Current Psychology (2021) 40:65–71
https://doi.org/10.1007/s12144-018-0001-x

Reliability and validity study of the Turkish version of cyberchondria severity scale

Süleyman Utku Uzun[1] · Mehmet Zencir[2]

Published online: 18 September 2018

Abstract

The exacerbation of health anxiety as the result of repeated online searches for medical information has been termed cyberchondria. Cyberchondria may lead to increased use of health services and increased healthcare costs. The aim of this study was to assess the validity and reliability of Turkish form of the Cyberchondria Severity Scale (CSS). This study was conducted on 335 employees who work in Pamukkale University. Depression Anxiety Stress Scale (DASS) was used for concurrent validity. After language adaptation and content validity of the CSS, confirmatory factor analyses (CFA) was performed. The mean age of participants was 38.2 ± 8.5 years and 64.5% of them were male. Cronbach alpha coefficient of CSS calculated for the reliability was 0.89, while the subscales ranged from 0.65 to 0.85. The correlation coefficients for test-retest reliability were ranged from 0.53–0.71. Correlation of CSS with DASS was $r = 0.33$. Fit indices based on CFA results were all excellent or within acceptable ranges. The Turkish version of CSS has adequate psychometric properties of validity and reliability, and can be used to assess cyberchondria.

Keywords Cyberchondria · Health anxiety · Reliability · Validity · Confirmatory factor analysis

Introduction

By the end of 2016, it is estimated that 47% of the world's population (about 3.5 billion people) were internet users, and two thirds of them were in developing countries (International Telecommunication Union 2016). In Turkey, it is estimated that about 61% of the population, approximately 48 million people were internet users (TURKSTAT 2016). With developing technology and increasing use of internet, more and more people have easily access to health-related information. The internet has taken the place of traditional resources used for health information such as social environment (friends, family members… etc.), mass media (television, radio, newspaper, magazines...) and health care providers (Napoli 2001). Searching for medical information with web search engines has become one of the popular occupations on the internet (Wang et al. 2012). According to Turkish Statistical Institute (TURKSTAT) 2016 data; within the last 3 months in Turkey, 65.9% of internet users were seeking information about health related issues (TURKSTAT 2016). Searching for medical information on the internet has many advantages such as amount of available information, anonymity, cost effectiveness, interaction with other patients and social support...etc. (Muse et al. 2012; Rains 2007; Starcevic and Berle 2013). In spite of these advantages, internet can cause digital divide that increase health inequalities; also has disadvantages such as confusing, unreliable, wrong or old information (Irving and Klegar 1999; Muse et al. 2012; Powell et al. 2003). One of the most important of these disadvantages is the increase of health anxiety (Baumgartner and Hartmann 2011; Fergus 2014; Muse et al. 2012; Turkiewicz 2012; White and Horvitz 2009).

Recently, the term "cyberchondriasis" which is derived from the words "cyber" and "hypochondriasis" is used to explain the negative results of the search for health information on the internet (Hart and Bjorgvinsson 2010; Starcevic and Berle 2013). The exacerbation of health anxiety as a result of repeated online medical information searches has been termed "cyberchondria" (Taylor and Asmundson 2004) and described as a dangerous and uncontrolled product of modern civilization (Starcevic and Berle 2013).

Cyberchondriacs can easily reach the excessive amount of unfiltered health information on the internet with the help of

Mehmet Zencir is a retired professor

✉ Süleyman Utku Uzun
utkuuzun402@gmail.com

[1] Department of Public Health, Epidemiology Division, Faculty of Medicine, Ankara University, Ankara, Turkey

[2] Faculty of Medicine, Department of Public Health, Pamukkale University, Denizli, Turkey

search engines. It is stated that most of the people searching health information on the internet are paying attention to interesting, even frightening, serious medical conditions that are less likely to occur than a benign condition (Starcevic and Berle 2013). So, health anxieties of these people were increasing even more. In addition to causing health anxiety, it has been stated that the cyberchondria may cause overuse of health services (Fergus 2014). Because people prefer to search on internet for health problems which they think are insignificant to ask a doctor or health professional, however, those seeking health information on the internet often consult a health professional to explain this confusing health information obtained from web search, or to make important health decisions about diagnosis and treatment (Berezovska et al. 2010). It is also stated that assurance-seeking behaviors such as visiting healthcare providers for a second opinion, may become a continuous response to anxiety (Taylor and Asmundson 2004).

