

The cognitive mediation of obsessive-compulsive symptoms: A longitudinal study

Jonathan S. Abramowitz^{*}, Christy A. Nelson, Rebecca Rygwall,
Maheruh Khandker

Mayo Clinic, 200 First St. SW, Rochester, MN 55905, United States

Received 20 January 2006; received in revised form 18 April 2006; accepted 17 May 2006

Abstract

Contemporary cognitive models of obsessive-compulsive disorder (OCD) posit that OC symptoms arise from negative interpretations of intrusive thoughts, which are derived from trait-like dysfunctional assumptions (“obsessive beliefs;” e.g., concerning overestimates of responsibility). Although correlational studies suggest that obsessive beliefs, negative interpretations of intrusions, and OC symptoms are interrelated, prospective studies evaluating the directional hypotheses implied in the cognitive model are lacking. In the present longitudinal study, 76 first time expecting parents were followed through the postpartum. Results indicated that the tendency to negatively interpret the presence and meaning of unwanted intrusive infant-related thoughts early in the postpartum period (3–4 weeks) mediated the relationship between pre-childbirth obsessive-beliefs and late postpartum (12 weeks) OC symptoms. Results are discussed in terms of their theoretical and treatment implications.

© 2006 Elsevier Ltd. All rights reserved.

Keywords: OCD; Cognitive theory; Mediation; Intrusive thoughts; Postpartum

Contemporary cognitive models of obsessive-compulsive disorder (OCD) are based on Beck’s (1976) cognitive specificity hypothesis, which proposes that different types of psychopathology arise from different types of dysfunctional beliefs. Depression, for example, is said to be associated with overly negative beliefs about the self, the world, and the future (e.g., “I’m a failure”). Social phobia is thought to be associated with beliefs about rejection or ridicule by others (Beck & Emery, 1985; e.g., “It’s utterly awful to be rejected”). Panic disorder is said to be

^{*} Correspondence to: University of North Carolina at Chapel Hill, CB #3270, Davie Hall, Chapel Hill, NC 27599, United States. Tel.: +1 919 962 4155; fax: +1 919 962 2537.

E-mail address: jabramowitz@unc.edu (J.S. Abramowitz).

associated with beliefs about imminent physical catastrophe or loss of control (Clark, 1986; e.g., “I will have a heart attack if my heart beats too fast”).

Similarly, cognitive theorists have proposed that obsessions and compulsions arise from specific types of dysfunctional beliefs. A prevailing cognitive model of OCD, proposed by Salkovskis (1985, 1989, 1996), is rooted in the concept that unwanted intrusive thoughts, images, and impulses are normal and universal occurrences (e.g., Rachman & de Silva, 1978). Such intrusions typically reflect the person’s current concerns and might arise autogenously or as triggered by external cues (e.g., a violent image that is triggered by the sight of a police officer’s gun) (Lee & Kwon, 2003). Salkovskis (1996) proposed that normal intrusions escalate into persistent and distressing clinical obsessions if the intrusions are appraised as posing a threat for which the individual is personally responsible. *Appraisal*, in this sense, involves giving meaning to an intrusion, whether it is a negative interpretation, expectation, or any other type of judgment.

Three theoretically derived domains of negative appraisals of unwanted intrusive thoughts in OCD have been identified (Obsessive Compulsive Cognitions Working Group [OCCWG], 1997, 2001, 2003). These domains include:

- (1) *Importance of Thoughts*: Appraisals which imply that the thought’s presence and meaning is threatening or otherwise personally significant.
- (2) *Control of Thoughts*: Appraisals which imply an obligation to control the thought in order to prevent associated feared consequences.
- (3) *Responsibility*: Appraisals which imply that if the thought persists, one would be responsible for a negative event.

To illustrate Salkovskis’ (1996) model and these domains, consider a healthy new mother who experiences the unwanted intrusive image of placing her infant in the microwave oven. Most parents experiencing such an intrusion would regard it as a meaningless cognitive event with no harm-related implications (“mental noise”). However, such an intrusion can develop into a clinical obsession if the new mother interprets it as personally meaningful and as having serious consequences for which she is responsible (e.g., “this thought means I’m a dangerous person;” “I must take extra precautions to ensure that I don’t lose control”). Such negative appraisals evoke distress and motivate the person to try to neutralize the unwanted intrusion (e.g., by replacing it with a “good” thought), and to try to prevent any feared harmful outcomes associated with it (e.g., avoiding the baby to prevent committing harm).

If unwanted intrusive thoughts are universal, why do some people, but not others, negatively appraise them in ways that lead to obsessions? Beck (1976) proposed that life experiences give rise to relatively enduring and pan-situational assumptions (i.e., beliefs) that we hold about the world. These *core beliefs* are thought to influence how we perceive and interpret various external situations and internal stimuli, such as intrusive thoughts and impulses. The OCCWG has identified core dysfunctional beliefs hypothesized to underlie the negative appraisal of intrusive thoughts and the development of obsessions (OCCWG, 1997, 2001, 2003, 2005). Three empirically derived domains of “obsessive beliefs” have been identified as follows:

- (1) *Overestimation of threat/inflated responsibility*: Exaggerated estimates of the probability and costs of negative events; exaggerated beliefs about personal responsibility for causing or preventing disastrous consequences associated with intrusive thoughts.
- (2) *Beliefs about the importance of, and need to control, intrusive thoughts*: Beliefs that the mere presence of intrusive thoughts indicates that such thoughts are very

meaningful; beliefs that complete control over such intrusions is both necessary and possible.

