Examining the factor structure of the self-report Yale-Brown Obsessive Compulsive Scale Symptom Checklist

Johanna A.M. du Mortier[a],[*], Henny A.D. Visser[a], Anton J.L.M. van Balkom[b], Harold J.G.M. van Megen[a], Adriaan W. Hoogendoorn[b], Gerrit Glas[c], Patricia van Oppen[b]

[a] *GGz Centraal, Innova Postbus 3051, 3800 DB Amersfoort, The Netherlands*
[b] *Amsterdam UMC, Vrije Universiteit, APH-research Institute, Department of Psychiatry and GGZ inGeest, Oldenaller 1, 1081 HJ Amsterdam, The Netherlands*
[c] *Dimence Groep, Postbus 473, 8000 AL Zwolle, The Netherlands*

A B S T R A C T

Obsessive-compulsive symptom dimensions are important in studies about the pathogenesis and treatment of obsessive-compulsive disorder. More than 30 factor analytic studies using the Yale-Brown Obsessive Compulsive Scale Symptom Checklist (Y-BOCS-SC) interview version have been published. However, a drawback of the Y-BOCS-SC interview is that it is time-consuming for the clinician. Baer's self-report version of the Y-BOCS-SC could be a less time-consuming alternative. The purpose of this study was to examine the factor structure of Baer's self-report Y-BOCS-SC. In a sample of 286 patients, we performed two factor analyses, one using categories and one using items of the Y-BOCS-SC. Using category-level data, we identified four factors; when using items we identified six factors. Symptom dimensions for contamination/cleaning, symmetry/repeating/counting/ordering and hoarding were found in both analyses. The impulsive aggression, pathological doubt, sexual, religious somatic and checking categories formed one factor in the analysis using category-level data and divided into three factors using item-level data. These factors correspond with studies using the interview version and support our hypothesis that the self-report version of the Y-BOCS-SC could be an alternative for the interview version.

1. Introduction

Although the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) describes obsessive-compulsive disorder (OCD) as a homogeneous condition, the symptoms of OCD vary widely between patients (Abramowitz et al., 2009). This is not only difficult for clinicians, but is also a problem in research because it potentially reduces the power of studies on OCD, such as neuroimaging and treatment studies (Mataix-Cols et al., 2005).

The Yale-Brown Obsessive Compulsive Scale symptom checklist (Y-BOCS-SC) was developed to assess the wide range of OCD symptoms (Goodman et al., 1989). It consists of 69 items assessing many OCD symptoms, divided into 15 pre-defined categories. In addition to the Y-BOCS-SC there is also a Y-BOCS severity scale. The severity scale consists of 10 items measuring the severity of OCD. The symptoms are usually rated using the Y-BOCS-SC before assessing the severity (Goodman et al., 1989).

Because it is comprehensive, the YBOCS-SC is used in studies seeking to identify homogeneous symptom dimensions. Such studies use statistical techniques such as factor analysis, a psychometric technique to define more homogeneous symptom dimensions based on unobserved latent variables. In this technique, either the items or

categories of the YBOCS-SC can be analysed. Early factor analytic studies used the Y-BOCS-SC categories, while subsequent studies also used the Y-BOCS-SC items (Bloch et al., 2008; Katerberg et al., 2010; Pinto et al., 2008; Stein et al., 2007; Zhang et al., 2013). Item-level analyses are more sensitive because the use of symptom categories assumes the validity of these categories. In item-level analyses, items in the same category can divide across different factors; this could question the validity of the categories. Based on the outcome of these item-based factor analyses, Pinto et al. (2007) adjusted the category 'aggressive obsessions'. They divided it into two categories: 1) 'pathological doubt' including the items '*I fear I will be responsible for something terrible happening*' and '*I fear that I will harm others because I am not careful enough*', and 2) 'impulsive aggression' including all other items of the original 'aggressive obsessions' category. These adjusted categories of the YBOCS-SC (Pinto et al., 2007) provide an alternative for item-level data because they use the data from previous item-level analyses to improve the categories used in factor analysis. This approach is widely accepted (Brakoulias et al., 2013; Pett et al., 2003; Pinto et al., 2008; Taj et al., 2013; Williams et al., 2011,2012).

Although many factor analytic studies using the Y-BOCS-SC have been published, no consensus has been reached on its factor structure. A meta-analysis by Bloch et al. (2008) included 18 studies with category-

[*] Corresponding author.
E-mail address: h.vandijk-dumortier@ggzcentraal.nl (J.A.M. du Mortier).

