Psychometric and Experimental Investigations of Beliefs About Losing Control

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ABSTRACT

Psychometric and Experimental Investigations of Beliefs About Losing Control

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According to cognitive theory, maladaptive beliefs play a pivotal role in the development and maintenance of anxiety-related problems and there is overlap in the beliefs involved across these disorders. Interestingly, clinical reports claim that individuals with obsessive-compulsive disorder (OCD) and with social anxiety disorder (SAD) fear losing control over their thoughts, behaviour, emotions, and/or bodily functions. This indicates that negative beliefs about the likelihood and consequences of losing control could be involved in both disorders. This program of research was designed to foster psychometric investigations of beliefs about losing control and increase our understanding of the causal role of these beliefs in OCD and SAD. In Study 1, a measure of maladaptive beliefs about losing control, the Beliefs About Losing Control Inventory (BALCI), was validated in a sample of undergraduate students (N = 488). Results indicated that the BALCI's items capture beliefs about losing control over one's thoughts/behaviour/emotions (Factor 1), about the importance of staying in control (Factor 2), and about losing control over one's body/bodily functions (Factor 3). The BALCI was found to be psychometrically sound and associated with OCD symptoms above and beyond already established maladaptive beliefs. In Study 2, beliefs about the likelihood of losing control over one's behaviour were manipulated by providing false feedback to undergraduate participants (N = 128). Believing that one is likely to lose control over their behaviour led to increasing anxiety while approaching stimuli that are typically feared in OCD, lower perceived caution while interacting with these stimuli, and recalling experiencing more unwanted intrusions throughout the protocol. In Study 3, beliefs about the likelihood and consequences of losing control over one's actions/speech were manipulated by assigning undergraduate participants (N = 93) to drinking vodka (alcohol condition), alcohol-free vodka (placebo condition), or orange juice (control condition). Participants then interacted with a stranger. Results indicated that those in the placebo (versus control) condition experienced greater anxiety, perceived themselves as making a poorer first impression, and reported engaging in more post-event processing. The pharmacological effects

of alcohol appeared to mitigate the effects of beliefs about losing control. Implications for cognitive-behavioural theories and therapies are discussed.

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I also wish to thank Dr. Roisin O'Connor for her continuous support throughout my time in the clinical program. As a committee member, clinical supervisor, course instructor, and co-supervisor for Study 3, she has consistently prioritized a collaborative approach with me and made me feel comfortable exchanging thought-provoking ideas in these several contexts. She has seen me evolve and become a better version of myself across these different roles—but most importantly, she has largely contributed to my growth within these several domains. Likewise, I would like to take this opportunity to thank Dr. Andrew Ryder for his insightful suggestions that have significantly helped improve the quality of this program of research.

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The following thesis is comprised of three manuscripts:

Study 1 (Chapter 2)

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Study 2 (Chapter 4)

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Study 3 (Chapter 6)

Gagné, J. P., Radomsky, A. S., & O'Connor, R. M. (2021). Manipulating alcohol expectancies in social anxiety: A focus on beliefs about losing control. *Cognitive Therapy and Research, 45*, 61-73. https://doi.org/10.1007/s10608-020-10165-6

I was responsible for selecting and conceptualizing this program of research—although Study 1 had already been launched prior to my entry in the Anxiety and Obsessive-Compulsive Disorders Laboratory (see below for more details). I regularly met with my supervisor, Dr. Adam Radomsky, to discuss the development and writing of this document and of all three manuscripts. My committee members, Drs. Roisin O'Connor and Andrew Ryder, approved the design and statistical analyses for all three studies at my proposal meeting on April 16, 2018.

The development and selection of items included in Study 1 were performed prior to my entry in the Anxiety and Obsessive-Compulsive Disorders Laboratory. Dr. Radomsky generated the items in consultation with Dr. S. Rachman and members of the laboratory. Research assistants (Stefanie Lavoie, Sarah Schell, and Edmine Sérulien) were responsible for organizing the survey software used to collect data. I was responsible for data cleaning and all statistical analyses. I interpreted the results and wrote all components of the manuscript, in consultation with Dr. Radomsky. He also edited the manuscript. I prepared the manuscript for publication and was responsible for incorporating reviewers' comments. Dr. Radomsky oversaw and provided feedback on all steps and components of this study.

I was responsible for conceptualizing, designing, and implementing Study 2, in collaboration with Dr. Radomsky. I wrote the protocol/script and collected all materials necessary for testing sessions. I prepared a screening questionnaire for the study and was responsible for screening all potential participants. I scheduled all undergraduate students who participated in this experiment. I trained an undergraduate specialization student (Ana Katerina Roman) to conduct testing sessions and she was the experimenter for all participants. I was the actor for all testing sessions. I was responsible for data cleaning and conducted all statistical analyses, in consultation with Dr. Radomsky and Dr. Shiu Wong. I interpreted the data and wrote all components of the manuscript. Dr. Radomsky edited the manuscript. I prepared the manuscript for publication and was responsible for incorporating reviewers' comments. Dr. Radomsky oversaw and provided feedback on all steps of this study as well.

I was responsible for conceptualizing, designing, and implementing Study 3, in collaboration with Drs. Radomsky and O'Connor. I wrote the protocol/script and collected all materials necessary for testing sessions with the help of laboratory coordinators (Stefanie Lavoie and Madeline Q. Morris). I prepared a screening questionnaire for the study and was responsible for screening all potential participants. I scheduled all undergraduate students who participated in this experiment. I trained an undergraduate student volunteer (Alissa Singerman) to be the conversational partner for the 'getting to know you' task. This volunteer was the conversational partner, and I was the experimenter for all participants. I was responsible for buying the beverages and snacks for participants for the entire duration of the study. I cleaned the data and conducted all statistical analyses. I interpreted the data and wrote all components of the manuscript. Drs. Radomsky and O'Connor edited the manuscript. I prepared the manuscript for publication and was responsible for incorporating reviewers' comments. Drs. Radomsky and O'Connor oversaw and provided feedback on all steps of this study as well.

I wrote all remaining components of this thesis which were also edited by Dr. Radomsky. All studies underwent peer-review when submitted for publication and feedback from reviewers was incorporated.

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CHAPTER 1

General Introduction

The cognitive model of psychopathology claims that negative beliefs about the self, others, and the world play a pivotal role in the development and maintenance of symptoms (e.g., Beck, 2011). This theory has been applied to anxiety disorders and related problems, among others (e.g., Clark & Beck, 2010). Interestingly, there is considerable overlap in the beliefs that are involved across anxiety-related problems (e.g., overestimation of threat and underestimation of one's coping abilities; Clark & Beck, 2010). Such an overlap has even emerged in the context of beliefs that were hypothesized to be unique to specific disorders, such as in the case of obsessive-compulsive disorder (OCD) and its three empirically-derived domains of obsessive beliefs (see below; e.g., Tolin, Worhunsky, & Maltby, 2006).

Beliefs about control are no exception to this (Moulding & Kyrios, 2006). Indeed, having poor perceived control over one's environment is known to be associated with symptoms of anxiety in general (Burger, 1992; Conway, Vickers, & French, 1992). Still, focusing on the domains over which individuals believe they have poor control can inform the conceptualization of specific anxiety-related problems. For instance, individuals with panic disorder believe they have poor control over their physiological sensations (e.g., Hedley, Hoffart, & Sexton, 2001); those with OCD believe they need to exert extreme control over their thoughts (e.g., Clark, 2004); and those with social anxiety disorder (SAD) focus on controlling overt signs of anxiety in social situations (e.g., Hofmann, 2005).

Cognitions related to controlling one's behaviour have however emerged in theoretical models and clinical reports of both OCD (e.g., Carr, 1974) and SAD (e.g., Clark & Wells, 1995). Specifically, a fear of losing control over one's behaviour has been identified: in OCD, it is proposed to take the form of a fear of acting on unwanted impulses (e.g., Rachman & Hodgson, 1980); in SAD, it is suggested that it relates to a fear of behaving inappropriately in front of others and of embarrassing oneself (e.g., Clark & Wells, 1995). This indicates that negative beliefs about the likelihood and consequences of losing control—not only over one's behaviour but also over several domains like thoughts, emotions, and bodily functions—should be examined in relation to both disorders. This program of research was designed to increase our understanding of the possible role of beliefs about losing control in the development of phenomena observed in OCD and SAD.

OCD and the Cognitive Model

OCD is characterized by unwanted intrusive thoughts, images, or impulses (i.e., obsessions) and/or repetitive behaviour, rituals, or mental acts (i.e., compulsions; American Psychiatric Association, 2013). Obsessions typically revolve around the themes of contamination, immoral thoughts, responsibility, and symmetry or incompleteness (Schulze, Kathmann, & Reuter, 2018). Compulsions that are most frequently reported include checking, washing/cleaning, reassurance seeking, and ordering (e.g., Ball, Baer, & Otto, 1996; Ruscio, Stein, Chiu, & Kessler, 2010). OCD is relatively common, affecting approximately 2.3% of the population in the United States (Ruscio et al., 2010) and this prevalence rate is consistent with transcultural estimates (e.g., Sasson et al., 1997). OCD is associated with a range of functional impairments (e.g., social, occupational, relationship, and home management difficulties), and is known to be very debilitating (e.g., Markarian et al., 2010; Ruscio et al., 2010). OCD has been listed among the leading causes of disability worldwide (World Health Organization, 1999) and is highly comorbid with anxiety, mood, impulse-control, and substance use disorders, including SAD (e.g., Ruscio et al., 2010). Fortunately, cognitive-behaviour therapy (CBT) has been shown to be an effective psychological treatment for OCD (e.g., Öst, Havnen, Hansen, & Kvale, 2015) and is recognized as the first-line recommended intervention (National Institute for Health and Clinical Excellence, 2005).

According to contemporary cognitive models of OCD (e.g., Clark, 2004; Rachman, 1997, 1997, 2002; Salkovskis, 1985, 1999), almost everyone experiences intrusive thoughts, images, or impulses that are similar in content to obsessions, and this proposal has been supported by empirical investigations internationally (e.g., Rachman & de Silva, 1978; Radomsky et al., 2014). It is suggested however that individuals with OCD misinterpret such normal intrusions as catastrophic, personally significant, and/or overly meaningful. This ultimately leads to negative emotional outcomes (e.g., anxiety, disgust, guilt) and compulsions, avoidance, safety behaviour, or other forms of neutralizing behaviour to prevent negative consequences from happening and/or to reduce distress. Importantly, cognitive theories posit that maladaptive beliefs are the underlying cause of catastrophic misinterpretations of intrusive thoughts in OCD.

The collaborative work of the Obsessive Compulsive Cognitions Working Group (OCCWG; 1997, 2001, 2003, 2005) has allowed the identification and examination of key maladaptive beliefs proposed to play a role in the aetiology and maintenance of OCD. These

include beliefs about responsibility and threat overestimation, perfectionism and intolerance of uncertainty, and beliefs about the importance of and need to control one's thoughts. Several self-report measures have been developed to assess these belief domains and associated psychometric investigations have provided substantial correlational evidence for cognitive models of OCD, wherein maladaptive beliefs are associated with elevated obsessive-compulsive tendencies (e.g., Myers, Fisher, & Wells, 2008; OCCWG, 2005; Wheaton, Abramowitz, Berman, Riemann, & Hale, 2010). Experimental studies have increased our understanding of the causal relationships between maladaptive beliefs and OCD symptoms. For instance, experimental manipulations of beliefs about responsibility have shown that having an inflated sense of responsibility leads to increased checking behaviour (e.g., Arntz, Voncken, & Goosen, 2007), greater urges to check (e.g., Lopatka & Rachman, 1995), and more reassurance seeking (Leonhart & Radomsky, 2019; Parrish & Radomsky, 2006). It has also been demonstrated that changes in maladaptive beliefs during CBT predict reductions in OCD symptoms (e.g., Anholt et al., 2010; Diedrich et al., 2016; Radomsky et al., 2020; Woody, Whittal, & McLean, 2011), supporting the notion that beliefs play a pivotal role in OCD.

Still, it should be noted that individuals with OCD do not necessarily endorse these specific belief domains and that currently identified maladaptive beliefs do not fully explain OCD symptomatology (Taylor et al., 2006). In fact, other lines of research have provided support for the inclusion of metacognitive beliefs—such as confidence in one's attention/perception (e.g., Hermans et al., 2008) and beliefs about one's memory (e.g., Alcolado & Radomsky, 2011)—in cognitive models of OCD, indicating that other belief domains are likely involved in the emergence and maintenance of symptoms.

Beliefs About (Losing) Control

It is now well-documented that beliefs about control are implicated in anxiety-related problems, beyond just OCD (Moulding & Kyrios, 2006). For example, it has been demonstrated with both clinical and analogue samples that having poor perceived control over anxiety-provoking events is associated with elevated general distress and OCD symptoms, especially when combined with a high desire for control (Moulding, Doron, Kyrios, & Nedeljkovic, 2008; Moulding & Kyrios, 2007). But more specific to OCD is a need to control one's intrusive thoughts, often by relying on neutralization, distraction, and self-punishment, among other 'strategies' (e.g., Freeston & Ladouceur, 1997; Wells & Davies, 1994). This need is further

reinforced by the idea that suppressing one's thoughts can sometimes lead to more intrusions (e.g., Abramowitz, Tolin, & Street, 2001; Tolin, Abramowitz, Przeworski, & Foa, 2002). Therefore, beliefs about control over thoughts, or the belief that having full control over one's thoughts is necessary to prevent negative consequences, have been highlighted as a central component of cognitive models of OCD (e.g., Clark, 2004). Psychometric investigations have shown that these beliefs are associated with elevated OCD symptoms above and beyond other traditional belief domains, such as responsibility and threat overestimation (e.g., Myers et al., 2008; Myers & Wells, 2005; Wheaton et al., 2010). Likewise, experimental work supports that manipulating beliefs about control over thoughts leads to recurrent intrusive thoughts and distress (e.g., Myers & Wells, 2013; Rassin, Merckelbach, Muris, & Spaan, 1999). In this way, the belief that controlling one's thoughts is necessary has been investigated psychometrically and experimentally (and is often a treatment target in CBT for OCD; e.g., Clark, 2004), but less attention has been dedicated to beliefs about the consequences of failed thought control.

Clark (2004) proposed that individuals with OCD infer that failed attempts at controlling their intrusive thoughts are indicators of upcoming negative consequences, with the primary one being a loss of control. Clinical reports have indeed documented concerns regarding a potential loss of control over one's thoughts, behaviour, emotions, and bodily functions among those with OCD (e.g., Carr, 1974; Clark, 2004; Clark & Purdon, 1993; McFall & Wollersheim, 1979; Reuven-Magril, Dar, & Liberman, 2008). Similarly, some individuals with OCD avoid sharp objects such as kitchen knives and scissors due to a fear of acting on unwanted impulses and harming loved ones (e.g., Rachman & Hodgson, 1980; Sasson et al., 1997; Summerfeldt, Richter, Antony, & Swinson, 1999; Thyer, 1985). In fact, the OCCWG (1997) wrote that "perceived control over upsetting intrusions is best predicted by *the belief that the thought might be acted upon* [emphasis added] or otherwise come true" (p. 672). In support of this hypothesis, Gagné and Radomsky (2017) found that priming beliefs about losing control did cause increased OCD symptoms. In this experiment, participants were provided with false feedback regarding their performance during a bogus electroencephalography (EEG) recording session: they were led to believe that they were either more or less likely to lose control over their thoughts and behaviour, as compared to a normative sample. Participants with elevated beliefs about a potential loss of control engaged in significantly more checking behaviour during a subsequent computer task asking them to control the pace of pictures, possibly to increase their perceptions

of control. Accordingly, negative beliefs about losing control (e.g., the belief that losing control is highly likely) may be relevant to consider when conceptualizing OCD from a cognitive framework and are perhaps worth targeting in CBT to further reduce symptoms.

Beliefs About Losing Control in SAD

Importantly, it has been demonstrated that OCD-related maladaptive beliefs (e.g., responsibility and threat overestimation) are also highly endorsed by individuals with other anxiety-related problems (e.g., Tolin et al., 2006) and the same appears to hold for concerns about losing control. For instance, a fear of losing control over one's bodily sensations (e.g., heart palpitations) is common in panic disorder (e.g., Hedley et al., 2001). In the case of SAD, a fear of losing control around other people and of embarrassing oneself has been documented (e.g., Butler & Wells, 1995; Clark & Wells, 1995; Kelly-Turner & Radomsky, 2020) and even included in symptom measures (e.g., Mattick & Clarke, 1998).

Maladaptive cognitive-behavioural processes typically observed in SAD also appear to be directly related to a fear of losing control. These include, for example, engaging in post-event processing (i.e., reviewing one's performance following a social interaction and focusing on the negative aspects) and relying on safety behaviour to prevent negative consequences from happening (e.g., holding one's glass very tightly to prevent uncontrollable hand shaking; Clark & Wells, 1995). Actually, in their cognitive model, Clark and Wells proposed that individuals with SAD believe they are at risk of behaving in an unacceptable manner, indicating that beliefs about losing control could underlie symptoms and processes of SAD as well.

Rationale and the Current Program of Research

The identification of novel belief domains is often followed by the development of comprehensive self-report measures to assess them in the laboratory and clinic and to examine relationships with symptoms and related constructs (e.g., OCCWG, 1997). There are a number of self-report measures that assess control-related cognitions but few incorporate items pertaining to beliefs about losing control. For instance, some questionnaires focus on one's perceived control (e.g., Brown, White, Forsyth, & Barlow, 2004; Lachman & Weaver, 1998), desire for control (e.g., Burger & Cooper, 1979), and realistic/unrealistic control beliefs (e.g., Zuckerman, Knee, Kieffer, Rawsthome, & Bruce, 1996). Also, one of the subscales of the Obsessive Beliefs Questionnaire (OCCWG, 2005) measures beliefs about control over thoughts but only contains two items that capture aspects of losing control (e.g., "Having intrusive thoughts means I'm out

of control" and "Having violent thoughts means I will lose control and become violent"). These items emphasize beliefs about intrusive thoughts and neglect some other possible domains over which people fear losing control (e.g., emotions and bodily functions). In the same vein, a subscale from the Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004) assesses negative beliefs about the controllability of thoughts and corresponding danger but focuses solely on beliefs about control over thoughts and worries (e.g., "If I let my worrying thoughts get out of control, they will end up controlling me"). The Agoraphobic Cognitions Questionnaire (Chambless, Caputo, Bright, & Gallagher, 1984) includes a "beliefs about losing control" subscale, but items assess cognitions that are specific to panic disorder and agoraphobia (e.g., "I am going crazy"). The Padua Inventory (Sanavio, 1988) does include an "urges and worries of losing control over motor behaviors" subscale but, here, the focus is on the content of intrusive thoughts (e.g., "When I see a train approaching I sometimes think I could throw myself under its wheels") instead of on beliefs about the meaning, consequences, and likelihood of losing control. Unfortunately, this limits investigations and assessments of negative beliefs about losing control over one's thoughts, behaviour, emotions, and body/bodily functions (as they pertain to OCD) in research and clinical settings.

