

The role of cognitive factors in the pathogenesis of obsessive–compulsive symptoms: A prospective study

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Abstract

Cognitive models of obsessive–compulsive disorder (OCD) posit that specific kinds of dysfunctional beliefs (e.g., pertaining to responsibility and the significance of intrusive thoughts) underlie the development of this disorder. The present study was designed to prospectively evaluate whether dysfunctional beliefs thought to underlie OCD act as a specific vulnerability factor in the pathogenesis of obsessive–compulsive symptomatology. Eighty-five individuals were prospectively followed over a period of time thought to be associated with an increased onset of OCD symptoms—childbirth and the postpartum. The majority of these new mothers and fathers experienced intrusive infant-related thoughts and performed neutralizing behaviors similar to, but less severe than, those observed in OCD. Scores on a measure of dysfunctional beliefs thought to underlie OCD predicted the development of obsessive–compulsive symptoms after controlling for pre-existing OCD symptoms, anxiety, and depression. Dysfunctional beliefs also predicted the severity of checking, washing, and obsessional OCD symptom dimensions, but not neutralizing, ordering, or hoarding symptom dimensions. These data provide evidence for specific dysfunctional beliefs as risk factors in the development of some types of OCD symptoms.

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Introduction

Obsessive–compulsive disorder (OCD) is an anxiety disorder characterized by persistent, inappropriate intrusive thoughts, ideas, images, or impulses that evoke anxiety and subjective resistance (obsessions) and urges to perform overt or covert acts to neutralize obsessional fear or according to rigidly applied rules (compulsive rituals). The themes of OCD symptoms typically concern contamination, violence, sex, religion, responsibility for harm, hoarding, and symmetry (Foa et al., 2002; McKay et al., 2004). In most cases, untreated OCD runs a chronic and deteriorating course (Eisen & Steketee, 1998). Moreover, symptoms often

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produce significant personal distress and functional disability (Crino, Slade, & Andrews, 2005). When the chronicity and personal costs are considered along with the relatively high prevalence rate (2–3% in adults; Karno, Golding, Sorenson, & Burnam, 1998), one recognizes the importance of identifying the causes and treatments of OCD.

Although treatments with demonstrated efficacy exist for OCD (i.e., serotonergic medication and exposure-based cognitive-behavioral therapy), it remains largely unknown why some people develop this disorder whereas others do not. Among the most promising explanatory models of OCD are those based on Beck's (1976) cognitive specificity hypothesis, which proposes that different types of psychopathology arise from different types of dysfunctional beliefs. Social phobia, for example, is thought to develop from maladaptive beliefs about rejection or ridicule by others (Beck & Emery, 1985; e.g., "It's terrible to be rejected"). Similarly, several theorists (e.g., Rachman, 1997; Salkovskis, 1996) have proposed that obsessions and compulsions arise from specific sorts of dysfunctional beliefs. The foundation of cognitive models of OCD is the well-established finding that intrusions (i.e., thoughts, images, and impulses that intrude into consciousness) are experienced by most people (i.e., normal obsessions; Rachman & de Silva, 1978). An important task for any theory is to explain why almost everyone experiences cognitive intrusions (at least at some point in their lives), yet only some people experience intrusions in the form of clinical obsessions (i.e., intrusions that are unwanted, distressing, and difficult to remove from consciousness).

Rachman (1997) proposed that normal intrusions—whether wanted or unwanted—reflect important issues in the individual's life and are often triggered by internal or external cues. He argued that such intrusions develop into obsessions only when the person attaches exaggerated significance to these thoughts and regards them as horrific, repugnant, dangerous, immoral, and so on. To illustrate, consider a man who has just become a father for the first time, and while changing his baby's diaper, experiences a normal, yet unwelcome thought about the baby's genitals. Whereas many parents would likely disregard such an intrusion as nonsensical, the man described above believes that "since I have this awful thought, it means I am a bad father and a depraved man" and that "thinking improper thoughts will lead to improper behavior". Thus, he becomes extremely fearful when such thoughts come to mind ("What if I am really a child molester!"). To avoid a recurrence of the anxiety-evoking thought, he takes precautions such as avoiding changing the baby's diaper, compulsively repeating prayers, seeking reassurance, and thinking "positive" thoughts instead. He also tells himself that he must not let anyone else know about these thoughts. Paradoxically, these responses become reminders of the intrusion and increase its frequency and intensity. Moreover, when the man does not "go crazy" or act in "depraved" ways, he attributes this to the precautionary responses, rather than to the innocence of the intrusive thought, thereby sustaining the dysfunctional beliefs about the thought's importance.

Extending the theoretical work of Rachman (1997), Salkovskis (1996), and others, the Obsessive Compulsive Cognitions Working Group (OCCWG, 1997, 2005) empirically derived the following three domains of dysfunctional beliefs considered to underlie OCD symptoms:

- (1) *Overestimation of threat/Inflated Responsibility*. Individuals with OCD evidence exaggerated estimates of the probability and costs of negative events and believe themselves to be personally responsible for causing or preventing any disastrous consequences associated with obsessional thoughts.
- (2) *Beliefs about the importance of, and need to control, intrusive thoughts*. Individuals with OCD believe that the mere presence of intrusive thoughts indicates that such thoughts are very meaningful. They also believe that complete control over such intrusions is both necessary and possible.
- (3) *Perfectionism and intolerance of uncertainty*. Individuals with OCD show inability to tolerate mistakes or imperfection, as well as the strong need for a guarantee of safety.

