



Beliefs about losing control and other OCD-related cognitions: An experimental investigation

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ABSTRACT

Background and objectives: Cognitive theories of obsessive-compulsive disorder (OCD) suggest that dysfunctional beliefs influence symptoms. However, well-established belief domains do not fully explain OCD symptomatology, suggesting other cognitive mechanisms may be involved. An additional belief domain which may play a role in OCD is beliefs about losing control. Indeed, these beliefs have been found to be associated with OCD symptoms. However, the relationships between beliefs about losing control and other OCD phenomena, including other relevant dysfunctional beliefs, is unclear. The aim of this study was to examine the relationships between beliefs about losing control and appraisals hypothesized to be relevant to OCD.

Methods: A total of 163 participants completed the experimental protocol, wherein they received false (positive or negative) feedback regarding the likelihood they may lose control and completed a vignette task asking them to read hypothetical scenarios relevant to OCD concerns (checking, and aggressive thoughts). Vignettes were followed by questions and prompts used to measure OCD-relevant appraisals.

Results: Based on MANOVAs, beliefs about losing control had a significant impact on appraisals in the checking, $F(151) = 5.55, p = .001$, and aggressive thoughts, $F(151) = 2.898, p = .037$, vignettes. However, planned comparison indicated that in the aggressive thoughts vignettes, this effect was in the opposite direction than was hypothesized.

Limitations: The losing control induction may have inadvertently influenced participants' beliefs about the utility of thought control.

Conclusions: Findings provide preliminary evidence for an association between beliefs about losing control and OCD-relevant appraisals.

1. Introduction

Obsessive-Compulsive Disorder (OCD) is a debilitating disorder with an estimated prevalence of approximately 2% (Ruscio et al., 2010). OCD is comprised of obsessions and/or compulsions that are time-consuming, and that cause significant distress and/or impairment for affected individuals (APA, 2013). Obsessions are unwanted repetitive intrusive thoughts, images, or impulses that cause discomfort or distress (APA, 2013; Rachman, 1997). Compulsions are repetitive overt or covert behaviour, performed to alleviate the distress associated with intrusive thoughts, and/or to prevent negative events from occurring (APA, 2013; Rachman & Hodgson, 1980). OCD is often chronic and associated with a variety of unfavourable outcomes including social difficulties, and occupational impairment (Abramowitz & Jacoby, 2015; Eisen et al., 2006, 2010).

Cognitive theories (Rachman, 1997, 1998; Salkovskis, 1985) suggest that OCD develops due to misinterpretations of common intrusive thoughts as overly significant which leads individuals to engage in compulsive behaviours in an attempt to prevent negative outcomes. The likelihood that intrusive thoughts are misinterpreted as personally significant is proposed to be increased by specific dysfunctional beliefs (e.g., Frost & Steketee, 2002). Early research on the influence of maladaptive beliefs in OCD focused largely on beliefs pertaining to inflated responsibility, with findings indicating that greater perceived responsibility was associated with greater obsessive compulsive symptoms (e.g., Ladouceur et al., 1995; Ladouceur et al., 1996; Leonhart & Radomsky, 2019; Lopatka & Rachman, 1995; Salkovskis, 1985). The Obsessive Compulsive Cognitions Working Group (OCCWG) later identified six beliefs which clustered into three domains: 1) responsibility and threat overestimation, 2) perfectionism and intolerance of

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uncertainty, and 3) importance of and control over thoughts (ICT), proposed to be relevant to OCD (OCCWG, 1997, 2001, 2003, 2005; Frost & Steketee, 2002). However, not all individuals with OCD endorse high levels of these dysfunctional beliefs suggesting that additional cognitive mechanisms may be involved in the development and maintenance of this disorder (Taylor et al., 2006).

Control-related cognitive constructs have been highlighted as playing a critical role in OCD, as individuals struggling with the disorder are proposed to attempt to control their thoughts and to use compulsive behaviour to control external events, such as the consequences implied by the intrusive thought (Carr, 1974; McFall & Wollersheim, 1979; Purdon & Clark, 1994; Radomsky & Rachman, 2004). Research on control mechanisms within the cognitive model of OCD has largely been limited to beliefs about the need to control thoughts, which captures beliefs related to “the overevaluation of the importance of exerting complete control over intrusive thoughts, images and impulses and the belief that this is both possible and desirable” (OCCWG, 1997, p. 678). However, it has been proposed that other control-related cognitive domains may also influence OCD symptoms. For example, research has found that the combination of a higher desire for control (one’s motivation for control) and a lower sense of control (one’s perceived level of control) are associated with obsessive compulsive symptoms (Gelfand & Radomsky, 2013; Moulding et al., 2007, 2008, 2009; Moulding & Kyrios, 2006, 2007), suggesting that a mismatch between these two control constructs (specifically, the combination of lower sense of control and higher desire for control) may influence OCD symptomatology (Gelfand & Radomsky, 2013; Moulding et al., 2008; Moulding & Kyrios, 2007). Furthermore, desire for control and sense of control have also been found to be associated with the belief domains identified by the OCCWG and predict higher levels OCD symptoms via these dysfunctional beliefs (Moulding et al., 2007, 2008, 2009).