In addition, experimental evidence supporting the importance of beliefs about losing control in the development and maintenance of OCD-related phenomena, beyond compulsive checking, is lacking. As mentioned above, clinical reports emphasize a fear of losing control over one's behaviour in OCD and theoretical models posit that beliefs about control are involved in the perpetuation of obsessions (e.g., Clark, 2004). Yet, negative beliefs about losing control have only been investigated in the context of compulsive checking (Gagné & Radomsky, 2017). Also, that one experiment lacked ecological validity: the authors utilized a bogus EEG recording session to manipulate these beliefs and a computer task to assess checking behaviour. Relying on stimuli that are actually feared and avoided in OCD (e.g., kitchen knives and scissors) and using an experimental manipulation that targets the significance and meaning of intrusive thoughts (as proposed by cognitive models) could help to address this gap. In other words, it would be relevant to examine whether beliefs about losing control over one's behaviour play a role in the emergence of unwanted intrusive thoughts and of anxiety around stimuli that are typically feared in OCD, and these questions could be studied using ecologically valid paradigms.

Finally, the extent to which beliefs about losing control play a role in the aetiology and maintenance of symptoms and processes specific to other anxiety-related disorders is unclear. Again, concerns regarding a potential loss of control in public have been documented in SAD (e.g., Butler & Wells, 1995; Clark & Wells, 1995; Kelly-Turner & Radomsky, 2020). In OCD, beliefs about losing control over one's behaviour are proposed to be triggered by threatening stimuli such as kitchen knives and scissors. In SAD, it might be that other stimuli, like alcohol, activate similar underlying beliefs (e.g., Eggleston, Woolaway-Bickel, & Schmidt, 2004). Indeed, SAD is associated with both increased (e.g., Himle & Hill, 1991; Regier et al., 1990; Van Amerigen, Mancini, Styan, & Donison, 1991) and decreased (e.g., Bruch et al., 1992; Bruch, Rivet, Heimberg, & Levin, 1997; Rohsenow, 1983; Tran, Haaga, & Chambless, 1997) alcohol use, and research supports that alcohol expectancies (or one's beliefs about the consequences of drinking) are a primary reason explaining these discrepancies (e.g., Bruch et al., 1992). For example, having negative beliefs about the consequences of drinking (e.g., losing control over one's behaviour and embarrassing oneself) could explain a negative association between SAD and alcohol use (e.g., Eggleston et al., 2004). Accordingly, it could be that beliefs about the likelihood and consequences of losing control over one's actions/speech (primed by drinking alcohol) play a role in the development and maintenance of phenomena observed in SAD (e.g., anxiety prior to and during a social interaction; post-event processing).

To address the abovementioned gaps, a programmatic series of three studies was conducted. These studies are described below and include first the development and validation of a comprehensive self-report measure aiming to capture maladaptive beliefs about losing control over one's thoughts, behaviour, emotions, and body/bodily functions, as they pertain to OCD. Associations with OCD symptoms (while controlling for already established belief domains) were also examined. Second, the presented studies include an experiment in which the belief that one is likely to lose control over their behaviour was manipulated, as a way to assess the impact of beliefs about losing control on the emergence of unwanted intrusive thoughts and of anxiety while gradually approaching stimuli that are often feared in OCD (i.e., sharp knives and scissors). Third, this program of research includes an experiment in which negative alcohol expectancies (i.e., the belief that alcohol makes people lose control over their actions/speech and embarrass themselves) were manipulated to assess their impact on phenomena observed in SAD (e.g., anxiety prior to and during a social interaction; post-event processing).

CHAPTER 2

The Development and Validation of the Beliefs About Losing Control Inventory (BALCI)

Individuals with obsessive-compulsive disorder (OCD) experience recurrent, unwanted intrusive thoughts (i.e., obsessions) and/or engage in repetitive behaviour (i.e., compulsions; American Psychiatric Association, 2013; Rachman & Hodgson, 1980). According to cognitive theory (e.g., Rachman, 1997, 1998), unwanted intrusive thoughts are ubiquitous (e.g., Rachman & de Silva, 1978; Radomsky et al., 2014); however, individuals with OCD misinterpret these thoughts as overly meaningful and significant, which leads them to experience anxiety and doubt, and to engage in compulsions to prevent negative consequences. Maladaptive beliefs are proposed to underlie misinterpretations of intrusive thoughts. In this way, beliefs may play a critical role in the development and maintenance of symptoms.

Several lines of research have provided support for cognitive theory of OCD. For example, correlational investigations have consistently shown that endorsing maladaptive beliefs predicts OCD symptoms (e.g., Myers, Fisher, & Wells, 2008; Obsessive Compulsive Cognitions Working Group [OCCWG], 2003). Experimental research has also provided evidence in favour of the causal role of beliefs in exacerbating symptoms (e.g., Arntz, Voncken, & Goosen, 2007; Lopatka & Rachman, 1995). Further, in trials of cognitive-behaviour therapy (CBT), changes in maladaptive beliefs appear to contribute to reductions in OCD symptoms (e.g., O'Connor et al., 2005; Wilhelm, Berman, Keshaviah, Schwartz, & Steketee, 2015).

In 2005, the OCCWG validated a unified inventory to assess three belief domains involved in OCD (Obsessive Beliefs Questionnaire; OBQ-44). The scale captures beliefs about responsibility and threat overestimation, perfectionism and intolerance for uncertainty, and beliefs about the importance of and control over thoughts. Despite the comprehensive nature of the OBQ-44, Taylor and colleagues (2006) have shown that a significant portion of individuals with OCD score within the "community" range on this measure. This suggests either that these beliefs are not directly relevant to OCD, that current belief domains need to be expanded, or that other belief domains should be identified.

Key concepts that would benefit from further exploration are control and loss of control. According to Clark's (2004) cognitive control theory of obsessions, individuals with OCD misinterpret failed attempts at controlling their thoughts as catastrophic (e.g., "If I can't control these unwanted thoughts, then I must be a weak and vulnerable person who is capable of losing

control"; Clark, 2004, p. 145). Although these beliefs about control over thoughts—or the belief that having full control over one's thoughts is necessary to prevent negative outcomes (OCCWG, 1997)—are captured by the OBQ-44, a focus on the negative consequences attributed to failed thought control may be particularly informative.

Specifically, clinical reports indicate that some individuals with OCD experience failed thought control and, accordingly, fear an eventual loss of control over their thoughts, behaviour, emotions, body, and/or bodily functions (e.g., "Losing control over one's thoughts will eventually lead to loss of control over my behaviour"; Clark & Purdon, 1993, p. 165; see also Carr, 1974; Clark, 2004; Reuven-Magril, Dar, & Liberman, 2008). For example, individuals with OCD are known to avoid sharp objects, as they fear acting on unwanted impulses (e.g., Rachman & Hodgson, 1980). Based on Clark and Purdon's (1993) work, the OCCWG (1997) proposed that "perceived control over upsetting intrusions is best predicted by the belief that the thought might be acted upon…" (p. 672). In this way, negative beliefs about the likelihood, meaning, consequences, and severity of losing control (e.g., losing control is highly likely and catastrophic), may be core components of control-related cognitions in OCD.

In support of the importance of beliefs about losing control, Froreich, Vartanian, Grisham, and Touyz (2016) found a positive correlation between doubts about being able to control one's impulses/emotions and OCD symptoms. Also, experimental work has demonstrated that manipulating metacognition—such as the belief that controlling one's thoughts is necessary to prevent a negative outcome—leads to obsessive-compulsive symptoms (e.g., Myers & Wells, 2013). Of note, Gagné and Radomsky (2017) demonstrated that negative beliefs about losing control caused increased OCD (checking) symptoms. Following a bogus EEG recording session, participants were led to believe that they were either more or less likely to lose control over their thoughts and behaviour. Those who were led to believe that they were more (*versus* less) likely to lose control engaged in significantly more checking behaviour during a subsequent task. Putting emphasis on losing control may thus be important when assessing beliefs about control in OCD. Yet, existing measures may not capture this aspect.

Questionnaires have been developed to assess one's sense of control (e.g., Anxiety Control Questionnaire—Revised; Brown, White, Forsyth, & Barlow, 2004; Sense of Control Scale; Lachman & Weaver, 1998), desire for control (e.g., Desirability for Control Scale; Burger & Cooper, 1979), and realistic/unrealistic control beliefs (e.g., Realistic and Unrealistic Control

Beliefs Scales; Zuckerman, Knee, Kieffer, Rawsthome, & Bruce, 1996). Also, as mentioned above, the OBQ-44 measures beliefs about the importance of and need to control one's thoughts, but minimally captures aspects of losing control (e.g., "Having violent thoughts means I will lose control and become violent"). Likewise, the Metacognitions Questionnaire (MCQ; Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004) has a factor that taps into negative beliefs about the controllability of thoughts and corresponding danger, but the focus is put on worrying tendencies (e.g., "If I let my worrying thoughts get out of control, they will end up controlling me"). In this way, few measures incorporate items pertaining to beliefs about losing control. When they do, emphasis is put on the necessity to control one's thoughts and worries, instead of measuring the extent to which losing control over one's thoughts and over one's behaviour, emotions, and body/bodily functions is likely and catastrophic. Unfortunately, this limits investigations and assessments of these beliefs in research and clinical settings, such that a novel measure may be needed.

Tiggemann and Raven (1998) suggested that doubts about being able to control one's impulses, desires, and emotional behaviour could be measured by adapting the self-control subscale of Reid and Ware's (1974) Internal-External Questionnaire (i.e., by adding "I worry" in front of items; e.g., "I worry that something I cannot do is have complete mastery over all my behavioural tendencies"). The Padua Inventory (Sanavio, 1988) also includes "urges and worries of losing control over motor behaviors" as one of its four subscales (e.g., "When I see a train approaching I sometimes think I could throw myself under its wheels"). In addition, the Affective Control Scale (Williams, Chambless, & Ahrens, 1997) assesses fears of emotional experiences and captures aspects of losing control over one's emotions (e.g., "Once I get nervous, I think that my anxiety might get out of hand"). However, these tools mainly focus on the content of intrusive thoughts as opposed to assessing beliefs about a potential loss of control (e.g., the meaning and/or consequences of losing control) and do not capture the full range of domains over which individuals with OCD may believe they can lose control.

Similarly, the Anxiety Sensitivity Index (Reiss, Peterson, Gursky, & McNally, 1986; Taylor et al., 2007) includes very few items measuring one's perceived capacity to stay in control; these items are limited to control over thoughts and emotions (e.g., "When I cannot keep my mind on a task, I worry that I might be going crazy"). Finally, the Agoraphobic Cognitions

Questionnaire (Chambless, Caputo, Bright, & Gallagher, 1984) includes a "beliefs about losing control" subscale, but items are restricted to panic-related cognitions (e.g., "I am going crazy").

The goal of the current study was to validate a novel self-report measure of beliefs about losing control (**Beliefs About Losing Control Inventory; BALCI**) in a sample of undergraduate students. This inventory aims to assess the extent to which one fears losing control, the meaning and perceived negative consequences of a loss of control, and beliefs about the importance of staying in control. The BALCI also aims to capture multiple domains over which individuals with OCD may believe they can lose control. It was thus hypothesized that items would load onto four factors: beliefs about losing control over one's 1) thoughts, 2) behaviour, 3) emotions, and 4) body/bodily functions. It was also predicted that the BALCI would be strongly associated with measures of obsessive beliefs, anxiety sensitivity (given the theoretical and item overlap), and sense of control over anxiety-provoking events, and much less with a measure of desire for control over general (non anxiety-related) situations. Finally, it was hypothesized that the BALCI would predict elevated OCD symptoms above and beyond previously identified obsessive beliefs.

Method

Participants

Initially, 497 undergraduate students participated in this study. They were recruited from Concordia University's Psychology Participant Pool and were compensated with course credit. Eligibility criteria included being at least 18 years old and able to read/understand English. There were no missing data. To identify multivariate outliers, Mahalanobis distance was calculated and seven cases were excluded for having a $p < .001$ (Tabachnick & Fidell, 2007). Two cases were identified as univariate outliers for having a standardized BALCI total score greater than $Z = 3.29$ and were excluded (Tabachnick & Fidell, 2007). The final sample consisted of 488 undergraduate students of whom 88.11% were female and, on average, 22.56 ($SD = 4.87$; range = 18-52) years old. Skewness (0.50, $SD = 0.11$) and kurtosis (-0.33, $SD = 0.22$) were within acceptable limits (George & Mallery, 2010).

Item Development

Thirty-two potential items focusing on negative beliefs about losing control over one's thoughts, behaviour, emotions, and body/bodily functions were administered. Items are rated from 0 (*not at all*) to 4 (*very much*). Members of the Anxiety and Obsessive-Compulsive

Disorders Laboratory developed the items by relying on cognitive theories of OCD, published clinical reports, and personal/anecdotal clinical observations[1].

Measures

Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004). The VOCI is a self-report measure of OCD symptomatology with six subscales: contamination, checking, obsessions, hoarding, "just right", and indecisiveness. The VOCI contains 55 items rated from 0 (*not all all*) to 4 (*very much*). In this sample, the VOCI had excellent internal consistency (α = .97). Previously, the measure was shown to have good convergent and divergent validity (Radomsky et al., 2006; Thordarson et al., 2004).

Obsessive Beliefs Questionnaire (OBQ-44; OCCWG, 2005). The OBQ-44 is a self-report measure of maladaptive beliefs considered relevant to the development and maintenance of OCD symptoms. The OBQ-44 consists of three subscales: responsibility/threat overestimation, perfectionism/intolerance for uncertainty, and importance of/control over thoughts. The measure includes 44 items rated from 1 (*disagree very much*) to 7 (*agree very much*). In this sample, the OBQ-44 had excellent internal consistency (α = .95). In previous work, the scale was shown to have good convergent, divergent, and criterion validity (OCCWG, 2005).

Anxiety Sensitivity Index (ASI; Reiss et al., 1986). The ASI is a self-report measure of beliefs about anxiety-related symptoms (physical, cognitive, and social concerns). The measure includes 16 items rated from 0 (*very little*) to 4 (*very much*). In this sample, the ASI had excellent internal consistency (α = .91). Previously, it has been shown to have good retest reliability (*r* = .75; Reiss et al., 1986).

Anxiety Control Questionnaire—Revised (ACQ-R; Brown et al., 2004). The ACQ-R is a self-report measure adapted from a questionnaire developed by Rapee, Craske, Brown, and Barlow (1996). It assesses perceived sense of control over anxiety-provoking situations. The measure consists of three subscales: control of emotions, threat, and response to stress. The ACQ-R includes 15 items rated from 0 (*strongly disagree*) to 5 (*strongly agree*). In this sample, the ACQ-R had good internal consistency (α = .87). Previously, it was shown to have good retest reliability (*r*'s = .82-.88), as well as good convergent and divergent validity (Rapee et al., 1996).

[1] The final 21-item BALCI can be found in Appendix A.

Desirability for Control Scale (DCS; Burger & Cooper, 1979). The DCS is a self-report measure that assesses desire for control over general life events. The DCS includes 20 items rated from 1 (*never*) to 7 (*always*). In this sample, the DCS had fair internal consistency (α = .74). In previous work, it was shown to have good retest reliability (*r* = .75; Burger & Cooper, 1979).

Procedure

Participants were sent a link via email to the online survey (comprised of the questionnaires outlined above). The survey software prevented participants from leaving items on a questionnaire unanswered (i.e., no missing data). Two versions of the questionnaire package were created to control for potential order effects. For both versions, the BALCI was presented first but the order of all remaining questionnaires was randomized. Two independent samples *t*-tests were conducted to examine potential differences on key outcome variables between participants assigned to versions 1 versus 2. There were no significant differences on OCD symptoms (VOCI), $t(482.52) = -0.89$, $p = .38$, or obsessive beliefs (OBQ-44), $t(486) = 0.28$, $p = .78$, between participants assigned to versions 1 versus 2.

Results

Exploratory Factor Analysis (EFA)

An EFA (principal axis factoring) was conducted to determine the proportion of shared variance accounted for by the latent factors (Field, 2009). An oblique (Promax) rotation was selected given that factors were expected to correlate with each other (Tabachnick & Fidel, 2007). The ratio of respondents to number of items was approximately 15 participants per item, which is above the recommended ratio (Costello & Osborne, 2005). The correlation matrix was examined to detect the presence of multicollinearity (i.e., $r > .89$; Field, 2009), but no correlations exceeded $r = .73$. There was also no evidence of singularity. Bartlett's test of sphericity, $\chi^2(496) = 7997.13$, $p < .001$, indicated that items correlated significantly with each other, such that the data were appropriate for an EFA. The Kaiser-Meyer-Olkin (KMO) index of sampling adequacy was .94 (i.e., in the superb range), which indicated that an EFA would produce reliable factors (Field, 2009). Diagonals of the anti-image correlation matrix revealed that KMO indices for individual items fell between .84 and .97.

The initial factor analysis generated three factors with eigenvalues greater than 1 after extraction (and before rotation): 11.50, 1.53, and 1.31, respectively. This suggested a three-factor

solution based on Kaiser's (1960) greater-than-one criterion. Examination of the scree plot also suggested that three factors should be retained (Cattell, 1966). To compare the extracted eigenvalues with the mean of eigenvalues generated from random data sets, a parallel analysis was conducted using O'Connor's (2000) program and indicated that up to three factors could be retained (Ledesma & Valero-Mora, 2007).

Given the eigenvalues, scree plot, and parallel analysis, another EFA (principal axis factoring; Promax rotation) was conducted with a fixed number of three factors. After extraction, this solution explained 44.30% of the variance. To determine which items to retain, the pattern matrix was examined (Costello & Osborne, 2005). An item was retained and attached to a factor if its loading was .40 or greater for that factor and was less than .40 for the two other factors (Hair, Black, Babin, & Anderson, 2014). There were nine hyperplane items that loaded on none of the three factors ("If I lost control, I would freeze and be unable to move"; "Once you've lost control, you can never get it back"; "If I drink too much or take drugs, I could find myself totally out of control over my body and/or actions"; "Losing control means being disconnected from reality"; "If I'm not careful, I might say or do something awful"; "Losing control is the same as going crazy"; "I don't even like thinking about losing control"; "One of the worst things about losing control is what other people would think of me"; "If I have strange thoughts, I worry that I might be losing control of my mind"). These items were removed and the EFA was conducted again. One last hyperplane item was removed ("If I lost control, I might be locked away or institutionalized") and the solution was re-run. The first factor included 14 items pertaining to losing control over one's thoughts, behaviour, and emotions, but also 1 theoretically-unrelated item ("If I lost control, it would mean that I am a weak person"). This item was removed and the EFA was re-run. The final three-factor solution had 21 items explaining 52.37% of the variance after extraction.