Although underlying biological or genetic factors might predispose individuals toward developing OCD in a general way, cognitive formulations of OCD are specific, face valid, and can account for the disorder's highly idiosyncratic nature (Rachman, 1997; Salkovskis, 1996). However, empirical evaluations of cognitive theories have thus far included only cross-sectional (correlational) research and laboratory experiments. Laboratory studies in which dysfunctional beliefs have been experimentally induced suggest that the kinds of cognitive biases described above give rise to obsessive-compulsive phenomena (e.g., Rassin, Merckelbach, Muris, &

Spaan, 1999). But in maximizing internal validity, such experiments sacrifice ecological validity (and therefore, generalizability). Although numerous cross-sectional investigations indicate that OCD-related dysfunctional beliefs are positively *correlated* with OCD severity (e.g., Abramowitz, Whiteside, Lynam, & Kalsy, 2003), this type of research design does not address whether the dysfunctional beliefs are a cause or consequence of OCD symptoms. Testing the causal hypothesis requires longitudinal research in which individuals are assessed for the presence of dysfunctional beliefs and then followed up subsequent to a critical event that would be expected to produce intrusive thoughts. Cognitive models predict that individuals with dysfunctional beliefs would evidence greater difficulty with intrusive thoughts and neutralizing responses compared to individuals who do not hold such beliefs.

For at least three reasons, pregnancy and the postpartum period provide an ideal opportunity to prospectively examine whether cognitive factors confer vulnerability to obsessive–compulsive symptoms. First, retrospective research suggests that the postpartum period is a time of increased risk for the onset and worsening of OCD (e.g., Buttolph & Holland, 1990; Mania, Albert, Bogetto, Vaschetto, & Ravizza, 1999). Yet, although the majority of new parents report experiencing intrusive unwanted thoughts about their newborns (Abramowitz, Schwartz, & Moore, 2003), most of these individuals do not develop clinically severe OCD symptoms. Second, because childbirth is a relatively predictable event, it is possible to identify expecting parents and assess cognitive variables well before delivery and then follow participants into the postpartum to determine how cognitive variables affect the severity of postpartum intrusive thoughts. Third, findings that new *fathers* also report distressing infant-related intrusions and OCD symptoms (Abramowitz, Moore, Carmin, Wiegartz, & Purdon, 2001; Abramowitz, Schwartz et al., 2003), suggest overlap in the psychological processes involved in the development of obsessive–compulsive phenomena in new mothers and fathers.¹

Accordingly, the aim of the present research was to prospectively test causal predictions of the cognitive model of OCD using a naturalistic design. One of the distinctive features of this study is that the participants were assessed for cognitive vulnerability and then followed over a relatively brief (i.e., <6 months) period of time when there is an empirically established risk of intrusive thoughts and OCD onset. Specifically, we examined whether the tendency to hold specific types of dysfunctional beliefs predicted the severity of postpartum OCD symptoms in a large sample of individuals following the birth of their first child.

We hypothesized that the tendency to hold OCD-related dysfunctional beliefs, independent of a history of OCD symptoms and general distress (i.e., depression and anxiety), would predict the severity of obsessional and compulsive symptoms, but not general anxiety or depressive symptoms, in the postpartum period for new mothers and fathers. On the basis of research indicating that OCD is a heterogeneous condition (e.g., for a review see McKay et al., 2004), we also examined the relationship between dysfunctional beliefs and specific OCD symptom dimensions. Given previous findings that measures of OCD-related dysfunctional beliefs did not predict hoarding symptoms over and above general anxiety and depressive symptoms (Tolin, Woods, & Abramowitz, 2003), we hypothesized that dysfunctional beliefs would prospectively predict checking, washing, obsessions, neutralizing, and ordering, but not hoarding symptoms, in the present study.

Method

Participants and procedure

Participant recruitment

Following approval from the Mayo Clinic Institutional Review Board (IRB), individuals preparing for the birth of their first child were recruited from prenatal education classes at Methodist Hospital in Rochester, Minnesota to take part in a study on “thoughts and experiences of new parents.” The Department of Obstetrics and Gynecology at Methodist Hospital serves a fairly affluent population of Mayo Medical Center employees and their dependents. A member of the research team visited the prenatal classes, described the

¹Some authors (e.g., Wisner, Peindl, Gigliotti, & Hanusa, 1999) have proposed that obsessional thoughts during the transition to parenthood serve an adaptive role. For example, intrusive thoughts about violence and accidents might cause new mothers to be increasingly protective of their children, thereby increasing the child’s chances of surviving to maturity. Although interesting, such sociobiological or evolutionary theories have not been empirically tested.

study procedures, and informed potential volunteers that they would receive \$75.00 per family for completing all phases of the study. Eligibility criteria included being at least 18 years of age and fluent in English. Women had to be at least 5 months pregnant with their first child and men had to be married or living with their pregnant partner. A sign-up sheet was circulated for volunteers to indicate interest in the study.

The 60 pregnant women and 57 men (total $N = 117$) who provided their names and telephone numbers were subsequently contacted by study personnel and invited to an individual 60-min session to learn the details of the study, complete informed consent procedures, and undergo a clinical interview to determine eligibility. Exactly 100 individuals (50 women and 50 men) attended this interview. Potential participants were told that the study would involve an assessment of thoughts and emotions during pregnancy and at approximately 3 months postpartum. The postpartum assessment would include a 20–30 min telephone contact and the completion of a battery of self-report measures to be mailed back to the researchers. Individuals were informed that if they chose to participate in the study, a research assistant would keep track of their childbirth status using the medical center's electronic medical record system so that the participant could be contacted at 3 months postpartum for the follow-up assessment. They were also told that all study data would remain confidential and be kept in a locked file cabinet accessible only to study personnel, and that code numbers (rather than names) would be used on all forms to ensure anonymity. After reviewing the consent form, all 100 individuals agreed to participate in the study.

