Factor Structure analysis, Validity and Reliability of the Health Anxiety Inventory—Short Form

Mehdi Rabiei 1, Mehrdad Kalantari 1, Karim Asgari 2 and Fatemeh Bahrami 2

1- University of Isfahan, Dept. of Psychology, Isfahan, Iran
2-University of Isfahan, Dept. of counseling, Isfahan, Iran

*Corresponding Author Email: Rabiei_psychology@yahoo.com

Abstract
The purpose of this study was to examine the factor structure, validity and reliability of the Health Anxiety Inventory—Short Form. 500 participants (170 male and 326 female) were randomly selected. Convergent validity of Health Anxiety Inventory—Short Form with Yale–Brown Obsessive Compulsive Scale modified For BDD, The Obsessive–Compulsive Inventory-Revised and Depression Anxiety Stress Scales 21-item version were r=0.45, r=0.51 and r=0.7(P<0.001). Confirmatory factor analyses revealed, HAI—SF (18 items) assessing impairment and the other symptom severity (18 items each). Results suggest that health anxiety, as measured by the HAI—SF, adequately fits the current data. The Cronbach’s alpha for total factor was 0.89. Moreover, results were shown to possess good psychometric properties, as well as discriminant validity and classification accuracy, in both clinical and community populations. It can be concluded that this instrument is a useful measure for assessing the health anxiety and hypochondria symptoms in clinical assessment.

Keywords: Health Anxiety, Hypochondria, HAI—SF, Assessment, Factor Analysis

Introduction
The concept of an “obsessive– compulsive spectrum” of disorders is currently popular. These conditions are characterized as similar to obsessive– compulsive disorder in terms of phenomenology, associated features (age of onset, comorbidity, and clinical course), presumed etiology, familial transmission, and/or response to selective treatments (Hollander and Benzaquen 1997). Many psychiatric conditions are included under this rubric, including, but not limited to, somatoform disorders (hypochondriasis and body dysmorphic disorder [BDD]), eating disorders (e.g., anorexia nervosa, bulimia nervosa), pathologic “grooming” habits (e.g., pathologic nail biting or onychophagia, pathologic skin picking, trichotillomania), and other impulse control disorders (e.g., kleptomania, pathologic gambling, pyromania; Hollander and Benzaquen 1997). Hypochondriasis is usually identified as a categorical diagnostic entity. However, Hypochondriasis may be better conceptualized as an extreme form of health anxiety (Salkovskis & Warwick, 1986). Cognitive-behavioral theories (Salkovskis & Bass, 1997) propose that people experience particularly severe and persistent health anxiety (Hypochondriasis) because they have an enduring tendency to misinterpret bodily variations and other ambiguous health-related information (including the results of medical consultation and tests) as indicating that they may be suffering from a serious physical illness.

Among patients with primary diagnosis of OCD, OCSDs such as Hypochondriasis (lifetime prevalence: 8.2% to 13%). Obsessional fears and compulsive checking are central features of Hypochondriasis and BDD. There is significant comorbidity in clinical cohorts between patients with OCD as a primary diagnosis
and these disorders (e.g., trichotillomania [12.9%], Hypochondriasis [8.2%] and BDD [12.9%]) (du Toit et al. 2001). The study (Cullen et al, 2000) reported lifetime prevalence of Hypochondriasis 15%. What is required is a validated scale that is sensitive across the full range of health anxiety, which can be used to help identify people who will meet diagnostic criteria without the requirement for separate medical examination. Several questionnaires have been used in the past, particularly the Illness Attitudes Scale (IAS) (Kellner et al. 1987), the Illness Behavior Questionnaire (IBQ) (Pilowsky & Spence, 1975) and the Minnesota Multi-phasic Personality Inventory (MMPI) (Butcher et al. 1989).