Table 1
Results of the meta-analysis of Bloch et al. including 21 studies (2008), and studies involving adults performed after this meta-analysis.

	Category-level studies		
	N	%	Number of factors and content[a]
Bloch et al. (2008)[b]	4153	80%	4	1 symmetry, repeating, ordering, counting; 2 aggressive, sexual, religious, somatic, checking; 3 cleaning, contamination; 4 hoarding
Albert et al. (2010b)	151	68%	5	1 symmetry, repeating, counting, ordering; 2 contamination, cleaning; 3 hoarding; 4 religious,sexual, somatic; 5 aggressive, checking
Albert et al. (2010a)	329	58%	4	1 symmetry, repeating, counting, ordering; 2 aggressive, religious, sexual, somatic; 3 contamination, cleaning; 4 hoarding
Zhang et al. (2013)	512	67%	5	1 symmetry, arranging, repeating, counting; 2 contamination, cleaning; 3 hoarding; 4 aggressive, checking; 5 somatic, religious, sexual
Kashyap et al. (2017)	150	71%	5	1 checking; 2 symmetry; 3 forbidden thoughts; 4 washing; 5 hoarding
Adjusted category-level studies				
	N	%	Number of factors and content	
Pinto et al. (2007)	293	66%	5	1 symmetry, ordering; 2 hoarding; 3 doubt, checking; 4 contamination, cleaning; 5 taboo thoughts
Pinto et al. (2008)	485	64%	5	1 symmetry, ordering; 2 taboo thoughts; 3 hoarding; 4 doubt, checking; 5 contamination cleaning
Williams et al. (2011)	201	67%	5	1 doubt, checking; 2 contamination, cleaning; 3 symmetry, ordering; 4 unacceptable taboo thoughts, mental rituals; 5 hoarding
Williams et al. (2012)	54	59%	6	1 contamination, washing; 2 hoarding; 3 sexual obsessions, reassurance; 4 aggression, mental compulsions; 5 symmetry, perfectionism; 6 doubt, checking
Taj et al. (2013)	173	65%	5	1 hoarding; 2 checking; 3 symmetry, ordering; 4 contamination, cleaning; 5 sexual, somatic, aggressive, religious
Brakoulias et al. (2013)	154	65%	5	1 hoarding; 2 contamination, cleaning; 2 symmetry ordering; 4 unacceptable taboo thoughts; 5 doubt, checking
Item-level studies				
	N	%	Number of factors and content	
Bloch et al. (2008)[b]	1746	74%	5	1 symmetry, repeating, ordering, counting, hoarding; 2 aggressive, sexual, religious; 3 cleaning, contamination; 4 aggressive, checking; 5 somatic
Pinto et al. (2008)	485	53%	5	1 taboo thought: 2 symmetry, ordering; 3 hoarding; 4 contamination cleaning; 5 doubt, checking
Stein et al. (2008)	466	20%	5	1 contamination, cleaning; 2 harm, checking; 3 hoarding, symmetry; 4 sexual, religious; 5 somatic, hypochondriacal
Katerberg et al. (2010)	1224	58%	5	1 taboo; 2 contamination, cleaning; 3 doubt; 4 rituals, superstition; 5 hoarding symmetry
Zhang et al. (2013)	512	66%	6	1 contamination, cleaning; 2 symmetry, arranging, repeating, counting, superstition; 3 hoarding; 4 doubt, checking; 5 somatic; 6 religious, sexual, mental
Asadi et al. (2016)	216	34%	5	1 aggression, checking; 2 contamination, cleaning; 3 symmetry, ordering, repeating, counting, hoarding; 4 sexual; 5 somatic

N = number of respondents; % = Percentage of total variance explained by the factor solution;
[a] Nomenclature used in this table is derived from the original studies;
[b] Meta-analysis.

level analyses, involving 4153 participants and five studies with item-level analyses including 1746 participants. They found a four-factor solution for category-level studies and a five-factor solution for item-level studies. After this meta-analysis, several studies involving adults were published. Table 1 provides an overview of previous studies of the YBOCS-SC in adults. In general, most studies found a hoarding, symmetry and cleaning dimension. Sexual and religious symptoms frequently load on the same factor, while aggression, checking and somatic items form inconsistent dimensions (Bloch et al., 2008; Bloch, 2009).