Prenatal assessment (Time 1)

Once consent was obtained, a trained Doctoral or Masters level clinician administered the Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) to assess the presence of DSM-IV diagnoses. Individuals meeting criteria for psychotic disorders, antisocial, and borderline personality disorder were subsequently excluded from the study due to concerns about obtaining accurate self-report data (e.g., regarding intrusive infant-related thoughts). This resulted in the exclusion of one individual (a man with antisocial personality disorder). Each participant also completed a packet containing the following self-report questionnaires (all measures are described in detail below): Obsessive Compulsive Inventory-Revised (OCI-R), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Obsessive Beliefs Questionnaire (OBQ).

Postpartum assessment (Time 2)

The postpartum assessment occurred approximately 3 months after childbirth. To reduce the burden for participants, self-report data were collected via questionnaire packets that were mailed with instructions to complete and return to the investigators. Self-report measures at Time 2 included the OCI-R, BAI, and BDI. In addition, a trained Doctoral or Masters level clinician conducted a telephone interview with each participant during which the Postpartum Thoughts and Behaviors Checklist (PTBC) and Yale-Brown Obsessive Compulsive Scale (Y-BOCS) were administered. Up to three attempts were made to obtain Time 2 data from individuals who contributed Time 1 data but initially failed to return telephone calls or questionnaire packets at Time 2. Complete data from Time 1 and Time 2 were available from 43 women and 42 men ($N = 85$; 86% retention rate). Of the 85 participants, 74 (87%) were either married or living together (i.e., there were 37 dyads within the sample).

Measures

The following assessment instruments were used in the present study:

Mini international neuropsychiatric inventory (MINI; Sheehan et al., 1998)

The MINI is a brief, structured diagnostic interview for the major Axis I psychiatric disorders in DSM-IV. It has acceptable reliability and validity compared with other structured diagnostic interviews, yet can be administered in a much shorter period of time than other, more comprehensive, interviews (Lecrubier et al., 1997).

Obsessive compulsive inventory-revised (OCI-R; Foa et al., 2002)

The OCI-R is an 18-item self-report questionnaire on which respondents rate the degree to which they have been bothered or distressed by 18 common symptoms of OCD in the past month on a scale from 0 (not at all) to 4 (very much). Widely used in research with nonclinical samples, the OCI-R assesses six symptom domains: (a) washing, (b) checking/doubting, (c) obsessing, (d) neutralizing, (e) ordering, and (f) hoarding. Subscale scores range from 0 to 12. Foa et al. (2002) found the OCI-R to possess good psychometric properties (alphas ranged from .81 to .93 across samples) and adequate test–retest reliability (.57–.91 across samples).

Beck anxiety inventory (BAI; Beck, Epstein, Brown, & Steer, 1988)

The BAI assesses 21 common physiological and cognitive symptoms of clinical anxiety (e.g., sweating, fear of losing control). It is widely used in research with clinical and nonclinical samples. Respondents indicate the degree to which they have recently been bothered by each symptom during the past week. The BAI was designed to assess anxiety symptoms independently from depression symptoms and has good reliability and validity (Beck et al., 1988).

Beck depression inventory (BDI; Beck, Ward, Medelsohn, Mock, & Erlbaugh, 1961)

The BDI is a 21-item self-report scale that assesses the severity of the cognitive, affective, and somatic symptoms of depression experienced during the past week. The BDI has excellent reliability and validity and is widely used in research with clinical and nonclinical samples.

Obsessive beliefs questionnaire (OBQ; Obsessive Compulsive Cognitions Working Group OCCWG, 2005)

The OBQ is a 44-item self-report questionnaire developed to assess a variety of dysfunctional beliefs (derived from leading cognitive theories) thought to underlie OCD symptoms. Three factor analytically derived subscales correspond to the following domains of dysfunctional beliefs: (a) overestimates of threat and responsibility for harm, (b) importance and control of intrusive thoughts, and (c) perfectionism and the need for certainty. Participants rate their agreement with each of 44 statements from 1 (disagree very much) to 7 (agree very much). The instrument possesses good validity, internal consistency, and test–retest reliability, and has been widely studied in clinical and nonclinical samples (OCCWG, 2005; Tolin, Woods et al., 2003).

Postpartum thoughts and behaviors checklist (PTBC)

The PTBC, which was designed for use in the present study, is a semi-structured interview that evaluates the content of postpartum intrusive thoughts and neutralizing strategies. It includes three sections and was administered only at Time 2. In the first section, the interviewer defines and normalizes the experience of intrusive distressing thoughts following childbirth (examples of intrusions are provided and participants are informed that during the interview they should do their best to discuss their own intrusions in an honest and straightforward manner).

The second section contains a checklist of 32 intrusive postpartum thoughts (e.g., thoughts that the infant could stop breathing while sleeping; thoughts about puncturing the baby's fontanel [soft spot]). Checklist items were derived based on our previous research and categorized into the seven themes of postpartum intrusions identified by Abramowitz, Schwartz et al. (2003), including: (a) suffocation/ SIDS, (b) accidents, (c) intentional harm, (d) losing the baby, (e) illness, (f) sexual thoughts, and (g) contamination. The interviewer asks whether the participant has experienced each of the 32 unwanted postpartum thoughts since the baby's birth. The format of the interview is similar to the symptom checklist of the Y-BOCS (Goodman et al., 1989a, b).

