original five-factor structure for this instrument has been called into question because one subscale (i.e., mistrust of medical professionals) has been found to have poor model fit (e.g., Barke, Bleichhardt, Rief, & Doering, 2016; Fergus, 2014). Second, most of the studies relied upon self-report as a measure of online health information searching. Future studies could employ a controlled experimental design

or use real-time measures to avoid the problem of recall bias. A third limitation pertains to the dearth of studies that reported health anxiety in the context of clinically significant conditions, such as illness anxiety disorder, depression, and anxiety. Fourth, perhaps our review was not exhaustive, such that potentially relevant unpublished studies were not identified or included. Also, two studies were excluded because necessary statistics required to calculate an effect size were not provided by the authors. Finally, while cyberchondria is defined as involving heightened health anxiety or distress, it may be important to investigate the relationship between health anxiety and cyberchondria without the distress items of the CSS due to possible item overlap (e.g., Fergus, 2014). However, anecdotally, we note that studies which have reported on the relationship between health anxiety and the separate domains of cyberchondria have also found significant positive correlations with the non-distress domains of cyberchondria (Norr et al., 2015).

In conclusion, the findings of our systematic review and meta-analysis indicated a medium sized positive association between health anxiety and online health information seeking, and a strong association between health anxiety and cyberchondria. The findings revealed a high level of heterogeneity in both meta-analyses. A meta-regression indicated that age was a significant moderator of the strength of the association between health anxiety and cyberchondria. Limitations of the literature identified by our review suggest a need to recruit diverse samples, including those with “clinical” levels of health anxiety and illness anxiety disorder. Furthermore, the associations between health anxiety and cyberchondria should be examined using a diverse range of cyberchondria-related measures (e.g., potentially structured interviews as well as self-report measures). Future research may then inform attempts to develop relevant prevention and treatment avenues for people who suffer from distress and health anxiety in the context of online health information seeking.

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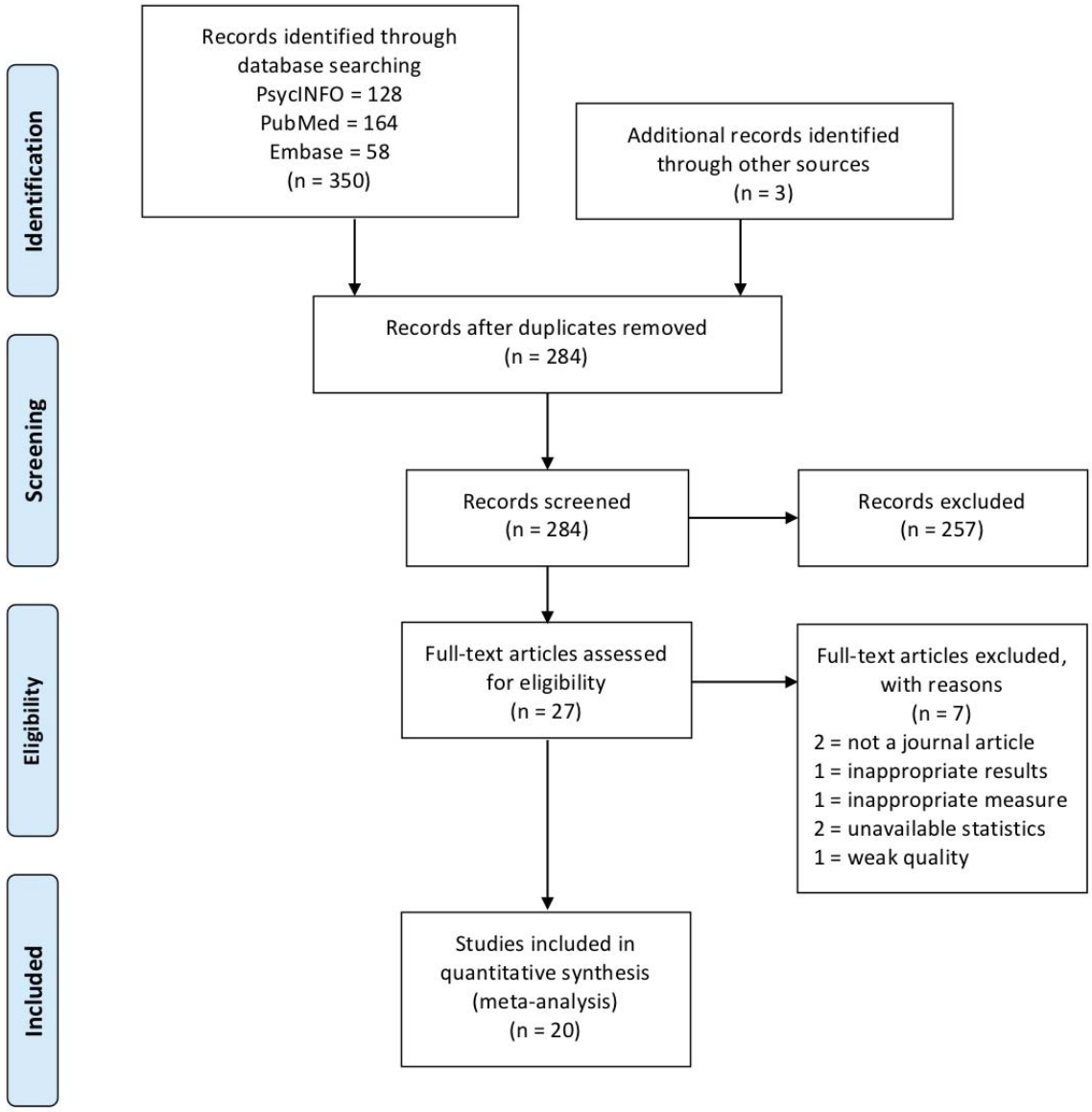

