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The Obsessive Beliefs Questionnaire (OBQ): Examination in Nonclinical Samples and Development of a Short Version

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Abstract

The study aimed to examine the factor structure of the Obsessive Beliefs Questionnaire (OBQ), the most widely used measure of dysfunctional beliefs in obsessive–compulsive disorder (OCD). Multiple exploratory methods (exploratory factor analysis, cluster analysis by variable, multidimensional scaling) were used to examine the questionnaire. Confirmatory factor analyses were also performed in two large nonclinical samples from Australia (N = 1,234) and Israel (N = 617). Our analyses suggested a four-factor solution with 38 items, where threat and responsibility formed separate dimensions (the "OBQ-TRIP"). This version had superior fit statistics across the two divergent confirmatory samples, when compared with four alternative models suggested by previous authors. Of the OBQ dimensions, the threat scale correlated most strongly with OCD symptom measures, even when controlling for depression. A short, 20-item version of the scale is offered for further study. Implications and limitations are discussed.

Keywords

cognitive theory, obsessive–compulsive disorder, cognition, factor structure, irrational beliefs

A Four-Factor Version of the Obsessive Beliefs Questionnaire (OBQ)

Obsessive–compulsive disorder (OCD) is a leading cause of worldwide disability (World Health Organization, 1996). It is an anxiety disorder characterized by repetitive and distressing thoughts, images or impulses (obsessions), and compulsive and ritualized behaviors performed to reduce distress or prevent the occurrence of the feared outcome signified by the obsessions (American Psychiatric Association, 2000). It has a lifetime prevalence of 1.6% (Kessler, Berglund, Demler, Jin, & Walters, 2005), affects most cultural and ethnic groups (Horwath & Weissman, 2000), and a slight predominance of females are affected (Bebbington, 1998).

Cognitive–behavioral theories of OCD are predicated on research indicating that most individuals experience intrusive thoughts that are similar in form and content to obsessions (Rachman & de Silva, 1978). However, although the obsessions are not objectively different to intrusive thoughts, they are experienced differently by individuals with OCD—for example, they are harder to dismiss, last longer, are more intense, are associated with greater discomfort, are more egodystonic (i.e., contrary to the individual's view of self), are more strongly resisted, and provoke more urges to respond ("neutralize"; Rachman & de Silva, 1978). Therefore, what distinguishes individuals with OCD is not the form or content of the thoughts themselves, but the meaning or interpretation applied to the thoughts (i.e., they are seen as more personally meaningful) and the resultant distress and strategies to control the thoughts. However, the control strategies (e.g., compulsions, thought suppression) are ineffective and actually increase the occurrence of intrusions (Frost & Steketee, 2002).

The Obsessive Compulsive Cognitions Working Group (OCCWG), a group featuring many prominent researchers into cognition in OCD, identified six dysfunctional belief

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domains that may lead to these misappraisals of intrusive thoughts (OCCWG, 1997). These are (a) *inflated responsibility*, the belief that one has power to bring about or prevent subjectively crucial negative outcomes; (b) *the overimportance of thoughts*, the belief that the mere presence of a thought indicates that it is important; (c) *the importance of controlling one's thoughts*, the overvaluation of the importance of exerting complete control over one's thoughts, and the belief that it is both possible and desirable; (d) *overestimations of threat*, an exaggeration of the probability and severity of harm; (e) *intolerance of uncertainty*, beliefs that it is a necessity to be certain, that one has a poor capacity to cope with unpredictability, and that one finds it difficult to cope in ambiguous situations; and (f) *perfectionism*, the tendency to believe there is a perfect solution to every problem, that performing an act without mistakes is both possible and necessary, and the belief that even minor mistakes will have serious consequences.

A large accumulation of evidence supports the relationship of these belief domains to OCD (for detail reviews, see Clark, 2004; Frost & Steketee, 2002). For example, experimental manipulations of responsibility have been found to affect OCD symptoms in an OCD sample with checking symptoms (Lopatka & Rachman, 1995) and in an OCD sample with miscellaneous symptoms (Shafran, 1997), and increasing responsibility leads to OCD-like checking behaviors in nonclinical samples (Ladouceur et al., 1995; Ladouceur, Rhéaume, & Aublet, 1997; Moulding, Kyrios, & Doron, 2007). These studies also point to the interrelationship of beliefs—for example, manipulations of responsibility also led to greater subjective reports of threat, while Bouchard, Rhéaume, and Ladouceur (1999) found that individuals high in perfectionism were more susceptible to a responsibility manipulation.

With respect to thoughts, Rowa, Purdon, Summerfeldt, and Antony (2005) found that for individuals with OCD, more upsetting obsessions were evaluated as more meaningful and more contradictory of valued aspects of the self than were less upsetting obsessions. Similar results have been found in an analogue sample (Rowa & Purdon, 2003). Ferrier and Brewin (2005) reported that compared with anxiety and normal controls, individuals with OCD were more likely to draw negative inferences about themselves from their intrusive thoughts. In addition to increased attempts at thought control, OCD patients have been found to make stronger internal attributions for failed attempts at thought control, relative to controls (Freeston & Ladouceur, 1997; Tolin, Abramowitz, Hamlin, Foa, & Synodi, 2002). Some evidence suggests that the more ego-dystonic presentations of OCD (i.e., those with obsessions related to aggression, sex, or blasphemy) may be more related to beliefs regarding the importance of thoughts and the need to control thoughts (e.g., Lee & Kwon, 2003; cf. Moulding, Kyrios, Doron, & Nedeljkovic, 2007).

Measures of perfectionism, particularly concern over mistakes, have been shown to correlate with OCD symptoms in nonclinical and clinical samples (Frost, Marten, Lahart, & Rosenblate, 1990; Frost, Steketee, Cohn, & Greiss, 1994; Rhéaume, Freeston, Dugas, Letarte, & Ladouceur, 1995). Perfectionism has also been linked to specific OCD symptoms, including checking (Gershuny & Sher, 1995) and washing (Tallis, 1996). However, several studies have indicated that perfectionism may not be specific to OCD, but may also be present in other anxiety disorders (Antony, Downie, & Swinson, 1998; Frost & Steketee, 1997). Similarly, threat perceptions are believed to be important within OCD, but like perfectionism, to not be specific to the disorder. For example, Woods, Frost, and Steketee (2002) examined clinical OCD ($N = 18$) and nonclinical students' ($N = 73$) ratings of the probability and severity of idiographic feared events and their ability to cope with these events. Consistent with the suggested importance of threat perceptions in OCD, the authors found that increased severity estimates and decreased coping ability correlated with higher OC-symptom severity. Jones and Menzies (1997) found that danger expectancies were of central importance in predicting washing behaviors in individuals with contamination-related OCD. Taken together, these strands of research provide multiple sources of evidence for the importance of the various belief domains in OCD, although some level of complexity is also apparent—for example, whether specific belief domains are more relevant to specific presentations of OCD (e.g., threat in washing, responsibility in checking, thought-importance in pure obsessions), and whether such domains may interact in producing OCD behaviors.

The Obsessive Beliefs Questionnaire

Based on the evidence from research and therapy for the importance of the belief domains to OCD, the OCCWG's primary goal was to create a single measure of the belief domains, the OBQ. The initial 87-item version of the scale (OBQ-87) had six theoretically defined subscales assessing the constructs (OCCWG, 2001). However, the six scales were highly intercorrelated; from .59 to .81 in a combined sample of students, community participants, and individuals with OCD. Therefore, the OCCWG (2005) empirically evaluated the OBQ-87 using an exploratory factor analysis (EFA) in a clinical sample with OCD ($N = 410$) from the United States, Canada, and Australia. The number of factors was determined from (a) the scree plot, (b) interpretability of factor loadings, (c) internal stability of each factor according to Kaiser's coefficient alpha of generalizability. Items

with high loadings (>.50) on the primary factor were retained to create subscales. Using principal axis factoring (PAF) extraction with an oblique rotation, three factors were found containing 44 items: (a) Responsibility/Threat (16 items), (b) Perfectionism/Certainty (16 items), (c) Importance/Control of Thoughts (12 items). An EFA in student controls ($N = 291$) resulted in a similar structure, albeit with some perfectionism items loading on the responsibility/threat factor (OCCWG, 2005). The inter-scale correlations ranged from .42 to .57 (clinical sample) and from .63 to .73 (combined student, community, and anxiety disorder sample).

