



# The curious case of cyberchondria: A longitudinal study on the reciprocal relationship between health anxiety and online health information seeking



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## ABSTRACT

The current study is the first to longitudinally investigate the reciprocal relationship between online health information seeking and health anxiety, i.e., cyberchondria. Expectations were that health anxious individuals who go online to find health information, experience an increase in health anxiety, which in turn will reinforce online seeking. A 4-wave longitudinal survey study among 5322 respondents aged 16–93 was conducted. Our results showed that individuals who are more health anxious than others, search online for health information more. Moreover, the results provided initial evidence for the expected reciprocal relationship between health anxiety and online health information seeking in respondents with non-clinical levels of health anxiety at the start of the study. However, this reciprocal relationship could not be found in a subsample of clinically health anxious individuals. Although for these individuals online health information seeking did not seem to exacerbate health anxiety levels, it might still serve as a maintaining factor of clinical health anxiety.

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## 1. Introduction

The Internet has become an important source of health information and provides the general public with access to a great amount of medical information (Chung, 2013; Cline & Haynes, 2001; Fox & Duggan, 2013; Fox & Jones, 2009; Gallagher & Doherty, 2009; Koch-Weser, Bradshaw, Gualtieri, & Gallagher, 2010; Lee, 2008; Lee & Hawkins, 2010; Morahan-Martin, 2004). Online health information is widely used by Internet users (European Commission, 2013; Fox & Duggan, 2013; Higgins, Sixsmith, Barry, & Domegan, 2011). However, this information is often disorganized, of poor quality and contains technical language (Chung, 2013; Cline & Haynes, 2001; Korp, 2006). Despite its overall usefulness (Cotten & Gupta, 2004; Dickerson et al., 2004; Gallagher & Doherty, 2009; Koch-Weser et al., 2010; Ybarra & Suman, 2008), online health information may thus also distress certain users. More specifically, it has been repeatedly suggested that seeking online health information may further reinforce the anxiety of those who are already overly anxious about their health (Baumgartner & Hartmann, 2011; Muse,

McManus, Leung, Meghreblian, & Williams, 2012; Singh & Brown, 2014; Starcevic & Berle, 2013, 2015).

Health anxiety reflects the – often unfounded – distress or anxiety that a person feels regarding his or her personal health and, because of the misinterpretation of bodily sensations, extremely health anxious people often believe that they have a serious illness or medical condition (Abramowitz, Olatunji, & Deacon, 2007; Ferguson, 2009; Salkovskis, Rimes, Warwick, & Clark, 2002). The level of health anxiety varies among individuals, whereby severe health anxiety may manifest as hypochondriasis (Abramowitz and Moore, 2007; Abramowitz et al., 2007; Ferguson, 2009; Salkovskis et al., 2002). In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders [DSM-V], hypochondriasis is replaced by illness anxiety disorder and somatic symptom disorder (American Psychiatric Association, 2013). Severe health anxiety is known to co-occur with depressive disorders and anxiety disorders such as panic disorder, generalized anxiety disorder or obsessive compulsive disorder (American Psychological Association, 2013).

The phenomenon of increased health anxiety due to online health information seeking has frequently been referred to as ‘cyberchondria’. Cyberchondria is generally defined as online health-related information seeking that is fueled by anxiety about one’s health (i.e., health anxiety) and that also amplifies this particular anxiety (Starcevic & Berle, 2013, 2015). Cyberchondria thus implies a reinforcing spiral in which anxiety about one’s health

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drives online health information seeking, which in turn increases health-related fears. However, although many past studies have referred to the term cyberchondria (e.g., Fergus, 2014; Loos, 2013; McElroy and Shevlin, 2014; Muse et al., 2012; Starcevic and Berle, 2013; White and Horvitz, 2009a), these studies have only provided cross-sectional evidence for a potential relationship between online health information seeking and health anxiety. Accordingly, what may be regarded as the very core of cyberchondria, namely a reciprocal relationship between online health information seeking and health anxiety that develops over time, has not yet been sufficiently examined. Furthermore, although the definition of cyberchondria as proposed by Starcevic and Berle (2013), suggests that health anxiety precedes an increase in online health-related information seeking, cross-sectional data do not inform us about the causal primacy of the reciprocal relationship, and it has yet to be examined whether online seeking may also precede an increase in health anxiety (Aiken & Kirwan, 2014; Harding, Skritskaya, Doherty, & Fallon, 2008; Starcevic & Aboujaoude, 2015; Starcevic & Berle, 2015).

The present article, therefore, substantially extends the existing literature by examining how health anxiety and online health information seeking are related longitudinally in a large nationwide sample. Adding to the innovativeness of the present approach, we applied an advanced data-analytical procedure to examine the obtained longitudinal data (Hamaker, Kuiper, & Grasman, 2015). This procedure enabled us to examine the proposed relationship within individuals as well as across people.