As alluded previously, the first factor comprises 14 items focusing on the meaning, consequences, and fear of a loss of control over one's thoughts/mind, behaviour, and emotions; it explains 40.78% of the variance. The second factor comprises 3 items related to the importance of staying in control over one's psychological functions and in general and explains 6.20% of the variance. The third factor comprises 4 items focusing on the consequences and fear of losing control over one's body/bodily functions and explains 5.39% of the variance. Therefore, the 21-item BALCI captures negative beliefs about losing control over one's **Thoughts, Behaviour,**

and Emotions (TBE; Factor 1), about the **Importance of Staying in Control (ISC; Factor 2)**, and about losing control over one's **Body and Bodily Functions (BBF; Factor 3)**. Given the oblique rotation, factors were found to be moderately or strongly correlated with each other: Factors 1 and 2 (r = .54); Factors 1 and 3 (r = .51); Factors 2 and 3 (r = .32). Factor loadings of all 21 items can be found in Table 1.

Internal Consistency

Internal consistency was examined using Cronbach's alpha. The total BALCI (α = .93) and TBE subscale (α = .94) demonstrated excellent internal consistency. The internal consistencies of the ISC (α = .81) and BBF (α = .67) subscales were good and fair, respectively. The proportional reduction of mean squared error based on total scores (PRMSETOT) was calculated for all subscales using Haberman's (2008) procedure, which allows to know whether subscores are worth reporting. PRMSETOT values were .91 for TBE, .49 for ISC, and .37 for BBF. Because these values are lesser than their respective Cronbach's alpha, reporting subscores (and not only a total score) appears to be informative (Reise, Bonifay, & Haviland, 2013).

Retest Reliability

Approximately 33.06 (SD = 7.57) days following their first BALCI administration, 108 participants completed the measure a second time. Retest reliability was examined by conducting zero-order correlations between scores from the first and second completions. The total BALCI and TBE subscale demonstrated adequate retest reliability (r's = .68); the ISC and BBF subscales demonstrated fair retest reliability (r's = .57; all p's < .001).

Convergent and Divergent Validity

To assess convergent and divergent validity, zero-order correlations were conducted between the BALCI and relevant measures. Correlations between the BALCI (total and subscales) and these measures can be found in Table 2. Convergent validity was assessed by examining correlations between BALCI scores and OBQ-44, ASI[2], and ACQ-R scores. Here, strong correlations indicated good convergent validity (Hinkin, 1988). Divergent validity was assessed by examining the association between the BALCI and DCS, a measure of desire for

[2] Given the strong zero-order correlation between the BALCI and ASI (r = .69, p < .001), a hierarchical regression analysis was conducted to ensure that these are not redundant measures. ASI scores were entered at step 1 of the regression analysis predicting VOCI scores and explained a significant amount of variance, $R^2_{adjusted}$ = .44, p < .001. BALCI scores were entered at step 2 and significantly increased the amount of variance explained, R^2_{change} = .04, p < .001.

control over general life events, unrelated to anxiety (e.g., "I enjoy making my own decisions"). A weak correlation was found and provided support for the BALCI's good divergent validity.

To confirm that the BALCI was more strongly associated with convergent measures than with the divergent measure, *t*-tests for dependent correlations were conducted (Steiger, 1980). As expected, results showed that correlations between the BALCI and OBQ-44, $z = 8.80$, $p < .001$, ASI, $z = 11.74$, $p < .001$, and ACQ-R, $z = 9.62$, $p < .001$, were significantly stronger than the correlation between the BALCI and DCS.

Predictive Power

A hierarchical regression analysis was conducted to examine whether beliefs about losing control contribute to OCD symptoms above and beyond previously identified obsessive beliefs. OBQ-44 total scores were entered at step 1 of the regression analysis predicting VOCI total scores and explained a significant amount of variance, $R^2_{\text{adjusted}} = .39$, $p < .001$. BALCI total scores were entered at step 2 and significantly increased the amount of variance explained, $R^2_{\text{change}} = .07$, $p < .001$. The final model accounted for 45.60% of the variance, $F(4,485) = 204.72$, $p < .001$, and both the OBQ-44, $\beta = .43$, $t(486) = 10.33$, $p < .001$, and BALCI, $\beta = .33$, $t(486) = 7.90$, $p < .001$, were significant predictors of VOCI total scores.

Finally, hierarchical regression analyses were conducted to determine whether subtypes of beliefs about losing control can be differentiated from the OBQ-44's theoretically-related subscale when predicting OCD symptoms. In other words, the predictive power of the BALCI subscales was examined while controlling for beliefs about the importance of and control over thoughts (OBQ-44's ICT subscale). Results of the regression analyses (i.e., ICT and BALCI subscales predicting the total VOCI and subscales) can be found in Table 3. Because these analyses were exploratory and four predictors were included, Bonferroni corrections were applied to reduce the possibility of type I errors ($\alpha = .05/4 = .0125$; Cabin & Mitchell, 2000). Overall, negative beliefs about losing control over one's thoughts, behaviour, and emotions (TBE subscale) and over one's body/bodily functions (BBF subscale) uniquely predicted elevated symptoms of OCD in general (total VOCI) and of contamination, checking, obsessions, hoarding, "just right", and indecisiveness (all VOCI subscales). However, the ISC subscale did not have significant predictive power over and above the ICT subscale and the two other BALCI subscales (all *p*'s > .0125).

Discussion

Recent psychometric (Froreich et al., 2016) and experimental (Gagné & Radomsky, 2017) work suggests that control-related cognitions in OCD should also include aspects of losing control. However, available questionnaires assess other facets of control. The current study aimed to validate a measure of beliefs about losing control (BALCI) in a sample of undergraduate students.

Although a four-factor solution was hypothesized (given the four domains over which individuals with OCD may believe they can lose control), an EFA supported a three-factor solution. Following psychometrically- and theoretically-appropriate adjustments, the 21 remaining items captured beliefs about losing control over one's thoughts/behaviour/emotions (TBE subscale) and one's body/bodily functions (BBF subscale), and beliefs about the importance of staying in control (ISC subscale). Accordingly, it appears that individuals may fear losing control over multiple psychological functions simultaneously (i.e., thoughts, behaviour, and emotions). This finding is consistent with Clark's (2004) cognitive control theory, which claims that failed thought control is taken as evidence that one could lose control over other domains as well (e.g., "If I can't control unwanted sexual intrusions, then I might lose control over my sexual behavior"; Clark, 2004, p. 145). Interestingly, the fear of losing control over one's body/bodily functions differentiated itself from other domains. It might be that this subtype is more strongly related to other anxiety-related problems, such as panic disorder, and less with OCD (e.g., Chambless et al., 1984). Further, the ISC subscale likely stands as a unique factor as it focuses more on desire for control than on a fear of losing control over one's psychological functions.

Findings related to the BALCI's convergent and divergent validity were in line with predictions. The BALCI was found to be strongly associated with measures of obsessive beliefs (OBQ-44), anxiety sensitivity (ASI), and perceived control over anxiety-provoking situations (ACQ-R). These relationships were significantly stronger than the association between the BALCI and a measure of general desire for control (DCS). The BALCI was further shown to have excellent internal consistency and adequate retest reliability, suggesting that it is a reliable and valid measure of beliefs about losing control. Of note, it was demonstrated that the BALCI subscores (TBE, ISC, and BBF) provide relevant information above and beyond a single total score, such that there is value in reporting them (Reise et al., 2013).

As expected, the BALCI was found to explain a significant amount of variance in OCD symptoms over and above other domains of obsessive beliefs. This result speaks to the BALCI's good predictive power but also provides further evidence that beliefs about control may need to be expanded to include aspects of losing control in cognitive formulations of OCD. Indeed, the OBQ-44's ICT subscale includes two items related to losing control (i.e., "Having intrusive thoughts means I'm out of control" and "Having violent thoughts means I will lose control and become violent"), but these items mainly assess beliefs about intrusive thoughts rather than the meaning and perceived consequences of a loss of control.

The TBE and BBF subscales were also shown to uniquely predict elevated OCD symptoms (contamination, checking, obsessions, hoarding, "just right", and indecisiveness) when controlling for the ICT subscale. In other words, these specific subtypes of beliefs about losing control appear to tap into a facet of OCD that is not captured by beliefs about the importance of and control over thoughts. That said, the ISC subscale (beliefs about the importance of staying in control) did not demonstrate significant predictive power in relation to all OCD symptoms when controlling for the ICT, TBE, and BBF subscales. It is likely that the variance in OCD symptoms associated with these beliefs is already explained by the ICT subscale, which measures beliefs about the importance of thoughts and about the necessity of controlling one's thoughts.

No study is without limitations. First, the BALCI was validated using a sample of undergraduate students, which restricts generalizability of findings to clinical populations. Although research has shown that obsessive beliefs fall on a continuum and that they can be studied in analogue samples (e.g., Abramowitz et al., 2014), examining the BALCI's psychometric properties in a clinical sample is a necessary future direction. Collecting data from clinical participants could also shed light on the relevance of the ISC subscale, as undergraduate students rarely report clinical phenomena as a priority in their everyday life. Likewise, some deleted items, such as "If I lost control, I would freeze and be unable to move", may capture experiences that are more typical of clinical populations (e.g., dissociation and derealization). In a clinical sample, deleted items could potentially be merged to currently identified factors (e.g., TBE in the case of dissociation) or could emerge as novel, more clinically-relevant factors (e.g., dissociative experiences subtype). Second, this study represents a first step toward the validation of the BALCI, justifying the use of an EFA. A confirmatory factor analysis is warranted to

replicate the current three-factor structure. Still, given the lack of predictive power of the ISC subscale, researchers may want to remove these items—which are potentially redundant with the OBQ-44's ICT subscale—and instead focus on increasing the number of items pertaining to losing control over one's body. Third, in this study, emphasis was put on OCD symptoms, but fears of losing control have been documented in other anxiety-related problems, such as panic (e.g., Chambless et al., 1984) and social anxiety (e.g., Spokas, Luterek, & Heimberg, 2009) disorders. Future research should investigate associations between the BALCI and these symptoms and/or incorporate items specific to these disorders (e.g., losing control over one's heart rate; losing control leads to embarrassment). Fourth, the ASI (Reiss et al., 1986) was used to assess the convergent validity of the BALCI, instead of the ASI-3 (Taylor et al., 2007). The ASI-3 has been shown to have improved psychometric properties over its original version, such that the current results should be interpreted with caution. Future work should confirm that the BALCI is positively associated with the ASI-3 and examine whether the BALCI predicts OCD symptoms over and above the ASI-3.

Despite limitations, the BALCI is, to our knowledge, the first self-report measure to assess negative beliefs about losing control as they pertain to OCD. This study provided concrete psychometric evidence that beliefs about losing control over one's thoughts, behaviour, emotions, and body/bodily functions are an important extension of control-related beliefs, not currently captured by the OBQ-44's ICT subscale. Indeed, these domains of beliefs about losing control were shown to be associated with all OCD subtypes, such that they perhaps play a pivotal role in their aetiology and perpetuation. As a result, these beliefs may be a critical treatment target in CBT for OCD and/or other anxiety-related problems. Frequently monitoring changes in symptoms and maladaptive beliefs is a core component of therapy that is known to improve treatment outcomes (Lambert et al., 2002). The BALCI appears to be a promising tool to assess beliefs about losing control both in the laboratory and in the clinic.

Table 1

Factor Structure and Loadings of the BALCI

Items	Factor 1 (TBE)	Factor 2 (ISC)	Factor 3 (BBF)
1. I'm afraid that I might not be able to keep my emotions in check	**.80**	-.10	-.15
2. If I have too many thoughts, or if they're too intense, I could lose control of my mind	**.83**	-.03	-.08
3. Strong emotions can be dangerous because you might lose control	**.75**	.04	-.07
4. I am afraid of losing control of my mind	**.74**	-.04	.10
5. If I can't keep my mind on a task, it means that I am losing control	**.58**	.04	.05
8. I am afraid of losing control of my thoughts	**.69**	.03	.12
9. I'm concerned about my ability to handle my emotions	**.91**	-.10	-.14
10. I'm afraid I might do something inappropriate or embarrassing	**.53**	-.02	.20
11. If I get too upset or anxious, I will lose control	**.79**	-.02	-.04
12. Strong emotions can be a sign that I'm losing control	**.76**	.01	.01
13. If I get too emotional, I worry that I might never calm down	**.69**	-.07	.04
16. I am afraid of losing control of my emotions	**.75**	.14	.01
17. If I don't manage the thoughts, images or impulses in my mind, I will lose control	**.60**	.17	.13
18. If I lose control over an urge or impulse, I will act on it even if I don't want to	**.47**	.09	.14
14. It's important for me to stay in control of my thoughts	-.08	**.95**	-.04
15. Staying in control is an important priority for me	-.04	**.88**	-.05

19. It's important for me to keep my emotions from spiraling out of control	.31	**.43**	.00
6. I am afraid of losing control of my bladder and/or bowels	-.11	-.04	**.79**
7. I am afraid of getting hiccups or of sneezing because I might not be able to stop	-.03	-.08	**.54**
20. If I lost control, I would throw up	.16	-.05	**.40**
21. I am afraid of losing control of my body or of my bodily function(s)	.00	.05	**.67**

Note. Principal axis factoring with Promax rotation was used for extraction of factors. BALCI = Beliefs About Losing Control Inventory; TBE = Thoughts/Behaviour/Emotions. ISC = Importance of Staying in Control. BBF = Body/Bodily Functions.

Table 2

Zero-Order Correlations Between the BALCI (Total and Subscales) and Study Measures

Measure	OBQ-44	ASI	ACQ-R	DCS	VOCI						
					Total	Contamination	Checking	Obsessions	Hoarding	Just Right	Indecisiveness
BALCI-Total	.59***	.69***	-.58***	-.14**	.58***	.48***	.38***	.55***	.41***	.52***	.57***
BALCI-TBE	.56***	.67***	-.61***	-.19***	.56***	.45***	.35***	.54***	.40***	.49***	.56***
BALCI-ISC	.43***	.42***	-.21***	.15**	.28***	.24***	.19***	.22***	.14***	.32***	.28***
BALCI-BBF	.38***	.49***	-.32***	-.15**	.51***	.46***	.34***	.47***	.43***	.44***	.39***

Note. BALCI = Beliefs About Losing Control Inventory. TBE = Thoughts/Behaviour/Emotions. ISC = Importance of Staying in Control. BBF = Body/Bodily Functions. OBQ-44 = Obsessive Beliefs Questionnaire. ASI = Anxiety Sensitivity Index. ACQ-R = Anxiety Control Questionnaire—Revised. DCS = Desirability for Control Scale. VOCI = Vancouver Obsessional Compulsive Inventory.

$^{**}p < .01$, $^{***}p < .001$.

Table 3

Hierarchical Regressions Predicting the VOCI (Total and Subscales) from the OBQ-44-ICT and BALCI Subscales

	Model 1						Model 2					
	R^2	*B*	*SE B*	β	*t*	*p*	R^2	*B*	*SE B*	β	*t*	*p*
Total	.33					<.001	.48					<.001
OBQ-44-ICT		1.57	0.10	.57	15.43	<.001		0.94	0.10	.35	9.08	<.001
BALCI-TBE								0.82	0.13	.28	6.44	<.001
BALCI-ISC								-0.15	.042	-.01	-0.36	.717
BALCI-BBF								3.68	0.52	.26	7.11	<.001
Contamination	.22					<.001	.34					<.001
OBQ-44-ICT		0.32	0.03	.47	11.76	<.001		0.19	0.03	.28	6.43	<.001
BALCI-TBE								0.14	0.04	.20	3.93	<.001
BALCI-ISC								0.00	0.12	.00	0.01	.992
BALCI-BBF								0.97	0.15	.28	6.72	<.001
Checking	.14					<.001	.20					<.001
OBQ-44-ICT		0.16	0.02	.37	8.74	<.001		0.10	0.02	.22	4.64	<.001
BALCI-TBE								0.08	0.03	.16	2.00	.003
BALCI-ISC								0.02	0.08	.01	0.19	.848
BALCI-BBF								0.42	0.10	.19	4.10	<.001
Obsessions	.37					<.001	.49					<.001
OBQ-44-ICT		0.38	0.02	.61	16.88	<.001		0.26	0.02	.41	10.80	<.001
BALCI-TBE								0.20	0.03	.30	6.92	<.001
BALCI-ISC								-0.22	0.10	-.09	-2.27	.024
BALCI-BBF								0.69	0.12	.21	5.73	<.001
Hoarding	.20					<.001	.30					<.001
OBQ-44-ICT		0.18	0.02	.45	11.15	<.001		0.11	0.02	.29	6.47	<.001
BALCI-TBE								0.08	0.02	.20	3.85	<.001
BALCI-ISC								-0.15	0.07	-.09	-2.12	.035
BALCI-BBF								0.53	0.09	.26	6.06	<.001
Just Right	.21					<.001	.35					<.001
OBQ-44-ICT		0.32	0.03	.47	11.57	<.001		0.17	0.03	.25	5.93	<.001
BALCI-TBE								0.16	0.04	.22	4.48	<.001

BALCI-ISC								0.23	0.12	.09	2.00	.046
BALCI-BBF								0.81	0.14	.23	5.62	<.001
Indecisiveness	.27					<.001	.40					<.001
OBQ-44-ICT		0.21	0.02	.52	13.32	<.001		0.12	0.02	.29	7.23	<.001
BALCI-TBE								0.16	0.02	.38	8.02	<.001
BALCI-ISC								-0.04	0.07	-.02	-0.54	.593
BALCI-BBF								0.27	0.08	.13	3.25	.001

Note. VOCI = Vancouver Obsessional Compulsive Inventory. OBQ-44 = Obsessive Beliefs Questionnaire. ICT = Importance of/Control over Thoughts. BALCI = Beliefs About Losing Control Inventory. TBE = Thoughts/Behaviour/Emotions. ISC = Importance of Staying in Control. BBF = Body/Bodily Functions. $R^2 = R^2_{\text{adjusted}}$. Bonferroni corrections were applied to determine the significance level for individual predictors ($\alpha = .05/4 = .0125$).

CHAPTER 3

Bridge

Clinical reports (e.g., Clark, 2004) and recent psychometric (Froreich et al., 2016) and experimental (Gagné & Radomsky, 2017) investigations suggest that beliefs about losing control may be worth considering in cognitive models of OCD—beyond the already established domain of beliefs about the importance of and control over thoughts. Still, existing control-related self-report measures fail to capture people's beliefs related to the experience of losing control, including the meaning and perceived consequences of losing control. The absence of a tool to assess beliefs about losing control is an obstacle for researchers who wish to understand how these beliefs might be associated with symptoms and other relevant constructs and for clinicians who wish to monitor and/or target these beliefs in CBT.

