Dysfunctional belief-based subgroups and inferential confusion in obsessive-compulsive disorder

Abstract

Cognitive-behavioural models emphasize the mediating role of dysfunctional beliefs in obsessive-compulsive disorder (OCD). However, recent studies indicated that beliefs related to responsibility and threat-estimation, importance and control of thoughts, and perfectionism and intolerance of uncertainty were not elevated in a substantial proportion of patients suffering from OCD. This study attempts to replicate these findings, and, in addition, explores the role of a cognitive process characteristic of OCD, i.e., inferential confusion. Participants suffering from OCD (n=174), completed cognitive- and symptom measures. Cluster-analysis revealed a 2- (high- and low-beliefs) and a 6-cluster solution (high importance and control of thoughts related beliefs, relatively high responsibility and threat related beliefs, overall high beliefs, overall low beliefs, high perfectionism beliefs, and overall very low beliefs). Both solutions contained substantial low belief subgroups; respectively 64.5% in the 2-cluster solution and 38.4% in the 6-cluster solution scored low on dysfunctional beliefs. The perfectionism and certainty beliefs cluster was distinct from the other high beliefs clusters, with low scores on inferential confusion and harm thoughts, and elevated scores on compulsions like washing and checking. Participants in the low beliefs cluster scored average on inferential confusion, indicating this to be a distinct construct. It is concluded that more work is required to validate the cognitive-behavioural model of OCD, and that the investigation of cognitive processes has complementary value in addition to assessment of belief content.
1. Introduction

Cognitive-behavioural models, which are currently the most prominent psychological theories of obsessive-compulsive disorder (OCD), highlight the importance of dysfunctional beliefs as potential mechanism of this disorder (cf. Frost & Steketee, 2002; Salkovskis, 1985). Recently, three dimensions of OCD related beliefs were identified; (a) inflated personal responsibility and the tendency to overestimate threat (Responsibility and Threat estimation), (b) perfectionism and intolerance of uncertainty (Perfectionism and Certainty), and (c) over-importance and over-control of thoughts (Importance and Control of Thoughts) (Obsessive Compulsive Cognitions Working Group (OCCWG), 2005). Furthermore, specific relationships between these belief dimensions and OCD symptom dimensions were reported: Associations were found between Responsibility and Threat Estimation and rumination, Perfectionism and Certainty and checking and precision, and between Importance and Control of Thoughts and impulses (Julien, O'Connor, Aardema & Todorov, 2006). Interestingly, no specific belief was found to be associated with washing/contamination. Moreover, there is evidence of two distinct washing subgroups: One group is characterized by patients who report feelings of discomfort and/or feelings of contamination in OCD situations without fears of harm, whereas the other group consists of patients reporting specific fears of harm to self or others as a result of contamination (Calamari, Wiegartz, Rieman, Cohen, Greer, Jacobi et al., 2004; Feinstein, Fallon, Petkova & Liebowitz, 2003). This raises the question as to whether dysfunctional beliefs are relevant to all patients suffering from OCD.

Two independent studies reported that indeed large subgroups of OCD patients did not show elevated scores on dysfunctional beliefs (Calamari, Cohen, Rector, Szacun-Shimizu, Riemann & Norberg, 2006; Taylor, Abramowitz, McKay, Calamari, Sookman, Kyrios, et al., 2006). Cluster-analysis based on patients’ OBQ-44 subscales scores, revealed two clusters which were represented by high (51%) versus low (comparable to normal controls) scores on dysfunctional beliefs (Taylor et al., 2006). The two belief subgroups did not differ on contamination, checking, and grooming, but the high-beliefs group scored higher on measures of harming obsessions. These results were replicated by Calamari et al. (2006), where a low beliefs group made up 56% of the sample. In addition to the 2-cluster model (high versus low beliefs), support for a 5-cluster model was found. Besides a high- and a low beliefs group, this model consisted of three subgroups with relatively elevated scores on one of the three OBQ-44 subscales; a high Responsibility and Threat estimation group, a high Importance and Control of Thoughts group, and a high Perfectionism and Certainty group. Furthermore, specific relationships were reported between belief clusters and symptom subtypes, e.g., contamination was underrepresented in the high beliefs group and was overrepresented in the Importance and Control of Thoughts group and the low beliefs group, whereas contamination with harming thoughts was associated with the high beliefs group,
and was underrepresented in the Perfectionism and Certainty- and low beliefs groups (Calamari et al., 2006).