A drawback of the clinician-administered interviews is their time-consuming nature. The Y-BOCS-SC takes about 30 min to complete, and the severity scale takes about 10–15 min. Self-reporting is a less time-consuming option. Several studies using self-report versions of the Y-BOCS severity scale have been published. Five studies compared self-report versions of the Y-BOCS severity scale with clinician-administered versions and found good (Baer et al., 1993; Federici et al., 2010; Rosenfeld et al., 1992; Steketee et al., 1996) to modest (Storch et al., 2017) agreement between both versions. Because clinicians are advised to use both the Y-BOCS-SC and the severity scale (Goodman et al., 1989), it is important to study self-report versions of the symptom checklist as well. Steketee et al. (1996) compared the self-report and the interview version of the Y-BOCS SC and found that patients scored more symptoms than clinicians. They hypothesised that patients sometimes score the same symptom several times under related items while clinicians score only the best-representing symptom.

Four exploratory factor analyses used a self-report version of the Y-BOCS-SC in adults with OCD. Leckman et al. (1997) used a self-report version of the Y-BOCS-SC developed by Rosenfeld and colleagues (1992) in a sample of 292 patients. They used the original categories and found a four-factor solution. Hasler et al. used a self-report version in a sample of 169 patients (2005). This study also used the original categories and found a four-factor solution. Wu et al. (2007) studied Baer's self-report version of the Y-BOCS-SC in a small sample of 53 OCD patients combined with 96 non-OCD psychiatric patients and 419 students. Their category-level analysis using the original categories

showed a four-factor or five-factor solution, and their item-analysis showed a three-factor solution. Asadi et al. (2016) used a self-report version of the Y-BOCS-SC in a sample of 216 patients. In an item-level analysis, they found a five-factor structure.

Baer's self-report version of the Y-BOCS-SC (1991) is very similar to the Y-BOCS-SC interview (Goodman et al., 1989). Due to this close resemblance, Baer's self-report Y-BOCS-SC would appear to be an alternative for the interview Y-BOCS-SC when the same factor dimensions can be found. We therefore performed an exploratory factor analysis of the dimensions that underlie Baer's self-report YBOCS-SC in 286 patients with OCD. Our aim was to describe the outcomes of both an exploratory category-level factor analysis and an exploratory item-level factor analysis.

2. Method

2.1. Sample

All included patients participated in the Netherlands Obsessive Compulsive Disorder Association (NOCDA) study, an ongoing six-year longitudinal multicentre cohort study. The study was accredited by the medical ethics committee of the VU University Medical Centre Amsterdam. All participants gave written informed consent. A total of 419 patients were included in the NOCDA study. They were recruited from specialised mental health organisations where they received treatment for OCD. Inclusion criteria were patients aged 18 years and over with a lifetime diagnosis of OCD that was diagnosed with a SCID-I (First et al., 1999). The only exclusion criterion was inadequate understanding of the Dutch language. Further details of the NOCDA study are described by Schuurmans et al. (2012). Data for the present study were drawn from the one-year follow-up assessment in which 286 patients participated.

The mean age of onset of this sample was 18.4 years of age (*SD* = 9.6). Comorbid conditions were measured with the SCID-I (First et al., 1999) at baseline assessment. At that time point, 23% of this sample had a comorbid affective disorder (including 18% with a

major depressive disorder) while 39% fulfilled the criteria of a comorbid anxiety disorder. There were no significant baseline differences regarding gender, age and Y-BOCS severity within the included NOCDA sample and the participants included in this study.

2.2. Measurements

At one-year follow-up, three instruments were assessed: Baer's self-report Y-BOCS-SC (Baer, 1991), the Y-BOCS severity scale (Goodman et al., 1989) and the Treatment Inventory Cost in Psychiatric Patients (TIC-P) (Bouwmans et al., 2013). Baer's self-report Y-BOCS-S contains the same 15 categories as the interview version (Goodman et al., 1989). The Y-BOCS self-report measurement includes 58 items identical to the interview version. In the YBOCS-SC interview every category – except the miscellaneous, hoarding, counting, ordering and symmetry categories – ends with an 'other' question to rate obsessions and compulsions that have not been inventoried under the standard questions. These 'other' questions are not included in the self-report version. These 'other' questions, together with the miscellaneous obsessions and compulsions (which are heterogenic), are usually excluded from factor analyses (Albert et al., 2010a; Baer, 1994; Brakoulias et al., 2013; Zhang et al., 2013). In our study, we also excluded these items and used the remaining 41 items. Like Wu et al. (2007), we used a five-point rating (0 'not present' to 4 'a very severe problem') instead of the original dichotomous rating (present versus absent). Although current symptoms and lifetime symptoms were both measured, to ensure fewer errors related to recall bias we analysed current symptoms only.