The OCCWG's (2005) empirically derived OBQ-44 subscales hold appeal as they appear theoretically meaningful. For instance, items related to being perfect and being absolutely sure (certainty) factored together, as did the items related to thoughts. The OBQ-44 is now widely used, with the subscales used as the basis for subsequent studies. For example, consistent with the evidence cited above that perhaps various belief domains are related to particular OCD presentations (e.g., responsibility to checking vs. threat to washing), studies have examined the specificity of such relationships (e.g., Julien, O'Connor, Aardema, & Todorov, 2006). Analyses have also examined which of the symptom dimensions are specific to OCD versus other groups—for example, Tolin, Worhunsky, and Maltby (2006) found that only the thought dimension differentiated OCD from other anxious control participants when depression and trait anxiety were controlled. However, such analyses are predicated on the assumption that the factor structure is correctly represented in the instrument—and are therefore threatened by the manifest difficulty researchers have experienced in replicating the original factor structure of the measure.

Further Analyses of the Factor Structure of the OBQ

We identified four other analyses of the OBQ (Table 1). Faull, Joseph, Meaden, and Lawrence (2004) performed a principal components analysis (PCA) on the OBQ-87 using the six belief scales as the unit of analysis, in a U.K. sample (18 with OCD, 134 students). As the first extracted component had an eigenvalue of 4.82 but the second only 0.35, Faull et al. concluded that the OBQ was unidimensional. Such analyses assume that the existing model of the relationship between items and belief domains is appropriate, which is highly questionable given observed cross-loadings in the six-factor OBQ-87 (OCCWG, 2001). Equally, it is unsurprising that a scale that contains correlated but distinct domains would show such a pattern of eigenvalues at the domain level of analysis.

Myers, Fisher, and Wells (2008) performed a PCA with oblimin rotation on the OBQ-44 with a U.K. student sample ($N = 238$). Using the scree plot for determination of the number of factors, they proposed a four-factor solution. These were (a) Perfectionism/intolerance of uncertainty, (b) Importance/need to control thoughts, (c) Responsibility, and (d) Threat. It should be noted that both Myers et al. and Faull et al. (2004) used PCA extraction. However, unlike EFA, PCA does not differentiate between unique and shared variance, and it is therefore usually considered more useful for data reduction than for determining underlying factor structure.

Woods, Tolin, and Abramowitz (2004) conducted exploratory and confirmatory analyses on an online version of the OBQ-87 in a U.S. student sample ($N = 994$). They used modified weighted least squares estimation with mean- and variance-adjusted standard errors extraction, on the polychoric correlation matrix. They found that the OBQ-44 and OBQ-87 models fit poorly using four common indices (Tucker–Lewis index [TLI], comparative fit index [CFI], Root Mean Square Error of Approximation [RMSEA], and the Standardized root mean square residual [SRMR]). Because of the poor fit, they performed an EFA of the OBQ-87, with a promax rotation. Based on (a) interpretability and (b) fit indices, they suggested four factors were appropriate, containing 66 items from the OBQ-87. The factors were (a) a general factor (32 items), (b) thoughts (10 items), (c) perfectionism (14 items), and (d) responsibility (10 items). The subscales were moderately intercorrelated ($r = .36$ to $r = .49$).

Finally, Wu and Carter (2008) also performed confirmatory and exploratory analyses on the OBQ-44 using a U.S. student population ($N = 797$). In a CFA with maximum likelihood extraction, they found the single-factor model, the three-factor OCCWG (2005) model, and the four-factor Myers et al. (2008) model to be inadequate, all with χ^2/df ratios >3, and CFI <.90. Therefore, using half of their sample ($N = 402$), they performed an EFA using PAF extraction and promax oblique rotation. Based on the interpretability of solutions with different numbers of factors, three factors were retained, with the 24 items with primary loadings >.40 and no secondary loadings >.30 on these factors, kept in the scale. These factors were (a) Importance / control of thoughts (10 items), (b) Responsibility (7 items), and (c) Perfectionism (7 items). Only two of the original OCCWG (2001) threat items were retained (placed on the thoughts subscale) while three perfectionism/uncertainty items were reassigned to responsibility.

Wu and Carter (2008) found their model to have a good fit ($\chi^2/df < 3$; CFI > .90) using a CFA in the second half of the sample ($N = 395$). Thus, the χ^2/df ratio was lower and CFI higher than the three alternative models. However, it

Table 1. Obsessive Beliefs Questionnaire (OBQ) Items, Previous Factor Structures (excluding one-factor model of Faull et al., 2004), and Derived Solutions

		Previous Analyses				Current Exploratory Analyses			
Items	OBQ-87 Item	OCCWG (2001)	OCCWG (2005)	Myers, Fisher, and Wells (2008)	Wu and Carter (2008)	EFA Solution	Cluster Solution	First Solution	Final Solution
1	6. I often think things around me are unsafe	T	R/T	T	—	T	T	T	T
2	10. If I'm not absolutely sure of something, I'm bound to make a mistake	U	P/U	P/U	—	T	T	T	T[a]
3	13. Things should be perfect according to my own standards	P	P/U	P/U	P/U	P/U	P/U	P/U	P/U
4	19. In order to be a worthwhile person, I must be perfect at everything I do	P	P/U	P/U	P/U	P/U	P/U	P/U	P/U[a]
5	20. When I see the opportunity to do so, I must act to prevent bad things from happening	R	R/T	R	R	R	R	R	—
6	23. Even if harm is very unlikely, I should try to prevent it at any cost	R	R/T	R	R	—	R	R	R[a]
7	24. For me, having bad urges is as bad as actually carrying them out	I	I/C	I/C	I/C	I/C	I/C	I/C	I/C[a]
8	27. If I don't act when I foresee danger, then I am to blame for consequences	R	R/T	R	—	R	R	R	R[a]
9	28. If I can't do something perfectly, I shouldn't do it at all	P	P/U	P/U	P/U	P/U	P/U	P/U	P/U
10	31. I must work to my full potential at all times	P	P/U	P/U	—	—	R	—	—
11	32. It's essential for me to consider all possible outcomes of a situation	U	P/U	P/U	R	—	R	—	—
12	33. Even minor mistakes mean a job is not complete	P	P/U	P/U	—	P/U	P/U	P/U	P/U
13	34. If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them	I	I/C	I/C	I/C	—	I/C	I/C	I/C
14	35. I must be certain of my decisions	U	P/U	P/U	R	—	R	—	—
15	38. In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm	R	R/T	R	—	R	R	R	R[a]
16	39. Avoiding serious problems (for example, illness or accidents) requires constant effort on my part	T	R/T	T	—	—	T	T	T
17	41. For me, not preventing harm is as bad as causing harm	R	R/T	R	R	R	R	R	R[a]
18	42. I should be upset if I make a mistake	P	P/U	P/U	—	P/U	P/U	P/U	P/U[a]
19	43. I should make sure others are protected from negative consequences of my decisions or actions	R	R/T	R	R	R	R	R	R
20	45. For me, things are not right if they are not perfect	P	P/U	P/U	P/U	P/U	P/U	P/U	P/U[a]
21	46 Having nasty thoughts means I am a terrible person.	I	I/C	I/C	I/C	I/C	I/C	I/C	I/C[a]
22	50. If I do not take extra precautions, I am more likely than others to have or cause a serious disaster	T	R/T	T	I/C	T	T	T	T[a]
23	53. In order to feel safe, I have to be as prepared as possible for anything that could go wrong	U	R/T	T	R	T	T	T	T
24	55. I should not have bizarre or disgusting thoughts	I	I/C	I/C	—	I/C	I/C	I/C	I/C
25	56. For me, making a mistake is as bad as failing completely	P	P/U	P/U	P/U	—	P/U	P/U	P/U

(continued)

Table 1. Obsessive Beliefs Questionnaire (OBQ) Items, Previous Factor Structures (excluding one-factor model of Faull et al., 2004), and Derived Solutions

