Cyberchondria and its measurement.
The Polish adaptation and psychometric properties of the Cyberchondria Severity Scale CSS-PL

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Summary

Aim. The aim of this paper is a presentation of the adaptation process of the Cyberchondria Severity Scale (SCC) to measure cyberchondria and verification of reliability and construct validities of the test in the Polish population.

Methods. The study included 380 participants (203 women and 177 men) aged 19–68 ($M = 26.5$; $SD = 11.1$). The CSS-PL was used to measure cyberchondria, the Short Health Anxiety Inventory (SHAI) for measuring hypochondria, and the Dimensional Obsessive – Compulsive Scale (DOCS) to verify obsessive-compulsive tendencies.

Results. Four-factor structure of cyberchondria measured with the CSS-PL was supported. Internal consistency indices of the CSS-PL were between 0.87 and 0.95, test-retest reliability results were 0.58–0.76. This study demonstrated construct validity of the CSS-PL

via its correlations with health anxiety ($r = 0.31$–0.56) and obsessive-compulsive symptoms ($r = 0.17$–0.48).

Conclusions. The CSS-PL is an initial standardized version of an instrument for measuring cyberchondria and meets the psychometric criteria of reliability and validity for psychological testing tools. The CSS-PL may be used both in diagnostic and scientific research.

Key words: cyberchondria, health anxiety, scale adaptation

Introduction

Cyberchondria is defined as a tendency to experience intense anxiety about one's health and excessive searching on the Internet for medical information about the symptoms and ailments, which may take on a dispositional form [1, 2]. These processes may be accompanied by a general health anxiety, obsessive doubts, and taking compulsive actions to verify them [1]. Cyberchondria is quite alarming, considering

the fact that about 75% of the world's Internet users searches the Web to diagnose their health symptoms [3–5]. Due to an escalating character of cyberchondria and a need to comprehend its nature, McElroy and Shevlin [2] developed *the Cyberchondria Severity Scale* (CSS) to measure this phenomenon.

Acquiring information on health and illnesses from the Internet may be beneficial for well-being of an individual [6, 7]. However, the majority of scientific research focuses primarily on the negative effects of the excessive use of online sources in self-diagnoses. Research shows that too frequent inquiring about perceived medical conditions and searching the Web for more information about them reflects an anxiety about one's health and a deep worry of being seriously ill (health anxiety) [8–10]. Also, it is probably associated with obsessive-compulsive disorder [11, 12].

In the literature, cyberchondria is described as a variation of hypochondria, i.e., a continuous, unspecified, severe concern about one's health [13]. Thus, in some studies hypochondria [14] demonstrated quite strong correlations with cyberchondria ($r = 0.33$–0.62 [11, 12, 15, 16] as well as with global anxiety and stress [2]. It is worth noting that these correlations were related to general health anxiety index and its two dimensions, i.e., illness likelihood and negative consequences of illness.

After performing a detailed theoretical analysis on the cyberchondria construct, Starcevic and Berle [1] suggest that searching the Web for information on illnesses may be linked to experiencing obsessive doubts, being absorbed by the possibility of being seriously ill, and taking compulsive actions to verify those suspicions. In accordance with these propositions, Fergus [11] demonstrated that cyberchondria is moderately correlated with general indicator of obsessive-compulsive inclinations ($r = 0.49$. Norr et al. [12], in turn, examined cyberchondria correlations with indices of obsessive-compulsive disorder (i.e., 'Contamination', 'Responsibility for harm', 'Unacceptable thoughts', and 'Symmetry/ordering'), and defined them on the level of 0.28–0.55 [12]. Presumably, frequent searching for medical information about one's symptoms produces feeling of relief in the case of thoughts about contamination and the responsibility for causing harm.

Studying cyberchondria and seeking a deeper understanding of the phenomenon is important because frequent using Internet information about one's health condition and potential illnesses may exacerbate the feeling of intense anxiety. Also, it turns out that individuals who excessively use the Internet for self-diagnoses do not abandon this activity despite feeling anxious [17]. It indicates that cyberchondria is closely linked, but not identical to hypochondria and obsessive-compulsive disorder [18]. Better understanding of cyberchondria and its relations to health anxiety will certainly facilitate the diagnoses and treatment. At the same time, it will be possible to pinpoint those hypochondriac factors that prompt individuals to excessively search the Internet for self-diagnosis.