Figure 1. Flowchart of selection process.

Table 1. Overview of the included studies

Author/s	Country	Design	Participants	CSS or internet use measure	Health anxiety measure	Finding	Methodological appraisal
Bajcar et al., (2018)	Poland	Observational	380	CSS	SHAI	Positive correlation between CSS and SHAI ($r = .56$, $p < .01$)	2
Barke et al., (2016)	Germany	Observational	500	CSS	mSHAI	Positive correlation between CSS and mSHAI ($r = .59$, $p < .001$)	1
Baumgartner et al., (2011)	Netherlands	Observational	104	Internet frequency	WI	Health anxiety was associated with searching for health information online ($b = 1.17$, $\beta = 0.46$, $t(96) = 5.05$, $p < 0.01$.	2
Doherty-Torstrick et al., (2016)	USA	Observational	731	Internet checking	WI	High use internet symptom searchers ($M = 56.26$) scored higher on the WI compared to low use internet symptom searchers ($M = 41.13$), $d = 1.30$, $p < .01$	1
Fergus (2013)	USA	Observational	512	Internet search frequency	SHAI	Positive correlation between internet search frequency and SHAI ($r = .48$, $p = .01$)	2
Fergus (2014)	USA	Observational	539	CSS	SHAI	Positive correlation between CSS and SHAI ($r = .59$, $p < .01$)	2
Fergus (2015)	USA	Observational	578	CSS	WI	Positive correlation between CSS and WI ($r = .62$, $p < .001$)	2
Fergus et al., (2014)	USA	Observational	430	Internet frequency	HA item	The increased health anxiety group reported more frequent online searching ($M = 2.03$, $SD = 1.00$) compared to the no impact health anxiety group ($M = 1.62$, $SD = 0.92$), $d = 0.43$	2

Table 1. Overview of the included studies (continued)