These studies suggest that dysfunctional beliefs, which are postulated to be a key factor in explaining the mechanism of OCD, might not be relevant to all patients suffering from OCD. Additional cognitive factors, not assessed by the OBQ-44, should be explored to answer questions regarding the relevance of the cognitive-behavioural model for all OCD patients/subtypes. In particular, the investigation of cognitive processes in OCD could further our understanding of the cognitive mechanisms behind OCD (subtypes). Inferential confusion, the tendency to negate reality on the basis of subjective possibilities (Aardema & O’Connor, 2003), is hypothesized to be a characteristic reasoning process associated with OCD and, as such, is more concerned with the form and context of the obsession rather than its (ab)normal content. Patients seem to come to a remote possibility (“Maybe my hands are dirty”) without an actual indication (no signs of dirt or aversive smell) or even in the face of contradictory evidence (hands have just been washed with soap). Questionnaire research in an OCD patient sample showed that inferential confusion relates to OCD independently of cognitive domains (as measured by the OBQ), and mood states (Aardema, O’Connor, Emmelkamp, Marchand & Todorov, 2005).

The current study attempts to replicate Taylor et al.’s (2006) and Calamari et al.’s (2006) findings. Moreover, the complementary value of investigating a cognitive reasoning process (inferential confusion) in addition to belief content is explored.

2. Method

2.1 Participants

The sample consisted of 174 French-speaking participants suffering from OCD according to DSM-IV-TR (American Psychiatric Association, 2000), who participated in clinical studies in Montreal, Canada (n = 174, 51.1% female; Mean age= 38.8, SD= 11.5). The participants included were between 18 and 65 years old, and all had a primary diagnosis of OCD. Exclusion criteria were evidence of current substance abuse, evidence of current or past schizophrenia, bipolar disorder or organic mental disorder. Diagnoses were established using the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV) (Brown, DiNardo & Barlow, 1996), and a clinical interview by an experienced psychiatrist using DSM-IV criteria. Comorbidity data was available for 127 participants; 70 of them reported no comorbid disorders. Reported comorbid disorders were, major depressive disorder (18), panic disorder (12), social phobia (13), general anxiety disorder (8), and simple phobia (6). Treatment history was available of 120 participants; 79 of them had never received treatment in the past, 27 had undergone psychotherapy, 9 had used medication, 4
had received psychotherapy and medication, and 1 participant had used medicatio
and had received electroconvulsive therapy. Civil status was available for 102
participants; 30.5% single, 13.2% married, 8.6% cohabitating, 2.9% widowed, and
4.0% was divorced. For this study participants’ pre-treatment questionnaire scores
served as the data source.

2.2 Measures
2.2.1 Obsessive Beliefs Questionnaire
The Obsessive Beliefs Questionnaire (OBQ; OCCWG, 2005) consists of 44 belief state-
ments considered characteristic of obsessive thinking. The OBQ-44 has three factor
analytically derived subscales: (a) inflated personal responsibility and the tenden-
cy to overestimate threat (Responsibility and Threat estimation), (b) perfectionism
and intolerance of uncertainty (Perfectionism and Certainty), and (c) over-import-
tance and over-control of thoughts (Importance and Control of Thoughts). Items
are rated on a 7-point rating scale, ranging from 1 (disagree very much) to 7 (agree
very much). Psychometric evaluation of the French version of the OBQ-44 showed
excellent internal consistency (Julien, Careau, O’Connor, Bouvard, Rhéaume,
Langlois et al., 2008). Partial support was found for the convergent and divergent
validity: The OBQ-44 subscales correlated more strongly with the Padua Inventory-
Revised (PI-R) than with the Beck Anxiety Inventory (BAI) and Beck Depression
Inventory (BDI), which is in line with findings of the English version of the OBQ-44
(OCCWG, 2005). However, the French OBQ-44 did not correlate more strongly with
the Yale Brown Obsessive-Compulsive Scale (Y-BOCS), than with the BAI and BDI.
This might be related to the type of instrument; the PI-R, BDI, and BAI are all ques-
tionnaires, whereas the Y-BOCS is a clinician rated interview.