2.3. Data analysis

We calculated descriptive statistics (means and standard deviations) of the items and categories of Baer's self-report Y-BOCS-SC. To evaluate internal consistency of Pinto's et al. (2007) adjusted categories, Cronbach's coefficient alpha (Cronbach, 1984) was calculated. We performed two exploratory factor analyses: one at the category-level using the adjusted categories and one at item-level.

In our category-level analysis we used the 14 adjusted Y-BOCS-SC categories as described by Pinto et al.: impulsive aggression, pathological doubt, religious, sexual, contamination, symmetry/exactness, somatic and hoarding obsessions, cleaning/washing, checking, repeating, counting, ordering/arranging, and hoarding compulsions (Pinto et al., 2007).

In previous studies, category scores were computed differently. For example scoring the absence or presence of positive symptoms in a category (0–1 scoring) (Albert et al., 2010b; Feinstein et al., 2003; Katerberg et al., 2010; Zhang et al., 2013), scoring presence or absence of positive symptoms and most important symptoms (0-1-2 scoring) (Brakoulias et al., 2013; Mataix-Cols et al., 2002b; Mataix-Cols et al., 1999; Matsunaga et al., 2008; Williams et al., 2011; Williams et al., 2012), counting all positive items in a category (Hasler et al., 2005; Hasler et al., 2007; Leckman et al., 1997) or counting all positive items in a category and dividing the sum by the number of items of that category (Pinto et al., 2007; Pinto et al., 2008; Summerfeldt et al., 1999). We computed the mean score for each category by taking average scores, thus correcting for differences in the number of items of the categories. Bloch et al. (2008) showed that different category scoring methods resulted in different factors. Therefore we compared the outcome of a mean score for each category with '0–1′ scoring and scoring by counting all items in a category.

The item-level factor analysis used the Baer's self-report Y-BOCS-SC item scores of 41 items ranging from 0 to 4. Category-level analyses restrict the number of values in the analysis to the number of categories used. In item-level analyses all items are independent values. The sample required for the analysis depends on the subject-to-variable ratio (Bryant and Yarnold, 1995; Hogarty et al., 2005; Jung and Lee,

2011; MacCallum et al., 1999; Tabachnick and Fidell, 2001). Item-level analyses have more variables than category-level analyses, so item-level analyses usually require a larger sample (Pett et al., 2003). However, we used both category-level analysis and item-level analysis because the latter can provide more information about the underlying factor structure. For example, item-level analysis would indicate whether our sample supports the division of the original aggressive category into two categories according to Pinto et al. (2007).

In determining the underlying factors of the YBOCS-SC self-interview, we used factor analysis with promax rotation, since we assumed that factors of OCD are related and because this type of rotation allows correlation between factors (Pett et al., 2003). We assessed suitability of the data for factor analysis by inspecting the correlation matrix, and we used the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity to evaluate the strength of the linear association between the items in the correlation matrix. If Bartlett's test of sphericity is significant, the correlation matrix appears to be factorable (Bartlett, 1950). The KMO test is also an indicator of the strength of the relationships between items. Kaiser (1974) described criteria to evaluate the size of the KMO ranging from unacceptable, middling, meritorious to marvellous. To determine the number of factors to extract, we combined the Guttman–Kaiser eigenvalue greater-than-one rule (K1-rule) (Kaiser, 1970), the 'scree plot' criterion and interpretability of the factor outcome. We used a cut-off value of 0.4 for factor loadings to use them for interpretation of a factor (Hair et al., 1995). When items loaded on more than one factor, we placed that item on the factor with the highest score and checked whether that factor was also most closely related (based on the content of that item) to the other items in that factor. Both the structure matrix and the pattern matrix were used to examine the factor structure. Finally, we inspected the correlation matrix to determine whether the choice for a promax rotation was supported (Tabachnick and Fidell, 2001).