The third section contains a similar checklist of 14 behavioral and mental strategies that new parents sometimes use for managing (neutralizing) unwanted infant-related thoughts (e.g., frequently checking on the baby, praying to make the thoughts go away). Items were derived from our own clinical observations (Larsen et al., in press) as well as from previous research on responses to intrusive thoughts (Freston & Ladouceur, 1997; Ladouceur et al., 2000), and categorized into the following groups: (a) self-reassurance, (b) checking, (c) seeking social support, (d) cognitive distraction, (e) religious/prayer, (f) behavioral distraction, and (g) avoidance. The interviewer asks whether the participant has engaged in these strategies *in response to unwanted thoughts*. A copy of the PTBC is available from the first author.

Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989a, b)

The severity of postpartum obsessional intrusions and neutralizing strategies as identified by the PTBC at Time 2 was assessed using the Y-BOCS, a 10-item semi-structured clinical interview. Items measure the following five parameters of obsessions (items 1–5) and compulsions (items 6–10): (a) time occupied/frequency, (b) interference, (c) distress, (d) resistance, and (e) perceived control. Each item is rated on a five-point Likert scale from zero (no symptoms) to four (severe symptoms) and the 10 items are summed to produce a total score ranging from 0 to 40. For each participant, up to three primary (most prominent as indicated by the participant) postpartum intrusions from the PTBC ($M = 2.2$, $SD = 0.3$) were rated on the obsessions subscale, and the most prominent neutralization strategies from the PTBC ($M = 1.8$, $SD = 0.5$) were rated on the compulsions subscale. The Y-BOCS has satisfactory reliability and validity (Goodman et al., 1989a, b) and has been found to be sensitive to obsessive-compulsive symptoms in nonclinical samples (Frost, Steketee, Krause, & Trepanier (1995).

Results

Demographic and clinical characteristics

Table 1 summarizes the sample's demographic characteristics. As would be anticipated in a nonclinical sample of expectant parents, rates of psychiatric diagnoses were generally low. Only one participant, a woman, met criteria for a history of OCD. Four individuals (2 women) were currently receiving pharmacotherapy, and 5 (3 women) were currently in psychotherapy for an emotional disorder. A series of chi-square tests revealed no significant differences between men and women on any demographic variable (all p 's > .05).

Table 1
Demographic characteristics of the sample (percents in parentheses)

Variable	Men ($n = 42$)	Women ($n = 43$)
Mean age (SD)	28.3 (3.8)	29.3 (3.9)
Ethnicity		
No. Caucasian	36 (86)	38 (88)
No. Asian	5 (12)	3 (7)
No. Hispanic	1 (2)	2 (5)
Education (no. with at least 2-yr vocational/college degree)	35 (83)	33 (77)
Income (no. with at least 50 K annual family income)	37 (88)	37 (86)
Marital status (no. married)	35 (83)	40 (93)
Religious affiliation		
Catholic	15 (36)	15 (35)
Protestant	21 (50)	20 (47)
Jewish	1 (2)	1 (2)
Other religion	6 (14)	4 (9)
No religion	4 (10)	8 (19)
Mean strength of religious belief (1-5) ^a (SD)	3.8 (0.9)	3.3 (1.3)
History of psychiatric diagnosis		
Mood disorders	1 (2)	5 (12)
Anxiety disorders	3 (7)	2 (5)
Substance abuse/dependence	—	2 (5)
Eating disorders	3 (7)	—
Personality disorders	1 (2)	1 (2)

^aParticipants indicating no religious affiliation not included.

Obsessive–compulsive and related psychopathology at Time 1 and Time 2

Gender differences

As a preliminary consideration we examined gender differences in scores on the self-report measures of psychopathology at Time 1 and Time 2. Except for the Time 1 BDI (women: $M = 6.23$, $SD = 4.01$; men: $M = 4.23$; $SD = 4.51$), $t(94) = 2.29$, $p < .05$, between-group comparisons (t -tests) indicated no gender differences on any of these indices.

Independence of observations

A second consideration was that many of the male participants in the study were partners of (e.g., married to or living with) the female (childbearing) participants and data from the individual members of such dyads might not represent statistically independent observations. If the responses to interview or questionnaire items are not independent, assumptions regarding many statistical procedures (e.g., regression) are violated. To empirically assess the issue of nonindependence in our data, we computed correlations between scores for males and females within each dyad ($N = 37$) on each study measure at Time 1 and Time 2. Nonsignificant correlations (range = $-.11$ to $.27$, all p 's $> .05$) were obtained for all variables, except the OCI-R washing subscale at both Time 1 ($r = .39$, $p < .05$) and Time 2 ($r = .49$, $p < .01$). Given these findings, we treated data from individual members of dyads as independent observations, except when analyzing the OCI-R washing subscale. For analyses of this subscale, data from men and women within the same dyad were averaged together.

Self-report measures

Preliminary analyses indicated that the OBQ subscales were highly intercorrelated (range = $.70$ – $.77$), which suggests that they are measuring a single construct. We therefore performed all analyses on the OBQ total score rather than on the three separate subscales. In a similar analysis, the OCI-R subscales evidenced only a small to moderate degree of intercorrelation (Time 1 range = $.24$ – $.56$; Time 2 range = $.20$ – $.61$), which justified retaining them as separate subscales.