The original hypochondriasis scale of the MMPI contains a number of items that are unrelated to hypochondriasis or somatization. A later version of the scale contains items related only to somatic complaints (Welsh, 1952) and does not mention hypochondria fears or beliefs. The Whiteley Index (Pilowsky, 1967) was devised in order to clarify the symptom clusters that are seen in clinical Hypochondriasis by using factor analysis. Three factors were identified ‘bodily preoccupation’, ‘disease phobia’ and ‘conviction of the presence of disease with non-response to reassurance’. The Whiteley Index includes some items that do not seem to be directly measuring hypochondriasis. There is no evidence that the Whiteley Index can discriminate between hypochondriac patients and psychiatric patients who are matched for levels of anxiety. The Illness Behavior Questionnaire was developed from the Whiteley Index. The IBQ is not solely concerned with hypochondriasis. The scales have been criticized for containing items that do not all measure the same aspect of illness behavior (Kellner et al. 1987). The IBQ was developed with pain clinic patients and there have been no studies examining the extent to which the IBQ or scales from it can identify hypochondriac patients.

The Illness Attitude Scale (Kellner, 1986; Kellner et al. 1987) purports to measure ‘psychopathology which tends to be associated with hypochondriasis and which can be responsible for abnormal illness behavior’. The questions were constructed from statements made by patients who were either diagnosed as having hypochondriac neurosis or who showed abnormal illness behavior. Some of the items on the IAS do not relate to hypochondriasis, such as the ones assessing smoking and healthy eating. More recently, Warwick & Salkovskis (1989) reported the preliminary development and validation of a scale intended to measure the full range of health anxiety, referred to in its development here as the Health Anxiety Inventory (HAI). The items chosen were closely based on the cognitive theory of health anxiety and Hypochondriasis (Salkovskis & Bass, 1997), and were found to distinguish between patients with Hypochondriasis and non-clinical controls. Although these studies have provided some basics about instruments hypochondria disorder, still there is some problems in diagnostic and assessing hypochondriac disorder and there is a need for a standard assessment tool to assess special hypochondriac disorder.

In the current study, we examined the psychometric properties of 18 item version the Health Anxiety Inventory—Short Form. A positive feature of the HAI—SF is that the scale now includes items that cover each of the impairment domains in a proposed diagnostic criteria for hypochondriac distress and functional impairment. The main aim of this study was to presentation a strong standard assessment tool to assess hypochondria disorder and determine its validity (construct and convergent), reliability and comparison of its factors in patients with hypochondria and normal peoples.

**Method**

The data for the Iranian sample were collected in 2012. The Iranian sample consisted of 500 students participants (170 male and 326 female) attending University of Isfahan of Iran. Participants ranged in age from 15 to 40 years (M = 16.5; S.D. = 2.7). Missing values were estimated in SPSS, using the Estimated Means (EM) procedure. Multi-stage cluster sampling method was used to select the sample. Moreover, we had 30 patients with hypochondria disorder and 30 peoples without hypochondria disorder for assessment of the diagnostic validity. Patients were drawn from consecutive referrals made by general practitioners and psychiatrists to medical clinics in the city of Isfahan, Iran. Hypochondria disorder diagnosis was established using the structured clinical interview for DSM-IV diagnoses (SCID, based on the *Diagnostic and Statistical Manual of Mental Disorders – 4th* Edition, Text Revision (American Psychiatric Association, 2000).
Measure

The measuring tools in this study have been Health Anxiety Inventory—Short Form, Yale –Brown Obsessive Compulsive Scale Modified for BDD and Depression Anxiety Stress Scales 21-item version and OCI-R.

Health Anxiety Inventory—Short Form, The Health Anxiety Inventory—Short Form (HAI–SF; Salkovskis et al., 2002) is an 18-item self-report measure of health anxiety/hypochondria symptoms. Specifically, the HAI-SF assesses for the presence of current health worries/concerns as well as how individuals believe that they would react if they believed that they had a serious medical condition. Items are rated on a four-point scale that allows for the assessment of instrument presence and severity. Total scores range from 0 to 54, with higher scores being indicative of greater symptomology. The HAI–SF assesses the degree of anxiety individuals experience about their health as well as how they think they would react if they thought that they had a serious medical condition. Good internal consistency (α=0.89) and test–retest reliability (r=0.90) have been found for the HAI–SF (Salkovskis et al., 2002). Convergent validity support for the HAI–SF has been found with measures of Hypochondriasis (Salkovskis et al., 2002).