Given previous investigations suggest that broader control cognitions may influence OCD, exploring additional control-related beliefs may inform the conceptualization of OCD, as well as identify potential novel treatment targets. A key aspect of the perceived importance of control in OCD is the anticipated or feared set of consequences regarding a loss of control (Carr, 1974; McFall & Wollersheim, 1979; Purdon & Clark, 1994; Reuven-Magril et al., 2008). For example, individuals with OCD may fear that losing control over their thoughts may be catastrophic and/or lead to a loss of control over their behaviour, emotions, and body/bodily functions (e.g., “losing control over one’s thoughts will eventually lead to loss of control over my behaviour”; Clark & Purdon, 1993 pg. 165). As opposed to the belief domain of need for control of thoughts which captures concerns related to mental control, beliefs about losing control may capture fears and cognitions which extend beyond thought control (e.g., control of behaviour). As such, beliefs about *losing* control may be a novel dysfunctional belief domain that may play an important role in the development and maintenance of OCD. Specifically, this belief domain may influence OCD symptoms and other OCD-relevant dysfunctional beliefs.

Indeed, this is supported by a study by Radomsky and Gagné (2020) which found that negative beliefs about losing control over one’s thoughts, behaviour, emotions, and body/bodily functions were associated OCD-dysfunctional beliefs and predicted OCD symptoms above and beyond these belief domains. Furthermore, two experimental investigations have examined the causal relationship between beliefs about losing control and OCD symptoms (Gagné & Radomsky, 2017, 2020). In these studies, undergraduate participants were provided false feedback following a bogus task regarding their ability to control their thoughts (Gagné & Radomsky, 2017) or behaviour (Gagné & Radomsky, 2020). In both investigations participants were told that they were at high or low risk of losing control based on their responses on the bogus task. The first study investigated how such feedback influenced checking behaviour (Gagné & Radomsky, 2017), whereas, the second study examined how the feedback impacted the experience of intrusive thoughts (Gagné & Radomsky, 2020). In the first study, participants in

the high beliefs about losing control condition were found to engage in significantly more checking behaviour during a computer task compared to participants in the low beliefs condition (Gagné & Radomsky, 2017). In the second study, following the false feedback, participants completed a knife sorting Behavioural Approach Task (BAT). Those in the high beliefs condition experienced significantly more anxiety, reported more intrusive thoughts and subjectively perceived themselves as less cautious while completing the task compared to participants in the low beliefs condition (Gagné & Radomsky, 2020). Taken together, findings suggest that negative beliefs about losing control may influence at least some domains of OCD symptoms. However, the impact of beliefs about losing control on other OCD phenomena is still unclear.

Several studies have focused on examining dysfunctional beliefs as predictors of OCD symptomatology (e.g., Julien et al., 2008; Kaiser et al., 2010; Wu & Carter, 2008). However, given the complex nature of this disorder, different cognitive domains are likely interrelated and may well interact to influence at least some aspects of OCD phenomenology. Indeed, there is overlap among the dysfunctional beliefs identified by the OCCWG, and indicated dysfunctional beliefs may mediate the relationships between other cognitive mechanisms and OCD symptoms (Moulding et al., 2009; OCCWG, 2003; OCCWG, 2005; Sassaroli et al., 2015; Taylor et al., 2010).

Given previous investigations suggest that different belief domains are related, it is likely that beliefs about losing control may also be associated and interact with other OCD-relevant beliefs and appraisals (Radomsky, 2022). Therefore, if an individual endorses a greater belief that they could lose control this may lead them to appraise situations and stimuli differently resulting in higher levels of responsibility (e.g., “Because I am at risk of losing control, I am irresponsible if I don’t do everything in my power to remain in control of this thought”), threat (e.g., “Because I am at risk of losing control, I am more likely than others to cause serious harm”), and/or need for control (e.g., “Because I am at risk of losing control, I need to work harder to control unwanted sexual intrusions, or I might lose control over my sexual behaviour”). Investigations examining these relationships are warranted to better understand the complex nature of OCD and identify how beliefs about losing control may directly and indirectly influence symptoms. Using experimental methods to explore these associations may be advantageous as they allow for causal relationships to be established.

The main aim of this study was to examine whether beliefs about losing control over thoughts, behaviour, and emotions played a causal role in inducing higher levels of OCD-relevant appraisals (responsibility, threat, and control of thoughts) and responses (urges to act and distress). In this experiment, beliefs about losing control were manipulated using false (positive or negative) feedback provided after a bogus cognitive task which was described as an objective measure of self-control. It was hypothesized that the manipulation would be effective: that is, that participants who received negative feedback about their self-control would endorse a greater belief that they could lose control over their thoughts, behaviour, and emotions. It was further hypothesized there would be a main effect of beliefs about losing control, such that those who received negative feedback would endorse higher ratings of perceived responsibility, threat, and control of thoughts compared to those who received positive feedback. We also hypothesized that those who received negative (vs positive) feedback would endorse a stronger desire to act and greater distress. Finally, we expected that the above hypotheses would hold both for vignettes describing doubting scenarios and for those describing the experience of an aggressive thought.