Table 2 displays the sample means, standard deviations, and intercorrelations between psychopathology measures at Time 1 and Time 2. As expected, sample means fell within the normal range on each measure at both Time 1 and Time 2. The pattern of correlations indicated that at both time points, scores on the OBQ

Table 2
Intercorrelations, means, and standard deviations among measures of psychopathology at Time 1 (below the diagonal) and Time 2 (above the diagonal)

Measure	Time 1										Time 2	
	BAI	BDI	OBQ	OCI-R subscale							Y-BOCS	M (SD)
				Checking	Washing ^a	Obsessions	Neutralizing	Ordering	Hoarding	Y-BOCS		
BAI	(.43)	.49	.44	.33	.21	.43	.21	.28	.22	.50		3.08 (4.35)
BDI	.65	(.40)	.45	.37	.13	.44	.06	.34	.27	.44		5.23 (4.85)
OBQ	.46	.48	(.71)	.32	.30	.49	.31	.49	.33	.36		112.74 (46.34)
OCI-R checking	.26	.34	.37	(.53)	.41	.50	.41	.46	.31	.27		0.99 (1.20)
OCI-R washing ^a	.18	.06	.27	.56	(.70)	.42	.61	.59	.20	.25		0.67 (1.43)
OCI-R obsessions	.49	.51	.48	.34	.24	(.51)	.36	.44	.38	.38		0.80 (1.36)
OCI-R neutralizing	.29	.22	.35	.39	.47	.49	(.67)	.61	.21	.21		0.45 (1.16)
OCI-R ordering	.30	.33	.50	.52	.42	.41	.45	(.61)	.21	.28		1.62 (2.05)
OCI-R hoarding	.27	.34	.35	.39	.29	.32	.44	.34	(.55)	.30		1.41 (1.66)
Y-BOCS												4.87 (4.45)
Time 1 M	5.41	5.22	114.80	1.17	0.73	0.95	0.56	2.37	2.01			
Time 1 SD	4.77	4.36	42.16	1.63	1.33	1.53	1.20	2.62	1.77			

Note. Correlations between scores on each measure at Time 1 and Time 2 appear within parentheses on the diagonal. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; OCI-R = Obsessive Compulsive Inventory-Revised; OBQ = Obsessive Beliefs Questionnaire. All correlations $> .25$ are significant at the $p < .05$ level.

^aCorrelations for washing subscale of the OCI-R $> .29$ are significant at the $p < .05$ level.

were associated with higher scores on the BAI, BDI, and OCI-R (especially the obsessions and ordering subscales).

Postpartum (Time 2) obsessive–compulsive symptoms

The vast majority of participants ($n = 76$, 89.4%) reported that they had experienced distressing intrusive thoughts about their infant at some point since the baby's birth. The proportion of women ($n = 39$, 90.7%) and men ($n = 37$, 88.1%) reporting such intrusions was not significantly different, $\chi^2 (N = 85, df = 1) = 2.0$, $p = .14$. Most of the sample ($n = 72$; 84.7%) also reported the use of particular strategies to “deal with” or “neutralize” postpartum intrusive thoughts. The proportion of women ($n = 33$, 76.7%) and men ($n = 25$, 59.5%) who reported neutralization strategies was not significantly different, $\chi^2(1) = 2.91$, $p = .07$. Table 3 displays the percentage of participants reporting each type of intrusion and neutralizing strategy on the PTBC.

The overall mean Y-BOCS score (4.87, $SD = 4.45$) indicated that on average, participants experienced subclinical obsessive–compulsive symptoms at Time 2. However, scores ranged broadly (0–17), and about 20% of the sample fell within the clinically mild range of the Y-BOCS (i.e., scores of 7–15; Goodman et al., 1989b). Two participants scored within the moderate range of symptoms (16–23). Thus, despite the presence of intrusive distressing thoughts in nearly all participants, clinically significant OCD symptoms were rare.

Characteristics of pregnancy and delivery

Characteristics of the pregnancy and delivery were available from 35 (81%) of the 43 women in the study. Of these women, 79% indicated that the current pregnancy was the first time they had ever conceived. Thirteen percent reported a history of fertility problems, and 8% indicated that they had required medical assistance to conceive the current pregnancy. Sixty-eight percent of women in the sample gave birth by vaginal delivery, while the other 32% underwent C-section. Only 12% reported complications during the pregnancy or delivery, and the majority of new mothers (86%) were breast feeding their baby. A series of between-group t tests indicated that these dichotomously coded variables were unrelated to scores on all psychopathology measures at Time 1 and Time 2 (all p 's > .10).

Table 3
Frequency and percent of new parents reporting intrusive thoughts and neutralizing responses on the PTBC

PTBC category and item	n (%)		
	Women (n = 43)	Men (n = 42)	All (n = 85)
Intrusive thoughts			
Suffocation/SIDS	35 (81.4)	31 (73.8)	66 (77.7)
Accidents	36 (83.7)	32 (76.2)	68 (80.0)
Intentional harm	14 (32.6)	13 (31.0)	27 (31.8)
Losing the baby	19 (44.2)	17 (40.5)	36 (42.4)
Illness	4 (9.3)	11 (26.2)	15 (17.7)
Sexual	5 (11.6)	3 (7.1)	8 (9.4)
Contamination	23 (53.5)	20 (47.6)	43 (50.6)
Neutralizing strategy			
Self-reassurance	36 (83.7)	25 (52.1)	61 (71.8)
Checking	32 (74.4)	20 (46.5)	52 (61.2)
Seek social support	23 (53.5)	13 (30.2)	36 (42.4)
Cognitive distraction	21 (48.8)	12 (27.9)	33 (38.8)
Religious/prayer	15 (34.9)	8 (18.6)	23 (27.1)
Behavioral distraction	9 (20.9)	3 (7.0)	12 (14.1)
Avoidance	5 (11.6)	3 (7.0)	8 (9.4)

Note. PTBC = postpartum thoughts and behaviors checklist.