- (3) *Perfectionism and intolerance of uncertainty*: Beliefs that it is necessary and possible to be perfect and certain; beliefs about the inability to cope with imperfection and ambiguity.

An additional type of obsessive belief hypothesized to underlie negative appraisals of otherwise normal unwanted intrusive thoughts is *thought–action fusion* (TAF; Shafran, Thordarson, & Rachman, 1996). This concept refers to two dysfunctional assumptions: (a) that unwanted thoughts about disturbing events are equivalent to the events themselves (*Moral TAF*; e.g., “Thinking about harming my defenseless infant is as bad as actually committing such harm”) and (b) that thinking about a disturbing event makes the event more probable (*Likelihood TAF*; e.g., “If I think too much about harm befalling my infant, it will cause my infant to be harmed”). Likelihood TAF has been further divided into *Likelihood-self TAF*, in which one believes his or her thoughts will increase the probability of negative events occurring to oneself; and *Likelihood-other TAF*, in which one believes that their thoughts will increase the probability of negative outcomes for other people.

Research indicates that the aforementioned obsessive beliefs and negative appraisals of intrusive thoughts are characteristic of, if not specific to, OCD and relate to one another (OCCWG, 2001, 2003, 2005). In addition, there is correlational evidence that the relationship between certain types of obsessive beliefs (i.e., perfectionism and inflated estimates of responsibility) and OC symptoms is partially mediated by negative interpretations of intrusive thoughts (Pleva & Wade, in press). With few exceptions, however, research on the relationship between cognitive factors and OC symptoms is cross-sectional (correlational) in design. Consequently, it cannot address the directional hypotheses purporting that trait-like obsessive beliefs give rise to negative appraisals of specific intrusive thoughts, which in turn lead to OC symptoms (e.g., Frost & Steketee, 2002; OCCWG, 1997).

One exception is our previous prospective study in which expecting parents were assessed for (a) the presence of obsessive beliefs prior to delivery and (b) for OC symptoms at 3 months postpartum (Abramowitz, Khandker, Nelson, Deacon, & Rygwall, in press). Expecting parents afford an excellent opportunity to prospectively examine the cognitive hypothesis of OCD since most experience unwanted postpartum intrusive thoughts regarding the newborn (Abramowitz, Schwartz, & Moore, 2003), yet relatively few develop clinical postpartum obsessional problems. We found that after controlling for baseline psychopathology, higher levels of obsessive beliefs among expecting parents (women and men) predicted more severe obsessions and compulsions in the postpartum (i.e., once they began experiencing intrusive thoughts about the newborn). Whereas these findings indicate that obsessive beliefs serve as vulnerability factors, rather than being epiphenomena, of OC symptoms, they do not address the hypothesized role of interpretations of intrusive thoughts as mediators of this relationship.

Therefore, the aim in the present study was to replicate and extend our previous findings by longitudinally examining whether the negative appraisal of intrusive thoughts mediates the relationship between premorbid obsessive beliefs and postpartum OC symptoms. To accomplish this aim, we examined data collected from expecting parents on three occasions: (a) during the third trimester of pregnancy, (b) at 3–4 weeks postpartum, and (c) at 12–16 weeks postpartum. We hypothesized that negative appraisals of postpartum intrusions early in the postpartum period (3–4 weeks) would mediate the relationship between pre-existing (i.e., before delivery) obsessive beliefs and postpartum OC symptoms after 12–16 weeks postpartum.

1. Method

1.1. Participants

Participants in the present study were expectant parents (total $N = 76$; 39 women and 37 men) who were recruited during the third trimester of pregnancy for their first child and followed through 4 months (16 weeks) postpartum. To be included in this sample, they had to have reported postpartum unwanted intrusive thoughts about their newborn within the first month after childbirth. Specific recruitment procedures and inclusion criteria are described further below (see Section 1.3). The mean age of the sample was 28.41 (S.D. = 3.60; range = 21–39); 88% was Caucasian, 7.9% was Asian, and 3.9% was Hispanic. Two thirds of the sample had at least a 2-year college degree and nearly all (92%) were married and living with their partner. Two men were taking psychotropic medications and three participants (two women and one man) were currently in some form of psychotherapy.

1.2. Measures

The assessment measures described below were used in the present study.

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). Total scores range from 0 to 72. Six OCD symptom domains are assessed: washing, checking/doubting, obsessing, neutralizing, ordering, and hoarding. 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 Depression Inventory (BDI; Beck, Ward, Mendelsohn, 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 non-clinical 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 thought to underlie OCD symptoms (“obsessive beliefs”). Three factor analytically derived subscales correspond to the following domains of obsessive 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 and internal consistency, and has been widely studied in clinical and non-clinical samples (OCCWG, 2005; Tolin, Woods, & Abramowitz).

Thought–Action Fusion Scale (TAFS; Shafran et al., 1996). This is a 19-Item Self-report Measure of beliefs about the importance of thoughts. It contains three subscales: *Moral* (e.g., “Having a blasphemous thought is almost as sinful to me as a blasphemous action”), *Likelihood-other* (e.g., “If I think of a relative/friend losing their job, this increases the risk that they will lose their job”), and *Likelihood-self* (e.g., “If I think of myself having an accident, it increases the risk that I will have an accident”). Each item is rated on a scale from 0 (disagree strongly) to 4 (agree strongly). The internal consistency (Chronbach’s alpha) of TAFS Subscales is consistently reported to be above .85 (e.g., Berle & Starcevic, 2005) and the measure can differentiate between clinical and non-clinical samples (e.g., Shafran et al., 1996).