		Previous Analyses				Current Exploratory Analyses			
Items	OBQ-87 Item	OCCWG (2001)	OCCWG (2005)	Myers, Fisher, and Wells (2008)	Wu and Carter (2008)	EFA Solution	Cluster Solution	First Solution	Final Solution
26	57. It is essential for everything to be clear cut, even in minor matters	U	P/U	P/U	—	P/U	P/U	P/U	P/U
27	58. Having a blasphemous thought is a sinful as committing a sacrilegious act	I	I/C	I/C	—	I/C	I/C	I/C	I/C
28	59. I should be able to rid my mind of unwanted thoughts	C	I/C	R	—	—	I/C	I/C	—
29	61. I am more likely than other people to accidentally cause harm to myself or to others	T	R/T	I/C	I/C	T	T	T	T[a]
30	64. Having bad thoughts means I am weird or abnormal	I	I/C	I/C	I/C	I/C	I/C	I/C	I/C[a]
31	65. I must be the best at things that are important to me	P	P/U	P/U	P/U	P/U	P/U	P/U	P/U
32	66. Having an unwanted sexual thought or image means I really want to do it	I	I/C	I/C	—	I/C	I/C	I/C	I/C
33	67. If my actions could have even a small effect on a potential misfortune, I am responsible for the outcome	R	R/T	I/C	—	—	T	—	—
34	68. Even when I am careful, I often think bad things will happen	T	R/T	T	—	T	T	T	T[a]
35	69. Having intrusive thoughts means I'm out of control	C	I/C	I/C	I/C	—	I/C	I/C	I/C[a]
36	72. Harmful events will happen unless I am very careful	T	R/T	T	—	T	T	T	T[a]
37	74. I must keep working until it's done exactly right	P	P/U	P/U	—	P/U	P/U	P/U	P/U[a]
38	76. Having violent thoughts means I will lose control and become violent	I	I/C	I/C	I/C	I/C	I/C	I/C	I/C
39	77. To me, failing to prevent disaster is as bad as causing it	R	R/T	R	—	R	R	R	R[a]
40	78. If I don't do a job perfectly, people won't respect me	P	P/U	P/U	P/U	P/U	P/U	P/U	P/U
41	79. Even ordinary experiences in my life are full of risk	T	R/T	T	—	T	T	T	T
42	83. Having a bad thought is morally no different than doing a bad deed	I	I/C	I/C	I/C	I/C	I/C	I/C	I/C[a]
43	84. No matter what I do, it won't be good enough	P	P/U	P/U	—	—	P/U	P/U	P/U[a]
44	86. If I don't control my thoughts, I'll be punished	C	I/C	I/C	I/C	I/C	I/C	I/C	I/C

Note: OCCWG = Obsessive Compulsive Cognitions Working Group; EFA = exploratory factor analysis; R = inflated responsibility for harm; T = overestimation of threat; P = perfectionism; U = intolerance of uncertainty; I = importance of thoughts; C = control of thoughts. Dashed items refer to items excluded from reduced revisions of questionnaires.

a. Items retained in the Obsessive Beliefs Questionnaire-20.

should be noted that there is a question as to the validity of this comparison. Specifically, the fit statistics for Wu and Carter's model were derived in a sample of $N = 395$ whereas a sample of $N = 797$ was used to test the other models. This would lead to a substantial improvement in the primary fit statistic for the Wu and Carter model (χ^2/df), as this indicator is highly sensitive to sample size, worsening in larger samples; note that the CFI would marginally improve (Jackson, 2007). Examination of model parameters (degrees of freedom) also suggests that Wu and Carter tested a 23-item scale rather than the 24-item scale in their CFA.

The Present Study

In the present study, our aim was to provide a theoretically robust and empirically justifiable factor structure for the OBQ-44. Although a number of previous studies have been conducted, none have gained prominence as a representation of the OBQ, leading to the danger that a measure that once had as strength the cooperation between researchers in its development, may become fragmented in its use. Generally, the previous studies have used single methods of analysis and developed a factor structure purely based on statistical decision rules (e.g., loadings over a certain level). In contrast, to enhance our understanding of the measure and future researcher's confidence in our solution, we used multiple exploratory methods as well as confirmatory methods in two randomly selected halves of a large nonclinical Australian sample as well as an additional CFA in an Israeli community sample. For consistency with previous analyses, we first examined the structure using an EFA. To provide additional information regarding the hierarchical and dimensional structure of the data, we also performed cluster analysis and multidimensional scaling (MDS) and considered our item placings alongside previous solutions. Following these analyses, we tested our and others' solutions through CFAs in the second half of the Australian sample and in the independent Israeli sample. Finally, we report on the relationship between the measure and OCD symptoms and depression.

The use of nonclinical populations within research on OCD is a common practice. Such studies follow the findings that nonclinical populations experience similar intrusive thoughts to clinical populations, albeit with lesser frequency and resulting distress (Rachman & de Silva, 1978). Two recent taxometric studies have directly examined this issue of whether OCD symptoms can be considered as dimensional or categorical. The first study examined the three OBQ-beliefs along with three OCD symptom dimensions within a sample of 404 diagnosed cases of OCD (Haslam, Williams, Kyrios, McKay, & Taylor, 2005). They found most potential subtypes to be dimensional, with somewhat ambiguous results for the importance/control of thoughts and the obsessional thoughts domains. More recently, the same research group examined the latent structure of obsessive–compulsive symptoms and beliefs in an unselected sample of 1,005 student participants, to compensate for "the restricted range in both symptom heterogeneity and severity" in the initial study (Olatunji, Williams, Haslam, Abramowitz, & Tolin, 2008, p. 958). This study found that, with the exception of hoarding symptoms, OCD was best conceptualized as dimensional rather than categorical. Similarly, the belief domains measured by the OBQ were also found to be dimensional. On balance, these results are consistent with cognitive models of OCD, which follow a dimensional model of beliefs and symptoms (Frost & Steketee, 2002) and support the appropriateness of studying OCD-related phenomena in nonclinical subjects.

Method

Participants

The Australian study included 121 community participants (M age = 32.3 years; $SD = 11.1$; range = 19-71 years; 63.6% female; 1 participant not reporting age), and 1,122 students undertaking first-year undergraduate psychology (M age years = 20.8; $SD = 6.4$; range = 16-62 years; 76.2% female; 4 participants not reporting age, 9 not reporting gender). All participants were proficient in English. The community participants had an average of 17.3 years of education ($SD = 3.2$ years). A small set of participants ($N = 9$; 0.72% of cases) had a large number of missing responses on the OBQ (>25% of items). The responses of these participants were deemed to be invalid and they were removed, leaving 1,234 participants. This data set was randomly split into two halves ($N = 617$ each), with one half reserved for exploratory analyses ($N = 553$ students; 64 community), and one half for confirmatory analyses ($N = 560$ students; 57 community).

The Israeli sample consisted of 617 participants. Of the 96.5% of participants who provided demographic information, 73.4% were female and 26.4% were male, with a mean age of 26.4 years ($SD = 10.40$, range 14-66 years). Most participants were born in Israel (81.5%) or Eastern Europe (13.8%). Educationally, 12.8% had not finished high school, 39.8% had high school–level education, 17.6% had apprenticeships/trade education, 29.7% had university education. Furthermore, 41.3% were employed or self-employed, 6.1% in the army, 43.9% enrolled in study, and 7.2% unemployed. Most participants (74.1%) self-reported that they were of low or very low socioeconomic status.

Measures

Obsessive Beliefs Questionnaire-44. The OBQ-44 (OCCWG, 2005) is a 44-item self-report measure of cognitions

associated with OCD (see introduction for detail). Items are answered on a 7-point Likert-type scale (*disagree very much* to *agree very much*) in relation to "what you are like most of the time." See Table 1 for items. The Israeli sample answered a Hebrew translation of the OBQ, which had undergone standard backtranslation procedures to ensure fidelity.

Padua Inventory–Washington State University Revision. The Padua Inventory–Washington State University Revision (PI–WSUR; Burns, Keortge, Formea, & Sternberger, 1996) is a 39-item inventory addressing the degree of disturbance caused by a range of intrusive thoughts and compulsive behaviors, measured on a 5-point Likert-type scale. Participants are instructed to consider, "which best seems to fit you and the degree of disturbance which such thoughts or behaviors may create." The PI-WSUR consists of five subscales: (a) obsessional thoughts of harm to self or others ("I think or worry at length about having hurt someone without knowing it"), (b) obsessional impulses of harm to self or others ("While driving, I sometimes feel an impulse to drive the car into someone or something"), (c) contamination obsessions and washing compulsions ("I wash my hands more often and longer than necessary"), (d) checking compulsions ("I check letters carefully many times before posting them"), and (e) dressing rituals ("Before going to sleep, I have to do certain things in a certain order"). Previous studies have shown patients with OCD (diagnosed through clinical interviews) to score significantly higher on the scale and subscales (e.g., mean total scores ranging from 46 to 66) than those with other anxiety disorders (e.g., total mean scores ranging from 28 to 37) or nonclinical controls (e.g., total mean scores ranging from 13 to 22; see Bhar & Kyrios, 2007; Burns et al., 1996). The scale has adequate test–retest stability over a 7-month interval ($r = .61$ to $.84$) and discriminative validity (Burns et al., 1996). In the present study, for the total scale, alpha was .94 (bootstrapped 95% confidence interval [CI] for 2,000 samples, .93 to .94) with average interitem correlations of .27. For the subscales, alpha ranged from .78 (.73, .81) for dressing/grooming to .91 (.89, .92) for checking, with interitem correlations from .32 (impulses) to .55 (dressing/grooming).

Beck Depression Inventory–II. The Beck Depression Inventory–II (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-rated measure assessing depressive symptoms over the past 2 weeks. Items are rated from 0 (e.g., "I do not feel sad") to 3 (e.g., "I am so sad or unhappy I can't stand it"). The BDI-II is a reliable and well-validated measure of depressive symptoms, with good test–retest reliability at a 1-week period, and demonstrated criterion validity, with mood-disordered patients obtaining higher scores than patients with anxiety, adjustment, or other disorders (Beck et al., 1996). In this study, Cronbach's alpha was .92 (.91, .93), and the average interitem correlation was .36.