It is found that 46% of health-seeking internet users think that they should consult a health professional about the information they find on web (Fox and Duggan 2013). Berezovska et al. (2010) found that about 30% of people searching for health information on the internet scheduled an appointment with a health professional due to online health care information obtained during searches.

Cyberchondria is considered to be a multidimensional construct and can be evaluated indirectly by scales measuring health anxiety (McElroy and Shevlin 2014). The Cyberchondria Severity Scale (CSS), an assessment tool that can directly evaluate cyberchondriasis, was developed by McElroy and Shevlin on university students (McElroy and Shevlin 2014). Fergus (2014) and Norr et al. (2015) have shown that the CSS is a valid and reliable scale for adults. Barke et al. (2016) also showed that the German form of the CSS was valid and reliable.

There are nearly 50 million internet users in Turkey and there are limited studies about the possible effects of the internet on health and also very few studies about health information search on the internet in Turkey. With the increasing use of the internet in Turkey as in the world, accessing to health information will increase gradually, so it is necessary to be aware of the potential health threats of this fact such as cyberchondria. In Turkey, there are no studies about cyberchondria or no Turkish evaluation tool for cyberchondria. It is important to understand cyberchondria and its effects such as possible health problems and potential economic costs. To determine the strategies to minimize its negative effects and to take actions by introducing policies, information about cyberchondria should be carefully assessed and gathered. Hence, to achieve this, a Turkish evaluation for cyberchondria is needed. The aim of this study is to evaluate reliability and validity of the Turkish version of the CSS.

Method

Study Design

To establish the validity and reliability of the CSS, following phases of study was conducted: translation and linguistic validity, content validity, construct validity, concurrent validity, internal consistency, and test-retest reliability.

Participants

The population of the study was a total of 2205 employees (1073 of were academic staff, 1132 were non-academic staff) working at the central campus of Pamukale University. A wide range of recommendations regarding optimal sample size for factor analysis exist in literature. We used a 10:1 ratio approach which is one of the most proposed and supported recommendation (Everitt 1975; Kline 1994; Nunnally and Bernstein 1994; Velicer and Fava 1998). According to this approach, there should be at least 10 cases for each item in the instrument. CSS consists of 33 items, therefore, this study was carried out among a total of 335 employees. Simple random sampling method was used. From the list of university staff, 160 academic staff and 175 non-academic staff randomly selected proportionally to staff distribution of university employees population. The age range of the participants was between 19 and 61, the mean age of participants was 38.2 ± 8.5 and 64.5% of them were male. The research was conducted between 2 November and 11 December 2015. Ethical and institutional permissions were taken before the research. Study was approved by Pamukkale University Ethics Committee (ref:2015/05). Informed verbal consents were obtained from all participants prior to the study. This study was funded by Pamukkale University Scientific Research Projects Commission (No:2015TPF017).

Measurements

Cyberchondria Severity Scale

The Cyberchondria Severity Scale (CSS) is a psychometric continuous measure (not a categorical measure) developed by McElroy and Shevlin (2014) to measure cyberchondria. The scale contains questions about how people do health researches on the web, how these health researches affect their other activities on the internet and in their daily life. CSS consists of 33 items and these items are rated using a 5-point Likert scale (1-Never, 2-Rarely, 3-Occasionally, 4-Frequently, 5- Always). The CSS consists of five subscales:

Factor 1: Compulsion (items 3, 6, 8, 12, 14, 17, 24, 25) (score range: 8–40),

Factor 2: Distress (items 5, 7, 10, 20, 22, 23, 29, 31) (score range: 8–40),
Factor 3: Excessiveness (items 1, 2, 11, 13, 18, 19, 21, 30) (score range: 8–40),
Factor 4: Reassurance (items 4, 15, 16, 26, 27, 32) (score range: 6–30),
Factor 5: Mistrust of medical professional (items 9, 28, 33) (score range: 3–15), (CSS total score range: 33–165).