3. Results

3.1. Clinical characteristics and descriptive statistics

The subjects of this study were patients, 119 males and 167 females. During this one-year follow-up assessment the participants had a mean age of 38.4 years ($SD = 11.1$), ranging from 18 to 80 years of age. Their mean Y-BOCS severity score, assessed at this one-year follow-up, was 15.9 ($SD = 8.9$) with a mean score on obsessions of 8.2 (SD 4.6) and compulsions of 7.7 ($SD = 4.9$); 18% of the patients had a subclinical score (Y-BOCS 0–7), 32% a mild score (Y-BOCS 8–15) 33% a moderate score (Y-BOCS score 16–23), 11% a severe score (Y-BOCS 24–31) and 6% an extreme score (Y-BOCS 32–40). The Treatment inventory Cost in Psychiatric Patients (Bouwmans et al., 2013) showed that 82% of the patients had received psychological or psychiatric treatment between baseline and the one-year follow-up assessment.

Descriptive statistics of Baer's self-report version of the Y-BOCS-SC were calculated and are displayed in Table 2. All 41 Y-BOCS-SC items were represented in our sample: mean item scores ranged from 0.12 ('*I have obsessive thoughts about aggressive sexual behaviour towards others*') to 1.74 ('*I check that I did not make mistakes*'). The mean category scores ranged from 0.23 for the sexual obsession items to 1.31 for the obsessions with symmetry. Cronbach's alphas of the adjusted Y-BOCS-SC categories (Pinto et al., 2007) varied between 0.49 and 0.87 (Table 2).

3.2. Category-level factor analysis

The factor analysis of the categories resulted in four factors that are presented in Table 3. Examination of the correlation matrix indicated that all categories were correlated. Bartlett's test of sphericity was significant ($x^2 = 1711.91$; df 91; $p < 0.001$), which indicated that the correlation matrix was not an identity matrix. The value of the KMO statistic (0.79) was 'middling' according to Kaiser's (1974) criteria. The

Table 2
Descriptive statistics of the categories of Baer's self-report version of the Yale-Brown Obsessive Compulsive Scale Symptom Checklist.

	Number of items	Mean	*Standard deviation*	Cronbach's alpha
Impulsive aggression	7	0.58	0.66	0.78
Pathological doubt	2	0.62	0.92	0.66
Contamination obsessions	8	0.59	0.75	0.87
Sexual obsessions	4	0.23	0.50	0.70
Hoarding obsessions	1	0.37	0.87	
Religious obsessions	2	0.72	0.88	0.47
Obsessions with symmetry/exactness	1	1.31	1.34	
Somatic obsessions	2	0.79	0.99	0.56
Cleaning and washing compulsions	4	0.87	1.07	0.85
Checking compulsions	5	0.67	0.65	0.64
Repeating rituals	2	1.13	1.8	0.74
Counting compulsions	1	0.62	1.12	
Ordering and arranging compulsions	1	0.82	1.23	
Hoarding compulsions	1	0.35	0.86	

Table 3
Structure and pattern matrix of the factor analysis on the category level of Baer's self-report version of the Yale-Brown Obsessive Compulsive Scale Symptom Checklist.

Factor	1	2	3	4
Explained variance	17%	15%	16%	10%
Cronbach's alpha	0.78	0.85	0.89	0.91
Aggressive obsessions	0.80 (0.79)			
Pathological doubt	0.71 (0.80)			
Sexual obsessions	0.47 (0.46)			
Religious obsessions	0.59 (0.58)			
Somatic obsessions	0.53 (0.42)			
Checking compulsions	0.72 (0.63)	0.52		
Symmetry compulsions		0.86 (0.87)		
Repeating rituals		0.78 (0.75)		
Counting compulsions		0.61 (0.59)		
Ordering compulsions		0.76 (0.78)		
Hoarding obsessions	0.40		0.99 (0.99)	
Hoarding compulsions			0.80 (0.78)	
Contamination obsessions	0.49			0.99 (1.00)
Cleaning compulsions		0.50		0.74 (0.67)

First value is the structure value and second value in parentheses is the pattern value. Maximum likelihood, promax rotation with Kaiser Normalization.

pattern and the structure matrix closely resembled each other. Four factors were extracted with an eigenvalue > 1. This was in line with the scree plot. The explained variance of these factors ranged from 10% to 17%, and the total cumulative variance explained by these four components was 59%.

The first factor consisted of impulsive aggression, pathological doubt, sexual, religious and somatic obsessions and checking compulsions. The second factor consisted of obsessions with symmetry, repeating, counting and ordering compulsions. The third factor consisted of hoarding obsessions and compulsions. The fourth factor consisted of contamination obsessions and cleaning compulsions. Internal consistency ranged from excellent to acceptable with the following Cronbach's alphas: factor 1, 0.78; factor 2, 0.85; factor 3, 0.89; factor 4, 0.91 (George and Mallery, 2003). The component correlation matrix supported the choice for promax rotation with correlations between factors ranging from 0.27 to 0.45 (Table 4).