Author/s	Country	Design	Participants	CSS or internet use measure	Health anxiety measure	Finding	Methodological appraisal
Fergus et al., (2016)	USA	Observational	375	CSS	MIHT	Positive correlation between CSS and MIHT ($r = .51$, $p < .001$)	2
Fergus et al., (2017)	USA	Observational	260	CSS	WI	Positive correlation between CSS and WI ($r = .67$, $p < .001$)	1
Lagoe et al., (2015)	USA	Observational	245	Information seeking	HAI	Positive correlation between information seeking and HAI ($r = .14$, $p < .05$)	2
Lee et al., (2016)	USA	RCT	224	Health information seeking	Worry	Non-significant correlation between health information seeking and worry ($r = .07$)	1
Mathes et al., (2018)	USA	Observational	462	CSS	SHAI	Relationship between CSS and SHAI ($r = .61$, $p < .001$)	2
Muse et al., (2012)	England	Observational	167	Internet frequency and duration	SHAI	The high health anxiety group ($M = 1.30$, $SD = 1.19$) searched online for health information significantly more frequently than the low health anxiety group ($M = 0.17$, $SD = 0.38$), $t(80) = 5.52$, $p < .001$, $d = 1.28$.	1
Norr, Albanese et al., (2015)	USA	Observational	526	CSS	SHAI	Positive correlation between CSS and SHAI ($r = .53$, $p < .05$)	2

Table 1. Overview of the included studies (continued)

Author/s	Country	Design	Participants	CSS or internet use measure	Health anxiety measure	Finding	Methodological appraisal
Norr, Oglesby et al., (2015)	USA	Observational	469	CSS	SHAI	Positive correlation between CSS and SHAI (r = .50, p < .001)	2
Singh et al., (2014)	England	Observational	255	Internet usage	SHAI	Health anxiety was significantly correlated with more frequent use of the internet for health purposes (r_s = .16, p < .01)	1
Singh et al., (2016)	England	Experimental	40	Internet usage (15 mins)	SHAI	There was no significant difference between the high health anxious group and the low health anxious group on the number of pages searched, $F(1)$ = .46, p > .50, η_p^2 = .01	2
Selvi et al., (2018)	Turkey	Observational	337	CSS	HAI	Positive correlation between CSS and HAI (r = .23, p < .01)	2
Tanis et al., (2016)	Netherlands	Observational	239	Internet usage (mins)	SHAI	Positive correlation between online information seeking and SHAI (r = .15, p < .05)	2

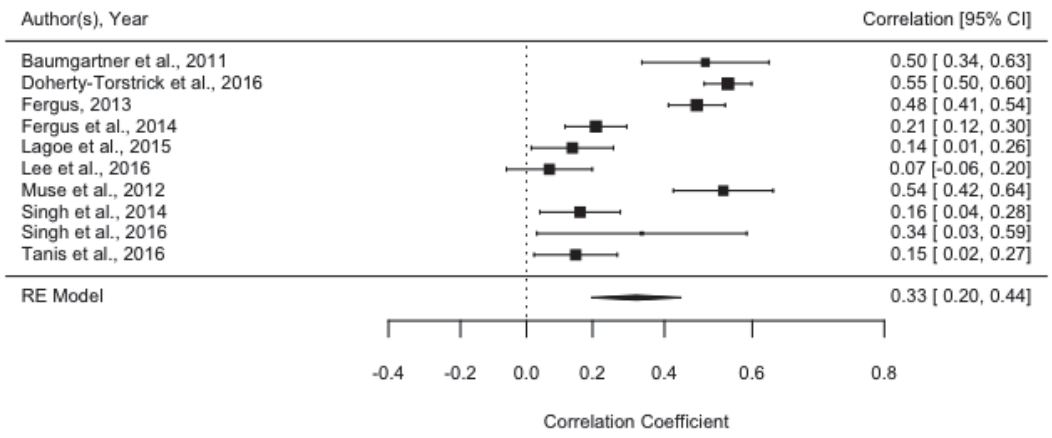

Figure 2. Forest plot from meta-analysis of the relationship between health anxiety and online health information seeking.