2. Method

2.1. Participants

A sample of 163 undergraduate students from Concordia University were recruited for the study. The use of such a sample is justified given that OCD phenomena fall on a continuum in the general population

meaning that it is possible to study OCD-relevant factors in analogue samples which fall at the lower end of this continuum (e.g., Abramowitz et al., 2014; Gagné & Radomsky, 2017, 2020). Participants received course credit as compensation for their participation. To be eligible, participants had to be over 18 years old and be able to read, write and communicate in English.

2.2. Measures

2.2.1. Manipulation check

To assess whether the losing control manipulation was effective, participants were asked to answer a question about the degree to which they believed they could lose control over their thoughts, behaviours, and emotions on a rating scale ranging from 0 to 100 following the false feedback task ("To what extent do you believe you could lose control over your thoughts, behaviours, and emotions?"). The manipulation check questionnaire also included several filler questions to mask the true purpose of the study.

2.2.2. Demographic questionnaire

Participants were asked to provide basic demographic information on their age, sex, gender, ethnicity, and educational attainment.

2.2.3. Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004)

The VOCI is a 55-item measure designed to assess OCD symptoms. This measure is comprised of six subscales: contamination, checking, obsessions, hoarding, indecisiveness, and 'just right' experiences. All items are rated on a five-point Likert scale ranging from 0 ("Not at all") to 4 ("Very much"). The VOCI has strong psychometric properties, including excellent internal consistency ($\alpha = 0.94$ to 0.98), excellent retest reliability ($r = 0.91$), and excellent convergent and divergent validity (Radomsky et al., 2006; Thordarson et al., 2004). In the current study, the VOCI exhibited excellent internal consistency ($\alpha = 0.95$).

2.2.4. Obsessive Beliefs Questionnaire (OBQ-44; OCCWG, 2005)

The OBQ-44 is a 44-item questionnaire designed to measure maladaptive beliefs identified as relevant to the development and maintenance of OCD. The questionnaire consists of three subscales: responsibility and threat overestimation, perfectionism and intolerance for uncertainty, and importance of and control over thoughts. Items are rated on a seven-point Likert scale ranging from 1 ("Disagree very much") to 7 ("Agree very much"). The OBQ-44 subscales have good-to-excellent internal consistency ($\alpha = 0.89$ to 0.93), and good criterion, convergent and divergent validity (OCCWG, 2005). In the current study, the OBQ exhibited excellent internal consistency ($\alpha = 0.96$).

2.2.5. Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995)

The DASS-21 is a 21-item measure designed to assess depression, anxiety, and stress. Each item is rated on a four-point Likert scale ranging from 0 ("Did not apply to me at all") to 3 ("Applied to me very much, or most of the time"). The DASS-21 has good-to-excellent internal consistency ($\alpha = 0.87$ to 0.94), and good convergent and divergent validity (Antony et al., 1998; Crawford & Henry, 2003; Henry & Crawford, 2005). In the current study, the DASS-21 exhibited excellent internal consistency ($\alpha = 0.92$).

2.2.6. Beliefs about Losing Control Inventory (BALCI; Radomsky & Gagné, 2020)

The BALCI is a 21-item questionnaire which measures negative beliefs about losing control and has three subscales: beliefs about losing control over one's thoughts/behaviours/emotions, beliefs about losing control over one's body/bodily functions, and beliefs about the importance of staying in control. Items are rated on a five-point Likert scale ranging from 0 ("Not at all") to 4 ("Very much"). The BALCI total score

has excellent internal consistency ($\alpha = 0.93$), adequate retest reliability ($r = 0.68$), and good convergent and divergent validity (Radomsky & Gagné, 2020). The subscales of the BALCI demonstrate fair-to-excellent internal consistency ($\alpha = 0.67$ to 0.94), and fair-to-adequate retest reliability ($r = 0.57$ to 0.68 ; Radomsky & Gagné, 2020). In the current study, the BALCI exhibited excellent internal consistency ($\alpha = 0.95$).

2.2.6. Appraisals and responses

Participants' appraisals (i.e., responsibility, threat, and control of thoughts) of and responses (i.e., urges to act, and distress) to vignettes were assessed using a series of questions adapted from Obsessive-Compulsive Vignette Inventory (OCVI; Moulding et al., 2007). Participants rated their response to each question on a scale ranging from 1 ("not at all") to 9 ("Extremely"). Appraisals were measured using 17 questions: six questions assessed *responsibility* (e.g., "In this situation, to what extent do you believe that you could be responsible for serious harm?"), and *threat* (e.g., "According to you, what is the probability that these negative events will occur in this context?") appraisals, and five questions measured appraisals of *control of thoughts* (e.g., "To what extent do you believe that in order to avoid negative outcomes in this situation you need to control all thoughts and images that pop into your mind?"). *Distress* was assessed using one question ("To what extent do you feel discomfort in this situation?"). *Urges to Act* (e.g., "Try to reassure myself that everything is okay.") was assessed using eight items which were rated based on the likelihood that participants would use each strategy to deal with the situation on a scale ranging from 1 ("Not at all likely") to 9 ("Extremely likely"). While distress and urges to act were initially conceptualized as two separate constructs, for the analysis these variables were collapsed into a composite variable, "responses", as the distress variable demonstrated low internal consistency (i.e., $\alpha = 0.56$). After combining the distress and urges to act subscales, this measure exhibited excellent internal consistency ($\alpha = 0.92$) on the total score, and good to excellent internal consistencies on all subscales (α 's = 0.81 to 0.90).