Table 4
Factor correlation matrix.

Factor	1	2	3	4
	1	1.00	0.36	0.72	0.45
	2	0.36	1.00	0.38	0.36
	3	0.37	0.38	1,00	0.27
	4	0.45	0.36	0.27	1.00

We compared these results with the results using ' 0–1′ scoring and scoring counting all items in a category. When using '0–1′ scoring, cleaning and checking had the highest loading on the repeating/ordering/counting factor. Cleaning also loaded on a contamination factor with nearly the same loading as on the repeating/ordering/counting factor. Checking also loaded on a factor consisting of impulsive aggression obsessions, pathological doubt and religious obsessions, but this loading was below the cut-off value of 0.4. We found the same factors when we used a scoring based on counting all items in a category.

3.3. Item-level factor analysis

The results of the factor analysis on item-level are presented in Table 5. Examination of the correlation matrix indicated that all items were correlated. Bartlett's test of sphericity was significant (x^2 = 5803.01, *df* 820, *p* < 0.001), which indicated that the correlation matrix was not an identity matrix. The value of the KMO static (0.86) was 'meritorious' according to Kaiser's (1974) criteria. The pattern and the structure matrix closely resembled each other. The application of the scree plot criterion to extract factors resulted in six factors with an eigenvalue larger than 1. The explained variance of these factors ranged from 22% to 4%, and the total cumulative variance explained by these six components was 49%.

The first factor consisted of contamination obsessions and cleaning compulsions. The second factor consisted of symmetry obsessions, repeating, ordering and counting compulsions and a single item belonging to the checking compulsions ('*I check that I did not make mistakes*'). The third factor consisted of three impulsive aggression obsession items ('*I fear that I might harm other people*', '*I have violent or horrific images in my mind*', and '*I Fear that I will act on an unwanted impulse*'), the two pathological doubt obsessions and two checking items ('*I often check that I did not harm* others' and '*I check that nothing terrible happened*'). The fourth factor consisted of sexual obsession, religious items, and two impulsive aggression items. The fifth factor consisted of somatic- and two checking obsession items ('*I check all aspects of my health related to obsessions about my body*' and '*I often check that I did not harm myself*') items. The sixth factor consisted of hoarding items. Internal consistency ranged from excellent to acceptable with the following Cronbach's alphas: factor 1, 0.91; factor 2, 0.86; factor 3, 0.84; factor 4, 0.77; factor 5, 0.74 (George and Mallery, 2003). The correlation matrix for factor scores (Table 6), supported the choice for promax rotation, showing considerable correlations between the factors ranging from 0.31 to 0.49.

Table 5
Structure and pattern matrix of the factor analysis on the item level of Baer's self-report version of the Yale-Brown Obsessive Compulsive Scale Symptom Checklist.