"Mistrust of medical professional" items were reverse coded. The points obtained from each item are summed to calculate the total cyberchondria score. Higher scores reflected higher levels of cyberchondria. The validity and reliability study of the original CSS was conducted among 208 university students. Cronbach's alpha values of the subscales ranged from 0.75 to 0.95 (Compulsion: 0.95, Distress: 0.92, Excessiveness: 0.85, Reassurance: 0.89, Mistrust of medical professional: 0.75). Cronbach's alpha for the total scale was 0.94.

Depression Anxiety Stress Scale 21

The short form of the depression, anxiety and stress scale (DASS-21) was used to examine criterion validity of the CSS. The DASS-21 consists of 21 items and rated using a 4-point Likert scale (ranging from "0-Never to 3-Almost Always"). DASS-21 consists of three subscales which measure depression, anxiety and stress. There is not any reverse coded item and higher scores indicate higher level on each dimension (Henry and Crawford 2005; Osman et al. 2012). The adaptation of the Turkish version of DASS was carried out by Akin and Cetin (2007); and Cronbach's alpha for the total scale was 0.89, while depression, anxiety and stress subscales were 0.90, 0.92 and 0.92, respectively (Akin and Cetin 2007).

Procedure

Translation of the CSS into Turkish

After obtaining permission, the scale has been translated into Turkish independently by 3 bilingual health professionals. Two another bilingual health professionals reviewed these translations together and jointly finalized the Turkish form. Then, two independent interpreters translated the final Turkish form back into English. These interpreters were fluent both in Turkish and English, and had no prior knowledge about the original scale. The back-translated form was compared with the original form. It was determined that there was no change in meaning of items from the original scale items.

Content Validity

For the content validity of the CSS, 5 health professionals working in different institutions and divisions such as psychiatry, psychology, public health were determined. The Turkish form of the CSS and the instructions for the task, the conceptual definition of the construct and its facets sent to the judges. Each item were assessed by using a 4-point Likert response scale (1:not relevant, 2:somewhat relevant, 3:relevant, 4:very relevant) whether the item was relevant for the target construct. The content validity index (CVI) for each item and total items calculated from the proportion of judges who scored items as either 3 or 4. CVI scores higher than 0.80 were accepted as the criterion (Davis 1992).

Construct Validity

In order to examine the factor structure of the CSS, confirmatory factor analysis was used. Robust maximum-likelihood estimation was used as the extraction method, because this method is relatively insensitive to sample size, non-normality and model size (Bentler and Dijkstra 1985; Chou and Bentler 1995). The following common measures were used to assess the model's overall goodness of fit: chi-square/degree of freedom, chi-square difference test, Goodness-of-Fit Index (GFI), Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), Akaike's Information Criterion (AIC), and the Bayesian Information Criterion (BIC).

For models with good fit, chi-square normalized by degrees of freedom (χ^2/df) less than three represents excellent fit or should be less than five (Kline 2011). NNFI and CFI should exceed 0.9 (Hu and Bentler 1999; Kelloway 1989; Schumacher and Lomax 1996; Tabachnick and Fidell 2001; Thompson 2004). GFI values above 0.80 are considered acceptable (Byrne 1998). SRMR and RMSEA ranges in value from 0 to 1, with lower values indicating a better fit and RMSEA below 0.05 indicates excellent fit (Brown 2006; Jöreskog and Sörbom 1993; Raykov and Marcoulides 2008; Schumacher and Lomax 1996). Nonetheless, it has been reported that the RMSEA value ≤0.08 indicates good fit (Brown 2006; Hooper et al. 2008; Hu and Bentler 1999; Jöreskog and Sörbom 1993); even value ≤0.1 reflects an acceptable fit (Anderson and Gerbing 1984; Cole 1987; Kelloway 1989; Marsh et al. 1988; Tabachnick and Fidell 2001). Differences between the models are examined with the chi-square difference test correction procedure proposed by Satorra and Bentler (2010), the chi-square difference test is appropriate to compare nested models, and a significant result of the chi-square difference test would indicate that the baseline model is a better representation of the data (Muthén and Muthén 2012). Model fit was also assessed using

