The Cyberchondria Severity Scale (CSS): An examination of structure and relations with health anxiety in a community sample

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ABSTRACT

McElroy and Shevlin (2014) developed the 33-item Cyberchondria Severity Scale (CSS) to allow for a multidimensional assessment of cyberchondria (compulsion, distress, excessiveness, reassurance, and mistrust of medical professional). The present study evaluated psychometric properties of the CSS, including its factor structure, internal consistency, convergent validity, and incremental validity, using a large sample of community adults located in the United States ($N = 539$). Results from a confirmatory factor analysis (CFA) supported the adequacy of the five-factor structure of the CSS. However, results from a higher-order CFA indicated that the mistrust of medical professional factor does not assess the same construct as the other factors of the CSS. The CSS scales evidenced adequate internal consistency and significantly correlated with health anxiety. The distress, excessiveness, and mistrust of medical professional scales correlated significantly more strongly with health anxiety than obsessive–compulsive symptoms and these three scales were the only CSS scales to share unique variance with health anxiety. Implications of these results for future research are discussed.

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1. Introduction

Searching for medical information on the Internet is common, as approximately eight-out-of-ten American adults engage in this activity (Fox, 2006). There are benefits to using the Internet to access medical information, including anonymity, cost-effectiveness, and feeling better informed about your own or someone else's medical experience (Starcevic & Berle, 2013). Despite these benefits, searching for medical information on the Internet leads some individuals to experience increased health anxiety. In fact, White and Horvitz (2009) found an escalation in health anxiety among approximately 38% of individuals who searched for medical information online. Health anxiety has been defined as the wide range of worry that individuals can have about their health (Asmundson & Taylor, 2005) and the exacerbation of health anxiety as the result of repeated online searches for medical information has been termed cyberchondria (Taylor & Asmundson, 2004). Along with engendering distress, cyberchondria could lead to medical overutilization. For example, White and Horvitz (2009) found that approximately 24% of individuals reported that their health-related online searching behavior led them to seek out medical care that they would not have sought out had they not searched online.

Given its associated distress and potential economic costs, it is important to better understand cyberchondria. To achieve this goal, it is of course necessary to develop valid assessment tools. To date, cyberchondria has primarily been assessed using single-items, such as whether individuals experience greater health anxiety as a result of Internet searches for medical information (Fergus, 2013; Muse, McManus, Leung, Meghreblian, & Williams, 2012). Although single-item markers are acceptable when a construct is sufficiently narrow (Wanous, Reichers, & Hudy, 1997), cyberchondria is best considered a multidimensional construct (Starcevic & Berle, 2013). Single-item markers are thus not optimal when assessing cyberchondria.

McElroy and Shevlin (2014) sought to address this gap in the literature by developing the Cyberchondria Severity Scale (CSS). McElroy and Shevlin (2014) initially developed a pool of 43 items and, using a small college student sample ($N = 190$), exposed the 43 items to an exploratory factor analysis (EFA). Five factors were extracted from the EFA and 10 items were removed based on non-salient loadings or salient cross-loadings, resulting in 33 total items. The first factor was labeled *compulsion*, as the items tap the interruption of daily living associated with repeated online searching behavior (e.g., "Researching symptoms or perceived medical conditions online interrupts my offline work activities"). The second factor was labeled *distress*, as the items assess related

negative affective states (e.g., "I find it hard stop worrying about symptoms or perceived medical conditions that I have researched online"). The third factor was labeled *excessiveness*, as the items pertain to the repetitive quality of online behavior (e.g., "I read different web pages about the same perceived condition"). The fourth factor was labeled *reassurance*, as the items assess the need to seek out a professional opinion (e.g., "Researching symptoms or perceived medical conditions online leads me to consult with my doctor"). The fifth factor was labeled *mistrust of medical professional*, as the items, which are all reverse-keyed, relate to the distrust of medical services (e.g. "I trust my GP/medical professional's diagnosis over my online self-diagnosis").

McElroy and Shevlin (2014) found that each CSS scale evidenced adequate internal consistency (Cronbach's αs ranging from .75 to .95) and generally significantly correlated with symptoms of depression (rs ranging from .10 to .34), anxiety (rs ranging from .14 to .49), and stress (rs ranging from .16 to .36). McElroy and Shevlin (2014) presented preliminary data on the use of a total scale, with the CSS total scale evidencing good internal consistency ($\alpha = .94$) and significantly correlating with symptoms of depression ($r = .24$), anxiety ($r = .43$), and stress ($r = .37$). Overall, the CSS appears to be a promising new assessment tool of cyberchondria.