Procedure

Data were extracted from ongoing studies in our OCD research program. Australian student participants were recruited through advertisements in the first-year psychology Research Participation Program and received course credit for their participation. They completed the questionnaires in classrooms and in groups of 3 to 20. Participants in the Australian community group were recruited through several means (hospital staff, other university sites, working population, through newspaper advertisements, and flyers, etc.) and returned the questionnaires by reply-paid mail. All participants provided informed written consent. Australian participants were to be excluded if they disclosed a current psychiatric disorder, drug abuse, or current psychiatric treatment on self-report screening questions. The mean sample scores on the measure of OCD symptoms (PI-WSUR; student sample $M = 24.13$, $SD = 19.07$, community sample $M = 12.71$, $SD = 11.60$)[1] were consistent with those recorded in previous research using nonclinical populations (e.g., Bhar & Kyrios, 2007). The Israeli sample participated voluntarily and completed questionnaires online via the "midgam.com" Internet site: a self-awareness site where registered users can complete psychological measures and receive feedback. Participants consented to their data being used for research purposes.

Results

Data Exploration

Exploratory analyses were performed with R (version 2.5.1) and SPSS (version 14.0), and confirmatory analyses were run using LISREL (8.80). A small number of values were missing for each OBQ item. These missing values were imputed for the Australian and Israeli data sets separately using the SPSS EM algorithm, with values rounded to the nearest valid number. To examine the potential influence of outliers, in each separate sample (i.e., Australia Exploratory, Australia Confirmatory, and Israeli) the squared Mahalanobis distance was calculated for each participant using data from the 44 items of the OBQ. OBQ correlation matrices with and without cases with the 10 most extreme Mahalanobis values were compared. The mean absolute difference of the correlations in these correlation matrices was never greater than .01. Because removal of these cases would make no substantive difference to results, all cases were retained.

Mean values, *SD*, skewness, and kurtosis statistics for each OBQ item in the exploratory Australia data set are indicated in Table 2.

Exploratory Analyses

To seek evidence for converging solutions using alternative statistical methods, three exploratory analyses were performed

Table 2. Descriptive Statistics and Exploratory Factor Analysis Solution for Exploratory Sample ($N = 617$)

		Descriptive Statistics ($N = 617$)				Factor Solution					
Item	OCCWG (2001)	*M*	*SD*	Skew	Kurtosis	Initial	Extracted	Factor 1	Factor 2	Factor 3	Factor 4
83	I	2.14	1.39	1.26	0.93	.65	.62	*.86*	–.13	–.08	.10
46	I	2.47	1.61	0.93	–0.16	.68	.64	*.77*	.15	–.09	.02
58	I	2.22	1.48	1.10	0.29	.58	.49	*.77*	–.11	–.14	.16
64	I	2.01	1.29	1.41	1.60	.65	.59	*.72*	.09	.06	–.12
76	I	1.81	1.19	1.75	2.93	.65	.52	*.71*	–.01	.06	–.08
55	I	3.07	1.71	0.44	–0.91	.52	.37	*.67*	.06	–.24	.13
86	C	1.81	1.25	1.74	2.52	.71	.68	*.64*	.02	.27	–.13
69	C	2.18	1.31	1.18	0.95	.66	.63	*.59*	–.05	*.33*	–.11
24	I	2.88	1.78	0.65	–0.77	.55	.47	*.58*	–.12	–.01	.29
66	I	2.46	1.46	0.85	–0.19	.44	.32	*.53*	.00	.08	–.05
56	P	2.23	1.43	1.24	0.85	.71	.61	*.51*	*.42*	.01	–.08
59	C	3.86	1.74	–0.17	–1.05	.35	.22	*.39*	.02	–.13	.26
34	I	2.15	1.47	1.22	0.57	.44	.30	*.35*	–.04	.29	–.04
45	P	3.19	1.81	0.40	–1.09	.70	.67	.05	*.83*	–.03	–.06
19	P	2.95	1.89	0.51	–1.15	.69	.67	.02	*.81*	.07	–.14
13	P	4.08	1.89	–0.18	–1.28	.55	.46	–.12	*.74*	.02	–.04
74	P	3.71	1.78	–0.03	–1.22	.63	.53	–.03	*.71*	.04	.01
65	P	4.52	1.74	–0.62	–0.68	.52	.45	–.11	*.71*	–.01	.04
28	P	2.48	1.61	1.00	0.04	.62	.55	.21	*.65*	.01	–.09
33	P	3.44	1.71	0.25	–1.01	.63	.54	.04	*.65*	–.04	.19
31	P	4.92	1.72	–0.73	–0.44	.48	.42	–.24	*.60*	–.14	*.34*
78	P	3.11	1.81	0.39	–1.17	.59	.53	.07	*.59*	.17	–.04
35	U	4.65	1.50	–0.69	–0.24	.45	.36	–.02	*.51*	–.21	*.34*
42	P	3.72	1.68	–0.15	–1.16	.49	.41	.19	*.46*	.08	.02
84	P	2.63	1.80	0.82	–0.62	.68	.56	.19	*.42*	*.35*	–.21
57	U	3.30	1.72	0.28	–0.96	.48	.40	.10	*.41*	.17	.09
68	T	3.14	1.83	0.25	–1.33	.68	.70	–.13	.02	*.90*	.03
61	T	2.17	1.52	1.27	0.60	.64	.60	.17	–.05	*.70*	–.08
6	T	2.83	1.63	0.57	–0.89	.44	.37	–.19	.02	*.70*	.05
79	T	2.92	1.75	0.50	–1.00	.50	.44	–.05	–.01	*.68*	.06
72	T	2.45	1.45	0.85	–0.06	.63	.58	.15	.00	*.62*	.05
50	T	2.33	1.52	0.95	–0.22	.70	.65	.24	–.06	*.61*	.08
53	U	3.09	1.72	0.39	–1.02	.60	.54	–.01	.07	*.61*	.18
10	U	3.47	1.68	0.21	–1.10	.45	.38	.02	.13	*.49*	.04
39	T	2.76	1.65	0.69	–0.64	.53	.43	.05	.00	*.42*	*.31*
67	R	3.06	1.62	0.33	–1.05	.58	.50	.13	–.01	*.40*	*.33*
41	R	3.10	1.70	0.37	–1.00	.71	.58	.23	–.07	–.02	*.68*
43	R	4.79	1.64	–0.87	0.01	.56	.50	–.04	.14	.06	*.63*
38	R	3.12	1.63	0.38	–0.88	.68	.53	.22	–.04	.01	*.63*
20	R	4.93	1.64	–0.79	–0.16	.46	.35	–.16	–.02	.06	*.62*
27	R	3.99	1.73	–0.28	–1.11	.53	.46	.19	.03	–.01	*.57*
23	R	3.99	1.76	–0.23	–1.05	.53	.43	–.10	–.06	*.37*	*.51*
32	U	4.72	1.63	–0.69	–0.32	.55	.42	–.18	*.39*	.02	*.47*
77	R	2.68	1.59	0.68	–0.62	.66	.43	.22	–.08	.20	*.43*

Note: OCCWG = Obsessive Compulsive Cognitions Working Group. I = importance of thoughts; C = control of thoughts; U = intolerance of uncertainty; P = perfectionism; R = inflated responsibility for harm; T = overestimation of threat. Italicized numbers represent factor loadings ≥.30.

in the Exploratory Australian data set: an EFA, a hierarchical cluster analysis (HCA) by variable, and MDS. Specifically, EFA highlights structure consistent with items being a function of latent factors; MDS highlights spatial structures whereas HCA highlights hierarchical structure such as factors that are more similar or items within a factor that are more similar. Given the disagreement in the literature over the structure of the OBQ, the combination of these exploratory methods provided multiples lenses through which the structure of the OBQ could be viewed. These exploratory

analyses led to the proposed "OBQ-TRIP" solution which then fed into the confirmatory analyses (i.e., by CFA).

Exploratory factor analysis. The EFA was performed on the polychoric correlation matrix between the OBQ items in the Exploratory Australian data set, which was obtained using the polycor package in R (Fox, 2007). Polychoric correlations estimate the correlation between the latent continuous variables assumed to underlie the observed responses to the discretely coded questionnaire items. Polychoric correlations serve to reduce the effect of item distribution properties on Pearson correlations.