Study 1 was undertaken with the purpose of developing and validating a novel self-report measure of maladaptive beliefs about losing control, the BALCI. The measure aimed to be comprehensive by capturing the several domains over which individuals believe they can lose control: thoughts, behaviour, emotions, and body/bodily functions. Results from a sample of undergraduate students indicated a three-factor solution: beliefs about losing control over one's Thoughts, Behaviour, and Emotions (Factor 1), about the Importance of Staying in Control (Factor 2), and about losing control over one's Body and Bodily Functions (Factor 3). Beliefs about losing control (as measured by the BALCI) were found to be associated with elevated OCD symptoms above and beyond already established obsessive beliefs. Precisely, beliefs about losing control over one's thoughts, behaviour, and emotions (Factor 1) and over one's body and bodily functions (Factor 3) were positively associated with all subtypes of OCD symptoms (i.e., contamination, checking, obsessions, hoarding, "just right" experiences, and indecisiveness) over and above beliefs about the importance of and control over thoughts, as measured by a pre-existing, well-validated scale.

Study 1 supports the hypotheses that beliefs about losing control might be relevant to consider in cognitive models of OCD, and that these beliefs might be different from the theoretically-related domain of beliefs about the importance of and control over thoughts, but the evidence reported above can only be interpreted from a correlational perspective. Experimental work is therefore critical to understand the causal relationships between constructs, such as

beliefs and symptoms, and to identify intervention targets (see Gagné, Kelly-Turner, & Radomsky, 2018).

A recent experiment conducted with a sample of undergraduate students has shown that negative beliefs about losing control (i.e., the belief that losing control over one's thoughts and behaviour is likely) led to increased checking behaviour (Gagné & Radomsky, 2017). However, other phenomena observed in OCD appear to be phenomenologically related to this idea of losing control and, specifically, to negative beliefs about losing control over one's behaviour. These include, for example, experiencing intense anxiety and unwanted intrusive thoughts/urges about harming loved ones upon seeing threatening stimuli like kitchen knives and scissors (e.g., Thyer, 1985). Similarly, individuals with OCD appear to be very cautious around such stimuli and, sometimes, avoid them altogether (e.g., Abramowitz et al., 2013). In this way, experimental research is needed to assess whether beliefs about losing control (i.e., the belief that losing control over one's behaviour is likely) drive these maladaptive experiences as well.

Evidence supporting these suggestions would reinforce the idea that beliefs about control over other psychological functions (beyond internal experiences like thoughts and worries) play a role in OCD symptoms (e.g., Clark, 2004; OCCWG, 2005), and that losing control over one's behaviour should be emphasized in cognitive models. Moreover, such evidence could lead to a wider range of clinical interventions. Currently, clients and patients are typically asked to face their fears and sit with their anxiety—for example, to hold a pair of scissors close to their therapist and to tolerate the anxiety and uncertainty associated with the situation (e.g., Abramowitz et al., 2013; Foa, Yadin, & Lichner, 2012). Still, demonstrating that beliefs about losing control over one's behaviour play a causal role in the development of anxiety, intrusive thoughts, and maladaptive behaviour (e.g., extreme caution) while approaching threatening stimuli could lead to focused cognitive interventions that target underlying problematic beliefs.

CHAPTER 4

Beliefs About Losing Control, Obsessions, and Caution: An Experimental Investigation

Obsessive-compulsive disorder (OCD) is characterized by unwanted intrusive thoughts, images, or urges and/or repetitive behaviour or mental acts (American Psychiatric Association, 2013). Research has consistently demonstrated that intrusive thoughts, similar in content to obsessions, are practically universal (e.g., Rachman & de Silva, 1978; Radomsky et al., 2014). This finding is a core aspect of current cognitive models of OCD. Specifically, cognitive theory posits that individuals with OCD hold maladaptive beliefs that lead them to misinterpret normal intrusive thoughts as catastrophic, personally significant, and/or overly meaningful (e.g., Rachman, 1997, 1998, 2002; Salkovskis, 1985, 1999). As a result, they experience negative emotions and often perform compulsions as a means of reducing distress and/or preventing negative consequences.

Maladaptive beliefs that are proposed to play a role in the development and maintenance of OCD have been identified and examined psychometrically and/or experimentally (e.g., Lopatka & Rachman, 1995; Myers, Fisher, & Wells, 2008). These include, among others, beliefs about responsibility and threat overestimation, perfectionism and intolerance of uncertainty, and beliefs about the importance of and need to control one's thoughts (e.g., Obsessive Compulsive Cognitions Working Group [OCCWG], 2005). Clinical trials focusing on mechanisms of change have also provided evidence in favour of cognitive theory by showing that changes in maladaptive beliefs during cognitive-behaviour therapy (CBT) predict reductions in OCD symptoms (e.g., Anholt et al., 2010; Diedrich et al., 2016; Woody, Whittal, & McLean, 2011).

Interestingly, some cognitive models of OCD have emphasized control cognitions (e.g., Clark & Purdon, 1993; Moulding & Kyrios, 2006). This is primarily because a number of individuals with OCD try to control their intrusive thoughts by using 'strategies' like distraction, neutralization, and punishment (e.g., Freeston & Ladouceur, 1997; Wells & Davies, 1994). Clark (2004) thus proposed that beliefs about control over thoughts—or the belief that having full control over one's thoughts is necessary to prevent negative outcomes—are central to OCD and underlie misappraisals of thought recurrence and/or failed thought control. Psychometric research has provided support for this theory by showing that the metacognitive domain of "beliefs about the importance of and control over thoughts" consistently emerged as a unique predictor of obsessive-compulsive (OC) symptoms, above and beyond other belief domains (e.g.,

Hansmeier, Exner, Rief, & Glombiewski, 2016; Myers et al., 2008). Importantly, Myers and Wells (2013) demonstrated the causal role of metacognitive beliefs in the exacerbation of OCD-related phenomena by manipulating beliefs about the need to control one's thoughts in a sample of undergraduate students (see also Rassin, Merckelbach, Muris, & Spaan, 1999). In this experiment, participants were told that an EEG could detect their thoughts related to water/drinking, but those in the experimental condition were told that they might experience an aversive noise when these specific thoughts would be detected. Participants in the experimental condition and with higher baseline OC symptoms reported having more intrusive thoughts about water/drinking and experiencing more discomfort from them.

Nonetheless, beliefs about the perceived consequences of thought control failure have been little explored and previous experiments have relied on laboratory-based consequences (e.g., aversive noises and electrical shocks) that are weak in ecological validity. Clark (2004) explained that a recurrent feared negative outcome of thought control failure in individuals with OCD is a complete loss of control over their thoughts and behaviour (e.g., "If I can't control unwanted sexual intrusions, then I might lose control over my sexual behaviour", p. 145). In fact, the OCCWG (1997) had proposed that "perceived control over upsetting intrusions is best predicted by the belief that the thought might be acted upon or otherwise come true" (p. 672). As such, holding the belief that one can lose control—not only over their thoughts but also over their behaviour—might interact with beliefs about control over thoughts and contribute to misappraisals of intrusive thoughts. In other words, one may need to believe that they can lose control over their behaviour in the first place to endorse specific metacognitive beliefs (e.g., that controlling their thoughts is necessary to prevent a loss of control).

In support of this hypothesis, a measure of negative beliefs about losing control over one's thoughts, behaviour, emotions, and bodily functions was found to be positively associated with OC symptoms, over and above other domains of obsessive beliefs—including the metacognitive domain of "beliefs about the importance of and control over thoughts" (Radomsky & Gagné, 2020). Further, beliefs about losing control have been shown to cause increased OC symptoms (Gagné & Radomsky, 2017). In this recent experiment, undergraduate students were provided with false feedback regarding their performance during a bogus EEG recording session: they were led to believe that they were either more or less likely to lose control over their thoughts and behaviour as compared to a normative sample. Participants with elevated beliefs

about a potential loss of control engaged in significantly more checking behaviour during a subsequent computer task asking them to control the pace of pictures, possibly to increase their perceptions of control. Accordingly, negative beliefs about losing control—or the belief that losing control over one's thoughts and behaviour is likely—may be relevant to consider when conceptualizing OCD from a cognitive perspective.

The causal impact of beliefs about losing control on other OCD-related phenomena (beyond compulsive checking) remains however unexplored. As mentioned above, beliefs about losing control over one's behaviour could interact with metacognitive beliefs (e.g., "my thoughts about harming others mean that I am dangerous and I know I can lose control over my actions") and contribute to the exacerbation of symptoms. Still, beliefs about losing control could also be involved on their own in the misinterpretation of immoral, harm-related intrusive thoughts (e.g., stabbing a loved one; pushing a stranger in front of a train; kicking a baby), one of the most common obsessional themes (Schulze, Kathmann, & Reuter, 2018). In fact, several individuals with OCD report a fear of acting on their unwanted impulses (e.g., Rachman & Hodgson, 1980; Summerfeldt, Richter, Antony, & Swinson, 1999). As a result, they fear and actively avoid stimuli like kitchen knives and scissors (e.g., Thyer, 1985). They hide them, lock them away, avoid their kitchen altogether, or attempt to tolerate elevated anxiety when asked to approach or manipulate them (e.g., Abramowitz et al., 2013). In this way, beliefs about losing control over one's behaviour could also underlie and maintain this fear that individuals with OCD experience around such stimuli.

The goal of this experiment was thus to determine whether activating beliefs about losing control—or the belief that one is likely to lose control over their behaviour—would cause increasingly higher anxiety and recurrent intrusive thoughts while approaching stimuli that are commonly feared in OCD. Another aim was to assess whether endorsing beliefs about losing control would have a behavioural impact and lead to interacting with such stimuli more cautiously. It was hypothesized that participants in a condition of higher beliefs about losing control (HLC), relative to lower beliefs (LLC), would report higher anxiety averaging across all steps of a behavioural approach test (BAT), which required them to interact with sharp knives and scissors in an increasingly challenging manner. Further, we predicted that there would be a positive linear relationship between anxiety and step difficulty of the BAT, and that this relationship would be greater for those in the HLC (versus LLC) condition. Finally, we expected

that those in the HLC (versus LLC) condition would experience more intrusive thoughts related to losing control over their behaviour throughout the protocol and that they would take longer (i.e., be objectively more cautious) while sorting the knives and scissors as quickly as possible in a knife block (i.e., a second task following the BAT called the "knife sorting task"). Exploratory measures were also included: participants were asked to rate their perceived level of caution while completing the knife sorting task and, at the end of the protocol, to freely recall and write down all the intrusive thoughts related to losing control over their behaviour they had experienced during the BAT and knife sorting task combined.

Method

Participants

Participants were 132 undergraduate students recruited from Concordia University. They all received course credit for participating. The only inclusion criteria were the ability to read and communicate in English, and to be at least 18 years of age. Data from four participants were omitted for not following the instructions during the BAT. The final sample consisted of 128 participants, with 64 participants in both the HLC and LLC conditions. The final sample size was consistent with results from a priori power analyses conducted with G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009), in which parameters were entered as follow: $d = 0.50$; $\alpha = .05$; $1\text{-}\beta = .80$. Participants' mean age was 22.70 ($SD = 5.27$; range = 18-57) years and 89.06% of the sample was female ($n = 114$). There were no significant differences in terms of age, $t(92.75) = -1.47$, $p = .15$, sex, $\chi^2(1) = 1.28$, $p = .26$, ethnicity, $\chi^2(5) = 2.92$, $p = .71$, or educational attainment, $\chi^2(3) = 2.94$, $p = .40$, between conditions.

Measures

Demographics. Participants were asked to provide demographic information, including age, sex, ethnicity, and educational attainment.

Manipulation check. Participants were asked the following question: "On a scale from 0 (*do not believe it at all*) to 100 (*believe it completely*), to what extent do you believe you could lose control over your behaviour?" (adapted from Gagné & Radomsky, 2017). The item assessed the degree to which participants believed the false feedback about their likelihood of losing control over their behaviour. As such, it was expected that participants in the HLC (versus LLC) condition would score higher on this question.

Credibility check. At the end of the protocol, the believability of the false purpose of the study was assessed. Participants were asked the following question: "On a scale from 0 (*did not believe it at al*l) to 100 (*believed it completely*), to what extent did you believe that the study examined the characteristics of impulsive individuals?".

Subjective Units of Distress Scale (SUDS; Wolpe, 1958). The SUDS is a brief subjective measure of anxiety that is commonly used in research and clinical settings. Participants were asked the following question at every step of the BAT: "How anxious are you right now?". They had been instructed to provide a rating from 0 (*neutral* or *not anxious at all*) to 100 (*the worst anxiety you can imagine*) every time.

Intrusive thoughts. There were two measures of intrusive thoughts related to losing control. First, participants were asked to click a tally counter every time they experienced an intrusive thought pertaining to losing control over their behaviour throughout the BAT and knife sorting task. Intrusive thoughts were defined as thoughts, images, urges, or impulses that suddenly pop into one's mind (e.g., "an image of you stabbing the experimenter that pops into your mind or a sudden urge to throw a knife out of the blue"). Participants were instructed to click the tally counter one time if they experienced an intrusive thought and to click it again if a new thought emerged or if a previous thought emerged again but at a later time. This first measure focused on the number of intrusive thoughts experienced as participants went through the protocol.

Second, at the very end of the protocol, participants were asked to freely recall and write down all the intrusive thoughts pertaining to losing control over their behaviour they had experienced throughout the BAT and knife sorting task combined. This second measure focused on the extent to which participants remembered the content of their intrusive thoughts and was mainly exploratory.

Objective caution. Participants were asked to sort all the stimuli (i.e., knives, pair of scissors, and knife sharpener) in a knife block as quickly and as safely as possible during the knife sorting task. The time taken to complete the knife sorting task (i.e., sort all the stimuli) was used as an objective index of caution, with longer times indicating that participants were being more cautious.

Perceived caution. After completing the knife sorting task, participants were asked the following question: "On a scale from 0 (*not cautious at all*) to 100 (*extremely cautious*), how

cautious were you while sorting the knives?". This subjective measure of caution was mainly exploratory and was added after the study had been launched given that perception of one's behaviour or of a situation can be more informative than objective data according to cognitive models of psychopathology (n = 105; 53 participants in the HLC condition and 52 participants in the LLC condition).

Materials

Stimuli. For the BAT, participants were asked to gradually approach and interact with a set of stimuli that are commonly feared in OCD in a stepwise manner. For the knife sorting task, they were asked to sort the same stimuli in a knife block as quickly and as safely as possible. The set included one 8" chef knife, one 5" utility knife, one 5.5" serrated utility knife, one 5" santoku knife, one 3.5" paring knife, six steak knives, one pair of scissors, one knife sharpener, and one cherry wood knife block.

Tally counter. Participants were asked to click a digital tally counter every time they experienced an intrusive thought related to losing control over their behaviour while completing the BAT and knife sorting task. The tally counter was silent upon clicking to reduce the potential impact of demand characteristics and/or social desirability. Participants were told that the tally counter was silent beforehand.

Procedure

This experiment involved the experimenter (female) who guided participants through the protocol (i.e., unaware of condition assignment) and the actor (male) who presented himself as a "senior doctoral student with expertise in impulsivity" and who conducted the random assignment.

Upon arriving to the laboratory, participants were told that the study aimed to increase our understanding of the characteristics of impulsive versus non-impulsive individuals (i.e., false purpose of the study). Following the informed consent process, participants provided relevant demographic information.

Afterwards, the experimenter read a definition of "intrusive thought" to participants (adapted from Radomsky et al., 2014) and presented them with a list of intrusive thoughts related to losing control over one's behaviour. As part of the experimental manipulation, participants were asked to read the list and highlight all the intrusive thoughts they had ever experienced throughout their life, even if it was only once and very briefly. The list included 25 possible

intrusive thoughts (adapted from Rachman & de Silva, 1978) and an open-ended "other" section. Examples of intrusive thoughts included "throwing myself in front of a car, train, metro/subway train, and/or bike", "jumping off a balcony, a bridge, a cliff, and/or a building", "shouting something inappropriate in public (e.g., in a store, at church, in the street)", and "hurting and/or stabbing someone and/or an animal with a knife and/or scissors"[3]. Participants were asked not to write their name on the sheet and to put it in an envelope once they were done. The experimenter left the room while participants were completing this task. Participants rang a bell to indicate they were done. The experimenter came back and told them she would give the envelope to a senior doctoral student who has experience in working with impulsive individuals (i.e., the actor). She told them she would be "right back" so they did not expect the actor to come in. The actor had already randomly assigned participants to the HLC or LLC condition. Specifically, while participants were highlighting intrusive thoughts on the list, the actor used an online program which randomly generated either a "1" (i.e., HLC condition) or a "2" (i.e., LLC condition). Their highlighted and/or written responses on the list of intrusive thoughts were not actually used in any way.

Three minutes later, the actor entered the testing room and introduced himself as a senior doctoral student with expertise in impulsivity. He told participants that he 'examined' their list of intrusive thoughts and that he wanted to share a few things with them. Participants randomly assigned to the HLC condition were told that years of research have shown that individuals who experience such intrusive thoughts are more likely to act on them and lose control over their behaviour. They were also given an example: "You probably remember being angry at a family member, a friend, or a partner and saying something mean to them out of the blue." Participants randomly assigned to the LLC condition were told that years of research have shown that everyone in the population has such intrusive thoughts, that they are completely normal, and that having these thoughts does not mean that one will act on them and lose control over their behaviour. They were also given an example: "You probably remember being angry at a family member, a friend, or a partner and thinking about suddenly doing something mean to them—but then you dismissed the thought and did not act on it". After providing false feedback to participants, the actor left the testing room and the experimenter came back.

[3] The full list of intrusive thoughts can be found in Appendix B.

Participants were asked to complete a bogus feedback questionnaire under the guise of providing the laboratory with information about the professionalism of the doctoral student. It included the manipulation check and several buffer items about the doctoral student's behaviour. Participants were asked 1) how professional the doctoral student was; 2) how clear his feedback was; 3) whether the doctoral student gave them an example to better contextualize the feedback; 4) whether they had done a similar activity before; and 5) whether they had any other comments about the doctoral student. The manipulation check question was between questions 4 and 5. Efficacy of the manipulation was assessed in this way to minimize suspicions about the true purpose of the experiment.

Participants were then provided with instructions regarding the next portion of the study (i.e., the BAT). They were instructed to rate their anxiety level using the SUDS and to click the digital and silent tally counter every time they experienced an intrusive thought related to losing control over their behaviour. A shorter definition of "intrusive thought" was provided, along with some examples (e.g., "an image of you stabbing the experimenter that pops into your mind or a sudden urge to throw a knife out of the blue"). Participants were asked to hold the tally counter in their non-dominant hand so they could interact with the stimuli using their dominant hand during the BAT.