Cyberchondria is a relatively new construct therefore the awareness of the negative effects of thoughts, feelings and behaviors resulting from the excessive searching for medical information on the Internet is valuable and important for both doctors and

their patients. Using valid and reliable diagnostic tool to measure the level of cyberchondria seems to be crucial in relations between patients and general practitioners, effective medical diagnosis, and the treatment process. Currently, there are no Polish data on prevalence of cyberchondria; at the same time, there is no tool to measure this phenomenon. Therefore, the first step to better understand the nature and prevalence of cyberchondria in the Polish population is to develop a measuring tool with excellent psychometric properties and utilize it both, in medical diagnosis and in scientific research.

Aim

The aim of this paper is to adapt *the Cyberchondria Severity Scale* (CSS) to Polish conditions. In this research, reliability and construct validity of the scale was tested. Because of a dysfunctional nature of cyberchondria it was assumed that the CSS-PL scale would reach high level of the convergent validity in the context of its relationships with health anxiety [11] and obsessive-compulsive symptoms [18].

Material and Method

Cyberchondria Severity Scale (CSS)

The original version of the CSS by McElroy and Shevlin [2] included 43 items of behaviors and emotions related to searching for health information on the Internet. After the exploratory factor analysis ($N = 208$), 10 items of low factor loading were removed. Therefore, the CSS includes 33 statements and respondents provide their answers using a 5-point scale (1 – Never; 2 – Rarely, 3 – Sometimes, 4 – Often, 5 – Always) to what extent each statement reflects their typical behavior [2]. The results of factor analysis revealed five cyberchondria factors which explained 66% of variance: (1) **Compulsion,** which describes excessive online health research destabilizing and interfering with other activities (e.g., "Researching symptoms or perceived medical conditions online interrupts other research (e.g., for my job/college assignment/homework)"); (2) **Distress** that concerns negative emotions experienced when researching health information on the Internet (e.g. "I have trouble relaxing after researching symptoms or perceived medical conditions online"); (3) **Excessiveness,** accounting for repeatedly searching various Internet resources for the information on one's symptoms (i.e., "I enter the same symptoms into a web search on more than one occasion"); (4) **Reassurance,** which indicates anxiety and a need to consult with a medical professional about the information acquired from the Internet (e.g., "I discuss my online medical findings with my GP/health professional"); (5) **Mistrust of Medical Professionals,** that reflects having greater confidence in medical information from the Internet than from the medical doctor (e.g., "I trust my GP/medical professional's diagnosis over my online self-diagnosis"). Items in this factor are reverse coded.

The scale's authors claim that the CSS measures global construct of cyberchondria and its components, though the Mistrust subscale correlated the lowest with other subscales [2]. Results of research by Fergus [11, 18] also indicated that the Mistrust scale was weakly related to general cyberchondria factor, and to the other four components. Therefore, Norr et al. tested 1-, 2-, 3-, 4-, and 5-factor solutions for cyberchondria structure (including first – and second-order models) [19]. The results of their research showed that the 2-factor model with Cyberchondria factor and Mistrust factor was best fitted to the data [19]. Alternatively, the adequacy of McElroy and Shevlin's [2] 5-factor model of the CSS was supported in the study by Fergus [11].

Polish adaptation of *the Cyberchondria Severity Scale* (CSS)

The CSS was translated into Polish by four independent translators. The CSS includes many problematic idiomatic phrases (i.e., general practitioner or other medical professional and perceived medical condition) [20] – examples of the translation of these idioms are '*doktor*' and '*potencjalne schorzenia*', respectively). After comparing all translated versions, individual items, which met the criteria of content validity, linguistic correctness and coherence, as well as common use in the Polish language, were selected. The final Polish version was back translated and used to test a group of bilingual people and English-speaking students. The inverted version of the CSS showed a satisfactory level of convergence with the original version. Distributions of the results for individual items in both versions were alike and did not statistically significantly differ. No significant differences were also noted in items between the Polish version of the scale (CSS-PL) and its back translation.