2.3. Procedure

This study was approved by the Research Ethics Committee at Concordia University, and initially planned and pre-registered on Open Science Framework (<https://doi.org/10.17605/OSF.IO/MT738>). The study was conducted using Zoom for videoconferencing and Qualtrics to administer online questionnaires. First, participants were asked to provide informed consent and complete an online demographic questionnaire. They were told that the study's purpose was to examine the role of self-control in individuals' responses to and interpretations of real-life scenarios.

The participants were then asked to complete a bogus cognitive task which they were told measured self-control. This task consisted of two texts with equal word count that participants were asked to read aloud alternating between the two texts at every word. This task was designed to be difficult enough that it led to multiple errors (Kelly-Turner & Radomsky, 2020) so that participants might be unsure of their performance. Participants were also told prior to starting the task that people often do not have an accurate idea of their ability to maintain control (over- or under-estimate) and this task provided an objective measure of self-control. This was done to further provoke uncertainty about performance. This task has previously been used to successfully induce negative beliefs about losing control (Kelly-Turner & Radomsky, 2020).

After completing the task, the experimenter told the participant that they would score the participant's results and provide feedback. At this point the experimenter turned off their camera and randomized the participant using a random number generator to either the low losing control (LLC) condition or the high losing control (HLC) condition. The experimenter conducting the study remained unaware of condition assignment until this point. The condition to which participants were randomized determined the false feedback they received. After 1 min,

the experimenter turned their camera back on and shared the results of the task with the participant. Participants in the HLC condition were told they scored very low on the task, which indicated they had very poor self-control and were more likely to lose control across a variety of contexts. Participants in the LLC were told that they scored very high on the task, which suggested they had very good self-control and were unlikely to lose control across a variety of contexts. In both conditions, participants were shown a bogus graph of their below average or above average performance and given examples to increase the believability of the feedback. Participants were then asked to complete the manipulation check questionnaire through Qualtrics.

Participants then completed the vignette task. Participants were reminded verbally and in writing to consider their self-control (i.e., the false feedback they received regarding the likelihood of losing control) while reading and responding to each scenario. Four vignettes were used in this study, all described scenarios relevant to OCD concerns, with two about doubt and two about the experience of an aggressive intrusive thought. One vignette was taken directly from the OCVI (Moulding et al., 2007); another was adapted from (Corcordan, 2006). All were written in keeping with the style of OCVI vignettes and following from previous research on beliefs about losing control, suggesting their relevance to symptom domains of checking and unacceptable intrusive thoughts (Gagné & Radomsky, 2017, 2020). Participants were asked to read each vignette and imagine that the scenario was happening to them. Following each vignette, participants were asked to complete the series of questions regarding their appraisals of and responses to the vignette. The vignettes were administered through Qualtrics in random

Table 1
Scenarios used in vignette task.

Vignette Type	Scenario
Checking	“You are at a friend’s house, and you are feeling thirsty, so you get yourself a drink of tap-water. While you are drinking, you are distracted by a lively discussion with your friend. Later you both go to a restaurant, and while you are there you realize that you are not sure if you had turned off the tap, which you think was running rather strongly. You try and think back to when you were at your friend’s house, but can only remember turning the faucet on, not if you actually turned it off. You also think that the sink might have had a plug in it, and that it may have been next to some appliances such as a toaster and microwave oven, which were plugged in. Your friend lives alone.” (Moulding et al., 2007, p. 1696)
Checking	Your friend is away for the week and you have agreed to stop by their house each morning to feed their cat. One morning you are running late for class, so you rush to your friend’s house. You get the cat food out of the cupboard beside the kitchen sink and hastily fill the cat dish with food. After you set the bowl down, you hurry to the front door putting on your coat as you go and rush out the door to school. Later that day during your lecture, your mind begins to drift, and you realize with a start that you are not sure if you locked the front door of your friend’s house. In fact, you can’t even remember if you closed the front door. Your friend lives alone, and their house is on a very busy street.
Aggressive thought	You are babysitting your six-year-old niece. For lunch you decide to make sandwiches. You get all the ingredients to begin preparing the sandwiches and select a large sharp knife out of the drawer to cut the vegetables. Your niece is sitting at the kitchen table near where you are preparing lunch. Right before you start cutting the tomatoes you have a sudden, horrific impulse to stab your niece with the sharp kitchen knife you are using. You try to ignore the thought but are unsuccessful and it remains at the center of your mind. (Adapted from Corcordan, 2006, p. 140)
Aggressive thought	After finishing a long day at school, you are waiting for the bus at your bus stop which is on a busy street. You feel a headache coming on, and can’t wait to go home, get into bed and watch Netflix. Standing next to you at the bus stop is a mother and her young child. The young child begins to cry loudly, and when the mother tries to soothe them the child begins screaming. Your head is pounding. You wish the child would be quiet. All of the sudden you have the horrible impulse to shove the child into oncoming traffic.

sequence. See Table 1 for vignettes.