Postpartum Thoughts and Behaviors Checklist (PTBC). The PTBC, which was designed for use in our earlier study (Abramowitz et al., in press), is a Semi-structured Interview that evaluates the presence and content of postpartum intrusive thoughts and related phenomena. The PTBC includes three sections. 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 encouraged 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). Checklist items were derived based on our previous research and categorized into the seven themes of postpartum intrusions identified by Abramowitz, Schwartz, and Moore (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 Yale-Brown Obsessive Compulsive Scale (YBOCS; Goodman, Price, Rasmussen, Mazure, & Delgado, 1989; Goodman, Price, Rasmussen, Mazure, & Fleischmann, 1989).

The third section contains a similar checklist of 14 behavioral and mental strategies that new parents sometimes use for managing (i.e., neutralizing) unwanted infant-related thoughts (e.g., frequently checking on the baby, praying to make the thoughts go away). A copy of the PTBC is available from the first author.

Interpretation of Intrusions Inventory (III; OCCWG, 2005). The III is a Semi-idiographic Measure designed to assess negative appraisals of intrusive thoughts. The respondent reads a set of instructions that includes examples of intrusive thoughts (e.g., images of the baby lying dead in his crib, an impulse to shake the infant) and then is asked to identify one or two examples of his or her own intrusions. He or she next identifies the extent of his or her agreement with 31 items concerning various negative appraisals of these intrusions (e.g., "I would be a better person if I didn't have this thought"). Although three theoretically derived subscales were initially proposed: (a) Importance of Thoughts, (b) Control of Thoughts, and (c) Responsibility (OCCWG, 2003), we used the III total score in our analyses on the basis of recent data suggesting that only a single factor exists (OCCWG, 2005).

Yale-Brown Obsessive Compulsive Inventory (Goodman, Price, Rasmussen, Mazure, & Delgado, 1989; Goodman, Price, Rasmussen, Mazure, & Fleischmann, 1989). The YBOCS was used to assess the severity of postpartum OC symptoms (as identified on the PTBC). This 10-Item Semi-structured Clinical Interview measures the following five parameters of obsessions (Items 1–5) and compulsive rituals (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 0 (no symptoms) to 4 (severe symptoms) and the 10 items are summed to produce a total score ranging from 0 to 40. For each participant, up to three prominent (as indicated by the participant) postpartum intrusions from the PTBC ($M = 2.4$, $S.D. = .4$) were rated on the obsessions subscale, and the most prominent neutralization strategies from the PTBC ($M = 1.7$, $S.D. = .5$) were rated on the compulsions subscale. The YBOCS has satisfactory reliability and validity (Goodman, Price, Rasmussen, Mazure, & Delgado, 1989; Goodman, Price, Rasmussen, Mazure, & Fleischmann, 1989) and is sensitive to OC symptoms in non-clinical samples (Frost, Steketee, Krause, & Trepanier, 1995).

Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). The MINI is a structured clinical interview that assesses the presence of psychiatric disorders based on *DSM-IV* diagnostic criteria. It is comprised of standardized closed-ended (yes–no) questions. It possesses

excellent interrater reliability, test–retest reliability, and convergent validity (i.e., with the structured clinical interview for DSM [SCID]; Sheehan et al., 1997). The instrument requires only 15–45 min to administer, which is substantial briefer than for other structured clinical interviews (e.g., the SCID).

1.3. Procedure and design

Fig. 1 graphically depicts the design of this naturalistic longitudinal study. All participants were recruited from prenatal education classes to take part in a study on “thoughts and experiences of new parents.” Remuneration of \$75.00 per family was offered in exchange for completing all phases of the study. Inclusion criteria were as follows: participants had to be at least 18 years of age, 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.

1.4. Prenatal assessment (Time 1)

After obtaining consent, a trained clinician administered the MINI. Individuals meeting criteria for psychotic disorders, anti-social, and borderline personality disorder were subsequently

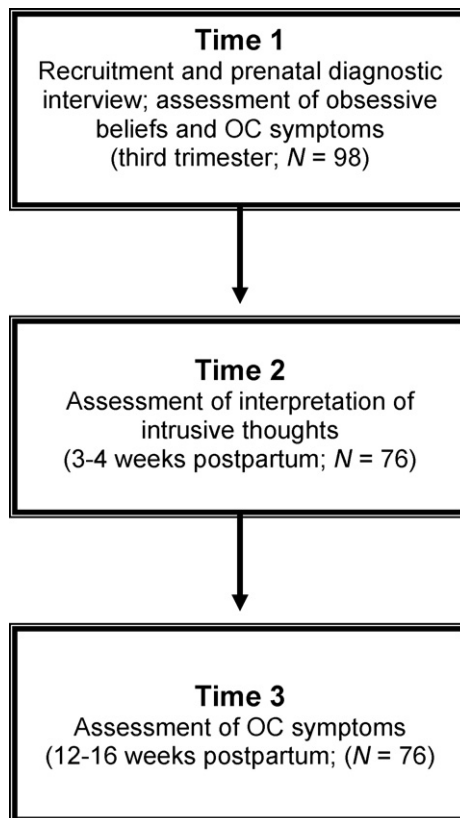


Fig. 1. Study design.