Table 1 Descriptive statistics for the cyberchondria severity scale subscales

	Mean ± SD	Score Range*
Compulsion	11.7 ± 4.8	8–40
Distress	16.8 ± 6.0	8–40
Excessiveness	22.1 ± 7.0	8–40
Reassurance	13.4 ± 4.9	6–30
Mistrust of Medical Professional	6.8 ± 3.2	3–15
Total Scale	71.1 ± 17.6	33–165

SD standard deviation

*Possible total and subscale score ranges of CSS

AIC and BIC. AIC and BIC are recommended when comparing models and the model with the smaller AIC and BIC would be preferred (Kline 2011).

Reliability Analysis

The reliability of the CSS was tested with the Cronbach alpha and item-total correlations. Test-retest reliability was established over a period of 2 weeks on 66 participants. Besides calculating test-retest reliability coefficient, paired t-tests were also performed to evaluate whether there were statistically significant score changes between first and second CSS scores.

Concurrent Validity

Concurrent validity was estimated from the correlations between the CSS and the DASS-21 total score and subscales.

Statistical Analysis

All statistical analyses were conducted using the R statistical package, version 3.4.3 (R Core Team 2017) and the lavaan package (Rosseel 2012) was used for confirmatory factor analysis (CFA).

Results

Descriptive Statistics

Participants' total score of CSS was 71.1 ± 17.6. Means and standard deviation of CSS subscales are presented in Table 1.

Construct Validity

Confirmatory Factor Analysis Results

Confirmatory factor analyses were performed with robust maximum likelihood estimation. Table 2 presents fit indices for the CFAs performed in our study. First, the five-factor model which proposed in the original scale was analyzed and fit indices and the modification index were examined. The overall fit indices for the proposed structural model were $\chi 2 = 1260.164$ (df = 485, $p < 0.001$), $\chi 2/df$ ratio = 2.59, SRMR = 0.068, GFI = 0.80, Robust RMSEA = 0.054, Robust CFI = 0.95, Robust NNFI = 0.95, BIC = 29,727.864, AIC = 29,437.990 (Table 2). Modification indices were assessed to determine if the model fit could be improved. Suggested modification indices would have resulted in significantly smaller changes to the chi-square statistic and, therefore, were considered unworthy of consideration. The standardized first-order factor loadings were all reasonably high (ranging from 0.43 to 0.80) and statistically significant.

Second-order confirmatory factor analysis was performed. The model fit indices showed similar results as the first-order confirmatory factor analysis: $\chi^2 = 1308.977$ (df = 490, $p < 0.001$), χ^2/df ratio = 2.67, SRMR = 0.080, GFI = 0.80, Robust RMSEA = 0.064, Robust CFI = 0.94, Robust NNFI = 0.95, BIC = 29,747.606, AIC = 29,476.803. (Table 2) After examining the modification indices, it has been decided not to conduct any model respecification. The standardized second-order factor loadings were all reasonably high (ranging from 0.45 to 0.81) and statistically significant.

The overall fit indices values of all models were found to be within acceptable limits. However a significant difference was revealed between Model 1 and 2, indicating that Model 1 was

Table 2 Fit indices for the models for the Turkish form of the CSS tested in the confirmatory factor analysis

Models	Goodness of Fit Values									
	χ^2 fit (*p* value)	χ^2/df	Robust RMSEA	SRMR	GFI	Robust CFI	Robust NNFI	BIC	AIC	S-B$\Delta\chi^2$
Model 1	<0.001	2.59	0.054	0.069	0.80	0.95	0.95	29,727.864	29,437.990	–
Model 2	<0.001	2.67	0.064	0.080	0.80	0.94	0.95	29,747.606	29,476.803	52.01*