A PAF extraction was performed using SPSS 14.0 FACTOR with an oblique rotation (*promax*), as factors were expected to correlate. Statistics indicated that the correlation matrix was suitable for analysis (Kaiser–Meyer–Olkin statistic = 0.94, item-level measures of sampling adequacy from 0.84 to 0.97). To determine the number of factors to be extracted, three criteria were examined: Horn's parallel analysis suggested five factors, Velicer's minimum average partial correlational method suggested five factors, and the scree plot suggested between three and five factors (the first eight eigenvalues were 15.7, 3.5, 2.8, 1.8, 1.6, 1.1, 1.1, and 1.1). Therefore, we examined the solutions with three to five factors. From examination of the interpretability of the pattern matrix, a four-factor solution was deemed most appropriate (see Table 2) and explained 54.25% of the variance. In contrast, the five-factor solution returned a fifth factor with a limited number of items (the four primary items were 31, 32, 35, and 43), where the items only had moderate primary loadings (<.57) and with most items cross-loading across the other factors. The three-factor solution was similar to the four-factor solution, but collapsed most "threat" items onto the thoughts factor. Following Wu and Carter (2008), items with primary loadings <.40 or secondary loadings >.30 were excluded, leaving 33 items in the "EFA solution". Factors corresponded to (a) importance of thoughts/control of thoughts (9 items), (b) perfectionism/certainty (10 items), (c) responsibility (6 items), and (d) threat (8 items).

Cluster analysis by variable. Cluster analysis by variable illustrates the hierarchical structure of the data through graphical techniques such as the dendogram (see Figure 1), which provides a visual representation of similarity (for a general outline of cluster analysis, see Everitt, 1993). Through such diagrams, clustering solutions are formed based on visual examination at the point where a large jump in distance is required to combine two clusters into one.

Cluster analysis was performed using the hclust function in R with each element of the input proximity matrix calculated as $(1-r_{\text{POLY}})$, where r_{poly} is the polychoric correlation in the Exploratory Australian data set. Alternative measures of proximity such as the squared Euclidean distance were not used as they confound correlations and differences between

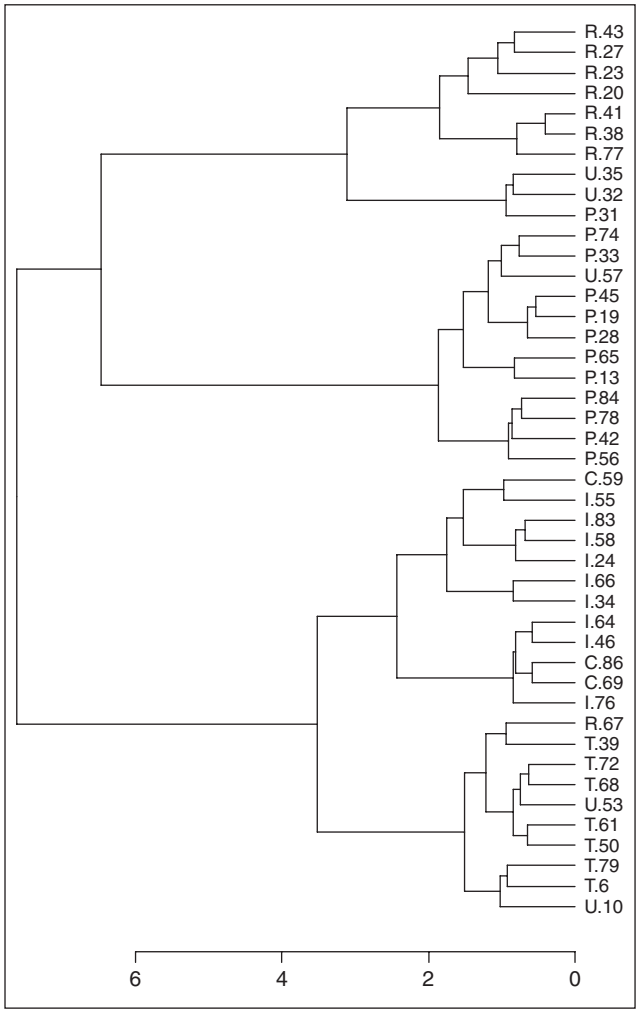

Figure 1. Dendogram of structure in exploratory data set
Note: Letters refer to original theoretical scales. R = inflated responsibility for harm; T = overestimation of threat; P = perfectionism; U = intolerance of uncertainty; I = importance of thoughts; C = control of thoughts. Numbers refer to item numbers in OBQ-87.

item means. Ward's method of agglomeration was used as it tends to yield relatively equal sized clusters and it resulted in a meaningful representation in the present data set (for a discussion of agglomeration options, see Milligan & Cooper, 1987). Examination of the dendrogram suggested that four clusters were appropriate (see Figure 1). The clusters corresponded to (a) Responsibility, (b) Perfectionism and certainty, (c) Importance of and control of thoughts, (d) Threat. Of note, three perfectionism/certainty items formed a subcluster within responsibility (Items 31, 32, 35); two of these perfectionism items were also placed on the responsibility scale in Wu and Carter's (2008) solution. One threat and one responsibility item (39, 69) formed a subgroup within the threat cluster.

Multidimensional scaling. A nonmetric MDS was performed using SPSS 14.0 PROXSCAL with the input distance matrix

calculated as $(1-r_{poly})$, where r_{poly} is the polychoric correlation in the Exploratory Australian data set (for a general discussion, see Borg & Groenen, 1997). MDS attempts to reproduce the distances between objects in some lower dimensional space. The two- or three-dimensional model often presents a useful picture of spatial structure in the relationship between items. Items positioned close together in the MDS diagram may represent a similar factor. Items that lie between larger groupings may represent items with content that overlaps two domains. Items that are distant from the main structure may be poorly represented by the main factors.

Examination of a plot of stress by dimensions in our study indicated that a two-dimensional solution provided a major improvement over a single-dimensional solution. Improvements in stress for the three and four dimensions were not sufficient to justify the loss in intuitive graphical interpretation that would flow from modeling beyond two dimensions. Examination of the MDS plot reveals a number of distinct regions (see Figure 2). The perfectionism and uncertainty items tended to overlap and be distinct from other items, with a similar distinct grouping for the items relating to the importance of, and need to control thoughts. However, three perfectionism and uncertainty items (Items 31, 32, 35) were distinct from the remaining grouping, having a similar distance to responsibility. Finally, the threat items (particularly Items 50, 68, and 72) could be said to fall at the centroid of the items.

The MDS provides partial support for all previously derived factor structures. The distinct grouping of perfectionism and certainty items in the MDS was consistent with the assignment of these items to a distinct factor in previous analyses, as was the grouping of responsibility items. The three outlying perfectionism items were less consistently assigned, with Wu and Carter (2008) assigning two of the items to responsibility—indeed, these items were the highest loading from Wu and Carter's responsibility subscale. The emergence of the thoughts items as a region is consistent with past analyses. The major point of contention appears to be the assigning of the threat items, which may reflect their central position in the MDS solution: The OCCWG (2005) combined these items with the responsibility factor; Wu and Carter omitted most of the items; Woods et al. (2004) combined the items with closely surrounding perfectionism and thoughts items into a general factor; Myers et al. (2008) placed the items in a distinct scale.

Summary of exploratory analyses and exploratory CFA. From consideration of the exploratory analyses and past studies, the following decisions were made with respect to the factor structure of the OBQ. First, converging evidence from the three analyses outlined above (EFA, HCA, MDS) suggested that four separate factors best represented the exploratory data set, these being (a) Responsibility (R), (b) Perfectionism/intolerance of uncertainty (P/U), (c) Importance of/Control of Thoughts (I/C), (d) Threat (T). Second, as the goal of our analysis at this point was not to shorten the scale, a conservative approach was taken to removing items. Thus, the perfectionism and uncertainty items 31, 32 and 35 were removed on the basis of (a) inconsistency in placing of these items in our analyses (EFA, CA) and in past analyses, and (b) the MDS solution indicating a separation between these items and the other perfectionism items. The responsibility item 67 was also removed for similar reasons, leaving 40 items in our initial revision of the scale (see Table 1). With respect to item classification, most items were classified consistently with the original empirical grouping by the OCCWG (2005), but with threat and responsibility items assigned to two separate scales. The exception was Item 10 ("If I'm not absolutely sure, I'm bound to make a mistake"), which our analyses suggested could be better assigned to the threat scale.