Yale-Brown Obsessive Compulsive Scale Modified for Body Dysmorphic Disorder (BDD-YBOCS; Phillips, Hollander, Rasmussen, Aronowitz, DeCaria, Goodman, 1997): This is a reliable and valid 12-item semi-structured clinician administered instrument that evaluates current BDD severity. It assesses BDD-related preoccupations, repetitive behaviors, insight, and avoidance (3). The reliability and validity of the BDD-YBOCS Farsi version was and translated version was demonstrated by Rabiei, Khormdel, Kalantari, & Molavi, (2010) in both healthy and clinical samples. They showed that alpha coefficients ranged from .78 to .93 for the BDD-YBOCS total score and for its subscales (preoccupations, repetitive behaviors).

Depression Anxiety Stress Scales 21-item version (DASS-21) (Lovibon, & Lovibond, 1995). The DASS-21 is a self-report measure designed to assess current symptoms of depression, anxiety and stress. On each of the three (7-item) scales, participants are asked to rate how much the items applied to them during the past week using a Likert scale from 0(did not apply to me at all) to 3(applied to me very much, or most of the time). Thus, scores can range from 0 to 21 on each scale. Previous studies have demonstrated acceptable psychometric properties of the DASS-21 and data from a non-clinical samples showed averagescore of3.51 (SD=3.78), 2.12(SD=3.64), and 1.22 (SD=1.77) for the stress, depression and anxiety scales, respectively (Antony, Bieling, Cox, Enns, & Swinson, 1998). OCI-R (Foa, Huppert, Leiberg, Langner, Kichic, Hajcak, et al., 2002) The OCI-R is an 18-item self-report questionnaire that assesses obsessive–compulsive symptoms, with a total score ranging from 0 to 72 and subscale scores ranging from 0 to 12. The original version was translated to German by two of the authors (S.G. and W.E.) and back-translated by a bilingual psychotherapist. The back-translation was verified by the authors of the original version.

Data analysis

To test the factor structure validity of the HAI–SF and a tow correlated factors model were tested by means of Confirmatory Factor Analyses (CFA). For these analyses the Structural Equation Modeling program AMOS 5 was used (Arbuckle, 2003). values of the Goodness of Fit Index (GFI) and the Adjusted Goodness of Fit Index (AGFI) close to 1 represents a good fit, values of the Root Mean Square Residual (RMR) and Standardized Root Mean Square Residual (SRMR) below .05 represents a good fit, and values less than .08 represents an acceptable fit. In order to examine possible differences of HAI–SF factors within the patients with hypochondria cohort, we performed a multivariate analysis of variance test (ANOVA) on the scores with patients with hypochondria and peoples without hypochondria as independent variables. Since in large sample sizes the delta chi-square (Δχ²) is likely to be significant.
Results

Scale validity

Confirmatory factor analysis of the HAI—SF

Measurement in variance was tested by examining the measurement model of the latent construct of health anxiety as measured by the HAI—SF. The global fit indices for the nested model indicated excellent fit ($x^2 = 363.65$, $N=500$) 21.4, $p=0.06$; CFI=0.85, IFI=0.99, RMSEA=0.060, GFI=0.92, AGFI=0.904. These results suggest that health anxiety as measured by the HAI—SF fits the data suggesting that the health anxiety factor as measured by the HAI—SF appears to be adequate in the current sample comprised of Iranian sample. The factor structure of the Iranian version of the HAI—SF was examined by means of CFAs. Findings, reported in Table 1, demonstrated that the model had overall fit to the data. As the model had the best fit to the data and is closely related to the theoretical assumptions of the HAI—SF.