χ^2 Chi-square, *df* degrees of freedom, *RMSEA* Root Mean Square Error of Approximation, *SRMR* Standardized Root Mean Square Residual, *GFI* Goodness of Fit Index, *CFI* Comparative Fit Index, *NNFI* Nonnormed Fit Index, *AIC* Akaike Information Criteria, *BIC* Bayesian Information Criteria, *S-B*$\Delta\chi^2$ Satorra-Bentler scaled chi-square difference test *p < 0.001

Model 1: Five factor first order, Model 2: Five factor second order

Table 3 Comparison of the Turkish form of the CSS total and subscales scores of test-retest

	Test Mean ± SD	Retest Mean ± SD	p value*
Compulsion	11.2 ± 3.3	12.7 ± 6.5	0.342
Distress	16.4 ± 5.8	17.0 ± 6.2	0.936
Excessiveness	21.8 ± 7.1	21.9 ± 7.0	0.710
Reassurance	13.9 ± 4.9	14.7 ± 5.3	0.251
Mistrust of Medical Professional	6.6 ± 2.7	6.7 ± 2.7	0.649
Total Scale	68.8 ± 16.9	73.1 ± 19.7	0.175

SD standard deviation

*paired t-test p value

a better fit to the data (S-B$\Delta\chi^2 = 52.01$, $p < 0.001$). Also BIC and AIC values of Model 1 were smaller than Model 2, which indicates that Model 1 was better. These results indicated first and second order models both fit the data adequately according to goodness of fit criteria (Table 2).

Reliability Analysis Results

Corrected item-total correlations for the CSS items ranged from 0.35 to 0.75. Cronbach's alpha of the CSS subscales ranged from 0.65 to 0.85 and Cronbach's alpha for the total scale was 0.89.

The overall CSS correlation coefficient for test-retest reliability was 0.65 and coefficients of CSS subscales were ranged from 0.53–0.71. The mean scores of the CSS total and subscale scores obtained in the first and second tests were compared with "paired t-tests" and there was no significant difference ($p > 0.05$). (Table 3).

Concurrent validity was estimated from the correlations between the CSS and the DASS-21 total score and subscales. Correlations between the CSS and the DASS-21 total and subscale scores ranged between 0.11 and 0.33. There was no significant correlation between "reassurance", "mistrust of medical professional" and "depression" subscales; also "distress" and "total DASS-21". Other correlations between subscales were significant, but weak. (Table 4).

Discussion

In this study, the reliability and validity of the Turkish version of the CSS was evaluated. In order to examine the construct validity of the CSS, first and second order five-factor models were assessed with CFA. Indexes of fit for both models indicated adequate fit to the data according to all criteria. The results from CFA modelling in our study indicate that both model results were similar. But, model preference became more apparent when comparing AIC and BIC. As can be seen in Table 2, in terms of difference in BIC and AIC values models, Model 1 has lower BIC and AIC values. According to Raftery (1996), the absolute value of a difference of more than 10 points between BIC statistics shows very strong evidence of model preference. Thus, these results show that the first order model provided a better fit to the data than the high order model. Additionally, a Satorra-Bentler scaled chi-square difference test was computed. The scaled Satorra-Bentler test showed the significant difference among Model 1 and. Model 2, which indicated Model 1 was better.

Our CFA results are consistent with findings from other studies that used CFA to evaluate the factor structure of the CSS. Fergus reported similar results with our results and fit indices of both five-factor model and four-factor models indicated a good fit (Fergus 2014). Barke et al. (2016) also showed that results of first and second order five-factor models of the German form of the CSS were acceptable. In the study by Norr et al. (2015), the researchers found that the results of proposed two-factor model (RMSEA = 0.07, CFI = 0.97) had a better fit than the original hypothesized five-factor model (RMSEA = 0.09, CFI = 0.95).