The final version of the CSS-PL includes 33 items to measure cyberchondria, i.e., anxiety and behaviors related to online health research [2]. Respondents assess the degree to which each statement describes their typical thoughts, feelings and behaviors using a 5-point response scale (1 – Never; 2 – Rarely, 3 – Sometimes, 4 – Often, 5 – Always) [2]. As in the original version of the scale, the CSS-PL includes five subscales: Compulsion, Distress, Excessiveness, Reassurance, and Mistrust of Medical Professionals. Total result of subscales makes the general cyberchondria index.

Short Health Anxiety Questionnaire (SHAI)

The Short Health Anxiety Inventory (SHAI) [14, 21] consists of 18 items that assess two hypochondria components: likelihood of an illness and feared consequences of having an illness. Each item includes 4 statements reflecting the increasing anxiety intensity. In this research the reliability of subscales and the total score of hypochondria were high (Cronbach's $\alpha = 0.72$–0.93), similar to results of other research studies [2, 15, 16, 19].

Dimensional Obsessive-Compulsive Scale (DOCS)

The Dimensional Obsessive-Compulsive Scale (DOCS) contains 20 items in 4 categories: Contamination, Responsibility, Unacceptable thoughts, Symmetry/ordering [22]. Each category includes 5 statements, which are rated by the respondents using a 5-point Likert scale (from 0 to 4). DOCS subscales constitute a higher-order factor, referred to as obsessive-compulsive inclinations [22]. In the presented research, the DOCS achieved a satisfactory level of reliability ($\alpha = 0.74$–0.93), similar to the original study ($\alpha = 0.83$–0.96) [11, 18, 22].

Results

Study participants

This study aimed at determining the psychometric properties of the Polish version of the CSS and involved 380 adults from a city of 600 thousand inhabitants. This sample consisted of 203 females and 177 males aged 19–68 ($M = 26.5$; $SD = 11.1$). Study participants had completed mostly secondary (69%) and higher education (31%). Participants who did not entirely completed the questionnaires were excluded from further analysis. This research study was conducted following the guidelines of the Declaration of Helsinki and was approved by the Ethical Committee.

The internal validity of the CSS-PL

In the first step, the factor structure of the CSS-PL using a confirmatory factor analysis was verified (using AMOS 24.0). At first, the 5-factor model, which explained 62% of variance and achieved the required fit to the data, was tested [23] (Table 1).

Table 1. **The results of the confirmatory analysis of factor model of cyberchondria**

Model	χ^2	df	p	χ^2/df	RMSEA	90% CI		CFI	NNFI	SRMR
CSS-PL (33 items)										
5-factor model	644.23	404	0.001	1.60	0.040	0.03	0.05	0.97	0.96	0.06
Second-order model (5 factors)	652.78	409	0.001	1.60	0.040	0.03	0.05	0.97	0.96	0.06
CSS-PL (30 items)										
4-factor model	561.52	327	0.001	1.72	0.044	0.04	0.05	0.97	0.96	0.05
Second-order model (4 factors)	564.80	329	0.001	1.71	0.043	0.04	0.05	0.97	0.96	0.05