Demographic characteristics predicting obsessive–compulsive symptoms at Time 2

As an initial step in evaluating predictors of postpartum obsessive–compulsive symptoms, linear regression was used to examine separately whether the following demographic variables were related to Time 2 OCI-R subscales and Y-BOCS scores: age, gender, ethnicity, educational level, marital status, and religious devotion. Similar analyses including only women were conducted using the following pregnancy-related variables: difficulty conceiving the pregnancy and pregnancy/delivery complications. None of these demographic or pregnancy variables were significantly related with obsessive–compulsive symptoms at Time 2. Therefore, these variables were not controlled for in the analyses presented below.

Time 1 OBQ predicting Time 2 obsessive–compulsive, anxious, and depressive symptoms

Table 4 presents zero-order correlations between the cognitive and psychopathology measures at Time 1 and measures of psychopathology at Time 2. Time 1 OBQ scores tended to be more strongly associated with Time 2 OCI-R and Y-BOCS scores than with Time 2 BAI and BDI scores (differences in the magnitude of correlations did not reach significance; $p < .10$). Moreover, Time 1 OBQ scores tended to appear as stronger predictors of Time 2 OCI-R scores (but not Y-BOCS scores) than did Time 1 BAI and BDI scores ($p < .10$).

Multiple regression analysis was performed to determine whether Time 1 OBQ scores predicted the severity of postpartum obsessive–compulsive symptoms as measured by the Y-BOCS at Time 2. To control for baseline levels of obsessive–compulsive symptoms, Time 1 OCI-R (total score) was entered into the regression as a control variable along with Time 1 BAI and BDI. Table 5 shows that, as predicted, Time 1 OBQ was a significant predictor of postpartum obsessive–compulsive symptomatology ($R^2 = .23$; $F [4, 82] = 5.84$, $p < .01$). Fig. 1 displays the mean Time 2 Y-BOCS scores for the sample divided into quarters on the basis of Time 1 OBQ score.

To evaluate whether Time 1 OBQ scores predicted Time 2 BAI and BDI scores two multiple regression analyses, controlling for each respective Time 1 symptom level, were performed (Table 5). As can be seen, the OBQ predicted neither BAI nor BDI scores at Time 2 when the respective Time 1 symptom level was used as a control variable (R^2 for Time 2 BAI = .20; $F [3, 83] = 6.45$, $p < .01$, R^2 for Time 2 BDI = .18; $F [3, 83] = 5.65$, $p < .01$).

Time 1 OBQ predicting Time 2 obsessive–compulsive symptom dimensions

Six multiple linear regression analyses were performed to determine whether Time 1 OBQ scores predicted each of the six OCI-R symptom-based subscales at Time 2. The respective Time 1 OCI-R subscale was entered as a control variable along with Time 1 BAI and BDI. As is shown in Table 6, after controlling for the respective Time 1 symptom levels, the OBQ significantly predicted the following OCI-R subscales at Time 2: checking ($R^2 = .36$; $F [4, 84] = 11.18$, $p < .01$), washing ($R^2 = .54$; $F [4, 45] = 22.52$, $p < .01$), and obsessions

Table 4
Zero-order correlations between cognitive and psychopathology measures at Time 1 and Time 2

Time 1	Time 2								
	Y-BOCS	BAI	BDI	OCI-R subscale					
				Checking	Washing	Obsessions	Neutralizing	Ordering	Hoarding
OBQ	.40**	.31**	.31**	.46**	.41**	.47**	.35**	.46**	.34**
BAI	.36**	.43**	.28*	.21	.15	.17	.28*	.27*	.15
BDI	.39**	.28**	.39**	.27*	.14	.25*	.33**	.41**	.10
OCI-R (subscale) ^a				.53**	.70**	.51**	.67**	.61**	.55**

Note. * $p < .05$., ** $p < .01$. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; OCI-R = Obsessive Compulsive Inventory-Revised; OBQ = Obsessive Beliefs Questionnaire; Y-BOCS = Yale-Brown Obsessive Compulsive Scale.

^aEach OCI-R subscale at Time 2 is correlated with the corresponding subscale at Time 1.

Table 5
Time 1 OBQ scores predicting Time 2 Obsessive–compulsive, anxious, and depressive symptoms

Time 1 Predictors	B	SE B	β	<i>t</i>
Predicting Time 2 Y-BOCS				
OCI-R total	.041	.077	−.069	−0.53
BAI	.103	.120	.117	0.86
BDI	.187	.138	.188	1.36
OBQ	.017	.007	.314	2.31*
Predicting Time 2 BAI				
BAI	−.321	.120	.372	2.68**
BDI	−.035	.140	−.035	−0.25
OBQ	.016	.012	.155	1.29
Predicting Time 2 BDI				
BAI	−.020	.136	−.021	−0.15
BDI	.383	.159	.350	2.40*
OBQ	.015	.014	.129	1.06

Note. * $p < .05$, ** $p < .001$. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; OCI-R = Obsessive Compulsive Inventory-Revised; OBQ = Obsessive Beliefs Questionnaire.