The internal consistency of the Turkish form of the CSS was assessed using Cronbach's coefficient alpha and corrected item-total correlations. In general, it is recommended that corrected item-total correlations should range between 0.30

Table 4 Correlations of the Turkish form of the CSS and DASS-21 and their subscales

	DASS-21 Depression	DASS-21 Anxiety	DASS-21 Stress	DASS-21 Total
Compulsion	0.22*	0.26*	0.26*	0.27*
Distress	0.23*	0.30*	0.33*	0.33*
Excessiveness	0.11*	0.15*	0.23*	0.20*
Reassurance	0.08	0.16*	0.19*	0.17*
Mistrust of Medical Professional	0.09	0.14*	0.019	0.09
CSS Total	0.22*	0.31*	0.33*	0.33*

*$p < 0.001$

and 0.70 for a good scale (Ferketich 1991; Nunnally and Bernstein 1994). Corrected item-total correlations of the Turkish form of the CSS items ranged from 0.35 to 0.75. Cronbach's alpha of the Turkish form of the CSS subscales ranged from 0.65 to 0.85 and Cronbach's alpha for the total scale was 0.89. The internal consistency of the Turkish form of the CSS was found to be satisfactory, although Cronbach's coefficient alpha values in other studies (McElroy and Shevlin 2014; Norr et al. 2015; Turkiewicz 2012) higher than our study.

Based on the results of test-retest reliability coefficients of total scale and subscales (ranged from 0.53 to 0.71) and the results of the paired t-tests (all p values >0.05), the Turkish form of the CSS is reliable.

In order to assess the concurrent validity, the Pearson correlation coefficients between CSS and DASS-21 were computed. The DASS-21 was weakly correlated with the CSS except for the "mistrust of medical professional" subscale. These findings were coherent with those other studies and the reasons for poor correlation with CSS tried to be explained. It has been reported that cyberchondria differs from depression, hypochondriasis and problematic internet use and a new scale is needed for the evaluation of cyberchondria (Turkiewicz 2012). There is a debate that CSS and scales about depression, anxiety or stress were not measuring a similar construct. So, it can also be said that the concept of cyberchondria is different and a measurement tool is needed.

The "mistrust of medical professional" subscale did not correlate with DASS-21 subscales (except only demonstrated small correlation with the Anxiety subscale). McElroy and Shevlin also found that there was no significant correlation between the CSS "mistrust of medical professional" subscale and DASS-21 "depression" subscale, while all other correlations were weak (McElroy and Shevlin 2014). Also Barke et al. (2016) found that the CSS "mistrust of medical professional" subscale was not significantly correlated with either the modified version of the Short Health Anxiety Inventory (mSHAI) or Center for Epidemiologic Studies Depression Scale (CES-D), while all other correlations were weak. The "mistrust of health professionals" subscale which consists of three reversed items seems unnecessary to the CSS construct. Considering all these results, the removal of "mistrust of medical professional" subscale from the CSS should be considered. The results of previous studies also suggested that the "mistrust of medical professional" subscale should be considered distinct from the CSS (Fergus 2014; Norr et al. 2015; Barke et al. 2016).

In conclusion, the Turkish form of the CSS was valid and reliable. The "Mistrust of Medical Professional" subscale should be considered separately. Further validating researches will be necessary. The validity and reliability of the Turkish form of the CSS was conducted in university staff and researches that will be conducted on different study groups (e.g. clinical or community based sample...etc.) and with larger samples are needed. There are a limited number of studies on cyberchondria in the literature. This first study in Turkey about cyberchondria can guide future studies.

Acknowledgments The present study was funded by a grant from the Pamukkale University Scientific Research Projects Commission (Grant No:2015 TPF 017). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Compliance with Ethical Standards

Conflict of Interest All authors declare no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

Akin, A., & Cetin, B. (2007). Depresyon, anksiyete, stres ölçeği (DASÖ) geçerlik ve güvenirlik çalışması. [The depression anxiety and stress scale (DASS): the study of validity and reliability]. *Educational Sciences: Theory & Practice, 1*, 241–268.

Anderson, J. C., & Gerbing, D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika, 49*(2), 155–173. https://doi.org/10.1007/BF02294170.