Participants were asked to move to the laboratory kitchen for the BAT. Before starting (and while standing in front of the closed kitchen door), they were told that they would soon approach several sharp knives and scissors, that all instructions would be provided to them, and that eventually they would be asked to point the biggest knife (i.e., chef knife) in the direction of the experimenter. The BAT consisted of seven steps: 1) standing outside of the laboratory kitchen with the door closed; 2) entering the kitchen; 3) standing halfway between the kitchen door and the stimuli; 4) standing next to the stimuli; 5) touching the handle of the chef knife with one's index finger; 6) holding the chef knife to the side of one's body (using a reverse grip) while standing at a 1.5-metre distance from the experimenter; and 7) holding the chef knife above one's head (using a reverse grip) while standing at a 1.5-metre distance from the experimenter. At every step, participants were asked to rate their anxiety level (i.e., SUDS). As mentioned above, they also maintained a count of their intrusive thoughts related to losing control over their behaviour using the tally counter. During the BAT, all the stimuli were aligned on a tray that was placed on the laboratory stove.

After the BAT, participants were asked to sort all the stimuli in the knife block as quickly and as safely as possible, using their dominant hand only (i.e., knife sorting task). They were told that the task would be timed. They were asked to continue to maintain a count of their intrusive thoughts by clicking the tally counter with their non-dominant hand. Then, participants were asked to rate their perceived level of caution while they were sorting the stimuli. They gave back the tally counter to the experimenter.

Participants went back to the testing room. They were asked to freely recall and write down all the intrusive thoughts related to losing control over their behaviour they had experienced during both the BAT and knife sorting task combined. Finally, they completed the credibility check and were fully debriefed about the true purpose of the study.

Results

Data Screening

There was one univariate outlier on each of the following variables: 1) anxiety rating (i.e., SUDS) at Step 1 of the BAT; 2) anxiety rating (i.e., SUDS) at Step 2; 3) anxiety rating (i.e., SUDS) at Step 3; and 4) number of intrusive thoughts freely recalled at the end of the protocol. These univariate outliers were from four different participants. Each outlying score was replaced with the next highest score within 3.29 standard deviations of the mean for the specific variable (Tabachnick & Fidell, 2007). No multivariate outliers were detected. The data were assessed for normality and were found to have acceptable skewness and kurtosis on all dependent variables (Kline, 2009). There were no missing data (other than for the measure of perceived caution given that it was added after the study had already been launched, as explained above). Thus, for perceived caution, an independent samples *t*-test was conducted using the available data (n = 105; 53 participants in the HLC condition and 52 participants in the LLC condition).

Manipulation Check

To assess whether the experimental manipulation was effective in producing different degrees of beliefs about losing control over one's behaviour between conditions, an independent samples *t*-test was conducted using the manipulation check as the dependent variable. As expected, there was a significant difference between conditions, $t(109.49) = 7.01$, $p < .001$, d = 1.24, such that participants in the HLC condition (M = 36.75, SD = 23.89) believed to a significantly greater degree that they could lose control over their behaviour, compared to those in the LLC condition (M = 11.64, SD = 15.86).

Credibility Check

An independent samples *t*-test was conducted to examine potential condition differences on the believability of the false purpose of the study. The credibility check was used as the dependent variable. As expected, there were no significant differences between conditions, $t(126) = 0.40$, $p = .69$, $d = 0.07$, such that participants in the HLC and LLC conditions believed the false purpose of the study to a similar degree (see Table 1 for means and standard deviations).

Anxiety Ratings (SUDS)

Figure 1 shows a visual representation of results pertaining to anxiety ratings (i.e., SUDS) throughout the BAT.

Multilevel modelling was used to test the hypothesis that, averaging across all steps of the BAT, participants in the HLC (versus LLC) condition would report greater anxiety (i.e., main effect of Condition). This analysis was also used to test the prediction that there would be a positive linear relationship between anxiety and step difficulty, and that this relationship would be greater for those in the HLC (versus LLC) condition (i.e., Step × Condition interaction). A multilevel model (Model 1) was conducted with the fixed model part consisting of a) a dummy-coded variable defining the conditions (LLC condition coded 0; HLC condition coded 1); b) an effect-coded variable defining a general linear time effect starting with 1 to indicate Step 1 of the BAT (i.e., Step 2 coded 2, Step 3 coded 3, etc.); and c) an interaction term defined by the product of a) and b). As hypothesized, the analysis revealed a significant main effect of Condition on anxiety, $p = .002$, 95% CI [3.52, 15.86]. Specifically, averaging across all steps of the BAT, those in the HLC condition ($M = 30.28$, $SD = 18.85$) reported significantly greater anxiety, relative to those in the LLC condition ($M = 14.68$, $SD = 18.85$). Also, there was no main effect of Step on anxiety, $p = .10$, 95% CI [-0.15, 1.80]. As expected, the analysis revealed that the Step × Condition interaction was a significant predictor of anxiety for the whole sample, $p = .04$, 95% CI [0.10, 2.86] (see Table 2 for test statistics).

Two separate multilevel models (Model 2 and Model 3) were conducted to understand the significant Step × Condition interaction obtained from Model 1 (i.e., simple slope analyses). For Model 2, the fixed model part consisted of the same effect-coded variable defining a general linear time effect as Model 1 (i.e., steps of the BAT) but only for participants in the HLC condition. The analysis revealed a positive simple slope significantly different from zero (i.e.,

significantly increasing anxiety as the steps of the BAT became more challenging), $B = 2.30$, $p < .001$, 95% CI [1.26, 3.35] (see Table 2 for test statistics). For Model 3, the fixed model part consisted of the same effect-coded variable as Model 1 (i.e., steps of the BAT) but only for participants in the LLC condition. Interestingly, the analysis revealed a positive simple slope not significantly different from zero (i.e., anxiety remaining at a similar level although the steps of the BAT became more challenging), $B = 0.83$, $p = .07$, 95% CI [-0.72, 1.73] (see Table 2 for test statistics).

Because participants in the HLC (versus LLC) condition reported significantly greater anxiety averaging across all steps of the BAT, we conducted a series of seven independent samples *t*-tests to examine condition differences on anxiety ratings (i.e., SUDS) at every step of the BAT. To control for familywise error rate, a Bonferroni correction was applied ($\alpha = .05/7 = .007$). Results indicated that participants in the HLC (versus LLC) condition reported significantly greater anxiety at each individual step of the BAT (see Table 3 for means, standard deviations, and test statistics).

Intrusive Thoughts

An independent samples *t*-test was conducted to assess potential condition differences on the number of intrusive thoughts related to losing control over one's behaviour experienced throughout the BAT and knife sorting task. Total number of clicks on the tally counter was used as the dependent variable. Contrary to our hypothesis, there were no significant differences between the HLC and LLC conditions on total number of clicks on the tally counter, $t(126) = 0.55$, $p = .58$, $d = 0.10$ (see Table 1 for means and standard deviations).

An independent samples *t*-test was conducted to assess potential condition differences on the number of intrusive thoughts related to losing control over one's behaviour that participants freely recalled and wrote down at the end of the protocol (i.e., they wrote down the intrusive thoughts they remembered having during the BAT and knife sorting task combined). Total number of intrusive thoughts freely recalled was used as the dependent variable. Because this analysis was one of the two exploratory analyses conducted, a Bonferroni correction was applied ($\alpha = .05/2 = .025$). A significant difference was found between conditions, $t(111.24) = 3.42$, $p = .001$, $d = 0.60$, such that participants in the HLC (versus LLC) condition freely recalled significantly more intrusive thoughts related to losing control over their behaviour at the end of the protocol (see Table 1 for means and standard deviations).

Objective Caution

An independent samples *t*-test was conducted to assess potential condition differences on participants' objective level of caution during the knife sorting task. Total time taken to complete the task (i.e., to sort all the stimuli) was used as the dependent variable, with longer times indicating that participants were being more objectively cautious. Contrary to our hypothesis, there were no significant differences between conditions on time taken to sort all of the stimuli, $t(126) = -0.89$, $p = .37$, $d = 0.16$ (see Table 1 for means and standard deviations).

Perceived Caution

An independent samples *t*-test was conducted to assess potential condition differences on participants' perceived level of caution during the knife sorting task. Reported levels of caution were used as the dependent variable. Because this analysis was one of the two exploratory analyses conducted, a Bonferroni correction was applied ($\alpha = .05/2 = .025$). There was a significant difference between both conditions, $t(96.64) = -2.39$, $p = .02$, $d = 0.47$, such that participants in the HLC (versus LLC) condition perceived themselves as being significantly *less* cautious while sorting the sharp objects (see Table 1 for means and standard deviations).

Discussion

Recent psychometric (Froreich, Vartanian, Grisham, & Touyz, 2016; Radomsky & Gagné, 2020) and experimental (Gagné & Radomsky, 2017) work suggests that beliefs about losing control are involved in the development and maintenance of OC symptoms. However, it is unclear whether beliefs about losing control over one's behaviour play a causal role in the exacerbation of anxiety around stimuli that are commonly feared in OCD (e.g., kitchen knives and scissors). The impact of these beliefs on unwanted intrusive thoughts and behavioural outcomes (e.g., caution while manipulating such stimuli) has not been explored either. The primary goal of this experiment was to fill these gaps in the OCD literature using a sample of undergraduate students.

Results demonstrated that participants in the HLC (versus LLC) condition experienced greater anxiety not only across the BAT (i.e., while approaching sharp knives and scissors), but also at every step of the test—including at the very beginning when participants were standing outside of the laboratory kitchen. For anxiety scores, moderate effects were observed when participants approached the stimuli; large effects were observed when participants physically interacted with the objects. Importantly, simple slope analyses added to these findings by

showing that endorsing higher levels of beliefs about losing control over one's behaviour (i.e., HLC condition) caused participants to experience increasingly higher anxiety as the steps became more challenging. Conversely, those in the LLC condition reported relatively stable anxiety throughout the BAT. In this way, results suggest that holding the belief that one can lose control over their behaviour might contribute to the development of a fear of these stimuli. Findings also suggest that beliefs about losing control may potentially exacerbate this fear at higher levels of threat, given that anxiety increased as the steps of the BAT became more challenging—but only for those in the HLC condition. The potential for belief disconfirmation and/or inhibitory learning might thus be at its highest at the upper end of one's fear hierarchy. Interestingly, providing participants in the LLC condition with psychoeducation about the ubiquity of intrusive thoughts, as is typically done in CBT, may have played a role in attenuating anxiety, even at higher levels of threat. To test this possibility, future work should consider adding a control condition in which such psychoeducational information about intrusive thoughts is not provided to participants.

Contrary to our hypothesis, participants in both conditions reported a similar number of intrusive thoughts related to losing control over their behaviour as they were going through the protocol (i.e., number of clicks on the tally counter). This is consistent with the finding that unwanted intrusive thoughts are normal and experienced by nearly everyone (e.g., Radomsky et al., 2014), such that recurrent obsessions might only occur following frequent thought suppression (e.g., Tolin, Abramowitz, Przeworski, & Foa, 2002). This may also reflect the typical methodological difficulties of assessing thoughts and other internal experiences in research on obsessions and thought suppression (e.g., Janeck & Calamari, 1999; Purdon & Clark, 2001; Tolin et al., 2002). However, when asked to freely recall and write down the content of their intrusive thoughts at the end of the protocol, participants in the HLC (versus LLC) condition did report experiencing more intrusive thoughts related to losing control over their behaviour. Consistent with cognitive theory, this discrepancy between "objective" and "subjective" measures of intrusive thoughts potentially supports the idea that the thoughts experienced throughout the protocol were more memorable for those with higher beliefs about losing control. From a methodological perspective, Myers and Wells (2013) had also asked participants to report the number of intrusive thoughts they had experienced after completing the primary experimental task, instead of during the task. Accordingly, the emphasis might have

been placed on the salience of the thoughts—instead of on the actual number of thoughts—in previous research as well. Nonetheless, in the current study, it might be that those in the LLC condition simply experienced more instances of the same intrusive thoughts (and so they freely recalled and wrote down fewer thoughts at the end of the protocol). This discrepancy should be examined in future work, perhaps by assessing the meaningfulness, salience, and vividness of the intrusive thoughts. It may also be relevant to ask participants to specify how many times each thought was experienced throughout the protocol.

In a similar vein, the experimental manipulation of beliefs about losing control did not have a direct behavioural impact on participants' caution while interacting with the stimuli, such that participants in both conditions took a similar amount of time to sort them. Interestingly, participants in the HLC (versus LLC) condition appeared to perceive themselves as being *less* cautious while completing the knife sorting task. Together, these findings could potentially suggest that individuals with OCD are as cautious as others but that their perception of themselves is negatively biased by beliefs about losing control. In fact, Rachman (1997, 1998) had proposed that individuals with OCD perceive themselves as mad, bad, or dangerous, and that these beliefs underlie misappraisals of intrusive thoughts and, ultimately, compulsions and avoidance of feared stimuli. Still, this is only one potential (post-hoc) explanation of the results pertaining to perceived caution—an exploratory measure in this experiment. It would be important for the discrepancy between objective and subjective caution to be replicated and further explored, as finding the opposite pattern of results (e.g., participants in the HLC condition perceiving themselves as more cautious) could have been interpreted in a similar manner (e.g., participants with higher beliefs about losing control perceive themselves as more cautious because they believe they should be more cautious than others). Examining this discrepancy in more detail with clear a priori hypotheses is therefore warranted.

No study is without limitations. First, the current experiment was conducted in a sample of undergraduate students and participants were primarily females. Although experiments, reviews, and meta-analyses have confirmed that obsessive beliefs and the aetiology of clinical phenomena can be studied in analogue samples (e.g., Abramowitz et al., 2014; De Putter, Van Yper, & Koster, 2017; Gagné, Kelly-Turner, & Radomsky, 2018; Gibbs, 1996), stronger effects might have been detected using a clinical sample. Future research may want to assess whether participants diagnosed with OCD are more cautious while interacting with everyday kitchen

knives following a manipulation of beliefs about losing control—despite perceiving themselves as "dangerous" (Rachman, 1997, 1998). Second, given the nature of the sample, our primary measure during the BAT was anxiety instead of actual avoidance (i.e., number of steps completed). It might be relevant to design a more complex BAT to assess avoidance of knives and scissors when replicating a similar protocol with clinical participants. Third, manipulation check scores for both conditions were lower in this study compared to those reported in Gagné and Radomsky's (2017) experiment (despite a very large effect size in the current study and a moderate effect size in Gagné and Radomsky). It could be that providing psychoeducation about the prevalence of intrusive thoughts to those in the LLC condition led to much lower manipulation check scores for them (hence the larger effect size). A potential explanation for the lower manipulation check scores in both conditions is that beliefs about losing control over one's behaviour (i.e., a controllable psychological construct) may be more challenging to manipulate compared to beliefs about losing control over one's thoughts (as in Gagné and Radomsky). Nonetheless, two conditions with significantly different manipulation check scores were successfully created in the current experiment. Fourth, baseline anxiety scores were not assessed prior to the experimental manipulation to avoid priming participants and/or revealing the true nature of the study. Therefore, we cannot rule out that there might have been baseline differences on this dependent variable (despite employing random assignment and having a large sample size). Fifth, other belief domains (e.g., beliefs about the importance of and control over thoughts) were not assessed as part of the manipulation check questions, such that it is unclear whether these beliefs were also indirectly manipulated and had an impact on reported anxiety, caution, and intrusive thoughts. Assessing thought-action fusion—likelihood (i.e., the belief that having a thought increases the likelihood of that thought becoming reality; OCCWG, 1997) would have been particularly relevant given that the current manipulation insinuated a link between thought and behaviour (i.e., people who have intrusive thoughts about losing control are at greater risk of losing control over their behaviour).

Other avenues for future work include identifying mediators of the relationship between beliefs about losing control and fear of specific stimuli. Cognitive models would predict that misinterpretations of harm-related thoughts as catastrophic and/or personally meaningful mediate this association. Furthermore, assessing the impact of beliefs about losing control on other OC symptoms (e.g., contamination and "just right" experiences) should be explored. Experimental

manipulations could be extended to losing control over one's emotions, bodily functions, and/or physical sensations, and dependent variables could encompass symptoms of other disorders (e.g, panic and social anxiety disorder). Given the lack of a significant difference between conditions on objective caution, researchers may want to find ways to refine how we operationalize and assess this construct. In this study, time taken to sort the stimuli was used as an index of objective caution. Perhaps examining how participants hold the knives and position their fingers (e.g., by coding participants' behaviour) may be a more valid assessment method. Another potential avenue would be to tell participants that they can take as much time as they want to sort the stimuli—instead of asking them to sort the stimuli "as quickly as possible", as in the current study. Finally, when designing a manipulation of beliefs about losing control in future experiments, it will be important to have participants believe they can lose control over their behaviour in general—regardless of the frequency or meaning of their intrusive thoughts. This will reduce the likelihood of also indirectly manipulating metacognitive beliefs like thought-action fusion. This could be achieved, for example, by having participants complete a task in the laboratory that requires controlling their behaviour and then providing them with false feedback about how they performed compared to others and about what that means about their capacity to lose control over their behaviour in general. Of course, assessing other belief domains after the manipulation would allow researchers to examine the extent to which specific beliefs have been manipulated relative to others.

We nonetheless believe that the current study has several strengths. By using an experimental design, we demonstrated the causal role of beliefs about losing control over one's behaviour in the development of key phenomena in OCD. Additionally, we employed a novel experimental manipulation that we believe is ecologically valid, given that it targets the meaning of experiencing intrusive thoughts. The manipulation is therefore consistent with cognitive models of OCD. Previous experiments have instead relied on laboratory-based tasks (e.g., a bogus EEG recording session) to manipulate metacognitive beliefs (e.g., Gagné & Radomsky, 2017; Myers & Wells, 2013; Rassin et al., 1999). Similarly, the BAT resembles exposure protocols for OCD and the stimuli utilized are objects that are feared and avoided by clients and patients, further supporting the utility and ecological validity of the study. Finally, including both objective and subjective measures of caution and intrusive thoughts allowed to increase our understanding of the nuances of common phenomena in OCD, such that it might be individuals'

perception of their behaviour and internal processes that may be particularly important to target in CBT.

Both theoretical and clinical implications may follow from the results of this experiment. The current findings support the proposal that beliefs about control should be expanded in cognitive models of OCD to better integrate aspects of losing control (e.g., Gagné & Radomsky, 2017; Moulding & Kyrios, 2006). Likewise, current formulations of beliefs about control tend to focus on thought control failure (e.g., Clark, 2004), but this study suggests that beliefs about losing control over one's behaviour may be as significant for those with OCD. Indeed, endorsing these beliefs may increase the salience of harm-related intrusive thoughts and may explain avoidance of mundane objects in OCD. Consequently, targeting beliefs about losing control over one's behaviour may be important in CBT to further reduce symptoms. Strategies like behavioural experiments (e.g., comparing one's objective and perceived level of caution while interacting with sharp knives) and Socratic dialogue (e.g., discussing one's likelihood of losing control and critically evaluating past "losses of control") may be helpful to integrate in treatment plans. Such recommendations would naturally benefit from empirical support by conducting intervention studies and clinical trials.