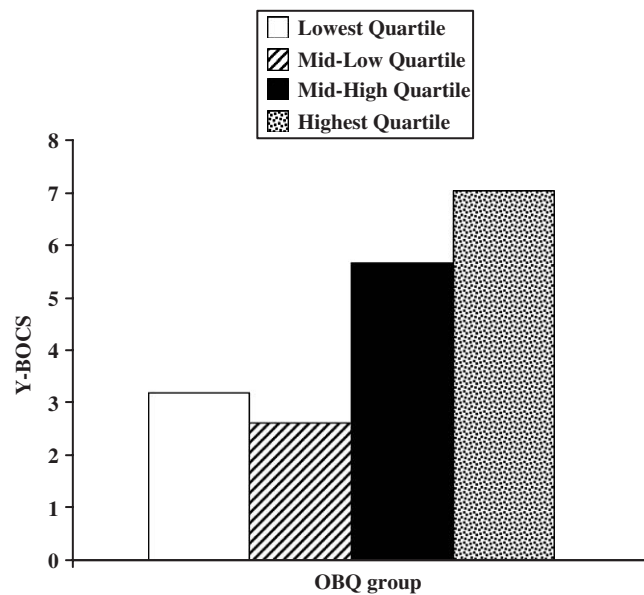


Fig. 1. Time 2 scores on the Y-BOCS by OBQ group.

($R^2 = .37$; $F [4, 84] = 11.53$, $p < .01$). The OBQ was not a significant predictor of neutralizing, ordering, or hoarding symptoms.

Discussion

Consistent with previous research, most new parents in our study (mothers and fathers alike) reported distressing intrusive thoughts regarding their newborns. In addition, the content of these intrusions resembled that of clinical obsessions in that they focused on misfortune but were described as senseless and incongruent with the person's belief system. The most common intrusions concerned thoughts, accidents and images of the

Table 6
Time 1 OBQ scores predicting Time 2 Obsessive–compulsive symptom dimensions

Time 1 Predictors	B	SE B	β	<i>t</i>
Predicting Time 2 OCI-R checking				
OCI-R checking (Time 1)	.297	.070	.417	4.23**
BAI	−.023	.030	−.098	−0.79
BDI	−.018	.035	.067	0.52
OBQ	−.088	.003	.315	2.82**
Predicting Time 2 OCI-R washing				
OCI-R washing (Time 1)	.704	.090	.64	7.81**
BAI	−.032	.031	−.11	−1.04
BDI	.013	.036	.004	0.04
OBQ	.086	.003	.26	2.68**
Predicting Time 2 OCI-R obsessions				
OCI-R obsessions (Time 1)	.362	.097	.423	3.73**
BAI	.057	.034	−.211	−1.70
BDI	.002	.039	−.007	−0.06
OBQ	.006	.002	.37	3.32**
Predicting Time 2 OCI-R neutralizing				
OCI-R neutralizing (Time 1)	.573	.081	.621	7.08**
BAI	−.018	.026	−.076	−0.68
BDI	.056	.030	.212	1.83
OBQ	.002	.003	.060	0.60
Predicting Time 2 OCI-R ordering				
OCI-R ordering (Time 1)	.375	.084	.486	4.45**
BAI	−.040	.048	−.099	−0.82
BDI	.127	.057	.276	2.23
OBQ	.003	.006	.064	0.05
Predicting Time 2 OCI-R hoarding				
OCI-R hoarding (Time 1)	.479	.095	.512	5.05**
BAI	−.013	.042	−.038	−0.30
BDI	−.042	.049	−.112	−0.85
OBQ	.008	.004	.215	1.88

Note. * $p < .05$, ** $p < .001$. BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; OCI-R = Obsessive Compulsive Inventory-Revised; OBQ = Obsessive Beliefs Questionnaire; T/R = threat estimation/responsibility subscale; I/CT = importance/control of thoughts subscale; P/C = perfectionism/certainty subscale.

infant suffocating (e.g., in their sleep/SIDS). Also prevalent were thoughts of contamination, losing the baby, and committing deliberate harm. Parents reported that they typically managed their intrusions by reassuring themselves, checking, and enlisting social support. In general, these experiences were infrequent and evoked little discomfort. Similarly, as expected, levels of anxiety and depression were within the normal range. However, a minority of new parents described clinically significant obsessive–compulsive symptoms. These findings are consistent with studies demonstrating the universality of unwanted intrusive thoughts pertaining to current life experiences (e.g., Rachman & de Silva, 1978), and the notion that most people are not seriously distressed by such experiences.

In accord with our prospective hypothesis, pre-existing (Time 1) levels of dysfunctional beliefs thought to underlie OCD predicted the severity of Time 2 (postpartum) obsessive–compulsive symptoms, but not anxious or depressive symptoms, even after controlling for baseline OCD symptomatology, depression, and anxiety. Put another way, expecting parents who believed strongly that intrusive thoughts are significant and threatening had more severe postpartum obsessive-compulsive symptoms relative to expecting parents who did not hold such dysfunctional beliefs. Partially consistent with our hypothesis, when we examined OCD

symptoms from a dimensional perspective, OCD-related dysfunctional beliefs prospectively predicted postpartum checking, washing, and obsessional symptoms, but not neutralizing, ordering, or hoarding symptoms. These findings add to the growing body of research on cognition in OCD and provide evidence that dysfunctional beliefs implicated in cognitive models of OCD serve as risk factors for the development of obsessions and compulsions from normal intrusive thoughts.