Barke, A., Bleichhardt, G., Rief, W., & Doering, B. K. (2016). The Cyberchondria severity scale (CSS): German validation and development of a short form. *International Journal of Behavioral Medicine, 23*(5), 595–605. https://doi.org/10.1007/s12529-016-9549-8.

Baumgartner, S. E., & Hartmann, T. (2011). The role of health anxiety in online health information search. *Cyberpsychology, Behavior and Social Networking, 14*(10), 613–618. https://doi.org/10.1089/cyber.2010.0425.

Bentler, P. M., & Dijkstra, T. (1985). Efficient estimation via linearization in structural models. In P. R. Krishnaiah (Ed.), *Multivariate analysis* (pp. 9–42). Amsterdam: North-Holland.

Berezovska, I., Buchinger, K., & Matsyuk, O. (2010). Evolving facets of cyberchondria: Primum non nocere "first, do no harm. 7th International Conference Hands-on Science (HSci2010), Crete: Greece.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford.

Byrne, B. M. (1998). *Structural equation modeling with Lisrel, Prelis, and Smplis: Basic concepts, applications, and programming*. Mahwah: Lawrence Erlbaum Associates.

Chou, C. P., & Bentler, P. M. (1995). Estimates and tests in structural modeling. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 37–55). Thousand Oaks: Sage Publications Inc..

Cole, D. A. (1987). Utility of confirmatory factor analysis in test validation research. *Journal of Consulting and Clinical Psychology, 55*, 584–594. https://doi.org/10.1037/0022-006X.55.4.584.

Davis, L. L. (1992). Instrument review: Getting the most from a panel of experts. *Applied Nursing Research, 5*, 194–197. https://doi.org/10.1016/S0897-1897(05)80008-4.

Everitt, B. S. (1975). Multivariate analysis: The need for data, and other problems. *British Journal of Psychiatry, 126*, 237–240. https://doi.org/10.1192/bjp.126.3.237.

Fergus, T. A. (2014). The cyberchondria severity scale (CSS): An examination of structure and relations with health anxiety in a community sample. *Journal of Anxiety Disorders, 28*, 504–510. https://doi.org/10.1016/j.janxdis.2014.05.006.

Ferketich, S. (1991). Focus on psychometrics: Aspects of item analysis. *Research in Nursing & Health, 14*, 165–168. https://doi.org/10.1002/nur.4770140211.

Fox, S., & Duggan, M. (2013). Online health search 2013. Retrieved from http://www.pewinternet.org/files/old-media/Files/Reports/PIP_HealthOnline.pdf

Hart, J., & Bjorgvinsson, T. (2010). Health anxiety and hypochondriasis: Description and treatment issues highlighted through a case illustration. *Bulletin of the Menninger Clinic, 74*, 122–140. https://doi.org/10.1521/bumc.2010.74.2.122.

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the depression anxiety stress scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44*, 227–239. https://doi.org/10.1348/014466505X29657.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53–60.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118.

International Telecommunication Union. (2016). ICT facts and figures 2016. [Press Release]. Retrieved from http://www.itu.int/en/mediacentre/pages/2016-PR30.aspx Accesed 25 June 2016.

Irving, L., & Klegar, L.K. (1999). Falling through the net: defining the digital divide. Retrieved from www.ntia.doc.gov/ntiahome/fttn99/FTTN.pdf.

Jöreskog, K. G., & Sörbom, D. (1993). *Lisrel 8: Structural equation modeling with the simplis command language*. Chicago: Scientific Software International Inc.

Kelloway, K. E. (1989). *Using Lisrel for structural equation modeling: A researcher's guide*. London: Sage Publications Inc.

Kline, P. (1994). *An easy guide to factor analysis*. New York: Routledge.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3nd ed.). New York: The Guilford Press.

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin, 103*(3), 391–410. https://doi.org/10.1037/0033-2909.103.3.391.

McElroy, E., & Shevlin, M. (2014). The development and initial validation of the cyberchondria severity scale (CSS). *Journal of Anxiety Disorders, 28*, 259–265. https://doi.org/10.1016/j.janxdis.2013.12.007.