Participants were asked to complete a battery of online questionnaires including the DASS-21 (Lovibond & Lovibond, 1995), OBQ-44 (OCCWG, 2005), VOCI (Thordarson et al., 2004), and BALCI (Radomsky & Gagné, 2020).

Finally, participants were debriefed and informed of the deception involved in the study (i.e., that the study did not formally assess the degree to which they are actually at risk of losing control). Participants were told the true purpose of the study was to examine the role of manipulating beliefs about losing control on specific appraisals. As participants were not given complete information about the purpose of the study when initially providing consent, they were asked to provide a second informed consent after debriefing and were asked if they were still willing for their data to be included in the study.

2.4. Data analysis strategy

Prior to the primary analysis, the data was screened for univariate and multivariate outliers and the assumptions of MANOVA were tested (i.e., normality, homogeneity of variance and multicollinearity). To assess for multivariate outliers the Mahalanobis distance was calculated for all outcome variables of interest. Baseline differences between condition on demographic characteristics and the questionnaires of interest were tested using independent samples t-tests. Participants who did not believe the experimental manipulation were excluded from subsequent analyses.

The manipulation check was tested using an independent samples t-test with condition as the independent variable and the manipulation check rating as the dependent variable. To examine whether there were differences between conditions in terms of the credibility of the manipulation, two independent samples t-tests were conducted with credibility of the task and credibility of the feedback as the dependent variables.

Two one-way MANOVAs (one for each vignette type) were conducted with condition (HLC vs. LLC) as the independent variable and appraisal ratings as the dependent variables. Results of the MANOVAs were further explored by conducting independent samples t-tests for each individual dependent variable (responsibility, threat, and control). While it was initially planned that MANOVAs would be used to test the impact of condition on urges to act and distress, given these two variables were combined into one construct, independent samples t-tests were conducted instead. For each dependent variable a mean score across relevant items from the vignette measure was computed.

3. Results

3.1. Data screening

Neither univariate nor multivariate analysis indicated any outliers, and as such, all data were retained. Variables of interest were normally distributed (i.e., kurtosis < |10|, skewness < |3|; Kline, 2016), and other assumptions of MANOVA (i.e., homogeneity of variance and multicollinearity) were also met. Eight participants were excluded from subsequent analyses because they did not believe the feedback provided after the bogus cognitive task. There were no baseline differences on demographic characteristics or on the questionnaires of interest (see Table 2). The mean scores on the questionnaires were comparable to previous studies which have used undergraduate samples (e.g., Kia-Keating et al., 2018; Kelly-Turner & Radomsky, 2020; OCCWG, 2005; Osman et al., 2012; Thordarson et al., 2004).

3.2. Manipulation check

As hypothesized participants in the HLC endorsed a greater strength of the belief ($M = 53.03, SD = 24.71$) that they could lose control of their thoughts, behaviours and emotions compared to participants in the LLC

Table 2
Demographics and descriptive statistics for self-report measures.

Variable	LLC (N = 80) M (SD)	HLC (N = 75) M (SD)
Age	24.00 (5.79)	22.65 (5.45)
Sex – Female N (%)	69 (86.30)	68 (90.70)
Gender – Female N (%)	64 (80.00)	62 (82.7)
Ethnicity – Caucasian N (%)	40 (50.00)	37 (49.3)
VOCI	45.40 (31.30)	50.31 (34.74)
OBQ-44	153.24 (48.01)	149.76 (48.43)
BALCI	21.85 (17.23)	24.49 (17.50)
DASS-21	16.84 (11.71)	20.61 (12.52)

Note. VOCI = Vancouver Obsessional Compulsive Inventory, OBQ-44 = Obsessive Beliefs Questionnaire, BALCI = Beliefs About Losing Control Inventory, DASS-21 = Depression Anxiety Stress Scales, LLC = low beliefs about losing control condition, HLC = high beliefs about losing control condition.

($M = 27.71, SD = 27.42, t(153) = 6.02, p < .001$ (see Fig. 1). There was no significant difference between conditions on the credibility of the task, $t(150) = 0.89, p = .19$, or the credibility of the feedback provided, $t(150) = 1.37, p = .09$. Overall, these results suggested that the experimental manipulation was effective and believable (see Table 3).

3.3. OCD-relevant appraisals

Based on MANOVAs, There was a significant effect of condition on OCD-relevant appraisals in both the checking, $F(151) = 5.55, p = .001$, and aggressive thoughts, $F(151) = 2.898, p = .037$, vignettes. To explore the nature of these omnibus effects, independent samples *t*-tests were conducted to examine the impact of condition on ratings of responsibility, threat, and control of thoughts in both vignette types (see Table 4).