Factor	1	2	3	4	5	6
% Variance	22%	7%	8%	6%	4%	4%
Cronbach's alpha	0.91	0.86	0.84	0.77	0.73	0.74
I am concerned or disgusted with bodily waste or secretions	0.74 (0.76)					
I am concerned with dirt or germs	0.86 (0.89)					
I am excessively concerned with environmental contaminants	0.63 (0.53)				0.50	
I am excessively concerned with certain household cleaners	0.63 (0.54)		0.44		0.45	
I am excessively concerned with animals	0.64 (0.60)					
I am bothered by sticky substances or residues	0.47 (0.48)					
I am concerned I will get ill because of contamination	0.72 (0.63)				0.56	
I am concerned I will make others ill	0.57 (0.53)		0.48 (0.42)			
I have excessive or ritualised hand washing	0.81 (0.87)					
I have compulsions that involve cleaning household items	0.62 (0.55)	0.60 (0.44)				
I do other things to prevent or remove contact with contaminants	0.78 (0.78)					
I have obsessions about symmetry/exactness		0.81 (0.80)				
I have excessive or ritualised showering, bathing, tooth brushing etc.	0.58 (0.46)	0.64 (0.54)				
I check that I did not make mistakes		0.67 (0.62)	0.44			
I re-read or re-write things over and over again		0.77 (0.75)				
I need to repeat routine activities		0.70 (0.71)				
I have counting compulsions		0.61 (0.59)				
I have ordering or arranging compulsions		0.71 (0.70)				
I fear that I might harm other people			0.73 (0.69)	0.47		
I have violent or horrific images in my mind			0.65 (0.58)	0.42		
I fear I will act on an unwanted impulse			0.61 (0.46)	0.55		
I fear that I will harm others because I am not careful enough			0.80 (0.93)			
I fear I will be responsible for something terrible happening			0.60 (0.56)			
I often check that I did not harm others			0.66 (0.69)			
I check that nothing terrible happened			0.58 (0.62)			
I fear blurting out obscenities			0.48	0.67 (0.58)		
I fear doing something embarrassing			0.48	0.52		
I have forbidden or upsetting sexual thoughts, images or impulses				0.78 (0.86)		
I have sexual obsessions which involves children or incest				0.47 (0.56)		
I have obsessions involving homosexuality				0.45		
I have obsessions about aggressive sexual behaviour towards others				0.57 (0.62)		
I am concerned with upsetting thoughts having to do with religion etc.				0.53 (0.50)		
I am excessively concerned with right or wrong (morality)			0.48	0.49		
I am concerned with illness or disease					0.68 (0.65)	
I am excessively concerned with a part of my body or my appearance					0.67 (0.69)	
I often check that I did not harm myself					0.49	
I check all aspects of my health related to obsessions about my body					0.76 (0.81)	
I have obsessions about hoarding or saving things						0.95 (0.96)
I have compulsions to hoard or collect things						0.82 (0.82)
I fear I will steal things						
I fear that I might harm myself						

First value is the structure value and second value in parentheses is the pattern value. Maximum likelihood, promax rotation with Kaiser Normalization.

Table 6
Factor correlation matrix.

Factor	1	2	3	4	5	6
1	1,00	0.31	0.33	0.27	0.36	0.22
2	0.31	1.00	0.25	0.20	0.20	0.34
3	0.33	0.25	1.00	0.49	0.45	0.30
4	0.27	0.20	0.49	1.00	0.40	0.35
5	0.36	0.20	0.45	0.40	1.00	0.32
6	0.22	0.34	0.30	0.35	0.32	1.00

3.4. Subsample analyses in patients with a Y-BOCS severity score above seven and patients receiving psychiatric treatment between the baseline and one-year follow-up assessment

Due to the relatively large number of patients with a low Y-BOCS severity score, we repeated all analyses in the subsample of 231 patients with a Y-BOCS > 7 and found the same factors as in the total sample. We also repeated the analyses in a subsample of 226 patients who received psychological or psychiatric treatment between the baseline and one-year follow-up assessment. In this subsample we also found the same factors as in the total sample.

4. Discussion

As far as we know, this is one of the first studies using Baer's self-report Y-BOCS-SC in a large clinical sample. Numerous studies have used the clinician-administered interview version of the Y-BOCS-SC. To determine whether factor analysis of Baer's self-report Y-BOCS-SC would yield the same dimensions as studies using the interview version, we performed two analyses: one category-level analysis and one item-level analysis.

In both factor analyses we found (i) a contamination and cleaning factor, (ii) a symmetry, repeating, counting and ordering factor, and (iii) a hoarding factor with relatively high Cronbach's alphas. In previous analyses of the interview version of the Y-BOCS-SC these three factors were frequently found as well; see for example the Bloch et al. (2008) meta-analysis, indicating that these OCD factors are rather stable.

Previous studies with the interview Y-BOCS-SC indicated that items and categories on impulsive aggression, pathological doubt, sexual, religious and somatic obsessions and on checking compulsions are less stable factors and divided into different varying factors (Bloch et al., 2008; Bloch, 2009). In our category-level analysis, all these categories formed one factor. This is in line with previous research (Bloch et al., 2008; Cullen et al., 2007; Hasler et al., 2005; Hasler et al., 2007; Leckman et al., 1997). In our item-level analyses, however, we found

that aggressive, sexual, religious, somatic and checking items divided into three factors: first a factor with items related doubt and checking, resembling a factor found by Zhang et al. (2013), Katerberg et al. (2010) and Pinto et al. (2008); second a factor dealing with morally unaccepted behaviour resembling a factor with unacceptable/taboo thoughts described by Pinto et al. (2007,2008), Williams et al. (2011) and Brakoulias et al. (2013); and third we found a factor comprised of somatic items resembling a factor found by Stein et al. (2007), Zhang et al. (2013), Asadi et al. (2016) and Denys et al. (2004b). These three factors (doubt and checking; morally unaccepted behaviour; somatic items) were highly correlated with each other (correlations ranging from 0.40 to 0.49), disclosing the relationship between these factors and explaining that in category-level studies they can form one factor.