Table 4

Means and Standard Deviations of Experimental Variables by Condition

Variable	LLC[a]		HLC[a]			
	M	*SD*	*M*	*SD*	*p*	*d*
Manipulation check	11.64	15.86	36.75	23.89	< .001	1.24
Credibility check	75.47	22.09	76.95	19.47	.69	0.07
Intrusive thoughts (clicks)	2.16	4.20	2.52	3.11	.58	0.10
Intrusive thoughts (recalled)	0.83	1.18	1.72	1.72	.001	0.60
Objective caution	59.59	11.34	57.97	9.17	.37	0.16
Perceived caution[b]	77.87	17.73	68.17	23.51	.02	0.47

Note. "Intrusive thoughts (clicks)" represents the number of clicks on the tally counter throughout the behavioural approach test and knife sorting task; participants were asked to click the tally counter every time they experienced an intrusive thought related to losing control over their behaviour. "Intrusive thoughts (recalled)" represents the number of intrusive thoughts related to losing control over one's behaviour that participants freely recalled and wrote down at the end of the protocol; participants were asked to write down all the intrusive thoughts they had experienced throughout the behavioural approach test and knife sorting task. "Objective caution" was the total time taken to complete the knife sorting task (i.e., sort all the stimuli in the knife block), with longer times indicating that participants were being more cautious. LLC = lower beliefs about losing control condition. HLC = higher beliefs about losing control condition.

[a]$n = 64$. [b]$n = 105$ (LLC: $n = 52$; HLC: $n = 53$).

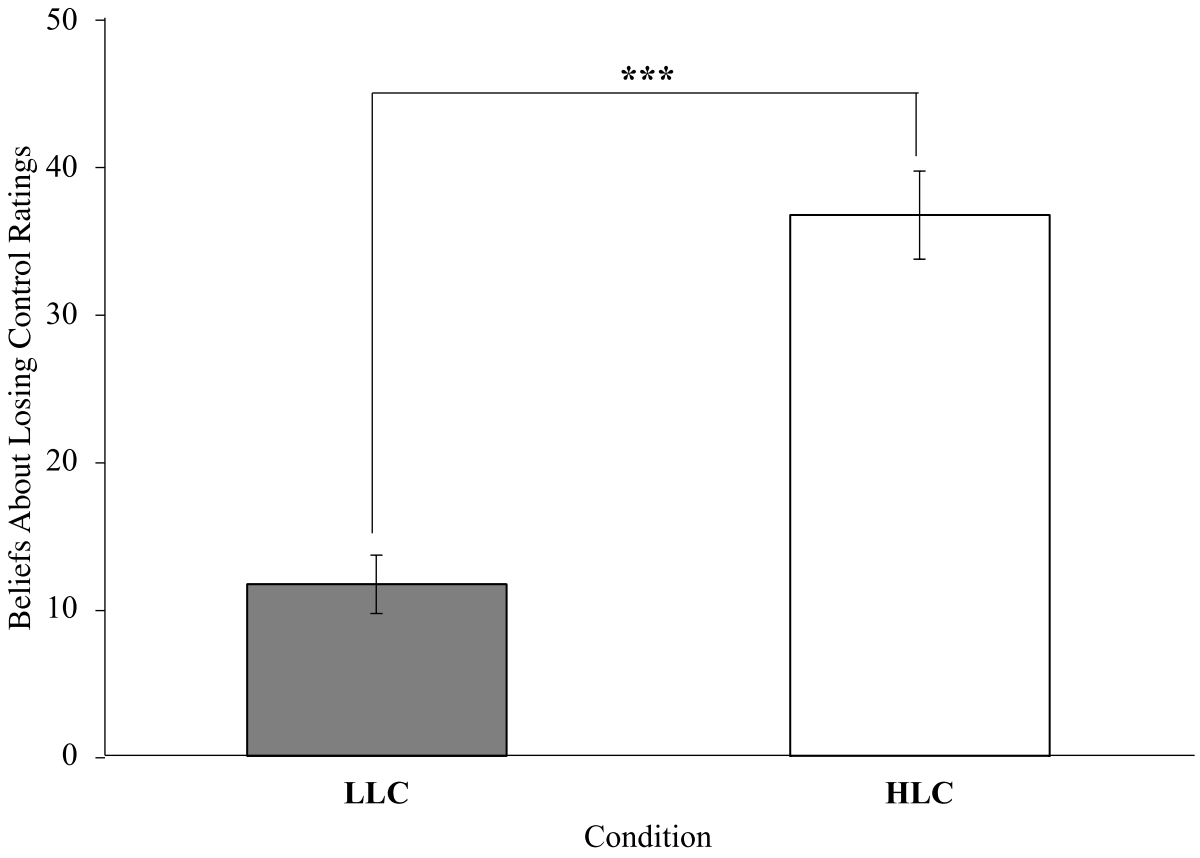

Figure 1. Mean ratings of beliefs about losing control (i.e., manipulation check) by condition. LLC = lower beliefs about losing control condition. HLC = higher beliefs about losing control condition.

***$p < .001$.

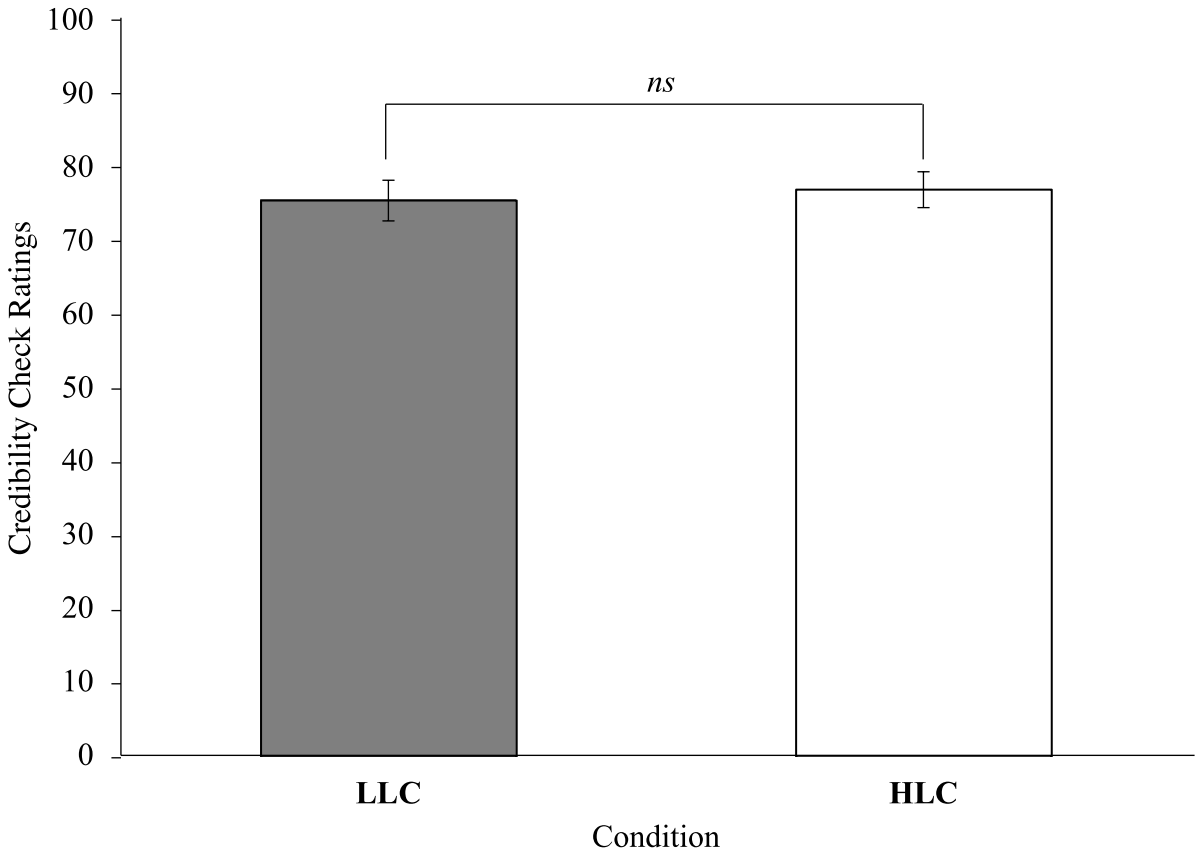

Figure 2. Mean ratings of credibility check (i.e., believability of the false purpose of the study) by condition. LLC = lower beliefs about losing control condition. HLC = higher beliefs about losing control condition.

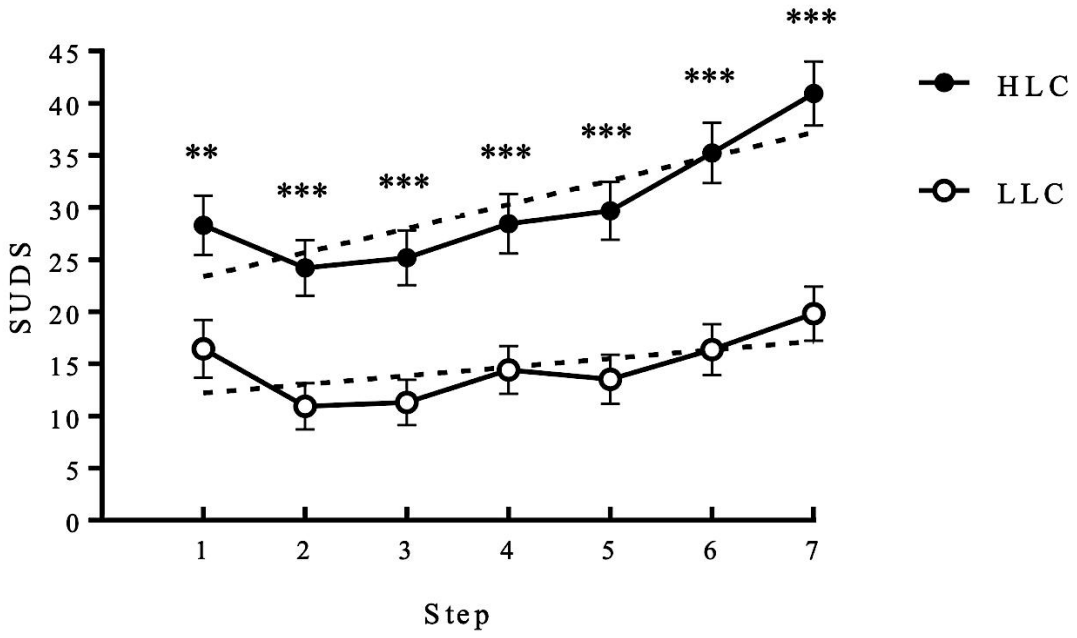

Figure 3. Mean anxiety ratings (i.e., Subjective Units of Distress Scale [SUDS]) throughout the behavioural approach test and simple slopes by condition. HLC = higher beliefs about losing control condition. LLC = lower beliefs about losing control condition.

$^{**}p < .01$, $^{***}p < .001$.

Table 5

Results of Multilevel Modelling – Anxiety Ratings (i.e., Subjective Units of Distress Scale) Throughout the Behavioural Approach Test

	Parameter	*B*	*SE B*	*df*	*t*	*p*	95% CI for *B*
Model 1: Whole Sample[a]	Intercept	11.38	2.22	896	5.12	< .001	7.01 , 15.74
	Condition	9.69	3.14	896	3.08	.002	3.52 , 15.86
	Step	0.83	0.50	896	1.66	.097	-0.15 , 1.80
	Condition × Step Interaction	1.48	0.70	896	2.10	.036	0.10 , 2.86
Model 2: HLC[b]	Intercept	21.06	2.39	448	8.82	< .001	16.37 , 25.76
	Step	2.30	0.53	448	4.32	< .001	1.26 , 3.35
Model 3: LLC[b]	Intercept	11.38	2.05	448	5.56	< .001	7.36 , 15.40
	Step	0.83	0.46	448	1.81	.071	-0.07 , 1.73

Note. For Model 1, predictors were coded as follows: dummy coding for Condition (LLC condition coded 0; HLC condition coded 1) and effect coding for Step (1, 2, 3, … 7) with 1 indicating Step 1 of the behavioural approach test, etc. For Models 2 and 3, the predictor was coded as follows: effect coding for Step (1, 2, 3, … 7) with 1 indicating Step 1 of the behavioural approach test, etc. For Models 1, 2, and 3, anxiety ratings (i.e., Subjective Units of Distress Scale) were used as the dependent variables. HLC = higher beliefs about losing control condition. LLC = lower beliefs about losing control condition.

[a]$N = 128$. [b]$n = 64$.

Table 6

Means, Standard Deviations, and Test Statistics of Anxiety Ratings (i.e., Subjective Units of Distress Scale) at Every Step of the Behavioural Approach Test by Condition

Step	LLC[a]		HLC[a]					
	M	*SD*	*M*	*SD*	*t*	*df*	*p*	*d*
1	16.45	22.40	28.30	22.83	2.96	126	.004	0.52
2	10.92	17.71	24.19	21.24	3.84	122.04	< .001	0.68
3	11.31	17.49	25.19	21.00	4.06	122.01	< .001	0.72
4	14.41	18.21	28.44	22.79	3.85	120.15	< .001	0.68
5	13.52	18.81	29.69	22.38	4.42	122.38	< .001	0.78
6	16.38	19.59	35.23	23.01	4.99	126	< .001	0.88
7	19.80	20.84	40.94	24.65	5.24	126	< .001	0.93

Note. "Step" indicates the steps of the behavioural approach test (i.e., Step 1: standing outside of the laboratory kitchen with the door closed; Step 2: standing inside the kitchen, close to the door; Step 3: standing halfway between the door and the threatening stimuli; Step 4: standing next to the stimuli; Step 5: touching the chef knife with one's index finder; Step 6: holding the chef knife to the side of one's body using a reverse grip at a 1.5-metre distance from the experimenter; Step 7: holding the chef knife above one's head using a reverse grip at a 1.5-metre distance from the experimenter). HLC = higher beliefs about losing control condition. LLC = lower beliefs about losing control condition.

[a]$n = 64$.

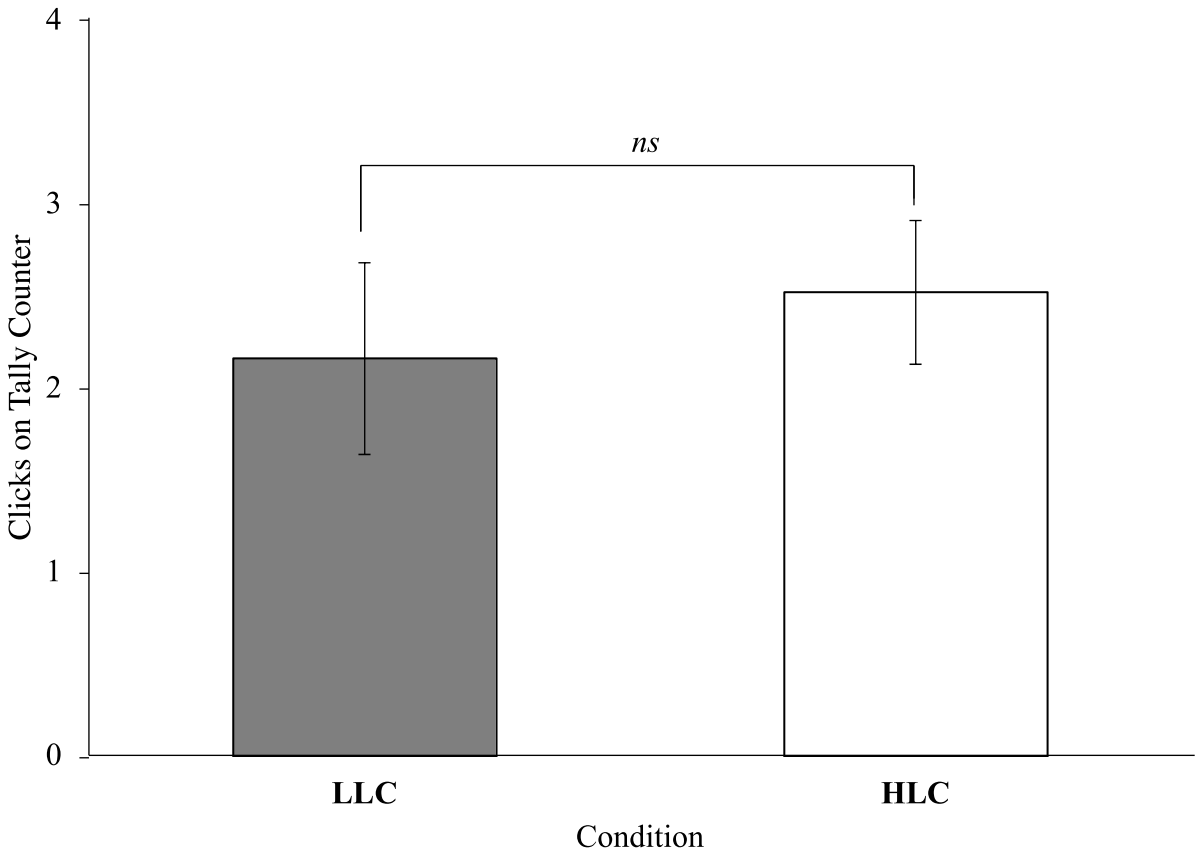

Figure 4. Mean number of clicks on the tally counter (i.e., number of intrusive thoughts pertaining to losing control reported throughout the behavioural approach test and knife sorting task combined) by condition. LLC = lower beliefs about losing control condition. HLC = higher beliefs about losing control condition.