Second-order factor model, in which a second-order factor of cyberchondria was introduced, was also tested (comprising four first-order factors), and the Mistrust factor remained as a first-order factor in the model (Figure 1).
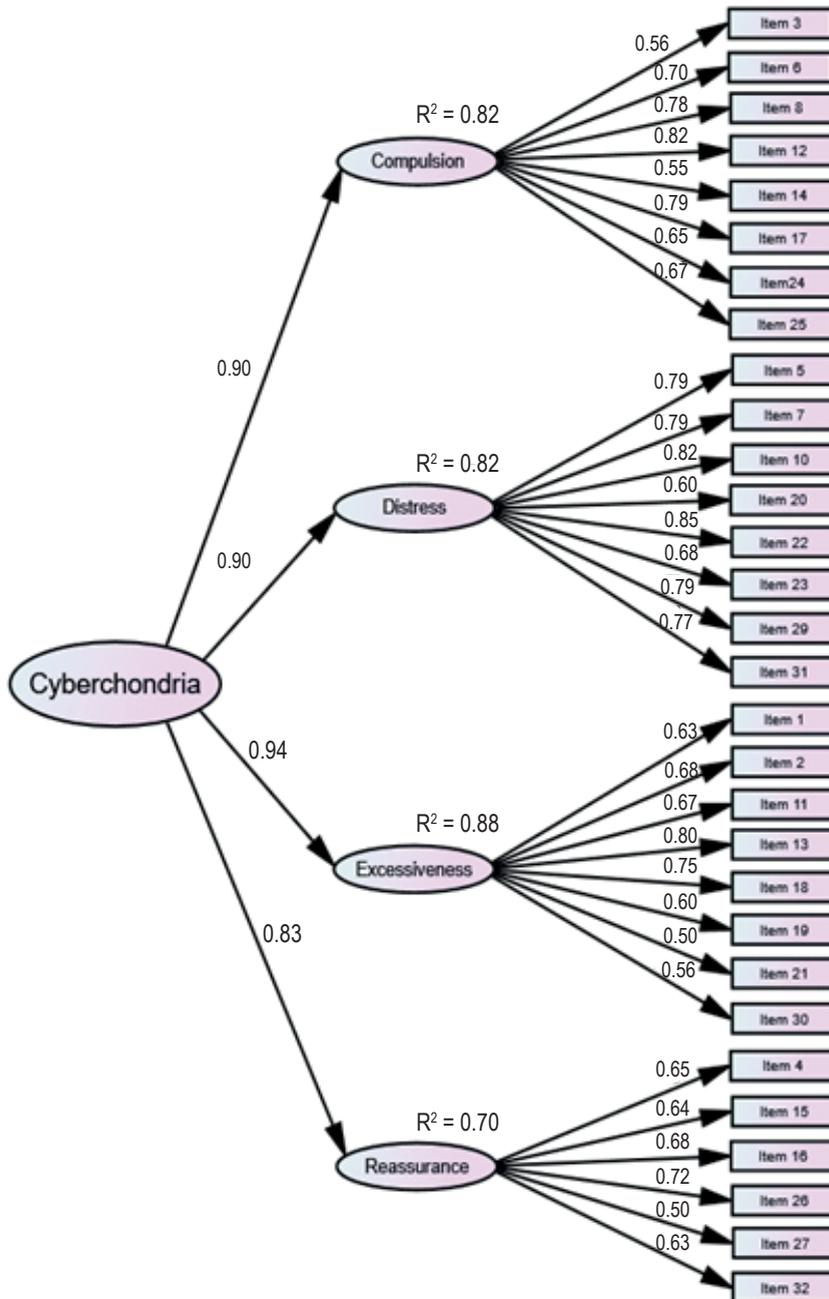
Figure 1. **The CSS-PL factor model**

Compared to the 5-factor model, this model achieved similar fit indices to the data[1]. The Mistrust factor correlated with the global cyberchondria factor to a lesser extent. Due to poor parameters of the Mistrust factor, its items were excluded and 4-factor models were tested for 30 items of the CSS-PL, i.e., first – and second-order 4-factor models. Compared to the 5-factor models of the CSS-PL (containing all 33items), the first – and second-order 4-factor models (with a general cyberchondria factor) obtained significantly better fit to the data than 5-factor models (first-order model: $\Delta\chi^2(2) = -73.93$, $p < 0.001$; second-order model: $\Delta\chi^2(2) = -82.66$, $p < 0.001$).

The reliability of the CSS-PL

To verify reliability of the CSS-PL (Table 2), internal consistency of subscales, discrimination power of items, and test-retest reliability (*rtt*) using SPSS 24.0 [24] were assessed. Table 2 also shows distribution parameters of the CSS-PL subscales.

Table 2. **Descriptive statistics of the CSS-PL subscales**

Subscales	Number of items	Min.	Max.	M	SD	r_{tt}	Cronbach's α
Compulsion	8	8	35	12.56	5.41	0.76	0.88
Distress	8	8	37	13.86	6.22	0.68	0.92
Excessiveness	8	8	37	18.40	6.70	0.67	0.87
Reassurance	6	6	27	11.51	4.79	0.64	0.80
Mistrust	3	3	15	5.94	2.71	0.58	0.62
Cyberchondria (sum of 5 factors)	33	33	133	62.25	20.32	0.74	0.95
Cyberchondria (sum of 4 factors)	30	30	128	56.33	20.06	0.72	0.95

N = 380

The four CSS-PL subscales achieved high level of internal consistency, except the Mistrust (α = 0.62). The internal consistency of total score of cyberchondria was also high (0.95).