2.2.2 Inferential Confusion Questionnaire
The Inferential Confusion Questionnaire (ICQ; Aardema, O’Connor, Emmelkamp,
Marchand & Todorov, 2005) assesses the tendency to negate reality and sense
based information on the basis of subjective possibilities. The questionnaire con-
sists of 15 items which are rated on a 5-point scale, ranging from 1 (strongly disa-
gree) to 5 (strongly agree). The ICQ showed an excellent internal reliability (α=.90),
and discriminated between obsessive-compulsive-, anxious-, and non-clinical
samples. Furthermore, analyses showed that the ICQ contributes independently to
the prediction of obsessive-compulsive symptoms while controlling for other cog-
nitive domains and negative mood states (Aardema et al., 2005). See Appendix I for
questionnaire items.

2.2.3 OCD symptom severity
The clinical semi-structured interview version of the Yale Brown Obsessive-
Compulsive Scale (Y-BOCS; Goodman et al. (1989a, 1989b) was administered to as-
sess severity of OCD symptoms. The Y-BOCS consists of 10 items (5 items related
to obsessions, 5 items related to compulsions) which are rated on a 5-point scale (0=no symptom, 4=extreme symptoms). The French version of the Y-BOCS (Mollard, Cottraux & Bouvard, 1989) shows excellent internal consistency, and convergent and discriminant validity are satisfactory (Bouvard, Sauteraud, Note, Bourgeois, Dirson & Cottraux, 1992).

Furthermore, participants completed the Padua Inventory-Revised (PI-R; Burns, Keortge, Formea & Sternberger, 1996; French translation by Freeston, Ladouceur, Retarte, Rhéaume, Gagnon & Thibodeau, 1994). This questionnaire consists of 39 items which are rated on a 5-point scale (0=not at all typical to 5=very typical). The PI-R has 5 subscales representing OC symptom dimensions; (a) obsessional thoughts about harm to self or others, (b) contamination obsessions and washing compulsions, (c) checking compulsions, (d) dressing and grooming compulsions, and (e) obsessional impulses to harm self or others.

2.2.4 General Anxiety and Depression
Participants completed the Beck Anxiety Inventory (BAI) (Beck, Epstein, Brown & Steer, 1988; French version: Freeston, Ladouceur, Thibodeau, Gagnon & Rhéaume, 1994) and the Beck Depression Inventory (BDI) (Beck, Steer, & Garbin, 1988; French version: Bourque & Beaudette, 1982) to establish anxiety and depressive symptomatology. Both measures showed good psychometric properties in French (Bourgue & Beaudette, 1982; Freeston et al., 1994).

2.3 Statistical analyses
In order to test whether our sample consisted of different OC-belief related subtypes, a hierarchical cluster-analysis was conducted on the participants scores on the OBQ-44 subscales using Ward’s method applied to squared Euclidian distances. This method is based on within-cluster variability and is found to be superior for practical purposes (Romesburg, 1984; Toninandel & Overall, 2004). To determine the number of clusters, we inspected the agglomeration schedule and the dendrogram using Ward’s criterion of large increases in within-cluster variability. In addition, we used Calinski and Harabasz’s (1974) formal stopping rule (pseudo F-statistic), which is based on the ratio between and within-cluster variability, and seems the best performing method (Milligan & Cooper, 1985).

Ward’s method favours the grouping of clusters that are homogeneous with respect to the variation in the cluster variables. However, hierarchical cluster analysis does not guarantee an optimal partitioning of objects into clusters, because finding minimal distances at each step of the clustering process is conditioned on the already existing set of clusters, which cannot be unmerged. To overcome this problem, we repeated the analysis with a K-means (non-hierarchical) cluster analysis, in which cases are allowed to switch cluster membership at every step of the clustering process. Furthermore, this method needs specification of the number of clusters to extract beforehand. Based on the results of the hierarchical analysis,
we specified the number of clusters and implemented the previously found cluster centroids as starting points of the K-means cluster analysis to avoid random selection of starting points.