Following selection of the 40-item solution, a CFA with diagonally weighted least squares (DWLS) estimation and an oblique rotation was performed using LISREL in the Exploratory Australian data set to determine whether further item removal was justified. DWLS estimation has been found to perform adequately with polychoric matrices in moderate sample sizes, and unlike other estimation techniques such as maximum likelihood, it makes no distributional assumptions about the data (Flora & Curran, 2004; Wang & Cunningham, 2005). Polychoric matrices and asymptotic covariance matrices were generated using LISREL for all CFAs. Examination of factor loadings for items in the four-factor model revealed two items that had small loadings (<.50) on their assigned factors (Item 59 loading = .44 on I/C, Item 20 loading = .41 on responsibility). By content, these items also differed from the other items, having limited negative connotations compared with the other items in their assigned scales (Item 59, "I should be able to rid my mind of unwanted thoughts"; Item 20, "When I see the opportunity to do so, I must prevent bad things from happening."). Given that these items also were distinct from the other items within their grouping in the MDS, they were dropped from the scale. This 38-item scale formed the final solution for examination. For differentiation, we have labeled it the OBQ-TRIP (OBQ-Threat, Responsibility, Importance and control of thoughts, Perfectionism and intolerance of uncertainty).

Confirmatory Analyses

The final confirmatory analyses were performed separately in the independent half of the Australian data set ($N = 617$) and in the Israeli data set ($N = 617$) using the same CFA procedure as above (see Table 3). Four fit statistics are reported (χ^2/df; CFI, RMSEA, SRMR). The four previous

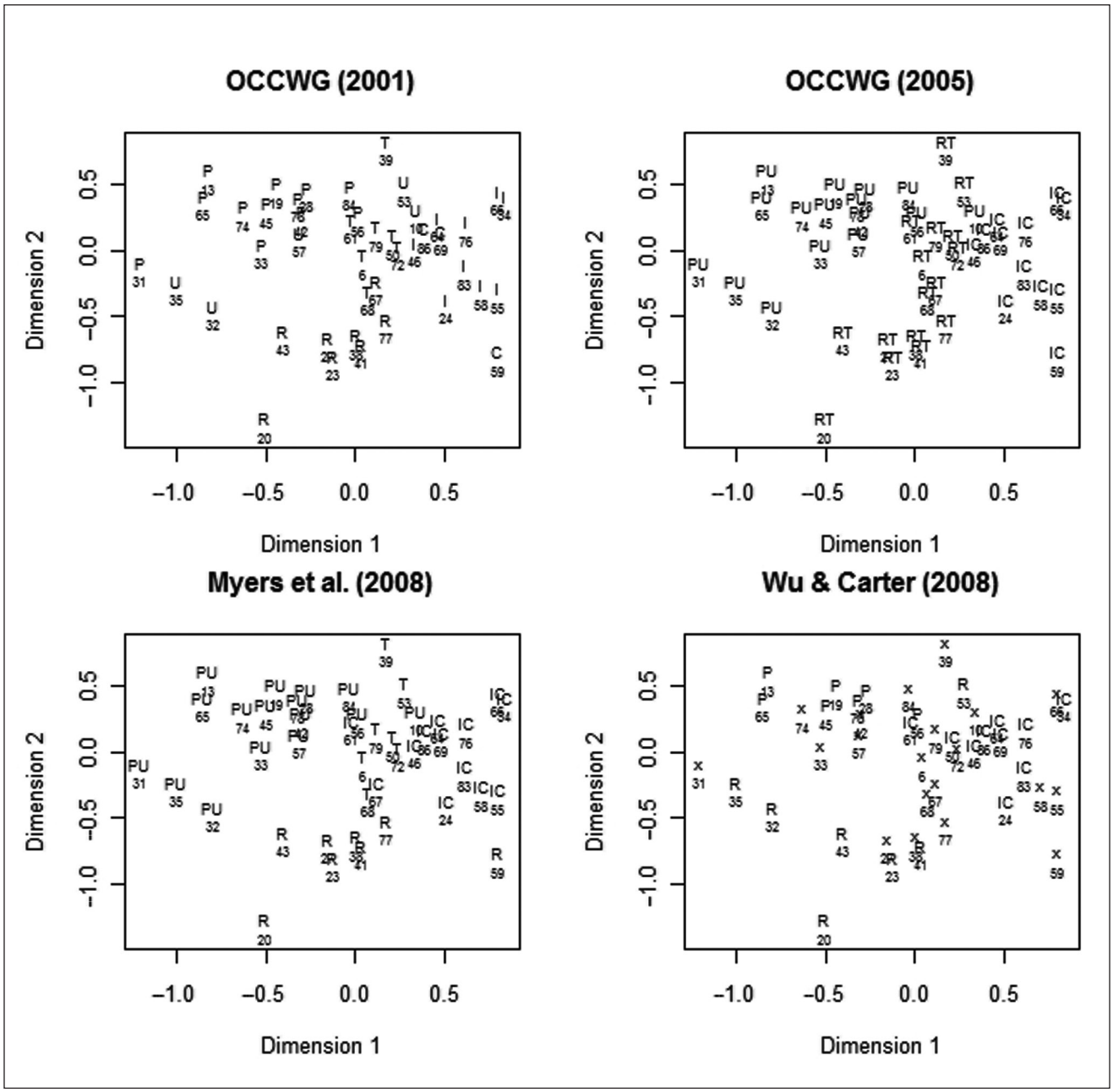

Figure 2. Multidimensional scaling (MDS) of structure in exploratory data set, with previous theoretical and empirical factor structures displayed

Note: R = inflated responsibility for harm; T = overestimation of threat; P = perfectionism; U = intolerance of uncertainty; I = importance of thoughts; C = control of thoughts; Items marked with x are excluded from reduced revisions of questionnaires. Numbers refer to item numbers in the Obsessive Beliefs Questionnaire-87 (OBQ-87). Solution rotated 180 degrees.

analyses of the OBQ-44 (one-factor model; Myers et al., 2008; OCCWG, 2005; Wu & Carter, 2008[2]) and our derived OBQ-TRIP solution were examined. In both the Australian Confirmatory data set and the Israeli data set, the OBQ-TRIP fit best on all four indices. The fit statistics for our model were also satisfactory in absolute terms. For example, Hu and Bentler (1999) are cited as suggesting criteria such as CFI > .95, SRMR < .08, and RMSEA < .06 (cf. Marsh, Hau, & Wen, 2004); note that χ^2/df under three is generally considered a good fit. By such conventions, our model fit satisfactorily in the Confirmatory Australian sample on all indices, and only the χ^2/df narrowly missed the criteria in

Table 3. Fit Statistics for the Obsessive Beliefs Questionnaire (OBQ) in Australian Confirmatory Sample (N = 617) and Israeli Confirmatory Sample (N = 617)

	Factors	Number of Items	*df*	χ^2	χ^2/df	CFI	SRMR	RMSEA	90% CI RMSEA
Model testing in Australian confirmatory sample									
One-factor model	1	44	902	6277.48	6.96	0.93	0.085	0.098	(0.096, 0.101)
OCCWG (2005)	3	44	899	4062.61	4.52	0.96	0.067	0.076	(0.073, 0.078)
Myers et al. (2008)	4	44	896	3414.80	3.81	0.97	0.066	0.068	(0.065, 0.070)
Wu and Carter (2008)	3	24	249	904.80	3.63	0.97	0.064	0.065	(0.061, 0.070)
OBQ-TRIP	4	38	659	1955.68	2.97	0.98	0.055	0.057	(0.054, 0.059)
Model testing in Israeli confirmatory sample									
One-factor model	1	44	902	8366.19	9.28	0.92	0.093	0.116	(0.114, 0.118)
OCCWG (2005)	3	44	899	5623.61	6.26	0.95	0.082	0.092	(0.090, 0.095)
Myers et al. (2008)	4	44	896	4832.69	5.39	0.96	0.079	0.085	(0.082, 0.087)
Wu and Carter (2008)	3	24	249	783.28	3.15	0.98	0.082	0.059	(0.054, 0.064)
OBQ-TRIP	4	38	659	2075.78	3.15	0.98	0.071	0.059	(0.056, 0.062)

Note: OCCWG = Obsessive Compulsive Cognitions Working Group; OBQ-TRIP = OBQ–Threat, Responsibility, Importance and control of thoughts, Perfectionism and intolerance of uncertainty; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CI = confidence interval. Satorra–Bentler scaled chi-square reported.

the Israeli sample. In comparison, of the earlier models, only Wu and Carter's (2008) solution approached a satisfactory fit, particularly in the Israeli sample. Given that the OBQ-TRIP solution fit better in the samples on a variety of indices, while also being more comprehensive than Wu and Carter's solution in its coverage of the original item pool, we believe it serves as the best model of the OBQ.

Correlations of OBQ-TRIP With OCD Symptoms and Depression

Next, we examined the relationship between the scales of the OBQ-TRIP in the full Australian sample (i.e., the combined confirmatory and exploratory data set) with (a) the three-factor structures of the OCCWG (2005) model and Wu and Carter's (2008) model, (b) OCD symptoms, (c) depression, (d) OCD symptoms controlling for depression, OCD symptoms when controlling for other OBQ-TRIP subscales (see Table 4). For comparison purposes, we also present the correlations of the most-accepted revision (the OBQ-44) and the best-fitting of the alternative solutions (Wu and Carter's [2008] model). Scales were created through summing the relevant items. Intercorrelations between scales of the OBQ-TRIP ranged from .49 (P/U with R) to .64 (I/C with T). The I/C and P/U factors of the OBQ-TRIP almost perfectly correlated with the corresponding scales in the OBQ-44 and in Wu and Carter's (2008) solution as would be expected due to the similar items in the scales. The R and T OBQ-TRIP factors correlated highly with the combined R/T factor of the OBQ-44.