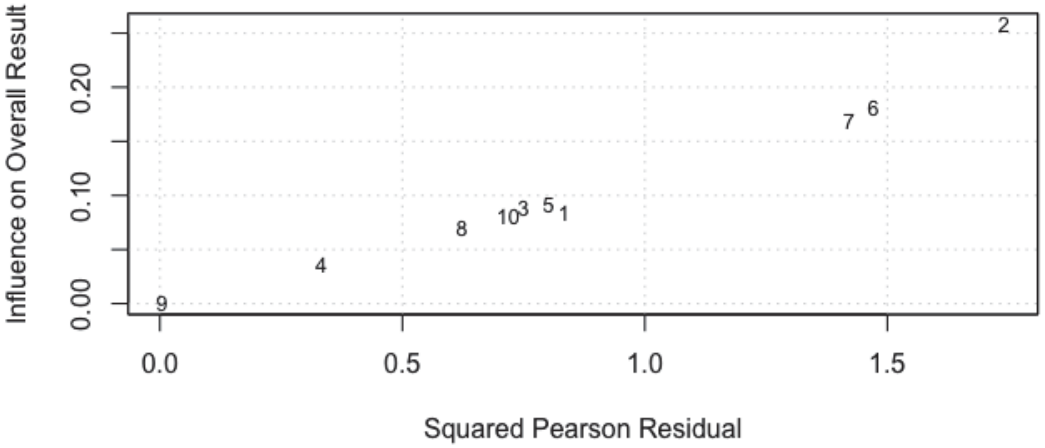

Figure 3. Bajaut plot.

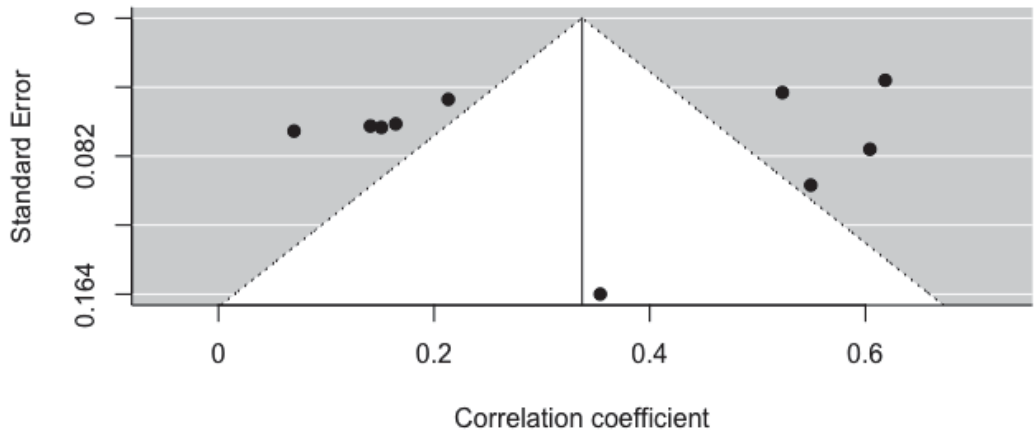

Figure 4. Funnel plot.