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 man with anti-social personality disorder. Each participant completed the OCI-R, BDI, OBQ, and TAFS in order to measure OC symptoms, depressive symptoms, and obsessive beliefs. A total of 98 individuals completed this assessment and were enrolled into the study.

1.5. First postpartum assessment (Time 2)

The first postpartum assessment occurred approximately 3–4 weeks after childbirth. The PTBC, YBOCS, and III were administered to measure the presence and severity of postpartum OC symptoms (PTBC and YBOCS), and interpretation of postpartum intrusive thoughts (III). To reduce the burden for participants, interview data were collected over the telephone and the self-report III was mailed to participants with instructions to complete and return the form to the researchers. Seventy-six of the 98 participants (78%) reported postpartum intrusive thoughts and were included in the data analyses.

1.6. Second postpartum assessment (Time 3)

All participants reporting intrusive thoughts at Time 2 were assessed again between 12 and 16 weeks (3–4 months) after childbirth. This second postpartum assessment included the YBOCS (administered over the telephone to assess OC symptom severity) as well as additional measures not germane to the present study.

2. Results

2.1. Characteristics of the sample

Preliminary analyses indicated that the OBQ subscales were highly intercorrelated (range = .67–.75), suggesting that they assess a single construct (i.e., obsessive beliefs). Therefore, we performed all analyses using the OBQ total score, as opposed to subscale scores. In contrast, TAFS Subscales were only weakly correlated with one another (range = .15–.35), which justified retaining them as separate subscales.

Table 1 displays the sample means and standard deviations for each study measure. Independent groups *t*-tests indicated that with the exception of Time 1 BDI scores (where women scored significantly higher than men, $t[74] = 2.44, P < .05$), there were no significant differences between men and women. Overall, scores on these measures fell within normal ranges and all measures demonstrated acceptable internal consistency (range = .80–.92).

The following characteristics of pregnancy and delivery were available for the women in the study: mode of delivery (vaginal vs. C-section), history of fertility difficulties, complications during pregnancy or delivery, and feeding status (breastfeeding vs. bottle). None of these variables was significantly associated with cognitive or psychopathology variables at any time points.

2.2. Independence of observations

Eighty-four percent of the females in the study were married to or living with a male study participant. Thus, it is possible that data from the individual members of such dyads do not

Table 1
Group means and standard deviations on study measures

Measure	<i>M</i>	S.D.
<i>Time 1</i>		
BDI	5.55	4.60
OCI-R	8.12	7.75
OBQ	117.91	42.61
TAFS Moral	21.15	10.67
TAFS Likelihood-other	1.70	2.58
TAFS Likelihood-self	2.40	2.64
<i>Time 2</i>		
III	345.00	385.10
YBOCS	6.53	4.80
<i>Time 3</i>		
YBOCS	4.69	4.24

(BDI) Beck Depression Inventory; (OCI-R) Obsessive Compulsive Inventory; (OBQ) Obsessive Beliefs Questionnaire; (TAFS) Thought–Action Fusion Scale; (III) Interpretation of Intrusions Inventory; (YBOCS) Yale-Brown Obsessive Compulsive Scale.

represent statistically independent observations. If the responses to questionnaire items are not independent, then assumptions implicit in our data analyses would be violated. To empirically assess the issue of non-independence in our data, we computed correlations between scores for males and females within each dyad ($n = 31$) on each study measure. Non-significant correlations (range = $-.21$ to $.24$, all P 's $> .05$) were obtained for all variables. Given these findings, we treated data from individual members of dyads as independent observations.

2.3. Content of postpartum intrusive thoughts

Table 2 displays number and percentage of participants reporting each type of postpartum intrusion at Time 2 on the PTBC. As can be seen, nearly all participants reported intrusions concerning suffocation (e.g., sudden infant death syndrome) and accidents. About half of the sample reported intrusions regarding loss of the baby and contamination. Unwanted thoughts of intentional harm were present among one-third to one-half of the sample, and illness and sexual intrusions were somewhat less common. A series of Chi-square tests indicated that men and women did not differ in their frequencies of any type of intrusion (all P 's = ns).

Table 2
Number (and percent) of participants reporting different types of postpartum intrusive thoughts

Type of intrusion ^a	<i>n</i> (%)		
	Women ($n = 39$)	Men ($n = 37$)	Entire sample ($n = 76$)
Suffocation/SIDS	35 (90)	31 (84)	66 (87)
Accidents	36 (92)	32 (87)	68 (90)
Intentional harm	14 (46)	13 (35)	27 (36)
Losing the baby	19 (49)	17 (46)	36 (48)
Illness	4 (10)	11 (30)	15 (20)
Sexual	5 (13)	3 (8)	8 (11)
Contamination	23 (59)	20 (54)	43 (57)

^a Categories of intrusions from the Postpartum Thoughts and Behaviors Checklist.

Some examples of postpartum intrusions as described by participants appear below:

- What if the baby stops breathing in his sleep (suffocation);
- image of the baby dying from suffocation (suffocation);
- image of the baby falling down the stairs (accidents);
- what if I picked up the baby the wrong way and broke her bones (accidents);
- idea of a car accident where I am killed and the baby has no mother (accidents);
- what if I dropped something heavy on her (accidents);
- idea that someone could take him away while I am in the store (losing the baby);
- I could poison her formula and she would not realize it (intentional harm);
- I could get so angry that I lose control and shake the baby (intentional harm);
- idea that the baby could develop a terrible case of the flu and die (illness);
- I might accidentally harm the baby if I have chemicals on my hands (contamination);
- thought about the baby's penis while changing his diaper (sexual).