As would be expected, all OBQ-TRIP subscales correlated positively with symptoms (*r*s from .09 to .49 for PI-WSUR subscales). The largest magnitude correlations were between the threat subscale of the OBQ-TRIP and the OCD symptom subscales, particularly obsessions ($r = .49$), checking ($r = .47$), and contamination ($r = .44$). Responsibility correlated less strongly with symptom scales, with the highest magnitude correlation being with obsessions of harm ($r = .33$) and checking ($r = .28$). Adding validity to the scale content, the OBQ-TRIP I/C scale correlated most highly with the symptom subscale assessing the occurrence of obsessions ($r = .41$), followed by checking ($r = .32$). Perfectionism/Certainty correlated most strongly with checking ($r = .42$) and obsessions ($r = .39$). The pattern of correlations between the OBQ-TRIP and OCD symptoms remained similar, albeit of smaller magnitude, when controlling for depression (*r*s from –.02 to .32). Note that the impulses of harm PI-WSUR scale did not correlate substantially with any of the OBQ-TRIP dimensions after controlling for depression (all *r*s < .08). Finally, we also examined the unique variance of each OBQ-TRIP subscale in predicting OCD symptoms, through examining the semipartial correlations between each OBQ-TRIP subscale and OCD while controlling for the remaining three subscales (see Table 4). Consistent with its larger initial correlations, the threat scale showed the greatest unique prediction of OCD. Importance of thoughts only contributed to predictions of obsessions of harm whereas perfectionism/uncertainty generally contributed to all symptom dimensions with a small magnitude. Responsibility did not uniquely predict any variance in symptoms when controlling for the other belief dimensions.

Short Version of the Questionnaire

Finally, although our primary aim was to examine the factor structure of the 44-item version of the OBQ, we believe that

Table 4. Zero-order correlations and semipartial correlations for OBQ-TRIP, OBQ-44, and Wu and Carter OBQ, with symptom measures

	OBQ-TRIP				OBQ-44			Wu and Carter			
	T	R	I/C	P/U	R/T	I/C	P/U	R	I/C	P/U	*N*
Mean	24.90	21.63	25.22	39.11	51.11	29.12	56.65	29.04	21.88	22.38	1,234
(*SD*)	(10.26)	(7.48)	(10.36)	(14.54)	(16.68)	(11.22)	(17.96)	(7.89)	(9.44)	(9.02)	1,234
Cronbach's alpha	.87	.83	.86	.90	.90	.86	.91	.80	.86	.86	1,234
(95% CI Cronbach's α)	(.85, .88)	(.81, .84)	(.85, .87)	(.89, .91)	(89, .91)	(.85, .87)	(.90, .92)	(.78, .81)	(.84, .87)	(.85, .87)	1,234
M interitem correlation	.42	.44	.37	.43	.36	.35	.39	.36	.39	.47	1,234
Pearson's correlations											
OBQ-TRIP											
T	—	.57	.64	.62	.89	.63	.65	.64	.75	.55	1,234
R	—	—	.53	.49	.87	.54	.54	.84	.54	.43	1,234
I/C	—	—	—	.54	.65	.99	.55	.51	.95	.49	1,234
P/U	—	—	—	—	.62	.55	.98	.58	.58	.96	1,234
PI-WSUR											
Contamination	.44 (.50)	.25 (.29)	.32 (.37)	.34 (.39)	.39 (.44)	.32 (.37)	.35 (.39)	.30 (.36)	.35 (.40)	.32 (.37)	1,049
Obsessions of harm	.49 (.59)	.33 (.41)	.41 (.49)	.39 (.46)	.47 (.56)	.40 (.49)	.39 (.46)	.35 (.44)	.45 (.55)	.35 (.42)	1,049
Impulses of harm	.26 (.31)	.09 (.11)	.20 (.24)	.23 (.27)	.20 (.24)	.20 (.24)	.21 (.25)	.09 (.11)	.27 (.33)	.22 (.26)	1,049
Checking	.47 (.53)	.28 (.32)	.32 (.37)	.42 (.46)	.42 (.47)	.32 (.36)	.42 (.47)	.33 (.39)	.37 (.42)	.38 (.43)	1,049
Dressing/grooming	.34 (.41)	.20 (.25)	.26 (.32)	.29 (.35)	.31 (.37)	.27 (.32)	.30 (.36)	.27 (.34)	.29 (.36)	.26 (.32)	1,049
Total	.54 (.60)	.31 (.36)	.40 (.44)	.45 (.49)	.48 (.53)	.40 (.44)	.46 (.49)	.36 (.42)	.45 (.50)	.42 (.47)	1,049
BDI-II	.44 (.49)	.22 (.25)	.34 (.40)	.42 (.46)	.37 (.40)	.35 (.39)	.40 (.44)	.22 (.26)	.43 (.48)	.37 (.42)	955
Semipartial correlations controlling for BDI-II											
PI-WSUR											
Contamination	.31	.16	.18	.20	.27	.18	.22	.22	.21	.19	772
Obsessions of harm	.32	.25	.25	.22	.33	.24	.23	.26	.27	.19	772
Impulses of harm	.08	–.02	.04	.07	.03	.04	.05	–.03	.09	.07	772
Checking	.31	.17	.16	.26	.27	.16	.27	.23	.20	.21	772
Dressing/grooming	.24	.14	.14	.18	.22	.14	.20	.20	.17	.15	772
Total	.35	.19	.21	.27	.32	.21	.27	.24	.26	.24	772
Semipartial correlations controlling for other OBQ-TRIP subscales											
PI-WSUR											
Contamination	.24	–.03	.03	.09	—	—	—	—	—	—	1,049
Obsessions of harm	.22	.02	.09	.08	—	—	—	—	—	—	1,049
Impulses of harm	.14	–.10	.04	.10	—	—	—	—	—	—	1,049
Checking	.24	–.03	–.01	.17	—	—	—	—	—	—	1,049
Dressing/grooming	.16	–.02	.04	.10	—	—	—	—	—	—	1,049
Total	.28	–.04	.03	.15	—	—	—	—	—	—	1,049

Note: OBQ-TRIP = OBQ–Threat, Responsibility, Importance and control of thoughts, Perfectionism and intolerance of uncertainty; R = inflated responsibility for harm; T = overestimation of threat; P = perfectionism; U = intolerance of uncertainty; I = importance of thoughts; C = control of thoughts; BDI = Beck Depression Inventory; PI-WSUR = Padua Inventory–Washington State University Revision; Correlations in parentheses represent zero-order correlations corrected for attenuation due to unreliability. PI-R and BDI square root transformed.

some researchers may find our final 38-item solution to be too burdensome to routinely use in their studies. Therefore, we offer for further analysis a shorter version of the OBQ-TRIP. There are varying approaches that can be adopted when developing shorter versions of existing measures. Most commonly, researchers aim to maximize internal consistency of each scale. For example, they may conduct EFA of the measure and select the most highly loading items from each subscale. However, we did not wish to follow this technique, as maximizing internal consistency can also lead to an item set that is highly redundant, narrow in content, and potentially low in validity (Boyle, 1991).

As we were content that the four derived factors in the OBQ-TRIP were unidimensional, following the removal of a limited number of items from the original scale, we wished to capture the same subscale variance with our reduced

Table 5. Internal Reliability for OBQ-TRIP and Short Obsessive Beliefs Questionnaire, and Correlations With the Full Subscale and With Symptom Measures in the Three Samples

	38-Item Version				20-Item Version			
	Threat	Responsibility	Importance of thoughts	Perfectionism	Threat	Responsibility	Importance of thoughts	Perfectionism
Exploratory Australian sample								
α	.87	.82	.84	.90	.82	.81	.80	.81
r with full subscale	—	—	—	—	.94	.98	.97	.96
r with OCD symptoms (*N* = 521)	.53	.30	.43	.44	.51	.30	.43	.43
Confirmatory Australian sample								
α	.87	.83	.82	.90	.79	.83	.77	.81
r with full subscale	—	—	—	—	.94	.98	.96	.95
r with OCD symptoms (*N* = 529)	.55	.33	.36	.48	.54	.32	.36	.46
Israeli sample								
α	.87	.81	.85	.91	.81	.80	.80	.78
r with full subscale	—	—	—	—	.95	.98	.96	.96

Note: OCD = obsessive–compulsive disorder; OBQ-TRIP = OBQ–Threat, Responsibility, Importance and control of thoughts, Perfectionism and intolerance of uncertainty.

questionnaire. We aimed to have five items per scale (20 items overall). This target was chosen for practical reasons—the abridged measure would fit a single page of a survey instrument. We also expected that five items per subscale would constitute a minimum scale length that would still exhibit acceptable levels of internal consistency (following Stanton, Sinar, Balzer, & Smith, 2002).