### 1.1. Cyberchondria: a reciprocal relationship between online health information seeking and health anxiety

From a cognitive-behavioral perspective, health anxiety is maintained by several factors: increases in physiological arousal as a response to feeling anxious (physiological factor, e.g., increased heart rate or numb fingers); a bias in the way health information is processed (cognitive factor, e.g., confirmatory attentional bias or sensitivity towards bodily sensations); and safety seeking behaviors (behavioral factor, e.g., checking bodily state; Abramowitz, Schwartz, & Whiteside, 2002; Salkovskis & Warwick, 1986; Warwick, 1989). Reassurance seeking is the most noticeable safety seeking behavior and people with health anxiety feel a constant need to seek reassurance to reduce anxiety and uncertainty about their health (Abramowitz & Moore, 2007; Abramowitz et al., 2007, 2002).

Searching for health information on the Internet is one way to achieve this reassurance (Salkovskis et al., 2002). In light of the cognitive-behavioral model of health anxiety we would thus expect that, as a form of reassurance seeking, health anxious individuals are more likely to search for health information online. Previous studies have indeed shown that health anxious people go online more often to find health information. For example, Muse et al. (2012) revealed that people with high levels of health anxiety go online more frequently and for longer periods of time than people with low levels of health anxiety. Similarly, Singh and Brown (2014) found positive correlations between health anxiety and the frequency of online health information seeking. In addition to increased online searching, health anxious people are also more likely to post health-related questions on online forums (Baumgartner & Hartmann, 2011). Health anxious people thus seem to exhibit more online health information seeking behavior.

The definition of cyberchondria further refers to the proposition that seeking health information online increases health anxiety. Previous studies have shown that health anxious people experience more worries and distress after online health information seeking (Baumgartner & Hartmann, 2011; Muse et al., 2012; Singh & Brown, 2014). More specifically, health anxious people indi-

cated feeling more frightened and anxious based on the health information that they found online (Baumgartner & Hartmann, 2011; Muse et al., 2012). Two mechanisms may account for this effect. First, if health anxious people go online to find reassuring information, they may become overwhelmed by the amount or complexity of the information that they find online (Baumgartner & Hartmann, 2011). The negative information regarding symptoms and illnesses that an individual is likely to encounter online may fuel levels of health anxiety (White & Horvitz, 2009a). Furthermore, although online information may provide some initial reassurance, the effects are often short-lived for health anxious individuals. Indeed, frequent reassurance seeking may increase awareness of bodily symptoms or sensations and thereby reinforce health anxiety (Abramowitz & Moore, 2007; Asmundson, Abramowitz, Richter, & Whedon, 2010; Rachman, 2012). In addition, a recent study by Singh and Brown (2015) shows that health anxious people are likely to engage in query escalation (i.e., an escalation of the seriousness of search terms based on previous search findings). For health anxious people, online health information may thus increase rather than decrease anxiety.

The second mechanism that may account for the effect of online health information seeking on health anxiety can be found in the selective perception of external stimuli. Health anxious people are known to selectively attend to information that confirms their worries about being ill, and they ignore information that counters their existing belief of being ill: this is referred to as the illness-related attentional bias (Hadjistavropoulos, Craig, & Hadjistavropoulos, 1998; Owens, Asmundson, Hadjistavropoulos, & Owens, 2004; Warwick & Salkovskis, 1990). For example, previous studies have shown that health anxiety is positively associated with a bias towards threatening health-related images (Jasper & Witthöft, 2011) and that health anxious people pay more attention to threatening health information compared to less health anxious people (Owens et al., 2004). Accordingly, health anxious people may be prone to attend to more negative online health information that fuels their already existing worries about health.

In sum, health anxious individuals search for health information online more frequent, but the online health information that they find may increase already existing levels of anxiety, which implies a mutually influencing process. Until now, however, this reciprocal relationship has not been studied longitudinally. It is thus unclear whether health anxiety is influenced by online health information seeking over time and vice versa.

The rationale for cyberchondria as described previously, implicitly assumes that this phenomenon pertains to individuals with high or clinical levels of health anxiety. However, the downsides of online health information such as technical language or lack of quality and an abundance of negative information may also increase health anxiety in individuals with non-clinical levels of health anxiety (White & Horvitz, 2009a, 2009b). Thus, another interpretation of cyberchondria may be that online health information seeking may lead to health anxious beliefs even in individuals who were not clinically health anxious before (Aiken & Kirwan, 2014; Starcevic & Aboujaoude, 2015; Starcevic & Berle, 2015). Since studies until now have only focused on cross-sectional associations between health anxiety and online health information seeking, and not on causal effects and primacy of causes, the question remains to what extent cyberchondria constitutes a phenomenon associated with clinical health anxiety or an impairing feature of the Internet that may affect everyone.

### 1.2. The present study

In the present study we aim to examine the reciprocal relationship between health anxiety and online health information seeking in a longitudinal design. We firstly hypothesize that higher levels

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