To analyse group differences we conducted MANOVA’s, and performed discriminant analyses to differentiate clusters.

3. Results

3.1 Cluster-analyses

Since the mean and standard deviation of the Importance and Control of Thoughts subscale of the OBQ-44 ($M=40.5$, $SD=16.1$) differed substantially from the Responsibility and Threat estimation ($M=60.6$, $SD=23.7$) and Perfectionism and Certainty ($M=74.6$, $SD=20.4$) subscales, scores were standardized into Z-scores before clustering.

Visual inspection of the dendrogram, resulting from the hierarchical cluster analysis using Ward’s method, suggested the possibility of a 2-cluster or a 6-cluster solution. This was confirmed by Calinsky and Harabasz’s stopping rule, which showed a maximum at two clusters, and a local maximum at six clusters. Therefore, we explored the interpretability of the 2-, and 6-cluster models. The 2-cluster model represented a group that scored high on dysfunctional beliefs ($n=47$) and a group that scored low (comparable to normal controls) on dysfunctional beliefs ($n=125$). The 6-cluster solution showed a more complex model: the first cluster showed very high scores on the Importance and Control of Thoughts subscale and relatively high scores on the Responsibility and Threat estimation subscale, the second cluster was characterized by relatively high scores on the Responsibility and Threat estimation subscale, the third cluster showed high scores on all OBQ-44 subscales, the fourth cluster showed relatively low scores on all OBQ-44 subscales, the fifth cluster showed relatively high scores on the Perfectionism and Certainty subscale, and finally, the sixth cluster showed very low scores on all OBQ-44 subscales. In short, both cluster models indicated low OBQ-beliefs groups, ranging from 72.7% of the participants in the 2-cluster solution to 38.4% in the 6-cluster solution, which is in line with previous findings (cf. Calamari et al., 2006; Taylor et al., 2006).

To evaluate the results of the hierarchical procedures using Ward’s method, we conducted a K-means cluster analysis with a specified number of clusters. The 2-cluster model was replicated with the K-means analysis: Results showed a high beliefs group consisting of 61 participants and a low beliefs group consisting of 111 participants. In total 154 (89.5%) of the participants were clustered into the same clusters as found in the hierarchical analysis. Fourteen patients switched from the low cluster in Ward’s solution to the high beliefs cluster resulting from the K-means method. No participants previously classified in the high beliefs cluster
by Ward’s method were now classified in the low beliefs cluster. Means on the OBQ-44 subscales of the high and low groups were comparable to those found using Ward’s method.

K-means analysis with six clusters revealed groups with the same themes as found by the hierarchical analysis (Ward’s); high Importance and Control of Thoughts, relatively high Responsibility and Threat estimation, overall high beliefs, overall relatively low beliefs, relatively high Perfectionism and Certainty, and

Figure 1. Mean standard scores for the three OBQ-44 subscales for the 2- and 6-cluster models.
overall very low beliefs. Eighteen participants (10.5%) switched clusters; one from Responsibility and Threat estimation to Importance and Control of Thoughts, 7 from overall high beliefs to Responsibilty and Threat estimation, 2 from low beliefs to Perfectionism and Certainty, 4 from low- to the very low beliefs subgroup, 2 from Perfectionism and Certainty to Responsibility and Threat estimation, and 2 from very low beliefs to Perfectionism and Certainty. Again, means on the OBQ-44 subscales were comparable to the ones found in the Ward’s clusters. The subgroup profiles found by the K-means method using Ward’s centroids was further explored, since this method combines the strengths of both techniques.

3.2 Group comparisons and cluster characterization
To compare between clusters we conducted MANOVA’s using the PI-R subscales, the Y-BOCS subscales, and the total scores of the ICQ, BDI, and BAI as dependent variables, both for the 2- and 6-cluster solutions. Subsequently, discriminant analyses were used to characterize the different clusters and to differentiate between them.