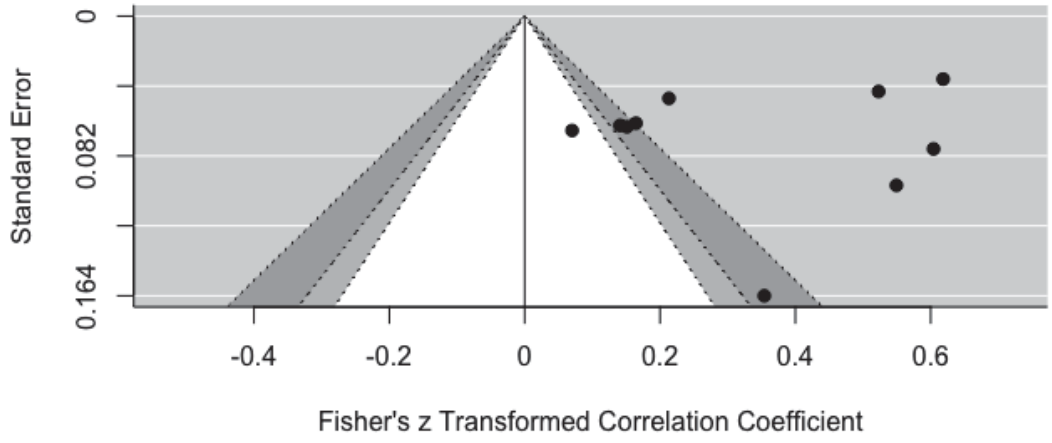

Figure 5. Contour enhanced funnel plot.

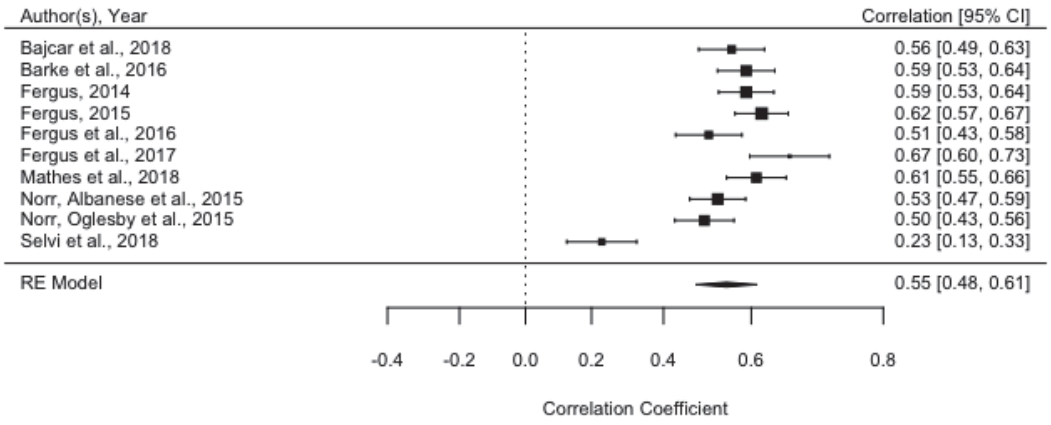

Figure 6. Forest plot from meta-analysis of the relationship between health anxiety and cyberchondria.

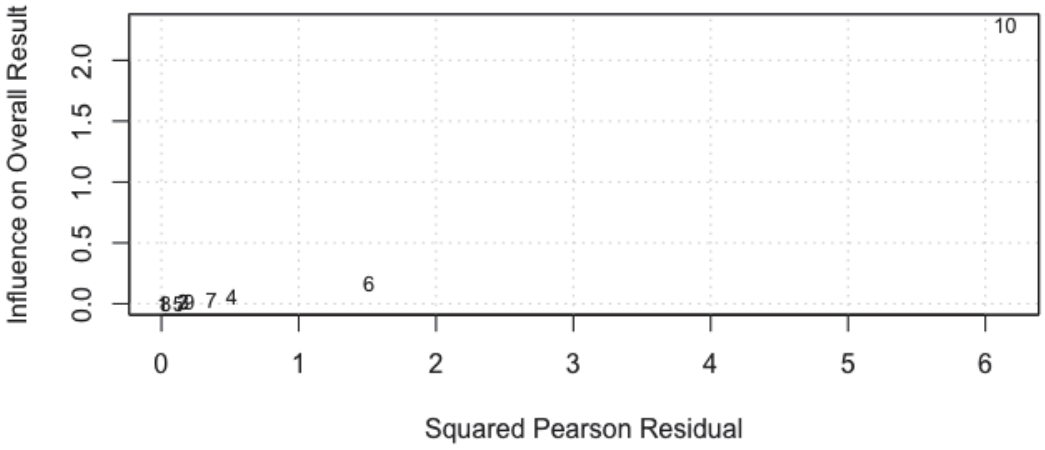

Figure 7. Bajaut plot.