Given the potential usefulness of the CSS for extending our knowledge of cyberchondria, it is necessary to further evaluate its psychometric properties. For example, and as discussed by McElroy and Shevlin (2014), the sample size used in the development of the CSS fell below conventional guidelines for EFA (i.e., at least 200 respondents; Comrey, 1988). As such, it is important to further examine the factor structure of the CSS, particularly using confirmatory factor analysis (CFA). In further examining the factor structure of the CSS, it is also important to evaluate its potential hierarchical structure. More precisely, McElroy and Shevlin (2014) opined that "the CSS subscales appear to tap both a general factor of cyberchondria, along with sub-dimensions of this construct" (p. 263). An important requirement in determining whether to use a total score versus subscale scores is to "establish that all of the items – regardless of how they are placed in the various subscales – define a single general factor" (Clark & Watson, 1995; p. 318). One way to test for such a possibility is to conduct a higher-order CFA (Brown, 2006).

Based on the factor intercorrelations found by McElroy and Shevlin (2014), there is reason to believe that use of a CSS total scale might not be optimal. This reasoning is based on their findings that the mistrust of medical professional shared factor intercorrelations (rs ranging from −.04 to .23) that were much more modest in magnitude relative to those found among the other four factors of the CSS (rs ranging from .52 to .67). As noted, all three items of the mistrust of medical professional scale are reverse-keyed. Although reverse-keyed items can be useful for identifying respondents who have a particular response tendency, such items can lead to confusion and often form a distinct factor from straightforwardly-worded items (Brown, 2003; Rodebaugh et al., 2004). As such, researchers have suggested only scoring the straightforward-worded items when creating total scale scores of measures that consist of both straightforward-worded and reverse-keyed items (Rodebaugh et al., 2004). It is thus possible that a CSS total scale might be best operationalized as the summation of only the straightforward-worded items.

In further evaluating the psychometric properties of the CSS, it is also important to establish its associations with health anxiety. Data speaking to such an association is important in supporting the construct validity of the CSS, as health anxiety is a core feature of cyberchondria (Starcevic & Berle, 2013). Moreover, distrust of medical services is related to health anxiety (Salkovskis & Warwick, 2001). As such, although the medical professional scale of the CSS might not belong to the same higher-order construct as

the other CSS scales, the utility of this scale could be supported when examined in relation to health anxiety. Tests of incremental validity of the CSS scales in relation to health anxiety can help speak to their relative usefulness. Elucidating associations between the CSS scales and health anxiety can also support the convergent validity of the CSS, particularly if those associations are significantly stronger than the associations between the CSS scales and a measure of a related symptom type. Because of parallels between health anxiety and obsessive–compulsive disorder (OCD) (Deacon & Abramowitz, 2008), as well as between cyberchondria and OCD (i.e., both have a compulsive element; McElroy & Shevlin, 2014), assessing for obsessive–compulsive symptoms should provide a stringent test as to whether the CSS adequately converges with health anxiety.

Addressing these gaps in the literature, the present study further examined the psychometric properties of the CSS. A higher-order CFA approach, following Brown (2006), was used to examine the factor structure of the CSS. Following Brown (2006), an adequate first-order model was initially fit to the data before examining for the presence of a higher-order factor. When testing the adequacy of first-order models, it was predicted that a five-factor model, in which the items of the compulsion, distress, excessiveness, reassurance, and mistrust of medical professional subscales of the CSS loaded on separate, yet intercorrelated, factors would provide an adequate fit to the data and a better fit to the data relative to an alternative first-order factor structure. This prediction would replicate McElroy and Shevlin's (2014) EFA results.

It was next predicted that a higher-order factor would *not* adequately account for the intercorrelations among the five, first-order factors of CSS. This prediction was based on the only modest factor intercorrelations between the mistrust of medical professional factor and the other factors of the CSS found by McElroy and Shevlin (2014). Based on these predicted findings, the possibility that a higher-order factor would account for the intercorrelations among the compulsion, distress, excessiveness, and reassurance factors of the CSS was examined next. Supporting the convergent validity of the CSS, it was predicted that each CSS scale would significantly correlate with a measure of health anxiety and significantly more so than with a measure of obsessive–compulsive symptoms. Exploratory incremental validity analyses were then completed to examine whether each CSS scale shared unique variance with health anxiety.

2. Method

2.1. Participants

The sample consisted of 539 adults who reported *not* being diagnosed with a physical health condition by a medical doctor and reported using the Internet to search for medical information. The mean age of the sample was 31.3 years (SD = 9.9, range = 18–67). Respondents primarily were male (56.6%), received at least a two-year college degree (59.6%), worked at least 20 h per week (73.5%), and were currently unmarried (69.5%). In terms of racial/ethnic identification, 75.3% of respondents self-identified as White, 8.4% self-identified as African American, 7.1% self-identified as Asian, 5.9% self-identified as Hispanic, 2.6% self-identified as bi- or multi-racial, and 0.7% self-identified as "Other" race/ethnicity.

2.2. Measures

2.2.1. Cyberchondria Severity Scale (CSS; McElroy & Shevlin, 2014)

As reviewed, the CSS is a 33-item measure that assesses for cyberchondria. The CSS items are rated using a 5-point scale (ranging from 1 to 5). In addition to a total score, the CSS consists of five subscales: an 8-item compulsion subscale, an 8-item distress