Table 1: Model fit indices for the model of the Iranian version of the HAI—SF

| model | N   | GFI | AGFI | RMR | RMSEA |
|-------|-----|-----|------|-----|-------|
|       | 500 | 0.92| 0.90 | 0.04| 0.061 |

Note: N: number of participants; GFI: Goodness of Fit Index; AGFI: Adjusted Goodness-of-Fit Index; RMR: Root Mean Square Residual; SRMR: Standardized Root Mean Square Residual.

Convergent validity

The convergent validity was supported by testing correlation between HAI—SF and (BDD-YBOCS), OCI-R and DASS-21. HAI—SF and its subscales were positively associated with (BDD-YBOCS), OCI-R and DASS-21 ($P<0.001$). And table (4) shows correlation results between the total score of scale and its factors after factor analysis.

Table 2: correlation results of HAI—SF with (BDD-YBOCS) and OCI-R and DASS-21.

| Variable | HAI—SF |
|----------|--------|
| (BDD-YBOCS) | 0.45 |
| OCI-R | 0.51 |
| DASS-21 | 0.70 |
| Significance | 0.001 |
Discriminant validity
The discriminant validity of the HAI—SF was examined by comparing the scores of clinically hypochondria peoples with those of control peoples. Results indicated that clinically hypochondria peoples reported significantly more hypochondria than control group.

| Dependent variables | Df | mean square | F   | Sig  | partial eta squared | observed power |
|---------------------|----|-------------|-----|------|---------------------|----------------|
| total Score         | 1  | 328.61      | 19.52 | 0.002 | 0.56               | 0.95           |

Internal consistency
Internal consistency coefficients were computed version of the HAI—SF using the data of the total sample. Cronbach’s alpha coefficients of the total score were generally high, indicating a high degree of homogeneity. The internal consistencies of the HAI—SF was 0.89.

Discussion
The current study examined the psychometric properties, factor structure, and convergent and discriminant validity of the Iranian version of the HAI—SF. Results from the present study indicate that the HAI—SF has acceptable psychometric properties, with assessing symptom severity and impairment. The model showed an acceptable fit in the sample. This confirms the construct validity of the measure and the underlying assumption of distinct symptom dimensions/subtypes belonging to category hypochondria. Findings of this study revealed that the Iranian version of the HAI—SF has a clear factor structure, congruent with its theoretical conceptualization (see Table 2 and 3). This is results congruent with the results of (Salkovskis, Rimes, Warwick, Clark, 2002).

In addition, results indicated the higher positive correlation and significance of this scale and its factors with depression, anxiety, stress and BDD represents good convergent validity of this scale (see Table 4). This is results congruent with results of (Stemberger et al., 2003 and Richter et al., 2003). Furthermore, our results strongly support the discriminant validity of the HAI—SF. The result showed that the HAI—SF scores in hypochondria group were significantly more than normal group that is indicator of its satisfied diagnostic validity (see Table 3). Hypochondria patients had higher scores than peoples without hypochondria on the HAI—SF and its subscales. This is results congruent with results of (Salkovskis, Rimes, Warwick, Clark, 2002).The scale possesses high internal consistency (0.89).This is congruent with the results of (Salkovskis, Rimes, Warwick, Clark, 2002).

In summary, our findings demonstrate that the Iranian version of the HAI—SF is, like the original version, a brief, psychometrically sound and valid measure for the assessment of a broad range of hypochondria disorder symptoms, appropriate for the use in clinical and research settings. The present study replicated and extended previous findings with the original scale in a different cultural context. It would be necessary to determine the structure and reliability over time and with other samples. In addition studies are required to examine the sensitivity of scale to treatment effects and recovery if the scales are to prove useful treatment evaluation tools. However, despite these limitations, All in all, it can be concluded that this instrument is a useful measure for assess hypochondria disorder symptoms in clinical assessment.
Acknowledgements

The authors would also like to acknowledge the assistance of participants and all of the clinicians and research assistants who conducted the assessments.

References

Welsh G S, 1952. A factor study of the MMPI using scales with item overlap eliminated. *American Psychologist*, 7, 341-347.