In the checking vignettes, as hypothesized, there was a significant effect of condition on ratings of threat, $t(153) = 2.10, p = .019$, with those in the HLC ($M = 5.46, SD = 1.27$) scoring higher on threat appraisals than those in the LLC ($M = 4.99, SD = 1.45$). There were no significant effects of condition on ratings of responsibility, $t(153) = 1.41, p = .08$, or ratings of control, $t(153) = 1.48, p = .07$. In the aggressive thoughts vignettes, there was a significant effect of condition on ratings of control, $t(153) = 1.87, p = .031$. However, this effect was in the opposite direction than hypothesized, with those in the LLC ($M = 6.81, SD = 1.61$) scoring higher than those in the HLC ($M = 6.30, SD =$

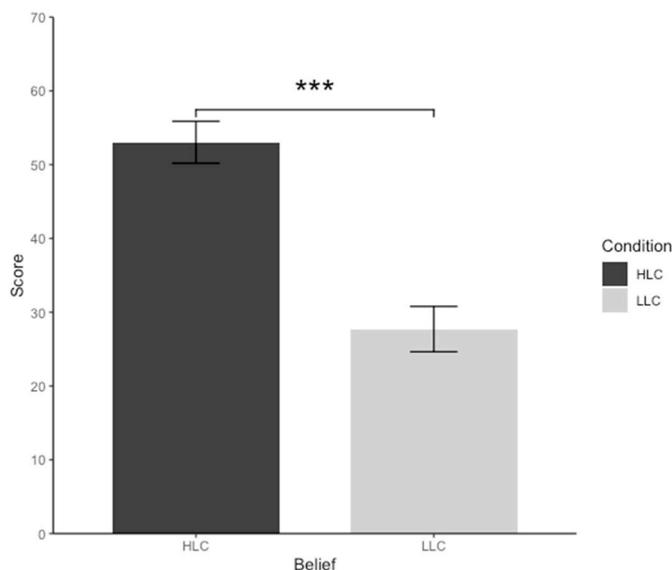


Fig. 1. Average Manipulation Check Rating of Beliefs about Losing Control. Note. LLC = low beliefs about losing control condition, HLC = high beliefs about losing control condition, *** = $p < .001$.

Table 3
Descriptive statistics for experimental manipulation variables.

Variable	LLC (N = 80) M (SD)	HLC (N = 75) M (SD)
Manipulation check***	27.71 (27.42)	53.03 (24.71)
Task credibility	65.70 (30.74)	61.27 (30.52)
Feedback credibility	66.65 (28.95)	59.85 (32.29)

Note. LLC = low beliefs about losing control condition, HLC = high beliefs about losing control condition, *** = $p < .001$.

Table 4
Descriptive statistics for outcome variables by condition.

Outcome	Checking M (SD)		Aggressive M (SD)	
	LLC (N = 80)	HLC (N = 75)	LLC (N = 80)	HLC (N = 74)
Responsibility	7.08 (1.25)	7.35 (1.12)	7.43 (1.31)	7.19 (1.50)
Threat	4.99 (1.45)	5.46 (1.27)	4.04 (1.16)	4.18 (1.61)
Control	6.23 (1.55)	5.87 (1.50)	6.81 (1.61)	6.30 (1.79)
Responses	5.40 (1.28)	5.23 (1.28)	5.70 (1.25)	5.35 (1.25)

Note. LLC = low beliefs about losing control condition, HLC = high beliefs about losing control condition, significant effects are in bold.

1.79). There were no significant effects of condition on ratings of threat, $t(153) = 0.613, p = .270$, or responsibility, $t(153) = 1.08, p = .141$.

3.4. OCD-relevant responses

There was no difference in responses in the checking vignettes, $t(153) = 0.812, p = .209$. There was a significant impact of condition on OCD-relevant responses in the aggressive thoughts vignettes, $t(153) = 1.71, p = .045$. However, this was in the opposite direction than hypothesized as those in the LLC ($M = 5.70, SD = 1.25$) endorsed higher OCD-relevant responses compared to those in the HLC ($M = 5.35, SD = 1.25$).

Given these findings were in the opposite direction than expected, a data-dependent exploratory analysis using a stepwise regression was conducted to investigate whether appraisals of responsibility, threat and control of thoughts were associated with OCD-relevant responses in both vignette types. The goal of this analysis was to investigate one possible explanation for the unexpected relationship between condition and OCD-relevant responses by examining whether this relationship may in part be accounted for by an effect of the appraisal domains on OCD-relevant responses. In both the checking ($\beta = 0.27, p = .009$) and aggressive thoughts ($\beta = 0.31, p = .001$) vignettes, control was significantly associated with OCD-relevant responses. Furthermore, threat

Table 5
Regression predicting OCD-relevant responses from appraisals of threat, control, and responsibility.

	R ²	B	SE B	β	t	p
Checking						
Step 1 (BALC)	0.004					.418
Step 2 (Threat, Resp, Control)	0.10					.005
BALC		-0.11	0.21	-0.04	-0.54	.591
Threat		0.11	0.11	0.12	1.02	.310
Responsibility		-0.10	0.12	-0.09	-0.80	.423
Control		0.22	0.08	0.27	2.65	.009
Aggressive thoughts						
Step 1 (BALC)	0.02					.089
Step 2 (Threat, Resp, Control)	0.30					<.001
BALC		-0.23	0.18	-0.09	1.32	.190
Threat		0.19	0.08	0.21	2.32	.022
Responsibility		0.08	0.08	0.09	1.08	.281
Control		0.23	0.07	0.31	3.26	.001

Note. BALC = Beliefs about losing control, significant effects are in bold.

appraisals were also significantly associated with responses in the aggressive thoughts vignettes ($\beta = 0.21, p = .022$). See Table 5 for regression results.