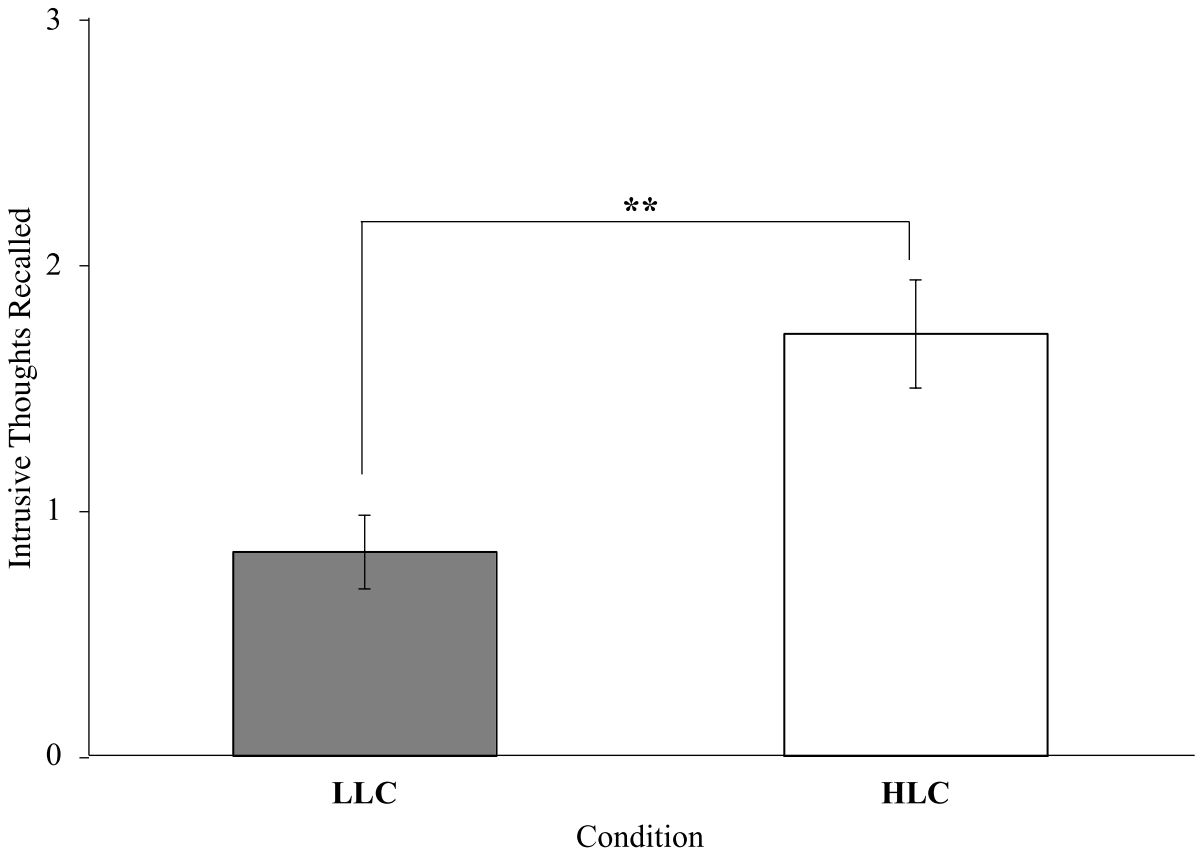

Figure 5. Mean number of intrusive thoughts pertaining to losing control freely recalled at the end of the protocol by condition. LLC = lower beliefs about losing control condition. HLC = higher beliefs about losing control condition.

$^{**}p < .01$.

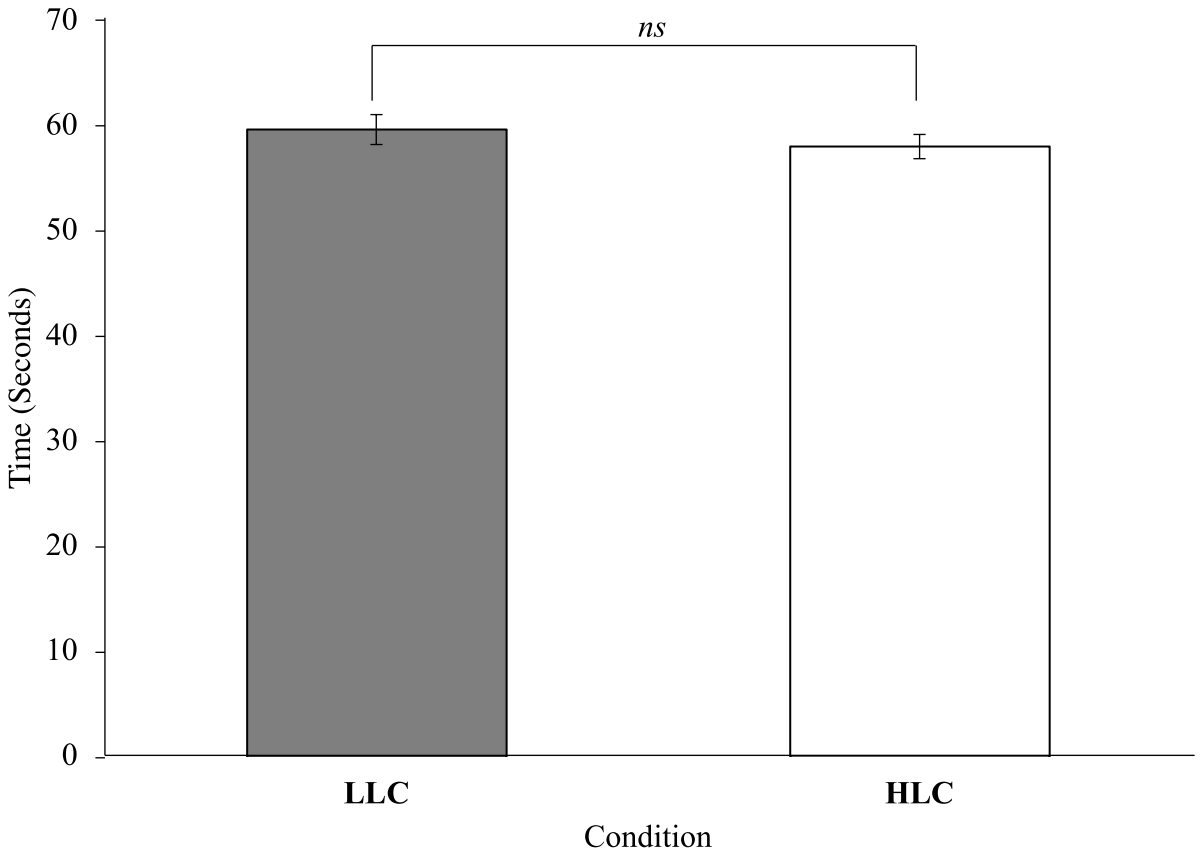

Figure 6. Mean completing time (in seconds) of the knife sorting task (i.e., measure of objective caution while interacting with the stimuli) by condition. LLC = lower beliefs about losing control condition. HLC = higher beliefs about losing control condition.

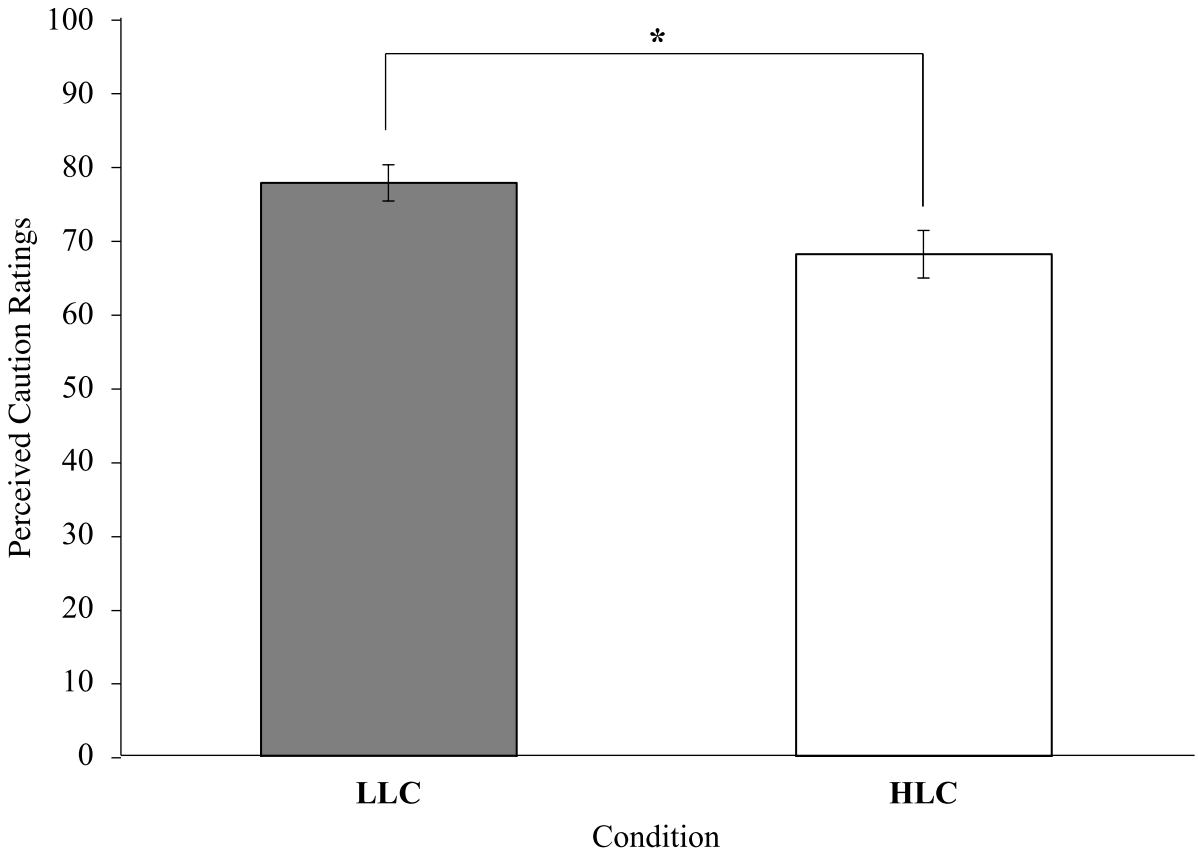

Figure 7. Mean ratings of perceived caution during the knife sorting task (i.e., while interacting with the stimuli) by condition. LLC = lower beliefs about losing control condition. HLC = higher beliefs about losing control condition.

*$p < .025$.

CHAPTER 5

Bridge

Several individuals with OCD report a fear of acting on unwanted impulses and of harming loved ones (e.g., Rachman & Hodgson, 1980). As a result, they often avoid threatening stimuli like kitchen knives and scissors or experience intense anxiety when asked to interact with them (e.g., Abramowitz et al., 2013; Thyer, 1985). Recent experimental evidence suggests that beliefs about one's likelihood of losing control could be involved in the development of compulsive checking (Gagné & Radomsky, 2017), a primary symptom in OCD. It was therefore suggested that beliefs about losing control over one's behaviour could play a role in other OCD-related phenomena, including these maladaptive behavioural and emotional experiences around threatening stimuli.

Study 2 was undertaken with the goal of manipulating the belief that losing control over one's behaviour is likely, as a way to assess the impact of this belief on people's cognitive, emotional, and behavioural experiences while approaching and interacting with stimuli that are typically feared and avoided in OCD (i.e., kitchen knives and scissors). Results from a sample of undergraduate students indicated that believing that one is likely to lose control over their behaviour led to increasingly higher anxiety while approaching kitchen knives and scissors. This belief also led to perceiving oneself as less cautious while interacting with the stimuli and to recalling experiencing more intrusive thoughts about losing control. However, the belief manipulation did not seem to have an impact on actual caution (i.e., no behavioural differences) or on the actual number of reported intrusive thoughts experienced while interacting with the stimuli.

In this way, results from Study 2 support that beliefs about losing control over one's behaviour could be involved in the experience of anxiety when exposed to knives and scissors, especially at higher levels of threat. Also, it appears that these beliefs could negatively impact one's perception of how cautious they are while interacting with the stimuli, which could perhaps explain why individuals with OCD may prefer to avoid them altogether. In addition, beliefs about losing control may not directly cause the experience of intrusive thoughts but may increase the memorability of these thoughts, which is consistent with cognitive theory (e.g., Clark, 2004; Rachman, 1997, 1998, 2002; Salkovskis, 1985, 1999).

Together, the abovementioned findings add to the growing literature that beliefs about losing control may be relevant to incorporate into cognitive models of OCD. Still, it is well documented that maladaptive beliefs involved in OCD are also at play in other anxiety-related problems (e.g., Tolin et al., 2006). For example, in their cognitive model of SAD, Clark and Wells (1995) suggest that individuals with SAD believe they are at risk of "behaving in an inept and unacceptable fashion" (pp. 69-70). This perhaps indicates that beliefs about losing control over one's behaviour may be maintaining factors of symptoms (e.g., anxiety prior to and during a social interaction) and cognitive-behavioural processes (e.g., post-event processing and safety behaviour) that are typically observed in SAD.

Research on alcohol expectancies (or one's beliefs about the consequences of drinking) in relation to shyness (e.g., Bruch et al., 1992) and SAD (e.g., Eggleston et al., 2004) also supports that some individuals avoid drinking due to a fear of behavioural impairment and embarrassment around others—which appears to be directly related to a fear of losing control. This could mean that underlying beliefs about losing control are primed upon drinking for some individuals with SAD. However, experimental work is needed to investigate this proposal and to assess the impact of negative beliefs about losing control on symptoms and processes of SAD.

Support for the hypothesis that beliefs about losing control (primed upon drinking alcohol) play a role in the development and maintenance of SAD could shed light on the inner workings of this disorder and of people's negative expectancies about the effects of alcohol. Additionally, empirical evidence suggesting a causal relationship between these beliefs and SAD-related phenomena could lead to focused cognitive strategies, wherein maladaptive beliefs about losing control (e.g., "I am at risk of losing control over my actions and speech"; "If I lose control, I will embarrass myself") could feature as potential intervention targets.

CHAPTER 6

Manipulating Alcohol Expectancies in Social Anxiety: A Focus on Beliefs About Losing Control

Social anxiety disorder (SAD) is characterized by elevated fear of situations in which being scrutinized or evaluated by others is possible (American Psychiatric Association [APA], 2013). Individuals with SAD fear behaving in a way or showing signs of anxiety that might lead to embarrassment, humiliation, and/or rejection (APA, 2013). According to epidemiological surveys, the lifetime prevalence rate of SAD is 13% (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). SAD is also associated with the development of other problems, including substance use (e.g., Schneier et al., 2010) and mood disorders (e.g., Koyuncu et al., 2014), and with substantial impairment in social and occupational domains (e.g., Aderka et al., 2012). Nonetheless, experiences associated with SAD fall on a continuum. Research on subclinical social anxiety has shown that 50% to 61% of individuals report being socially anxious in at least one situation (Hofmann & Roth, 1996; Stein, Walker, & Forde, 1994). As such, examining social anxiety in various samples, including non-clinical ones (e.g., university students), is important to better understand the spectrum of social anxiety and human behaviour (e.g., Purdon, Antony, Monteiro, & Swinson, 2001).

According to early cognitive models (e.g., Clark & Wells, 1995; Leary, 2001; Rapee & Heimberg, 1997), individuals who experience social anxiety perceive social situations as threatening. Specifically, they believe they are at risk of behaving in an unacceptable manner and overestimate the cost of such behaviour (e.g., loss of status/worth and rejection). Unconditional beliefs about oneself (e.g., “I’m odd”), high standards for social performance (e.g., “I must appear smart all the time”), and assumptions about social evaluation (e.g., “If others see I’m odd, they’ll reject me”) are proposed to underlie these perceptions of threat. Importantly, cognitive-behavioural processes appear to play a role in the maintenance of symptoms, as they prevent disconfirmation of such beliefs and assumptions. For example, prior to a social situation, individuals with elevated social anxiety often engage in anticipatory processing (i.e., thinking about what might happen and focusing on negative images of oneself and/or past social failures), which is accompanied by anticipatory anxiety and, sometimes, avoidance of the situation altogether. During a social situation, it is not uncommon for those with social anxiety to rely on safety behaviour to prevent negative consequences from happening and/or alleviate their anxiety

(e.g., speaking less, avoiding eye contact, holding nearby objects tightly to avoid shaking). After a social situation, engaging in post-event processing—or reviewing a social interaction with a focus on perceived negative aspects of the interaction—reinforces irrational beliefs/assumptions and transforms the event into another social failure for the individual (e.g., Clark & Wells, 1995).

Alternative (but complementary) models of social anxiety suggest that perceived anxiety control, or the extent to which one believes they have control over their anxiety response, plays a key role in the aetiology and maintenance of symptoms (Hofmann, 2005; Hofmann & Barlow, 2002; Rapee, Craske, Brown, & Barlow, 1996). In other words, individuals with social anxiety avoid social situations in part because they fear losing control over their emotional response (i.e., "emotional bursts", Hofmann, 2005, p. 887). This idea has been captured in items of self-report measures of SAD (e.g., "I worry I'll lose control in front of other people"; Mattick & Clarke, 1998) and psychometric findings have provided evidence for these alternative models. For instance, the relationship between estimated social cost and anxiety in a given social situation has been shown to be mediated by perceived anxiety control (Hofmann, 2005).

These models are in line with earlier research showing that beliefs about control over one's emotions are central cognitions across anxiety disorders (e.g., Glass & Singer, 1970). However, beliefs about control cover a range of psychological functions beyond emotions. For instance, a fear of losing control over one's bodily sensations has been documented in panic disorder (e.g., Hedley, Hoffart, & Sexton, 2001). Also, individuals with obsessive-compulsive disorder (OCD) report a fear of losing control over their thoughts and, as a result, over their behaviour (e.g., Clark, 2004; Gagné & Radomsky, 2017, 2020). Again, cognitive models emphasize that individuals with social anxiety believe they are at risk of behaving in an unacceptable fashion and of embarrassing themselves (e.g., Clark & Wells, 1995), indicating that negative beliefs about losing control over one's behaviour may be involved in the maintenance of experiences associated with social anxiety.

Research investigating the complex relationship between social anxiety and alcohol use also appears to support the importance of negative beliefs about losing control over one's behaviour. Interestingly, social anxiety is associated with both increased risk for alcohol use disorder (e.g., Himle & Hill, 1991; Regier et al., 1990) and lower levels of alcohol use (e.g., Bruch et al., 1992; Rohsenow, 1983; Tran, Haaga, & Chambless, 1997). Other research has found no association between these two variables (e.g., Buckner, Schmidt, & Eggleston, 2006). It

has been proposed that alcohol expectancies—one's beliefs about the consequences of drinking—may explain these inconsistent findings (e.g., Brown, Goldman, Inn, & Andersen, 1980; Goldman, Brown, & Christiansen, 1987). On the one hand, individuals with positive alcohol expectancies may believe that drinking will allow them to alleviate their anxiety—the basic idea behind tension reduction theory (Conger, 1951, 1956; Greeley & Oei, 1999). On the other hand, those with negative alcohol expectancies may believe that drinking will lead to behavioural impairment and embarrassment in front of others (e.g., Eggleston, Woolaway-Bickel, & Schmidt, 2004; Fromme, Stroot, & Kaplan, 1993). As such, this fear of behaving in an unacceptable fashion and/or of embarrassing oneself may underlie avoidance of alcohol for some individuals with social anxiety (e.g., Eggleston et al., 2004). In support of this hypothesis, research has shown that, among individuals with lower levels of positive alcohol expectancies, those with higher social anxiety symptoms were significantly less likely to use alcohol (Tran et al., 1997). Also, it has been demonstrated that alcohol expectancies operate as a suppressor variable, such that adding this variable in regression models reveals a significant, negative relationship between shyness and alcohol use (e.g., Bruch et al., 1992).