Despite our significant findings, a substantial portion of the variance in Time 2 obsessive–compulsive symptoms was not explained by the variables assessed in the present study. This suggests that, like the symptoms of OCD, the factors that contribute to its development are multidimensional with biological and psychological processes likely working in consort. Moreover, our findings that the dysfunctional beliefs measured by the OBQ predicted some, but not all, of the OCI-R symptom subscales is consistent with previous research suggesting that different OCD symptom dimensions (or subtypes) arise from different combinations of causal mechanisms (e.g., Mataix-Cols, Conceicao do Rosario-Campos, & Leckman, 2005). For example, different symptom dimensions appear to be inherited at different rates, with ordering and hoarding symptoms showing the highest degree of heritability (Hanna, Fischer, Chadha, Himle, & van Etten, 2005). Perhaps, as our data indicate, dysfunctional beliefs assessed by the OBQ (i.e., overestimation of threat and responsibility, the importance of and need to control intrusive thoughts, perfectionism, uncertainty) underlie checking, washing, and obsessional symptoms, whereas other factors not assessed by this instrument (e.g., genetic, neurobiological, and other psychological characteristics) more strongly influence the development of ordering and hoarding symptoms. There is also emerging evidence that the phenomenon of hoarding itself is multidimensional and not necessarily a symptom of OCD (Grisham, Brown, Liverant, & Campbell-Sills, 2005). These conclusions support Taylor et al.'s (in press) suggestion that the syndrome we presently call OCD is actually a set of topographically similar disorders, each characterized by some obsession- and compulsion-like features, but arising from different causal mechanisms.

The measure of dysfunctional beliefs used in the present study, the OBQ, is comprised of items assessing various domains of dysfunctional beliefs and attitudes drawn from a number of individual cognitive models of OCD. Although these various models have more similarities than differences (for a review see Shafran, 2005), each emphasizes a different belief domain. For example, Salkovskis' (1996) model emphasizes the role of inflated perception of *responsibility* as key to the development of obsessions whereas Rachman's (1997) model, as noted above, emphasizes beliefs about the *importance* of thoughts. The model of Clark (2004) emphasizes beliefs about the need to control or suppress intrusive thoughts whereas Tolin, Abramowitz, Brigidi, and Foa (2003) have emphasized beliefs about uncertainty. Because we found that the various OBQ subscales were highly intercorrelated in our sample, we were unable to examine the relative contributions of different cognitive domains in the prediction of obsessive–compulsive symptoms or symptom dimensions (i.e., we used the OBQ total score). However, future prospective research should address this issue as there is evidence from cross-sectional studies that some cognitive domains (e.g., metacognitive beliefs [beliefs about thoughts per se]) are stronger predictors of OCD symptoms than are others (e.g., responsibility beliefs) (Gwilliam, Wells, & Cartwright-Hatton, 2004), and that cognitive domains are differentially related to OCD symptom dimensions (Tolin, Woods et al., 2003). Future work might also employ multiple measures of OCD-related cognition.

We were surprised that OCD-related dysfunctional beliefs were not predictive of neutralizing symptoms, especially given the role of neutralizing in cognitive theoretical models of obsessions. According to such models (e.g., Rachman, 1997; Salkovskis, 1996), neutralizing involves overt or covert tactics (which may or may not have compulsive qualities) performed deliberately to “deal with” particular obsessions when they are misappraised as threatening. One potential explanation for our null finding is that the three items which comprise the OCI-R neutralizing subscale all pertain to numbers and counting (item 4: “I feel compelled to count while I am doing things”; Item 10: “I feel I have to repeat certain numbers”; Item 16: “I feel there are good and bad numbers”), behaviors that are not typically employed by new parents in response to infant-related intrusions (Abramowitz, Schwartz et al., 2003). Thus, this particular measure of neutralization might not have been relevant to the phenomena under study in the present research.

Our results were obtained with a relatively affluent sample and therefore might not generalize to the population of first-time expecting parents at large. In addition, whereas the C-section rate in the general population is estimated at approximately 1 in 4 (US Department of Health and Human Services, 2004), the women in our sample gave birth by C-section at a rate of nearly 1 in 3. Caution should also be exercised in

generalizing these findings to individuals with nonpostpartum obsessional symptoms or to individuals with clinical levels of OCD. Nevertheless, the postpartum period (particularly, we believe, for first-time parents) represents an ideal occasion to study the development of obsessive–compulsive symptoms since it is associated with unwanted intrusive cognitions and an increase in the rate of OCD onset. Equally as important, from a methodological standpoint, is that childbirth is a relatively predictable event that enables researchers to assess hypothesized etiological factors and examine how well they predict psychopathology during the postpartum. The results of this study may therefore be considered within a diathesis–stress model in which more or less cognitively vulnerable individuals were followed during a time when they were likely to experience an increase in stress and unwanted intrusive thoughts.

Questions for further study concern how some people acquire the OCD-related dysfunctional beliefs assessed by the OBQ in the first place. Rachman (1997) has suggested that being taught (or learning) that value-laden thoughts are of significance can make one prone to misinterpreting normal unwanted thoughts as significant. In addition, he proposed that depression and trait anxiety increase the tendency to interpret cognitive intrusions in a negative way. These possibilities present excellent hypotheses for future research on the development of OCD. Another area for further study is the *prevention* of obsessional symptoms. Cognitive-behavioral treatment procedures such as exposure, response prevention, and cognitive therapy, have been shown to lead to the correction of the kinds of dysfunctional beliefs we identified as playing a role in the development of obsessions and compulsions (e.g., McLean et al., 2001). This offers an exciting prospect for the development, evaluation, and implementation of programs that might effectively anticipate and prevent obsessional problems among vulnerable individuals, such as prospective parents.

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