4. Discussion

This experiment examined the relationships between beliefs about losing control and appraisals of responsibility, threat overestimation, and control of thoughts in OCD-relevant scenarios. The experiment also sought to extend previous research (Gagné & Radomsky, 2017, 2020) on the influence of beliefs about losing control on OCD-relevant behaviours (i.e., checking and caution) by examining the role these beliefs had on OCD-relevant responses. As expected, the false feedback after the bogus cognitive task was effective at manipulating participants' beliefs about losing control, with those who received negative feedback (HLC) scoring higher on the possibility of losing control compared to those who received positive feedback (LLC). Consistent with our hypothesis, participants in the HLC endorsed significantly higher appraisals of threat in the checking vignettes compared to participant in the LLC. However, there were no significant differences in ratings of responsibility or control of thoughts in these vignettes. Contrary to hypotheses, in the aggressive thoughts vignettes, participants who received positive feedback (compared to negative feedback) reported higher appraisals of control of thoughts, and OCD-relevant responses, with no differences between conditions in appraisals of responsibility or threat. In this case, while it could be that lower beliefs about losing control caused higher appraisals of control of thoughts and OCD-relevant responses, it is more likely these results reflect an issue with the experimental paradigm.

In this experiment participants in the low beliefs about losing control condition were provided positive feedback regarding their capacity to maintain control which may have inadvertently resulted in these individuals viewing this quality as more important when questioned about it during the vignettes which were administered directly following the false feedback. This unexpected impact of the manipulation may have been limited to control of thoughts given that this domain likely has greater overlap and similarities with beliefs about losing control compared to the domains of responsibility and threat (Radomsky, 2022; Radomsky & Gagné, 2020). Cognitive interventions targeting control of thoughts in Cognitive Behavioral Therapy (CBT) for OCD focus on illustrating the futility of thought control in order to reduce beliefs about the need to control thoughts as well as compulsive actions which are focused on controlling these thoughts (Wilhelm & Steketee, 2006). In this experiment the positive feedback provided to the LLC may have had the opposite effect wherein not only may it have led participants to believe that controlling thoughts, behaviours and emotions was possible, but also that such control was necessary to prevent negative outcomes. Indeed, the feedback included specific past examples wherein participants demonstrated "good" control of their thoughts, behaviours, and emotions. While the intention behind these examples was to provide further credibility for the feedback and illustrate to participants that they were at low risk of losing control, it may have actually caused these participants to adopt the belief that this "good" control is what has prevented the occurrence of negative outcomes in the past. As such, participants in the LLC may have felt more motivated to act when control was threatened in the stressful situations described in the vignettes to ensure negative outcomes were prevented. This is in line with theories proposing that perceptions of control, particularly desire for control, may be a key factor which influences anxiety and motivation to act in distressing situations (Burger, 1992; Moulding et al., 2007, 2008). On the other hand, in the HLC participants were told that they were at higher risk of losing control and provided specific examples where they had "lost control" in the past. This may have indirectly caused these individuals to recognize the futility of thought control leading to lower scores on appraisals of control of thoughts and subsequently OCD-relevant responses. In support of the proposed association between control of thoughts and OCD-relevant responses, in the exploratory

analysis examining whether appraisals were associated with OCD-relevant responses, across both vignette types higher control of thoughts was associated with higher ratings on OCD-relevant responses. While unexpected, these results may demonstrate the key role control plays in compulsive behaviour and may highlight an important thinking process in OCD whereby individuals with this disorder believe that control of thoughts is not only possible but also necessary to prevent negative outcomes and may engage in compulsive behaviour to ensure they do not lose control (Clark, 2006; Rachman & Hodgson, 1980; Radomsky, 2022).

While somewhat overshadowed by the unexpected results of this study, in the checking vignettes as hypothesized, higher beliefs about losing control were associated with significantly higher ratings of threat. This finding provides preliminary evidence that individuals with higher beliefs about losing control may appraise situations characterized by doubt as more threatening. This may be attributed to the fact that as these individuals believe losing control is possible, they are more likely to interpret that outcomes in such situations will be dangerous and/or catastrophic. The association between beliefs about losing control and threat appraisals is in line with previous investigations which have found associations and interactions among OCD-relevant cognitions (Clark & Purdon, 1993; Moulding et al., 2007; Sassaroli et al., 2015; Taylor et al., 2010).