Muse, K., McManus, F., Leung, C., Meghreblian, B., & Williams, J. (2012). Cyberchondriasis: Fact or fiction? A preliminary examination of the relationship between health anxiety and searching for health information on the internet. *Journal of Anxiety Disorders, 26*, 189–196. https://doi.org/10.1016/j.janxdis.2011.11.005.

Muthén, L.K., & Muthén, B.O. (2012). Chi-square difference testing using the Satorra-Bentler scaled chi-square. Retrieved from http://www.statmodel.com/chidiff.shtml.

Napoli, P. M. (2001). Consumer use of medical information from electronic and paper media: Literature review. In R. E. Rice & J. E. Katz (Eds.), *The internet and health communication: Experience and expectations* (pp. 79–98). Thousand Oaks: Sage Publications Inc.

Norr, A. M., Allan, N. P., Boffa, J. W., Raines, A. M., Schmidt, N., & B. (2015). Validation of the Cyberchondria severity scale (CSS): Replication and extension with bifactor modeling. *Journal of Anxiety Disorders, 31*, 58–64. https://doi.org/10.1016/j.janxdis.2015.02.001.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3th ed.). New York: McGraw-Hill.

Osman, A., Wong, J. L., Bagge, C. L., Freedenthal, S., Gutierrez, P. M., & Lozano, G. (2012). The depression anxiety stress Scales-21 (DASS-21): Further examination of dimensions, scale reliability, and correlates. *Journal of Clinical Psychology, 68*(12), 1322–1338. https://doi.org/10.1002/jclp.21908.

Powell, J. A., Darvell, M., & Gray, J. A. M. (2003). The doctor, the patient and the world-wide web: How the internet is changing healthcare. *Journal of the Royal Society of Medicine, 96*, 74–76. https://doi.org/10.1258/jrsm.96.2.74.

R Core Team. (2017). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

Raftery, A. (1996). Bayesian model selection in social research. In P. V. Marsden (Ed.), *Sociological methodology* (pp. 111–163). Oxford: Blackwell.

Rains, S. A. (2007). Perceptions of traditional information sources and use of the world wide web to seek health information: Findings from the health information national trends survey. *Journal of Health Communication, 12*, 667–680. https://doi.org/10.1080/10810730701619992.

Raykov, T., & Marcoulides, G. A. (2008). *An introduction to applied multivariate analysis*. New York: Routledge.

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software, 48*(2), 1–36.

Satorra, A., & Bentler, P. M. (2010). Ensuring positiveness of the scaled difference chi-square test statistic. *Psychometrika, 75*, 243–248.

Schumacher, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling*. New Jersey: Erlbaum.

Starcevic, V., & Berle, D. (2013). Cyberchondria: Towards a better understanding of excessive health-related internet use. *Expert Review of Neurotherapeutics, 13*(2), 205–213. https://doi.org/10.1586/ern.12.162.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston: Ally and Bacon.

Taylor, S., & Asmundson, G. J. G. (2004). *Treating health anxiety: A cognitive-behavioral approach*. New York: Guilford Press.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. Washington, DC: American Psychological Association.

Turkiewicz, K.L. (2012). The impact of cyberchondria on doctor-patient communication. (Unpublished doctoral dissertation). The University of Wisconsin, Milwaukee.

TURKSTAT. (2016). Information and communication technology (ICT) usage survey on households and individuals, 2016. [Press release]. Retrieved from http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=21779 Accesed 25 June 2016.

Velicer, W. F., & Fava, J. L. (1998). Effects of variable and subject sampling on factor pattern recovery. *Psychological Methods, 3*, 231–251.

Wang, L., Wang, J., Wang, M., Li, Y., Liang, Y., & Xu, D. (2012). Using internet search engines to obtain medical information: A comparative study. *Journal of Medical Internet Research, 14*(3), e74. https://doi.org/10.2196/jmir.1943.

White, R. W., & Horvitz, E. (2009). Cyberchondria: Studies of the escalation of medical concerns in web search. *ACM Trans Inf Syst, 27*(4), 23–37. https://doi.org/10.1145/1629096.1629101.