The exploratory Australian data set was used to select the reduced scale content. We took the approach of aiming to maximize the correlation between each five-item subscale and the full subscale, so as to ensure that the shorter scale adequately captures the variance of the original construct. To do this, we analyzed each subscale separately in the exploratory data set using the Alphamax macro for SPSS (Hayes, 2005). This macro constructs, through repeated computation, all possible combinations of the items from the original scale, from a length of two variables up to the full scale, and gives the internal consistency of the item set and the correlation of the item set with the original scale. Using this technique, the five-item solutions were ranked from highest to lowest on the basis of their correlation with the respective full OBQ-TRIP subscale, with the first solution selected that had an internal consistency above an acceptable level (α= .80). Through this approach we aimed to achieve a balance between the competing aims of capturing the full original subscale variance while still ensuring that the items were acceptably homogenous (i.e., the tension between breadth and similarity of items). This approach resulted in the following subscales—threat: Items 10, 50, 61, 68, 72; responsibility: Items 23, 27, 38, 41, 77; importance/control of thoughts: Items 24, 46, 64, 69, 83; perfectionism/uncertainty: Items 19, 42, 45, 74, 84 (item numbers based on the OBQ-87; see Table 1 for details).

To validate the scale, it was examined in its performance in correlating with the original OBQ-TRIP subscales across the three samples, in its internal consistency across the samples, and in its correlation with symptoms in the Australian samples. The scale showed adequate internal consistency in all three samples (.80-.82; .77-.83; .78-.81; see Table 5). Furthermore, as expected, the scales accounted for most of the variance in the full scale (correlations of .94-.98; .94-.98; .95-.98 in the three samples; see Table 5). Finally, as would be expected given the high correlations between the reduced and full scales, in the Australian samples the scales differed very little in their correlations with OCD symptoms (at maximum, correlating .02 less). Thus, although

further validation is needed, the reduced OBQ-20 may be an acceptable substitute for the original scale when a shorter version is required.

Discussion

In this article, we performed a thorough analysis of the OBQ-44 factor structure, using a variety of exploratory and confirmatory methods. We believe that a four-factor solution best represents the data and is superior to other derived factor structures. A total of 38 items of the OBQ-44 were retained corresponding to the four scales of: overestimation of threat (T); inflated personal responsibility for harm (R); perfectionism/intolerance of uncertainty (P/U); and the importance of and need to control thoughts (I/C). The scales correlated well with OCD symptoms, with threat having the strongest relationship. A shortened 20-item version reflecting the four subscales was also developed for further analysis.

The solution obtained in this study is consistent with aspects of past analyses of the OBQ. In particular, excluding the one-factor solution, all previous analyses have suggested that there are separate P/U and I/C factors within the OBQ. Although differing on some specific items, our version of these scales correlated almost perfectly with the OCCWG (2005) P/U and I/C scales. However, as noted above, the major point of disagreement with past analyses is the treatment of the threat and responsibility items. Like Myers et al. (2008), our analysis suggests that the threat and responsibility items should form separate subscales. Indeed, the threat items were the strongest predictors of OCD symptoms, indicating that removal or combination of these items, such as performed by Wu and Carter (2008), may lower the predictive power and thus the utility of the OBQ.

In comparison with previous analyses, we believe our approach has a number of strengths. We used multiple methods for determining the factor structure, as opposed to previous analyses that exclusively used an EFA with statistical decision rules for retaining items. The use of cluster analysis and MDS allows us a greater scope for understanding the factor structures of the measure, as random variation combined with black-and-white statistical decision rules (e.g., based only on EFA loadings) may lead to differences in derived structures across samples. We have also used polychoric rather than Pearson correlations for our factor analyses, which allowed for an assessment of item–factor relations that was less biased by item distributional properties.

We have adopted a conservative approach to determining factors to be removed from the original scale and have considered statistical findings from our own analyses in combination with theoretical considerations and past empirical analyses of the scale. For example, the responsibility item (23) "Even if harm is very unlikely, I should try to prevent it at any cost" loaded on both the R and T scales in our EFA. Based on this single criterion, it might be removed. However, theoretically, this item can be taken as a prototypical example of responsibility, empirically it joined the responsibility items in the cluster analysis, and on all past item-level EFAs it has also loaded highest on the responsibility scale. Removal of such items on the basis of a single statistical decision rule could jeopardize the external validity of the scale. Following these decision rules, the OBQ-TRIP solution performed better on CFA in two separate samples. The closest alternative solution, that developed by Wu and Carter (2008), did not fit as well in these analyses, and also excluded most items from the threat domain that transpired to be the most symptom-related domain of the measure.

Finally, we developed a shortened version of the scale, which captured a large part of the original variance of the scale while retaining acceptable internal consistency. Although needing further validation, we believe that the short scale should increase the utility of the OBQ and the likelihood that it would be used routinely in research studies on OCD, and perhaps in clinical practice.

Although this study was not primarily intended as an investigation into the cognitive theory of OCD, if replicated, the article may have important implications for our knowledge of OCD. First, the separation of threat and responsibility constructs in our article is consistent with the original intent of the OBQ, although contrary to the first empirically derived factor solution for the scale. Although threat and responsibility remained related, in our sample threat beliefs were more strongly related to the importance of thought domain (indeed, if we had forced a three-factor solution, it would have been the thoughts and threat domains that were collapsed in the cluster and factor analyses). This suggests that although the definition of responsibility includes an implication of heightened threat (i.e., the reference to "subjective crucial negative outcomes"), the perception of increased threat itself is a separable construct. An interesting question for future analyses is whether this separation does hold in clinical samples with OCD—if responsibility is as crucial to OCD as stated by some researchers (e.g., Salkovskis, 1985), then does responsibility come to be synonymous with threat in clinical samples with OCD (i.e., as implicated in the original clinical factor analysis of the OBQ when the two factors were combined)?

Second, and relatedly, in this nonclinical sample, responsibility was the least important factor of the OBQ, not adding unique variance to the prediction of symptoms over and above the other OBQ-TRIP subscales. Whether this indicates that responsibility is not as central a belief as has been hypothesized (e.g., perhaps general threat cognitions are more important, as suggested by Jones & Menzies, 1997), or whether there are more complex moderation relationships (e.g., between the subscales or with other constructs) is open to further study. Note that Salkovskis et al. (2000)

state that beliefs reflecting the importance of thoughts and the need to control thoughts are specific types of responsibility appraisals; although if this is the case, in this study they were the more important type of responsibility. Finally, the predictors of impulses of harm also require further study given the lack of relationships shown here. However, it should be noted that the now-most-commonly used self-report measure of OCD, the Obsessive Compulsive Inventory–Revised (OCI-R, Foa et al., 2002) does not assess impulses of harm specifically, limiting the potential for further research into this presentation of the disorder. Future studies using the OCI-R may consider adding additional items to represent this domain, as it appears to have different correlates to general obsessions.

Our study has several limitations. Similar to most previous analyses, excluding that by the OCCWG (2005), our results were based on nonclinical participants. It is possible that clinical participants differ in the factor structure for the OBQ, although the similarity in two of the scales, combined with theoretical and empirical arguments for the dimensional nature of OCD symptoms and beliefs (e.g., Olatunji et al., 2008), supports the use of nonclinical participants in analyses. Further analyses in clinical samples would resolve this issue, though this would likely require further international or multisite collaborative efforts to obtain the required numbers of participants (such as by the OCCWG, 2005). Differences with past analyses may also be due to differences in the demographic makeup of the samples. Our sample was made up of Australian student and community participants, along with a proportion of international students completing psychology within Australia, and of a sample of Israeli community participants. It is possible that cross-cultural differences influence the structure of OCD-related beliefs and their relationship with other variables. However, our model showed a satisfactory fit within two very different samples of participants, which we believe lessen such potential criticisms.

In sum, our examination of the OBQ has led to a four-subscale solution using 38 of the original items (along with a shortened 20-item version with the same structure). We believe this solution is robust and an accurate reflection of the scale and hope that future workers will use this solution.

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Notes

1. Note that some student participants did not complete this measure ($N = 185$).
2. As we administered the 44-item version of the scale, we did not conduct a test of the Woods, Tolin, and Abramowitz (2004) model that was based on a reanalysis of the OBQ-87 and contained many items not retained in the OBQ-44.

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