In our item-level analysis, 'pathological doubt' items load on the same dimension with impulsive aggression items, which does not support this division of the original aggressive category. Moreover, other factor analyses did not support the division of the aggressive items as described by Pinto et al., such as the studies by Denys et al. (2004a), Feinstein et al. (2003) and Asadi et al. (2016). In the item-level analysis, the checking items divided into different factors. The factors on which they loaded seemed highly related to the content of these checking items: 'checking for mistakes' loaded on repeating, ordering and counting; 'checking all aspects of my health' and 'checking that I did not harm myself' loaded on a somatic factor; 'checking that I did not harm others' and 'checking that nothing terrible happened' loaded on the pathological doubt items. A possible explanation for these findings is that the same underlying cognitions are involved in these checking items and the other items with which they form a factor. Our results also confirm that items of both the aggressive and the checking category did not belong to one consistent factor. This discrepancy suggests that the validity of these two categories is questionable.

When we used a '0–1' scoring of the categories, checking loads on a symmetry/repeating/ordering and counting factor instead of a factor consisting of impulsive harm, pathological doubt, sexual, religious and somatic obsessions (when using mean category scores). In the meta-analysis of Bloch et al. (2008), checking compulsions also loaded on a symmetry factor in a subsample of studies using a '0–1' scoring and on a factor with aggressive, sexual, religious and somatic obsessions in the total sample. Considering the different outcomes associated with various scoring methods, additional studies are needed to determine if the scoring method influences the outcome of the analyses, especially on the checking compulsions.

This study illustrates that item-level studies can provide interesting data, especially about the aggressive and checking items. When patients score a checking item positively, it would seem relevant to ask them for additional information to learn more about these compulsions and how they relate to their other symptoms. When conducting studies that use dimensions found in factor-analyses, researchers should realize that the original aggressive and checking categories both seem to be too heterogeneous to form stable factors, which could influence their results.

Although in our item-level analysis two items did not load on any factor with loadings of 0.4 or higher, future studies should provide clarification if these factors also do not load on any factor and if they, for example, could be omitted from the Y-BOCS-SC.

In the DSM-5 (American Psychiatric Association, 2013) hoarding is considered as an OCD-related disorder. The low cross loadings of hoarding items with other factors in this study seems to support the decision to consider hoarding as an OCD-related disorder instead of a subgroup of OCD patients. Additional studies, for example focusing on the genetics, neurological basis or phenomenology of this disorder, are needed before definitive conclusions on this topic can be made.

This study has several limitations. First, our sample size was relatively small concerning the item-level analysis. Second, in our sample the average Y-BOCS severity score was 15.9 (moderate severity), while 18% had a score below 8 (subclinical severity). Hoarding and symmetry dimensions are associated with a higher severity (Matsunaga et al.,

2010) and hoarding dimensions are also associated with more drop out and less improvement (Mataix-Cols et al., 2002a). Although we found the same factors in a subsample with a Y-BOCS severity score > 7, it is possible that the severity of our sample influenced the dimensions found in a factor analysis. Third, our sample consisted of patients who were treated for OCD when they were enrolled in this study. The self-report Y-BOCS-SC was part of the one-year follow-up assessment. Eighty-two per cent of the patients were still receiving treatment for their OCD at that point. During this one-year follow-up assessment, patients who received treatment had a mean Y-BOCS severity of 16.5 (*SD* 8.5) and patients who did not receive treatment had a mean Y-BOC severity of 13.8 (*SD* 9.8). There was a significant difference regarding the Y-BOCS between patients who received treatment between the assessments and those who did not, $t(272) = -1.99$, $p = 0.048$. We found the same factors in a subsample of patients who received psychiatric or psychological treatment between the baseline assessment and the one-year follow-up assessment. However, our sample could have also included patients whose OCD did not require treatment, so this makes it difficult to generalize our findings to other clinical samples.

This study aimed to examine the factors of Baer's self-report version of the Y-BOCS-SC. We found that factor analysis of Baer's self-report version of the Y-BOCS-SC results in factor solutions resembling the factors described in studies using the interview version, indicating that Baer's self-report version of the Y-BOCS-SC is a good alternative for the clinician-administered version of the Y-BOCS-SC when it is used to describe symptom dimensions.

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