American Psychiatric Association 2000. *Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition. Washington, DC.

Antony M M, Bieling P J, Cox B J, Enns M W, Swinson R P P, 1998. Psychometric properties of the 42-item and 21-item versions of the depression anxiety stress scales in clinical groups and a community sample. *Psychological Assessment*, 10, 176–181.

Arbuckle J L 2003. Amos 5.0 [Computer software]. Chicago: SPSS.

Cullen B, Samuels J, Bienvenu O, Grados M, Hoehn-Saric R, Hahn J, Kung-Yee L, Wellen D, Dees M, Riddle M A, Nestadt G, 2001. The relationship of pathologic skin picking to obsessive–compulsive disorder. *Journal of Nervous and Mental Disease*, 189, 193–195.

Du Toit P L, Van Kradenburg J, Niehaus D, Stein D J, 2001. Comparison of obsessive–compulsive disorder patients with and without comorbid putative obsessive–compulsive spectrum disorders using a structured clinical interview. *Compr Psychiatry*, 42, 291–300.

Foia E B, Huppert J D, Leiberg S, Langner R, Kichic R, Hajcak G, et al, 2002. The obsessive–compulsive inventory: Development and validation of a short version. *Psychological Assessment*, 14, 485–495.

Hollander, E, Benzakuen, S D, 1997. The obsessive-compulsive spectrum disorders. *Int Rev Psychiatry*, 9, 99–109.

Kaiser H F, Cerny B A, 1977. A study of a measure of sampling adequacy for factor analytic correlation matrices. *Multivariate Behavioral Research*, 12, 43-47.

Kellner R 1986. *Somatization and Hypochondriasis*. Praeger: New York.

Kellner R, Abbott P, Winslow W W, Pathak D, 1987. Fears, beliefs, and attitudes in DSM III hypochondriasis. *Journal of Nervous and Mental Diseases*, 175, 20-25.

Lovibon P F, Lovibond S H, 1995. The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales DASS with the Beck Depression and Anxiety Inventories. *Behavior Research and Therapy*, 33, 335–343.

Phillips K A, Hollander E, Rasmussen S A, Aronowitz B R, DeCaria C, Goodman W K, 1997. A severity rating scale for body dysmorphic disorder: Development, reliability, and validity of a modified version of the Yale-Brown Obsessive-Compulsive Scale. *Psychopharmacol Bull*, 33, 17 - 22.

Rabiei M, Khormdel K, Kalantari K, Molavi H, 2010. Validity of the Yale-Brown Obsessive Compulsive Scale modified for Body Dysmorphic Disorder BDD in students of the University of Isfahan. *Iranian Journal of Psychiatry and Clinical Psychology*, 15, 343-350.

Richter M A, Summerfeldt L J, Antony M M, Swinson R P P, 2003. Obsessive–compulsive spectrum conditions in obsessive–compulsive disorder and other anxiety disorders. *Depression and Anxiety*, 18, 118–127.

Salkovskis P M, Bass C, 1997. Hypochondriasis. In The Science and Practice of Cognitive-Behaviour Therapy ed. D. M. Clark and C. G. Fairburn, pp. 313-339. Oxford University Press: Oxford.

Salkovskis P M, Warwick H M C, 1986. Morbid preoccupations, health anxiety and reassurance: a cognitive behavioural approach to hypochondriasis. *Behaviour Research and Therapy*, 24, 597-602.

Salkovskis P M, Rimes K A, Warwick H M C, Clark D M, 2002. The Health Anxiety Inventory: development and validation of scales for the measurement of health anxiety and hypochondriasis. *Psychological Medicine*, 32, 843–853.
Stemberger R, Stein D, Mansueto C, 2003. Behavioral and pharmacological treatment of trichotillomania. *Brief Treatment and Crisis Intervention, 3,* 339–352.
Warwick H M, Salkovskis P M, 1989. Cognitive and behavioural characteristics of primary hypochondriasis. *Scandanavian Journal of Behaviour Therapy, 18,* 85-92.