The result of the MANOVA on the 2-cluster solution was significant, $F(10,86) = 4.7, p<.001$. The discriminant function differentiated groups based on the difference between high inferential confusion- and harm thoughts scores on the one hand, versus low checking scores on the other hand; high inferential confusion- and high harm thoughts scores were related to low scores on checking, and vice versa (see standardized canonical discriminant function coefficients in Table 1).

The result of the MANOVA on the 6-cluster solution was significant, $F(50, 377) = 2.5, p<.001$. Results of the discriminant analyses showed two significant functions. The first function explained 49.3% of the total variance, and differentiated groups based on inferential confusion and harm thoughts scores. Function 2 explained

<table>
<thead>
<tr>
<th>Variable</th>
<th>Function 1</th>
<th>Function 1</th>
<th>Function 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAI</td>
<td>.015</td>
<td>.048</td>
<td>.018</td>
</tr>
<tr>
<td>BDI</td>
<td>.158</td>
<td>.102</td>
<td>-.060</td>
</tr>
<tr>
<td>ICQ</td>
<td>.487a</td>
<td>.576a</td>
<td>-.386a</td>
</tr>
<tr>
<td>Y-BOCS obsessions</td>
<td>-.059</td>
<td>-.056</td>
<td>.106</td>
</tr>
<tr>
<td>Y-BOCS compulsions</td>
<td>.270</td>
<td>.078</td>
<td>.490a</td>
</tr>
<tr>
<td>Harm thoughts</td>
<td>.596a</td>
<td>.645a</td>
<td>.048</td>
</tr>
<tr>
<td>Harm impulses</td>
<td>.203</td>
<td>-.016</td>
<td>.094</td>
</tr>
<tr>
<td>Washing</td>
<td>-.113</td>
<td>-.066</td>
<td>.302a</td>
</tr>
<tr>
<td>Checking</td>
<td>-.331a</td>
<td>-.231</td>
<td>.624a</td>
</tr>
<tr>
<td>Dressing</td>
<td>.156</td>
<td>.021</td>
<td>-.005</td>
</tr>
</tbody>
</table>

$a= Salient Loading$
31.1% of the total variance, and discriminated groups on the difference between inferential confusion versus Y-BOCS compulsions, checking and washing scores (high scores on inferential confusion were related to low scores on compulsions, washing, and checking, and vice versa). In Table 1, the standardized canonical discriminant function coefficients are presented, and Figure 2 shows a plot of the individual variate scores and the group centroids. In Table 2, descriptives of the different clusters are presented.

When combining the information in Figure 2 and Table 2, it shows that at the extremes on function 1 are the high Responsibility and Threat estimation, and the high beliefs clusters which scored high on inferential confusion and harm thoughts versus the Perfectionism and Certainty low beliefs clusters on the other hand.

1= Importance and Control of Thoughts, 2= Responsibility and Threat estimation, 3= High-beliefs, 4= Low-beliefs, 5= Perfectionism and Certainty, 6= Very low-beliefs
### Table 2. Descriptives of the 2- & 6-cluster solution