The different relationships found between beliefs about losing control and OCD-relevant appraisals in the two vignette types may reflect the impact that symptom domain has on these associations. Indeed, past research supports that dysfunctional beliefs may be differentially associated with OCD symptoms, with threat and responsibility being more closely associated with symptoms of checking, and ICT more strongly associated with symptom domains of obsessing and neutralizing (OCCWG, 2001, 2003; Olatunji et al., 2019; Taylor et al., 2010). Based on the results of this study it may be possible that beliefs about losing control have a stronger influence on appraisals which are more relevant in that particular OCD domain. This may partly account for the differential results found for threat and control in the two vignette types. Given that symptom type may have had an influence on the relationships examined in this study, future investigations which examine how additional symptom domains such as contamination and symmetry may also differentially influence the associations between beliefs about losing control and OCD-related cognitions are warranted.

One would expect that if symptom type had an impact on the relationships between beliefs about losing control and OCD-relevant appraisals that responsibility would have had a similar pattern of results to that of threat overestimation given that both of these belief domains are closely linked with checking behaviour (Moulding et al., 2007; Rachman, 2002). While the difference in responsibility between conditions in the checking vignettes was not significant, there was a trend in the expected direction. It may be possible that as checking scenarios were designed to be stressful and described situations where there was the possibility of being responsible for harm that across both groups participants felt a high level of responsibility leading to a ceiling effect. This is supported by the high mean score observed on ratings of responsibility in both conditions.

As highlighted above this study had several limitations. First, as mentioned, there may have been an unexpected effect of the manipulation which contributed to the surprising results found among beliefs about losing control, control of thoughts, and OCD-relevant responses. Second, while the vignettes and associated questions were adapted from the OCVI, the measure used in this study has not yet been validated. As such, this instrument may be subject to measurement error which limits confidence in the results. Furthermore, while it was planned to test the impact of the manipulation on the subscales of distress and urges to act separately, given the limitations of the distress variable, the two subscales were combined. Third, the sample employed for this study was undergraduate participants. While it has been demonstrated that OCD phenomena can be studied in analogue samples (Abramowitz et al.,

2014), it is possible that these findings may not generalize to clinical populations. Therefore, future work investigating the relationships between beliefs about losing control and other OCD-relevant cognitions in OCD samples is warranted.

Despite the limitations of the experimental paradigm, this study did provide some preliminary evidence that beliefs about losing control influence other OCD-relevant appraisals. Perhaps the biggest obstacle in understanding and studying these relationships is the complex interplay and overlap among belief domains - particularly among control-related belief domains, which makes it challenging to manipulate one belief without inadvertently manipulating another. To address this, future nuanced experimental designs which account for the limitations described above and carefully consider how certain experimental provocations may affect different belief domains will provide further clarity regarding these relationships. Future research would also benefit from expanding investigations to assess the relationships between beliefs about losing control and additional OCD-relevant cognitions. As highlighted in Radomsky (2022), this could include perfectionism/intolerance of uncertainty as well as fear of guilt and beliefs about memory. Furthermore, to foster a better understanding of control beliefs within the cognitive model of OCD, future investigations should examine the relationships between different control beliefs, as well as how such associations may influence OCD symptoms. In addition, examining the influence of symptom domain on the associations among dysfunctional beliefs may also be beneficial. This would help to clarify the findings from this study regarding the differential relationships found between beliefs about losing control and OCD-relevant appraisals across the two vignette types.

Continued research on the relationships between beliefs about losing control and other OCD-relevant cognitions is essential for advancing our understanding of how this novel belief domain may influence OCD phenomenology and for highlighting the potential of considering these beliefs in clinical practice. Given current drawbacks in CBT for OCD related to relapse and non-response in combination with recent evidence that targeting additional belief domains in the treatment of this disorder leads to symptom improvement (Alcolado & Radomsky, 2016), there is increasing support for developing and integrating interventions that target novel OCD-relevant cognitions; like beliefs about losing control, in CBT. Targeting these beliefs may lead to reductions in OCD symptoms as well as other dysfunctional belief domains. Indeed, as the results of this study suggest addressing beliefs about losing control may lead to lower levels of OCD-relevant cognitions, specifically threat over-estimation, which in turn could lead to symptom reduction. For example, guided discovery and behavioural experiment used to target beliefs about losing control may also influence how one appraises future situations. Indeed, it may be the case that if one learns through this work that losing control of thoughts is not actual possible, they may appraise feared situations in the future as less threatening because they no longer believe that such a situation may lead to a loss of control. Future studies which test the utility of such interventions are warranted and would provide further support for the inclusion of these control beliefs in the assessment, case conceptualization and treatment of OCD.

Understanding the complex relationships between OCD-relevant belief domains could help to enhance our understanding of how such associations contribute to symptom presentation and reduction. The current study aimed to investigate the relationships between beliefs about losing and appraisals of responsibility, threat, and control of thoughts. While findings were limited due to issues with the experimental protocol, the results did provide some preliminary evidence for associations between beliefs about losing control and OCD-relevant appraisals. Future work addressing the limitations of this study would provide a clearer indication of the complex and pivotal role beliefs about losing control may play in OCD.

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CRediT authorship contribution statement

Andrea Sandstrom: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft. **Adam S. Radomsky:** Conceptualization, Funding acquisition, Methodology, Resources, Supervision, Writing – review & editing.

Declaration of competing interest

The authors have no conflicts of interest to declare.

Data availability

Data will be made available on request.

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