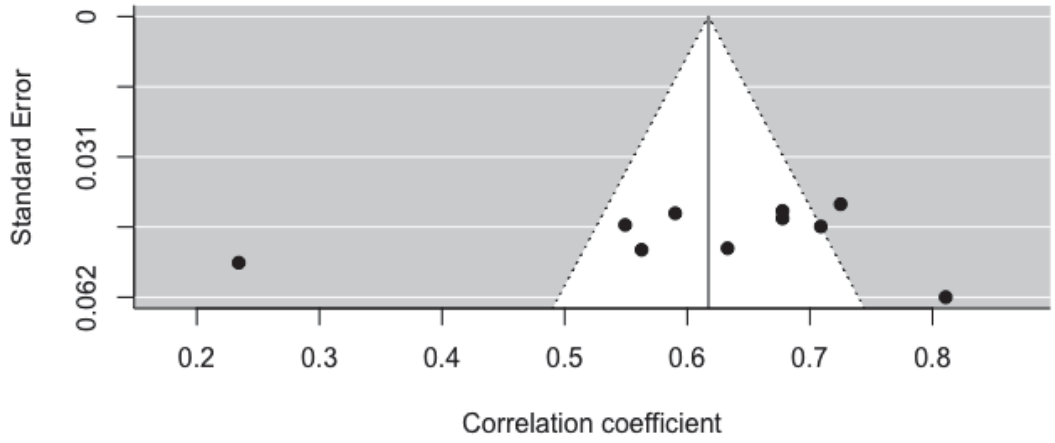

Figure 8. Funnel plot.

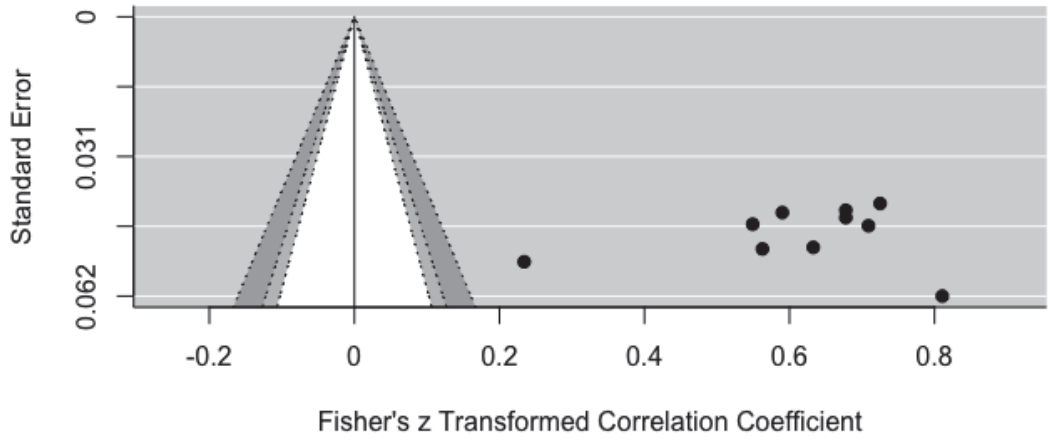

Figure 9. Contour enhanced funnel plot.

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Author statement
We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship. We confirm that the order of authors listed in the manuscript has been approved by all of us.

Contributors
RDM contributed to the development of the research question, performed literature searches, screened the studies, assessed the quality of the studies, extracted data, ran the analyses, and prepared the manuscript. DB contributed to the development of the research question, planned and guided literature searches, quality assessment, and data extraction, planned analyses, prepared the manuscript, and revised the final draft. SA contributed to the screening of studies and reviewed the final draft of the manuscript. VS contributed to the development of the research question and revised the final draft of the manuscript. All authors approved the final draft of the manuscript.

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