2.4. Mediation of the relationship between obsessive beliefs and OC symptoms

According to Baron and Kenny (1986), the following requirements must be satisfied in order for a mediational model to apply: (a) the independent, mediator, and dependent variables must all be significantly correlated and (b) controlling for the mediator must substantially reduce the variance in the dependent variable explained by the independent variable. Because existing levels of OC symptoms could account for variance at each of these steps, we included baseline OCI-R scores as a control variable in each of the analyses reported below. Therefore, we used the following set of four requirements for mediation:

- (1) The independent variable (Time 1 obsessive beliefs) must significantly predict the dependent variable (Time 3 YBOCS) after controlling for Time 1 OC symptoms (Time 1 OCI-R).
- (2) The independent variable (Time 1 obsessive beliefs) must significantly predict the mediator (Time 2 III) after controlling for Time 1 OC symptoms (Time 1 OCI-R).
- (3) The mediator (Time 2 III) must significantly predict the dependent variable (Time 3 YBOCS) after controlling for Time 2 OC symptoms (Time 2 YBOCS).
- (4) The pathway coefficient between the independent variable (obsessive beliefs) and the dependent variable (Time 3 YBOCS) must decrease significantly after controlling for the mediator (Time 2 III) and baseline OC symptoms (Time 1 OCI-R).

“Full” mediation is said to apply if, after controlling for the mediator (Time 2 III), the variance explained by the independent variable (obsessive beliefs) is no longer significant. “Partial” mediation is said to apply if the variance accounted for remains significant.

For the first set of analyses, the independent variable was the Time 1 OBQ, the mediator was the Time 2 III, and the dependent variable was the Time 3 YBOCS. Linear regression analyses revealed that after controlling for Time 1 OCI-R, Time 1 OBQ scores significantly predicted Time 2 III scores ($R^2 = .15, P < .01$) and Time 3 YBOCS scores ($R^2 = .13, P < .01$). In addition, Time 2 III was a significant predictor of Time 3 YBOCS after controlling for Time 2 OCI-R ($R^2 = .26, P < .001$). Thus our first three conditions of mediation were met (Table 3 shows the corresponding pathway coefficients; i.e., beta [β] values). Consistent with the fourth condition, the variance in Time 3 YBOCS scores explained by the Time 1 OBQ was reduced after controlling for Time 2 III

Table 3
Pathway coefficients (β) for regressions and Sobel's Z-scores for tests of mediation

Three-variable mediation chains ^a (IV → MV → DV)	β				
	IV → MV	MV → DV	IV → DV	IV → DV/MV	Z
OBQ → III → YBOCS	.38***	.51***	.36**	.24*	2.58**
TAFS Likelihood-other → III → YBOCS	.27*	.51***	.32**	.15	2.10*
TAFS Likelihood-self → III → YBOCS	.30**	.51***	.09	-.02	2.39*
TAFS Moral → III → YBOCS	-.10	.51***	.01	.11	-.82

Note: (IV) independent variable; (MV) mediator variable; (DV) dependent variable; (IV → DV/MV) the relationship between the IV and DV when controlling for the MV; (OBQ) Obsessive Beliefs Questionnaire; (TAFS) Thought–Action Fusion Scale; (III) Interpretation of Intrusions Inventory; (YBOCS) Yale-Brown Obsessive-Compulsive Scale (total score).

^a Baseline OC symptoms (Time 1 OCI-R or Time 2 YBOCS) used as a control variable in each analysis.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

and Time 1 OCI-R (from 13 to 6%). Sobel's Z-score (shown in Table 3) indicated a significant reduction in the indirect effect. Therefore, negative interpretations of postpartum intrusions at 3 weeks postpartum mediate the relationship between Time 1 (pre-childbirth) obsessive beliefs (OBQ) and Time 3 (3 months postpartum) OC symptoms (YBOCS). Since the variance in Time 3 YBOCS scores explained by the OBQ remained significant after controlling for the III and Time 1 OCI-R ($R^2 = .06$, $P < .05$), the relationship between obsessive beliefs and OC symptoms was only partially mediated by negative interpretations of intrusive thoughts.

In the second set of analyses, the independent variable was the Time 1 TAFS *Likelihood-other*, with Time 2 III scores again as the mediator and Time 3 YBOCS scores again as the dependent variable. Regression analyses revealed that after controlling for premorbid OC symptoms, Time 1 TAFS *Likelihood-other* scores significantly predicted Time 2 III scores ($R^2 = .74$, $P < .05$) and Time 3 YBOCS scores ($R^2 = .10$, $P < .01$), satisfying the first three conditions for mediation (see Table 3). Consistent with the fourth condition, the variance in Time 3 YBOCS scores explained by the Time 1 TAFS *Likelihood-other* Subscale was reduced after controlling for Time 2 III and Time 1 OCI-R (from 10 to 2%). Sobel's Z-score (shown in Table 3) indicated a significant reduction in the indirect effect. Therefore, negative interpretations of postpartum intrusions early in the postpartum period (i.e., 3 weeks after childbirth) mediated the relationship between this TAF *Likelihood-other* and OC symptoms later in the postpartum (i.e., 12–16 weeks or 3–4 months). Since the variance in Time 3 YBOCS scores explained by the TAFS *Likelihood-other* Subscale was no longer significant after controlling for the III and Time 1 OCI-R ($R^2 = .02$, $P = ns$), the relationship between TAF *Likelihood-other* and OC symptoms was fully mediated by negative interpretations of intrusive thoughts.