<table>
<thead>
<tr>
<th>Variable</th>
<th>2-cluster solution</th>
<th>6-cluster solution</th>
<th></th>
<th></th>
<th></th>
<th>Very low (n=19)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High (n=61)</td>
<td>Low (n=111)</td>
<td>ICT (n=14)</td>
<td>RT (n=35)</td>
<td>High (n=27)</td>
<td>Low (n=47)</td>
<td>PC (n=30)</td>
<td>Very low (n=19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OBQ-44 ICT</td>
<td>56.9</td>
<td>31.5</td>
<td>67.4</td>
<td>40.1</td>
<td>35.8</td>
<td>30.1</td>
<td>20.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT</td>
<td>85.1</td>
<td>47.1</td>
<td>80.0</td>
<td>76.8</td>
<td>90.6</td>
<td>52.2</td>
<td>40.7</td>
<td>25.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>88.2</td>
<td>67.3</td>
<td>68.6</td>
<td>80.2</td>
<td>101.6</td>
<td>60.2</td>
<td>89.0</td>
<td>44.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harm thoughts</td>
<td>12.7</td>
<td>6.3</td>
<td>12.5</td>
<td>10.5</td>
<td>13.7</td>
<td>6.9</td>
<td>6.1</td>
<td>3.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harm impulses</td>
<td>5.6</td>
<td>2.2</td>
<td>6.8</td>
<td>3.4</td>
<td>5.9</td>
<td>3.0</td>
<td>1.8</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washing</td>
<td>16.7</td>
<td>12.7</td>
<td>9.4</td>
<td>17.6</td>
<td>19.3</td>
<td>10.9</td>
<td>14.4</td>
<td>11.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checking</td>
<td>20.7</td>
<td>16.6</td>
<td>14.2</td>
<td>18.8</td>
<td>24.1</td>
<td>15.6</td>
<td>22.7</td>
<td>10.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grooming</td>
<td>5.3</td>
<td>3.9</td>
<td>2.9</td>
<td>4.3</td>
<td>6.7</td>
<td>3.4</td>
<td>5.8</td>
<td>2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y-BOCS total</td>
<td>25.5</td>
<td>23.9</td>
<td>22.1</td>
<td>25.9</td>
<td>27.7</td>
<td>20.5</td>
<td>28.2</td>
<td>23.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y-BOCS obsession</td>
<td>13.3</td>
<td>12.0</td>
<td>12.4</td>
<td>12.6</td>
<td>14.3</td>
<td>11.4</td>
<td>13.1</td>
<td>11.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y-BOCS compulsion</td>
<td>12.3</td>
<td>11.9</td>
<td>9.6</td>
<td>13.3</td>
<td>13.4</td>
<td>9.2</td>
<td>15.0</td>
<td>12.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAI</td>
<td>21.4</td>
<td>21.6</td>
<td>24.1</td>
<td>16.5</td>
<td>24.5</td>
<td>13.4</td>
<td>12.5</td>
<td>9.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI</td>
<td>12.9</td>
<td>15.1</td>
<td>20.1</td>
<td>17.7</td>
<td>23.0</td>
<td>13.9</td>
<td>17.7</td>
<td>13.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICQ</td>
<td>54.2</td>
<td>42.0</td>
<td>49.4</td>
<td>53.4</td>
<td>55.3</td>
<td>47.6</td>
<td>36.6</td>
<td>34.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OBQ=Obsessive Beliefs Questionnaire, ICT=Importance and control of thoughts, RT= Responsibility and threat estimation, PC=Perfectionism and certainty, Y-BOCS=Yale Brown Obsessions and Compulsions Scale, BAI= Beck Anxiety Inventory, BDI= Beck Depression Inventory, ICQ=Inferential Confusion Questionnaire

which scored low on inferential confusion and harm thoughts. Function 2 showed that whereas the high Perfectionism and Certainty and very low beliefs subgroups were similar with respect to their low scores on inferential confusion and harm thoughts, they can be differentiated on their compulsions and checking scores: the high Perfectionism and Certainty group scored similar to the overall high beliefs- and elevated Responsibility and Threat estimation subgroups, whereas the very low beliefs subgroup scored low on compulsions and checking. Furthermore, the high Importance and Control of Thoughts group has an interesting position in this picture, close to the high Responsibility and Threat estimation- and overall high beliefs clusters regarding inferential confusion and harm thoughts scores, but distinct with respect to the low scores on washing and checking. In short, for the
elevated belief groups, the Responsibility and Threat estimation- and overall high beliefs groups were relatively similar. The Perfectionism and Certainty group stood out for its low scores on inferential confusion and harm thoughts and high scores on compulsions and checking, whereas the Importance and Control of Thoughts group appears on the other end of this diagonal with high scores on inferential confusion and harm thoughts and low washing and checking scores.

When comparing the two low beliefs subgroups, the very low group scored low on inferential confusion and harm thoughts, whereas the low beliefs groups’ scores were more average, in particular for the ICQ (see also Table 2). Considering the size of the low beliefs group (n=47), this indicates that the ICQ seems related to the Importance and Control of Thoughts and Responsibility and Threat estimation subscales of the OBQ, but that inferential confusion is also a distinct construct since 28.5% of the sample scored low on all OBQ subscales, but average on the ICQ.