The discrimination power for the all items in the CSS-PL subscales ranged from 0.29 to 0.82. The split-half correlation coefficients for the odd and even items in each scale ranged from 0.57 (for the Mistrust subscale) to 0.85. In addition, a test-retest reliability of the CSS-PL subscales was estimated within 3 months [24] in the sample of 59 participants, yielding a high level of correlation between the measurements ($r = 0.58$–0.76.

To depict the structure of interrelations, Table 3 shows correlation matrix between Cyberchondria factors in the current study and in the validation study of the original version of the CSS by McElroy and Shevlin [2].

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[1]   All factor loadings were statistically significant ($p < 0.001$).

Table 3. **Correlations between the CSS and CSS-PL factors**

	1	2	3	4	5	6	7
1. Compulsion	-	0.56**	0.54**	0.54**	0.23**	-	-
2. Distress	0.75**	-	0.67**	0.56**	0.17*	-	-
3. Excessiveness	0.68**	0.71**	-	0.52**	0.13*	-	-
4. Reassurance	0.61**	0.63**	0.63**	-	-0.04	-	-
5. Mistrust	0.08	0.05	0.02	-0.08	-	-	-
6. Cyberchondria (sum of 5 factors)	0.87**	0.89**	0.88**	0.78**	0.15**	-	-
7. Cyberchondria (sum of 4 factors)	0.87**	0.90**	0.89**	0.80**	0.03	0.99**	-

Below the diagonal are the correlation coefficients for the CSS-PL subscales (N = 380), and above the diagonal are the correlations for the original CSS (N = 208). * p < 0.05; ** p < 0.01.

Apart from the Mistrust dimension, the correlations between the CSS-PL subscales are significant and high. The Mistrust subscale did not yield, however, the significant correlations with the other CSS subscales. It is worth mentioning that the subscales within the CSS-PL strongly correlate with the total score of Cyberchondria, only the Mistrust subscale correlates on the level of 0.15.

The construct validity of the CSS-PL

Construct validity of the CSS-PL was tested in the context of health anxiety and obsessive-compulsive inclinations. Within the group of 240 participants (137 females and 103 males; $M = 29.8$; $SD = 12.7$), the total score of Cyberchondria and the four subscales (except for the Mistrust) positively correlated with health anxiety and its dimensions (i.e., illness likelihood and negative consequences of the illness).

Table 4. **Correlations of the CSS-PL subscales with health anxiety (SHAI) and obsessive-compulsive symptoms (DOCS)**

	Compulsion	Distress	Excessiveness	Reassurance	Mistrust	Cyberchondria 5 factors	Cyberchondria 4 factors
SHAI Health anxiety[1]	0.50**	0.59**	0.45**	0.36**	0.08	0.56**	0.56**
SHAI Illness likelihood[1]	0.49**	0.56**	0.45**	0.36**	0.07	0.53**	0.52**
SHAI Negative consequences of illness[1]	0.31**	0.39**	0.23**	0.19*	0.06	0.33**	0.33**
DOCS Obsessive-compulsive symptoms[2]	0.34**	0.43**	0.31**	0.23**	0.07	0.38**	0.38**
DOCS Contamination[2]	0.18**	0.22**	0.18**	0.171**	0.02	0.21**	0.22**
DOCS Responsibility[2]	0.40**	0.48**	0.36**	0.29**	0.05	0.44**	0.44**

DOCS Unacceptable thoughts[2]	0.27**	0.32**	0.27**	0.14**	0.06	0.29**	0.28**
DOCS Symmerty/ ordering[2]	0.27**	0.34**	0.23*	0.17**	0.08	0.30**	0.30**

* $p < 0.05$; ** $p < 0.01$. [1] N = 240; [2] N = 338

Within the group of 338 participants (180 females and 158 males; $M = 27.2$, $SD = 11.5$), the general Cyberchondria construct and its four components (except Mistrust) positively correlated with all subscales and with the total score of obsessive-compulsive symptoms (see Table 4).

Discussion

As part of verifying construct validity of the CSS-PL, the 4-factor structure was confirmed. Despite the fact that we yielded adequate fit indices for the 5-factor structure developed by the scale authors [2], subsequent factor analyses of the CSS models indicated higher diagnostic and predictive value of the 4-factor structure of cyberchondria (similarly to the research by Fergus [11]). Since there are no definitive conclusions in regards to the CSS model structure [2, 11, 19], we finally assumed that the CSS-PL model encompasses four first-order factors: Compulsion, Distress, Excessiveness and Reassurance, which produce a second-order factor – Cyberchondria. The Mistrust factor, as relatively independent from other dimensions of cyberchondria, could be used as a control variable in cyberchondria measurement.