In the third and fourth sets of analyses, the independent variables were the TAFS *Likelihood-self* and TAFS *Moral* Subscales, respectively. As the β values in Table 3 indicate, however, mediational relationships were not found to apply since the relationships among the three variables in each case were not uniformly significant (i.e., Baron & Kenny's (1986) first requirement was not met).

3. Discussion

Our previous report (Abramowitz et al., in press) implicated obsessive beliefs (as measured by the OBQ) in the pathogenesis of OC symptoms, suggesting that these relatively enduring trait-

like beliefs serve as risk factors for, rather than merely as epiphenomena of, obsessions and compulsions. In the present study, we replicated and extended these findings by investigating the proposed mechanism by which obsessive beliefs lead to OC symptoms. Contemporary cognitive models of OCD (e.g., OCCWG, 1997; Salkovskis, 1996) posit that obsessive beliefs give rise to situation-specific negative appraisals of unwanted intrusive thoughts that evoke the perception of threat (obsessional anxiety) when such intrusions occur. Rituals, avoidance, or neutralizing behaviors might then be performed in effort to reduce obsessional anxiety. In contrast to the existing research, much of which is cross-sectional in nature and therefore not permitting tests of directional hypotheses, the longitudinal design of the present investigation allowed us to draw conclusions regarding the directional relationships hypothesized by cognitive models (e.g., OCCWG, 1997).

Our findings are consistent with our previous study (Abramowitz et al., *in press*) where obsessive beliefs (as measured by the OBQ and TAF *Likelihood-other* Subscale) predicted postpartum OC symptom development, but TAF *Moral* and TAF *Likelihood-self* did not. That is, expecting parents who reported higher levels of these types of obsessive beliefs before the birth of their first child experienced more severe postpartum OC symptoms at 3 months (12–16 weeks) postpartum, even after controlling for baseline OC symptom severity. That TAF *Likelihood-other* was the only form of TAF predictive of postpartum OC symptoms is not surprising given that such beliefs reflect the idea that thinking about negative events could result in such events befalling the infant. Perhaps *Moral* and *Likelihood-self* TAF serve as predictors of other types of OC symptoms (e.g., scrupulosity or obsessions regarding harm to oneself).

In accord with our hypothesis in the present study, negative appraisals of unwanted postpartum intrusive thoughts occurring within the first postpartum month mediated the relationship between pre-birth obsessive beliefs and postpartum OC symptoms experienced about 3 months after childbirth. This is consistent with the idea that negative appraisals of normally occurring postpartum intrusive thoughts derive from obsessive beliefs and are associated with increased time, interference, distress, and difficulty resisting and controlling such thoughts and the rituals performed in response to such thoughts. These findings support contemporary cognitive models of OCD as derived from Beck's (1976) cognitive model of psychopathology (e.g., OCCWG, 1997; Rachman, 1997, 1998; Salkovskis, 1996).

Despite our significant findings, a substantial portion of the variance in postpartum OC symptoms was not explained by pre-birth obsessive beliefs and interim negative appraisals of postpartum intrusions. This likely reflects the fact that multiple specific and general psychological and biological (e.g., genetic) factors probably interact as contributing factors in the development of OC symptoms. Although cognitive models are, at present, among the most well articulated and parsimonious explanations for the etiology and maintenance of OCD, this does not exclude the possibility that other processes are involved at some level.

The OBQ, used to assess obsessive beliefs in the present study, is comprised of items measuring 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 inflated perceptions of responsibility whereas Rachman's (1997, 1998) approach emphasizes mistaken beliefs about the significance of thoughts. Because the OBQ Subscales which measure such beliefs were highly intercorrelated in our sample, we were not justified in treating these subscales as measures of distinct constructs. We did, however, include the TAF as a measure of a particular set of obsessive beliefs. Future research should address the contribution of other specific types of dysfunctional beliefs,

especially given correlational evidence that some types of obsessive beliefs (e.g., metacognitive beliefs) are stronger predictors of OCD symptoms than are others (e.g., responsibility beliefs) (Gwilliam, Wells, & Cartwright-Hatton, 2004).

Although a non-clinical sample, we believe our group of first-time parents experiencing unwanted intrusive thoughts about their newborns constitutes an ideal analogue for studying the development of OCD from a cognitive perspective. Such individuals normally experience distressing intrusive thoughts that are of insufficient frequency or duration to meet diagnostic criteria for OCD, yet are highly similar in *content* to clinical obsessions. Normal postpartum intrusions and clinical obsessions share common themes such as violence, contamination, and doubt (e.g., Abramowitz, Schwartz, & Moore, 2003; Abramowitz, Schwartz, Moore, & Luenzmann, 2003; Rachman & de Silva, 1978). These similarities suggest that the study of normal intrusive thoughts may shed light on the mechanisms involved in clinical obsessions. Moreover, because some new parents report clinically severe postpartum OC symptoms, theoretically consistent predisposing factors can be measured before childbirth and examined for their ability to predict more severe obsessional problems in the postpartum.