4. Discussion

This study aimed to evaluate the contribution of dysfunctional beliefs in the understanding of OCD, and in addition, to explore the role of inferential confusion as a reasoning process characteristic of OCD. Previous studies have shown that dysfunctional beliefs are not relevant to all OCD patients (Calamari et al., 2006; Taylor et al., 2006), and our results were in line with these findings. Cluster-analysis revealed a 2-and a 6-cluster model, which both contained overall low beliefs subgroups, meaning that participants scored low on all three subscales of the OBQ-44. The low beliefs group did not merely represent a less severe OCD group; no significant differences on the Y-BOCS were found between the high and low subgroups of the 2-cluster model, nor between the high beliefs, high- Responsibility and Threat estimation, high Importance and Control of Thoughts and the very low beliefs groups in the 6-cluster model. The numbers of participants in the low-beliefs groups were substantial, ranging from 64.5% in the 2-cluster model to 38.4% of the total patient sample in the 6-cluster model. Taken together, these results imply that the dysfunctional beliefs as measured by the OBQ-44 are not a key factor for a substantial subgroup of OCD patients. This is a robust finding, since this is the third study that has reported a subgroup of OCD patients that did not show elevated scores on Responsibility and Threat estimation, or on Perfectionism and Certainty, or on Importance and Control of Thoughts.

Further characterization of the subgroups showed that groups can be differentiated with respect to inferential confusion, harm thoughts, and compulsive behaviours like washing and checking. The Importance and Control of Thoughts, Responsibility and Threat estimation, and overall high beliefs groups scored high on inferential confusion and harming, whereas the Perfectionism and Certainty, low and very low groups did not. Furthermore, participants in the overall high
believes group and the high Perfectionism and Certainty group scored high on compulsions, specifically washing and checking. From the elevated beliefs groups the Perfectionism and Certainty group stands out in its low scores on harming thoughts and inferential confusion. Our results showed a distinct group of patients whose symptoms were primarily related to perfectionism, certainty, and checking. In this case compulsions could be motivated to relieve a ‘not just right’ experience instead of preventing feared consequences. ‘Not just right experiences’ have been shown to be associated with checking, ordering, and doubting features of OCD (Coles, Frost, Heimberg & Rheaume, 2003).

With respect to the additional value of inferential confusion, it is interesting that the participants in the low beliefs group showed average scores on the ICQ, implying that the ICQ taps into a construct distinct to the OBQ belief factors. This is consistent with the findings of Aardema, O’Connor and Emmelkamp (2006) who found that the ICQ remained significantly related to OCD symptoms after controlling for OBQ-subscales, anxiety, and depression.

The present study has several limitations. First of all, differences between our findings and Calamari et al.’s findings could be due to the use of a different version of the OBQ-44 (French versus English). Regarding psychometric properties, both versions showed good validity with respect to the PI-R, however the French OBQ-44 did not correlate more strongly with the Y-BOCS than with the BDI and BAI. Unfortunately, information on the validity of the English OBQ-44 with respect to its relationship with the Y-BOCS is not available. A second limitation is that other cognitive constructs concerning belief content or cognitive processing could be involved which were not measured by the OBQ-44 and ICQ. Finally, measuring cognitive constructs with questionnaires is an important limitation in and of itself. Experimental studies, for example investigating reasoning styles (Pelissier & O'Connor, 2002), can further our knowledge of cognitive processes and OCD.

The principal implication of this study is that more work is required to validate the cognitive-behavioural model of OCD. Dysfunctional beliefs do not seem relevant for a substantial subgroup of OCD patients. Furthermore, patients with symptoms concerning perfectionism and control seem a distinct subgroup, which could be related to the ‘not just right experiences’. In addition to the exploration of other belief domains, investigation of more general underlying cognitive processes like inferential confusion seems promising to advance our understanding of this heterogeneous disorder within a cognitive-behavioural framework.