Analysis of reliability for cyberchondria measurement demonstrated high discrimination power of test items and internal consistency of the CSS-PL subscales. These results are consistent with the validation findings of the original CSS, in which the parameters of internal consistency were also adequate (α = 0.75–0.95) [2]. In other studies, the reliability of the CSS was on the level of 0.81–0.96, the level of compound reliability index for the CSS was 0.95–0.96 [11, 12, 15, 19] and the Mistrust factor had the lowest reliability parameters [2, 14, 15, 21]. In addition, except for the Mistrust factor, correlations between the CSS-PL scales were significant and higher than in original studies by McElroy and Shevlin [2][2]. In the research by Fergus, Mistrust was also weakly correlated with the total score of cyberchondria ($r = 0.26$) [11].

Moreover, the CSS-PL results turned out to be stable over time, indicating a rather dispositional character of cyberchondria and its robustness to situational variables. Of note, the Mistrust of medical professionals factor had the lowest reliability parameters in all CSS validation studies [2, 14, 15, 21]. Since the Mistrust scale demonstrated low psychometric parameters, when measuring cyberchondria, we suggest to consider it rather as a control variable rather than diagnostic one.

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[2]   The authors of the CSS McElroy and Shevlin did not analyze the correlation of all dimensions of the questionnaire with the total score of cyberchondria [2].

The study results also demonstrated high convergent validity of the CSS-PL in the context of a health anxiety measurement. It follows results of studies which indicate that among participants of non-clinical trials the mean level of general anxiety was associated with an increased number of medical visits, increased level of being terrified because of the information acquired online on an illness or worsening health condition [17]. The presented study also showed convergent validity of the CSS-PL in the context of obsessive-compulsive inclinations. A moderate level of the relationship between these variables may indicate recurring, intrusive thoughts about illnesses (obsessions) which are typical for cyberchondria, and a compelling desire to immediately obtain information on one's health status from the Internet (compulsions).

Conclusions

In the process of adapting the CSS-PL, our studies supported a 4-factor structure of the CSS-PL which encompasses factors of Compulsion, Distress, Excessiveness and Reassurance. This confirms a multidimensional model of cyberchondria [2, 11, 19]. The Mistrust of Medical Professionals subscale, which is a fifth factor in the original scale [2], has been excluded from the current cyberchondria model as a factor which is only potentially theoretically related to cyberchondria. At a diagnostic level, the Mistrust subscale may be considered a control variable which can help to better understand individual's picture of cyberchondria.

The CSS-PL demonstrates very good reliability parameters for measuring cyberchondria as dispositional variable. Moreover, the construct validity results indicate the dysfunctional character of Cyberchondria and its relationships with the other disadaptational psychological constructs, such as health anxiety and obsessive-compulsive inclinations. In conclusion, the CSS-PL is therefore a tool that exhibits high diagnostic and prognostic capacity for cyberchondria phenomenon in both diagnostic and scientific research.

There are some limitations of the current CSS-PL validation study. Firstly, these studies are of preliminary character and will be continued for the diagnostic and predictive validity of the tool, and the test normalization. Further studies shall control such variables as Internet access, frequency and time spent on the Internet, extent to which the Internet is used as a source of information on symptoms of illness, subjective assessment of one's health, which may increase the extent of the explained cyberchondria measurement variance. Another limitation of the study is sample size and homogeneity of sample with regard to education level (secondary 69% and higher 31%). Moreover, the current study was conducted among non-clinical participants; therefore, we do not know whether the factor structure of the CSS-PL and its relations with other psychological variables would be similar. Therefore, future research should encompass more heterogeneous sample. Because this is a preliminary validation research study, the results should be interpreted with caution.

Despite some limitations, the current study replicates and extends existing findings on the factor structure of the cyberchondria scale. Based on the yielded results, it can be assumed that a useful tool to measure cyberchondria as a disposition has been created. Assessing cyberchondria tendencies of an individual may facilitate predicting the cognitive, emotional and behavioral consequences in terms of pro-health and anti-health behaviors.

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