Our results have implications for treatment of obsessional problems using cognitive-behavioral therapy (CBT). One aim in CBT is to help the patient understand that it is not his or her unwanted intrusive thoughts, per se, that are the problem; instead, it is the erroneous and maladaptive *beliefs* about the meaning and consequences of such thoughts that lead to anxiety and compulsive behaviors. The finding that negative interpretations of otherwise harmless intrusive thoughts mediate the relationship between obsessive beliefs and OC symptoms underscores the importance of helping patients identify and correct such appraisals, which can be conceptualized as akin to *automatic thoughts* described by Beck, Rush, Shaw, and Emery (1979). Contemporary treatment manuals recommend psychoeducational procedures to teach patients about the universality of unwanted intrusive thoughts and how negative interpretations of such stimuli contribute to the development and maintenance of obsessions (e.g., Abramowitz, 2006; Rachman, 2002). Anecdotal clinical observations of patients with postpartum obsessions indicate that the didactic presentation of such material can produce rapid changes in appraisals, leading to symptom improvement. This process is similar to how patients with panic disorder often correct their misinterpretations of innocuous bodily sensations and cease their panic attacks after simply learning about the physiology of anxiety.

In addition, present findings suggest the need to focus treatment on modifying more firmly held obsessive beliefs (i.e., TAF, inflated responsibility) in order to help patients change their negative interpretations. Empirical evidence from controlled studies indicates that treatment incorporating formal behavior therapy (i.e., exposure and response prevention) or cognitive therapy procedures is effective in modifying faulty cognitions at both the core belief and misinterpretation levels (e.g., McLean et al., 2001). Zucker, Craske, Barrios, and Holguin (2002) found evidence that education about TAF-related cognitions could thwart the development of obsessional symptoms, and thus may be a fruitful direction to consider in developing programs for the prevention of obsessional problems.

A number of limitations of the present study deserve mention. First, although our design afforded a longitudinal assessment of the effects of hypothesized etiological factors on the development of postpartum OC symptoms, our results might not generalize to the development of non-postpartum OC symptoms. A second shortcoming is that although the III is intended to assess immediate, in-situation negative appraisals of intrusive thoughts, reliability analyses (test-retest) in previous research (OCCWG, 2003) suggest the possibility that it measures a trait-like construct similar to the OBQ and TAFS. We attempted to overcome this potential problem by

instructing participants to complete the III based on specific postpartum intrusions they identified on the PTBC. Nevertheless, in future research, interview methods might be better suited than Self-report Questionnaires for assessing negative appraisals of intrusions. Finally, we did not assess whether the men in the study had raised children from previous relationships.

Future studies should test hypotheses regarding pathways to the acquisition of obsessive beliefs and attitudes such as inflated responsibility and TAF. Are such beliefs learned through early experiences such as encounters with strict religious doctrine and incidents in which it appeared that one's thoughts contributed to a serious misfortune (e.g., [Rachman, 1997](#); [Salkovskis et al., 1999](#))? The *prevention* of obsessional symptoms is another area ripe for future study given the ability to identify those at risk for developing such problems. We have begun developing and testing a brief educational module for expecting parents that provides information about the normalcy of unwanted postpartum intrusions, the effects of misinterpreting such thoughts as threatening (e.g., as indicating the presence of psychosis), and techniques for managing distress associated with any recurring intrusions.

Acknowledgements

The authors wish to thank Autumn Braddock, Ph.D., Amy Brown, Ph.D., Anita DeAngelis, Roger Harms, M.D., and Stephen Whiteside, Ph.D. for their assistance and support at various stages of this research.

References

- Abramowitz, J. S. (2006). *Understanding and treating obsessive-compulsive disorder: a cognitive-behavioral approach*. Mahwah, NJ: Erlbaum.
- Abramowitz, J. S., Khandker, M., Nelson, C. A., Deacon, B. J., & Rygwall, R. (in press). The role of cognitive factors in the pathogenesis of obsessive-compulsive symptoms: a prospective study. *Behaviour Research and Therapy*.
- Abramowitz, J. S., Schwartz, S. A., & Moore, K. M. (2003a). Obsessional thoughts in postpartum females and their partners: content, severity and relationship with depression. *Journal of Clinical Psychology in Medical Settings*, *10*, 157–164.
- Abramowitz, J. S., Schwartz, S. A., Moore, K. M., & Luenzmann, K. R. (2003b). Obsessive-compulsive symptoms in pregnancy and the puerperium: a review of the literature. *Journal of Anxiety Disorders*, *17*, 461–478.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical consideration. *Journal of Personality and Social Psychology*, *51*, 1173–1182.
- Beck, A. T. (1976). *Cognitive therapy of the emotional disorders*. New York: International Universities Press.
- Beck, A. T., & Emery, G. (1985). *Anxiety disorders and phobias: a cognitive perspective*. New York: Basic Books.
- Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York: Guilford.
- Beck, A. T., Ward, C. H., Medelsohn, M., Mock, J., & Erlbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*, 561–571.
- Berle, D., & Starcevic, V. (2005). Thought–action fusion: review of the literature and future directions. *Clinical Psychology Review*, *25*, 263–284.
- Clark, D. M. (1986). A cognitive approach to panic. *Behaviour Research and Therapy*, *24*, 461–470.
- Foa, E. B., Huppert, J. D., Leiberg, S., Langner, R., Kichic, R., Hajcak, G., et al. (2002). The obsessive-compulsive inventory: development and validation of a short version. *Psychological Assessment*, *14*, 485–496.
- Frost, R. O., & Steketee, G. (2002). *Cognitive approaches to obsessions and compulsions*. Amsterdam: Pergamon.
- Frost, R. O., Steketee, G. S., Krause, M., & Trepanier, K. (1995). The relationship of the Yale-Brown Obsessive Compulsive Scale (YBOCS) to other measures of obsessive-compulsive symptoms in a nonclinical population. *Journal of Personality Assessment*, *65*, 158–168.
- Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Delgado, P., Heninger, G. R., et al. (1989a). The Yale-Brown Obsessive Compulsive Scale: validity. *Archives of General Psychiatry*, *46*, 1012–1016.

- Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., et al. (1989b). The Yale-Brown Obsessive Compulsive Scale: development, use, and reliability. *Archives of General Psychiatry*, *46*, 1006–1011.
- Gwilliam, P., Wells, A., & Cartwright-Hatton, S. (2004). Does meta-cognition or responsibility predict obsessive-compulsive symptoms: a test of the metacognitive model. *Clinical Psychology and Psychotherapy*, *11*, 137–144.
- Lee, H.-J., & Kwon, S.-M. (2003). Two different types of obsession: autogenous obsessions and reactive obsessions. *Behaviour Research and Therapy*, *41*, 11–29.
- McLean, P., Whittal, M., Thordarson, D., Taylor, S., Sochting, I., Koch, W., et al. (2001). Cognitive versus behavior therapy in the group treatment of obsessive-compulsive disorder. *Journal of Consulting and Clinical Psychology*, *69*, 205–214.
- Obsessive Compulsive Cognitions Working Group. (1997). Cognitive assessment of obsessive-compulsive disorder. *Behaviour Research and Therapy*, *35*, 667–681.
- Obsessive Compulsive Cognitions Working Group. (2001). Development and initial validation of the Obsessive Beliefs Questionnaire and the Interpretation of Intrusions Inventory. *Behaviour Research and Therapy*, *39*, 987–1006.
- Obsessive Compulsive Cognitions Working Group. (2003). Psychometric validation of the Obsessive Belief Questionnaire and the interpretation of intrusion inventory. Part 1. *Behaviour Research and Therapy*, *41*, 863–878.
- Obsessive Compulsive Cognitions Working Group. (2005). Psychometric validation of the Obsessive Belief Questionnaire and Interpretation of Intrusions Inventory. Part 2. Factor analyses and testing of a brief version. *Behaviour Research and Therapy*, *43*, 1527–1542.
- Pleva, J., & Wade, T. D. (in press). The mediating effects of misinterpretation of intrusive thoughts on obsessive-compulsive symptoms. *Behaviour Research and Therapy*.
- Rachman, S. (1997). A cognitive theory of obsessions. *Behaviour Research and Therapy*, *35*, 793–802.
- Rachman, S. (1998). A cognitive theory of obsessions: elaborations. *Behaviour Research and Therapy*, *36*, 385–401.
- Rachman, S. (2002). *The treatment of obsessions*. Oxford, UK: Oxford University Press.
- Rachman, S., & de Silva, P. (1978). Abnormal and normal obsessions. *Behaviour Research and Therapy*, *16*, 233–248.
- Salkovskis, P. M. (1985). Obsessional-compulsive problems: a cognitive-behavioural analysis. *Behaviour Research and Therapy*, *23*, 571–583.
- Salkovskis, P. M. (1989). Cognitive behavioural factors and the persistence of intrusive thoughts in obsessional problems. *Behaviour Research and Therapy*, *27*, 677–682.
- Salkovskis, P. (1996). Cognitive-behavioral approaches to the understanding of obsessional problems. In: R. Rapee (Ed.), *Current controversies in the anxiety disorders* (pp. 103–133). New York: Guilford.
- Salkovskis, P., Shafran, R., Rachman, S., & Freeston, M. (1999). Multiple pathways to inflated responsibility beliefs in obsessional problems: possible origins and implications for therapy and research. *Behaviour Research and Therapy*, *37*, 1055–1072.
- Shafran, R. (2005). Cognitive-behavioral models of obsessive-compulsive disorder. In: J. S. Abramowitz, & A. C. Houts (Eds.), *Concepts and controversies in obsessive compulsive disorder*. New York: Springer.
- Shafran, R., Thordarson, D., & Rachman, S. (1996). Thought–action fusion in obsessive-compulsive disorder. *Journal of Anxiety Disorders*, *37*, 231–237.
- Sheehan, D., Lecrubier, Y., Harnett Sheehan, K., Janavs, J., Weiller, E., Keskiner, A., et al. (1997). The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. *European Psychiatry*, *12*, 232–241.
- Sheehan, D., Lecrubier, Y., Sheehan, K., Amorim, P., Janavs, J., Weiller, E., et al. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, *59*(Suppl. 20), 22–33.
- Tolin, D. F., Woods, C., & Abramowitz, J. S. (2003). Relationship between obsessional beliefs and obsessive-compulsive symptoms. *Cognitive Therapy and Research*, *27*, 657–669.
- Zucker, B. G., Craske, M. G., Barrios, V., & Holguin, M. (2002). Thought–action fusion: can it be corrected? *Behaviour Research and Therapy*, *40*, 653–664.