The goal of the current experiment was to manipulate negative alcohol expectancies pertaining to losing control over one's behaviour (i.e., the belief that alcohol puts you at risk of losing control over your behaviour and that this can lead to embarrassment) to assess their impact on symptoms and processes associated with social anxiety. As such, in this experiment, participants were randomly assigned to drinking vodka with orange juice (i.e., alcohol condition), alcohol-free vodka with orange juice (i.e., placebo condition), or orange juice only (i.e., control condition). Participants were then exposed to a prime targeting these negative alcohol expectancies and were asked to interact with a stranger (i.e., a research assistant during a 'getting to know you' task). The placebo condition was included to observe the unique contribution of these negative beliefs about losing control (without intoxication).

The rationale underlying our predictions was that negative beliefs about losing control over one's behaviour would be the primary ingredient driving the development of experiences related to social anxiety. Accordingly, it was hypothesized that participants in the alcohol and placebo conditions would provide similar (i.e., not significantly different) ratings of anticipatory anxiety, anxiety during the 'getting to know you' task, perceived social competence (i.e., perception of the first impression they made), and post-event processing. It was also predicted

that ratings of anticipatory anxiety, anxiety during the 'getting to know you' task, and post-event processing would be significantly lower in the control (versus alcohol and placebo) condition. However, it was hypothesized that ratings of subjective first impression would be significantly higher in the control (versus alcohol and placebo) condition. Length of time spent speaking during the 'getting to know you' task was included as an exploratory measure of safety behaviour and was thus also compared across conditions. Previous experimental work by Battista, MacDonald, and Stewart (2012) has shown that, for socially anxious individuals, drinking alcohol (versus orange juice) reduces the tendency to rely on safety behaviour (e.g., increased speaking time), and so including this variable appeared informative. Battista and colleagues conceptualized reduced speaking time as a form of avoidance or safety behaviour as participants might be 'holding back' when providing shorter answers.

Method

Participants

Participants were 93 undergraduate students recruited from Concordia University. There were 31 participants in each condition. The sample size was consistent with results from a priori power analyses conducted with G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009), in which parameters were entered as follow: $f = 0.33$; $\alpha = .05$; $1\text{-}\beta = .80$; groups = 3. Participants either received $10 per hour or course credits for participating. To be eligible, they had to meet the following criteria: 1) 18 years of age or older; 2) fluent in English; 3) must have consumed at least one alcoholic drink in the past month; 3) no history of or current problem with alcohol use; 4) not pregnant, trying to get pregnant, or breastfeeding; 5) not taking medications for which alcohol consumption is contraindicated; 6) no current medical conditions that would make alcohol consumption problematic; 7) not advised by any health professionals not to consume alcohol; and 8) no history of head injuries. Participants' mean age was 22.16 ($SD = 2.90$; range = 18-32) years. Also, 70.97% of the sample was female ($n = 66$) and 55.91% of the sample was Caucasian ($n = 52$). There were no significant differences in terms of age, $F(2, 90) = 2.20$, $p = .12$, sex, $\chi^2(2) = 0.31$, $p = .86$, ethnicity, $\chi^2(12) = 10.52$, $p = .57$, or educational attainment, $\chi^2(8) = 6.85$, $p = .55$, between the three conditions.

Measures

Demographics. Participants provided general demographic information (e.g., age, sex, ethnicity, and educational attainment).

Manipulation checks. Two manipulation checks were included in this experiment.

Sensation Scale. To assess participants' perceptions of their physiological experience/intoxication level, they completed the Sensation Scale (Maisto, Connors, Tucker, McCollam, & Adesso, 1980). Participants were asked to rate the extent to which they experienced 31 physical sensations associated with alcohol consumption (e.g., drowsy, nauseous, warm), on a scale from 0 (*not at all*) to 10 (*a great deal*). Because our formulas targeted a breath alcohol concentration (BrAC) of approximately .08 gm%, it was expected that participants in the alcohol (versus placebo and control) condition would score significantly higher on this measure (e.g., Martin, Earleywine, Finn & Young, 1990). Still, it was expected that participants in the placebo condition, relative to those in the control condition, would also score significantly higher on this measure (e.g., Abbey, Zawacki, & Buck, 2005).

Beliefs about losing control. To assess the extent to which participants believed they could lose control over their behaviour after drinking their assigned beverages, they were asked the following question: "On a scale from 0 (*not at all*) to 100 (*extremely*), to what extent do you believe you could lose control over what you do and/or say because of the drinks you just had?" (adapted from Gagné & Radomsky, 2017). It was expected that participants in the alcohol and placebo conditions would provide similar (i.e., not significantly different) ratings on this item, and that their ratings would be significantly higher than those in the control condition.

Credibility checks. Two credibility checks were included in this experiment.

Alcohol. To assess the extent to which participants believed they had actually consumed alcohol, they were asked the following question at the end of the protocol: "On a scale from 0 (*did not believe it at all*) to 100 (*believed it completely*), to what extent did you believe that you were drinking alcohol?". Based on previous work (see Testa et al., 2006 for a review), it was expected that participants in the alcohol (versus placebo and control) condition would score significantly higher on this question; it was also expected that participants in the placebo condition, relative to the control condition, would score significantly higher on this question.

Purpose of the study. To assess the extent to which participants believed the false purpose of the study (i.e., investigating the relationship between alcohol and first impressions), they were asked the following question at the end: "On a scale from 0 (*did not believe it at all*) to 100 (*believed it completely*), to what extent did you believe that the study examined alcohol and first impressions?". No significant differences were expected between the three conditions.

Anticipatory anxiety. To assess the extent to which participants felt anxious about meeting the research assistant (i.e., anticipatory anxiety), they were asked the following question after drinking their assigned beverages and prior to the 'getting to know you' task: "On a scale from 0 (*neutral* or *not anxious at all*) to 100 (*the worst anxiety you can imagine*), to what extent are you anxious about meeting the research assistant?" (adapted from Wolpe, 1958).

Anxiety during the 'getting to know you' task. To assess the extent to which participants felt anxious during the 'getting to know you' task, they were asked the following question immediately after completing the task: "On a scale from 0 (*neutral* or *not anxious at all*) to 100 (*the worst anxiety you can imagine*), how anxious did you feel during the social interaction?" (adapted from Wolpe, 1958).

Subjective first impression. To assess participants' perception of their social competence, they were asked to provide a subjective rating of the first impression they made during the 'getting to know you' task. Immediately after completing the task, they were asked the following question: "On a scale from 0 (*worst impression*) to 100 (*best impression*), how good a first impression do you think you made?".

Post-Event Processing Questionnaire—Revised (PEPQ-R). The PEPQ-R (McEvoy & Kingsep, 2006; adapted from Rachman, Grüter-Andrew, & Shafran, 2000) is a 14-item self-report measure. It was used to assess the extent to which participants engaged in post-event processing 24 hours following the laboratory session. A link to the questionnaire was sent to them via email. Instructions were modified to ensure participants had the 'getting to know you' task with the research assistant in mind when completing the questionnaire. The first item focuses on how much anxiety participants experienced, and the other thirteen items are directly related to the extent to which they engaged in post-event processing (0 = *not at all*; 100 = *extremely*). The 14-item version has been shown to have good internal consistency ($\alpha = .87$; McEvoy & Kingsep, 2006), which was the case in the current sample as well ($\alpha = .85$).

Speaking time. Participants' speaking time during the 'getting to know you' task was measured (in seconds) and was used as an index of safety behaviour, with shorter speaking times indicating a higher reliance on safety behaviour (see Battista et al., 2012). Because the research assistant was trained to follow a script and always provide the same responses, the full length of the 'getting to know you' task was used as the dependent variable (such that only variations in participants' responses/speaking time would influence the total length of the interaction).

Materials

Breathalyzer. An Alco-Sensor IV breathalyzer device (Intoximeters, Inc., 1997) was used throughout the protocol to assess participants' BrAC. Please see Table 7 for means and standard deviations of BrAC for those in the alcohol condition throughout the protocol.

Procedure

Those interested in participating in this study signed up to complete a screening questionnaire through Concordia University's participant pool. The questionnaire assessed the abovementioned eligibility criteria (including demographic information); potential participants received course credits for completing this part. If eligible, potential participants were contacted via email and were provided with key information about the laboratory session. If interested, a session was scheduled. Participants were instructed not to drink alcohol, smoke cannabis, or take medications for twelve hours prior to the session, not to eat and drink anything (other than water) for three hours prior to the session, and not to drive a car or ride a bike to campus.

Upon arriving to the laboratory, participants entered a waiting room and were asked to verify their responses on the screening questionnaire. All participants denied any changes since completing the questionnaire. The other eligibility criteria (e.g., not driving) were also verified. Participants were told that the study focuses on how alcohol influences people's first impressions of others but especially others' first impression of them (i.e., incomplete/false purpose of the study). They were provided with information about the protocol (e.g., "you will be randomly assigned to the alcohol or orange juice condition") but no information about the placebo condition was provided. They then read and signed the consent form.

To begin, participants' baseline BrAC was assessed to ensure a reading of 0.00 gm% (which was the case for all participants). Then, their weight was measured using a digital scale. Afterwards, they were asked to move to a laboratory room (i.e., the 'bar') designed to look like a contemporary bar to enhance ecological validity.

Participants sat on a stool at the bar and the experimenter remained behind the bar (i.e., typical position of a bartender). Participants were then randomly assigned to one of the three conditions using an online randomizer and were informed of the results—although those in the placebo condition were told that they had been randomly assigned to the alcohol condition. The experimenter prepared the drinks according to their condition and participants were able to observe the process. Drinks were prepared based on a formula commonly used in studies

involving alcohol (e.g., MacDonald, Baker, Stewart, & Skinner, 2000). This formula is designed so that participants in the alcohol condition reach a BrAC of approximately 0.08 gm%. In the alcohol condition, participants received a mix of vodka and orange juice (women: 2.28 ml 50% USP units of alcohol per kilogram of body weight, mixed 1:4 parts vodka/orange juice; men: 2.73 ml 50% USP units of alcohol per kilogram of body weight, mixed 1:4 parts vodka/orange juice). In the placebo condition, participants received a mix of alcohol-free vodka and orange juice (same total volume of liquid as in the alcohol condition based on sex and weight but 60% of the volume was alcohol-free vodka and 40% of the volume was orange juice). Of note, the alcohol-free vodka was presented in an identical bottle as the alcoholic vodka. In the control condition, participants received orange juice (same total volume of liquid as in the alcohol condition based on sex and weight but 100% of the volume was orange juice). The total volume was equally distributed into three glasses (i.e., three drinks to consume). Participants were given five minutes to consume each drink. The experimenter left the 'bar' while participants were drinking but came back every five minutes to give them the next drink.

This step was followed by a 20-minute absorption period. The experimenter told participants that he would take advantage of that waiting time to provide them with information about the negative consequences of consuming alcohol (i.e., prime). Participants were 'informed' that alcohol lowers inhibitory capacities and that it can make people lose control over what they do and what they say around others. They were also told that this explains why people often do or say embarrassing things under the influence of alcohol. Those in the control condition were told that they were protected from these negative consequences given that they had only received orange juice. Then, participants were given information about the upcoming 'getting to know you' task. They were told that they would soon get to know a research assistant who is completely sober and who has experience in meeting new people for this study. Participants were also told that they would be video recorded and that they would evaluate each other's performance after the interaction. For the rest of the absorption period, participants remained by themselves in the 'bar' and were asked to read a 'brochure' about the negative consequences of drinking (i.e., prime). This bogus document was created to reiterate similar information as

mentioned above (i.e., alcohol can make people lose control over their behaviour). Bogus references and logos of health agencies and of the university were included on the document[4].

After the absorption period, the experimenter came back and asked all participants to rinse their mouth for ten seconds and to repeat this procedure three times. Then, for participants in the alcohol and placebo conditions, their BrAC was measured. They were not informed of their BrAC at any point. Afterwards, participants moved to a computer room to answer the two manipulation check questions and to provide a rating of their anticipatory anxiety. The form included several filler questions to hide the true purpose of the study (e.g., "On a scale from 0 (*not tasty at all*) to 100 (*extremely tasty*), how tasty were the drinks you just had?"). They then moved back to the 'bar' and sat on the same stool.

The experimenter provided participants with instructions regarding the upcoming 'getting to know you' task. They were given a document with 15 questions and were told that the research assistant had been 'randomly assigned' to ask questions with an odd number, such that participants would ask questions with an even number. In reality, the research assistant was always assigned questions with odd numbers to ensure she followed the script. Then, for participants in the alcohol and placebo conditions, their BrAC was measured (i.e., ten minutes since the last measure). The video recorder was turned on and the experimenter left the 'bar'.

For the 'getting to know you' task, the research assistant sat close to the participant (i.e., there was always one empty stool between them). The research assistant asked the first question and participants answered back. Then, participants asked the second question and the research assistant answered back according to the script (so forth and so on until they reached the fifteenth question). The document included questions about past experiences, the future, and hypothetical scenarios (e.g., "What would constitute a perfect day for you?")[5]. The 'getting to know you' task was timed to measure participants' speaking time. The same female research assistant interacted with all participants. She was trained to remain neutral by not displaying any positive or negative emotional reactions following participants' responses. After the task, the experimenter came back in the 'bar' and provided participants and the research assistant with 'evaluation sheets'. Participants were asked to provide a rating of their anxiety level during the social interaction and a rating of their subjective first impression. The form included several filler questions to hide the

[4] The bogus brochure can be found in Appendix C.
[5] The questions and script from the 'getting to know you' task can be found in Appendix D.

true purpose of the study (e.g., "On a scale from 0 [*worst impression*] to 100 [*best impression*], how good a first impression did the research assistant make?"). The research assistant left the 'bar' after 'completing' her form. Then, for participants in the alcohol and placebo conditions, their BrAC was measured (i.e., ten minutes since the last measure).

Participants moved to the waiting room for the detoxification period. All participants waited for at least 1.5 hours to ensure consistency across conditions. During this time, no phones or computers were allowed to control for social interactions. Participants were provided with snacks and coffee/tea/water and were allowed to read and/or rest. For participants in the alcohol condition, their BrAC was monitored to determine peak concentration and when they would be able to leave the laboratory (i.e., at or below 0.04 gm%). For participants in the placebo condition, their BrAC was 'monitored' in the same manner to mimic this procedure. After 1.5 hours, all participants moved to the computer room to answer the two credibility check questions. They then came back to the waiting room for the partial debriefing: they were provided with all information pertaining to the study (including the existence of a placebo condition) but no information regarding post-event processing was mentioned. They were told that they would receive a follow-up questionnaire by email in 24 hours and were asked to complete it as soon as they received it. Participants were compensated and left the laboratory, although those in the alcohol condition typically had to wait for their BrAC to further decrease.

Twenty-four hours later, participants were sent a link to the PEPQ-R. After completing the questionnaire, a full debriefing document appeared and included contact information.

Statistical Plan

There were two univariate outliers on anxiety ratings during the 'getting to know you' task, one on PEPQ-R scores, and one on speaking time during the 'getting to know you' task. Each outlying score was replaced with the next highest score within 3.29 standard deviations of the mean (Tabachnick & Fidell, 2007). There were no multivariate outliers and no missing data. For all dependent variables, skewness and kurtosis were found to be acceptable (Kline, 2009).

For primary analyses, a one-way analysis of variance (ANOVA) was conducted to assess condition differences for each of the variables below (i.e., manipulation checks, credibility checks, and dependent variables). If significant ($p < .05$), the one-way ANOVA was followed by three independent samples *t*-tests to examine comparisons between the three conditions. Given the number of planned comparisons, a Bonferroni correction was applied ($\alpha = .05/3 \approx .02$).

Results

Manipulation Checks

Perception of physiological experience. There were significant differences between conditions on Sensation Scale scores, $F(2, 90) = 47.38$, $p < .001$, $\eta_p^2 = 0.51$. As expected, participants in the alcohol condition had significantly higher scores on the Sensation Scale, relative to those in the control condition, $t(34.30) = -9.21$, $p < .001$, $d = 2.34$. As predicted, participants in the alcohol condition also had significantly higher scores on the Sensation Scale, relative to those in the placebo condition, $t(52.49) = 5.60$, $p < .001$, $d = 1.42$. Finally, as hypothesized, participants in the placebo condition had significantly higher scores on the Sensation Scale, relative to those in the control condition, $t(39.34) = -3.86$, $p < .001$, $d = 0.98$. Please see Figure 8 for a visual representation of these results and Table 8 for means and standard deviations.

Beliefs about losing control. There were significant differences between conditions on ratings of beliefs about losing control over one's behaviour, $F(2, 90) = 27.93$, $p < .001$, $\eta_p^2 = 0.38$. As expected, participants in the alcohol condition had significantly higher scores on this manipulation check, relative to those in the control condition, $t(60) = -8.76$, $p < .001$, $d = 2.23$. As predicted, participants in the placebo condition also had significantly higher scores on this manipulation check, relative to those in the control condition, $t(51.50) = -4.95$, $p < .001$, $d = 1.26$. Finally, as hypothesized, there were no significant differences on this manipulation check between the alcohol and placebo conditions, $t(50.37) = 1.69$, $p = .10$, $d = 0.43$. Please see Figure 9 for a visual representation of these results and Table 8 for means and standard deviations.

Credibility Checks

Alcohol. There were significant differences between conditions on the credibility check assessing the extent to which participants believed they had consumed alcohol, $F(2, 90) = 123.82$, $p < .001$, $\eta_p^2 = 0.73$. As expected, participants in the alcohol condition had significantly higher scores on this credibility check, relative to those in the control condition, $t(30.84) = -34.12$, $p < .001$, $d = 8.66$. As predicted, participants in the alcohol condition also had significantly higher scores on this credibility check, relative to those in the placebo condition, $t(39.36) = 4.96$, $p < .001$, $d = 1.26$. Finally, as hypothesized, participants in the placebo condition had significantly higher scores on this credibility check, relative to those in the control condition,

$t(30.13) = -8.39$, $p < .001$, $d = 2.13$. Please see Figure 10 for a visual representation of these results and Table 8 for means and standard deviations.

Purpose of the study. As expected, there were no significant differences between conditions on the credibility check assessing the believability of the false purpose of the study, $F(2, 90) = 0.55$, $p = .58$, $\eta_p^2 = 0.01$. Please see Table 8 for means and standard deviations.

Anticipatory Anxiety

There were significant differences between conditions on ratings of anticipatory anxiety, $F(2, 90) = 14.07$, $p < .001$, $\eta_p^2 = 0.24$. As expected, participants in the alcohol condition reported significantly greater anticipatory anxiety, relative to those in the control condition, $t(60) = -2.54$, $p = .01$, $d = 0.65$. Likewise, participants in the placebo condition reported significantly greater anticipatory anxiety, relative to those in the control condition, $t(30.13) = -5.60$, $p < .001$, $d = 1.43$. However, contrary to our hypothesis, participants in the placebo condition reported significantly greater anticipatory anxiety, relative to those in the alcohol condition, $t(60) = -2.62$, $p = .01$, $d = 0.67$. Please see Figure 11 for a visual representation of these results and Table 8 for means and standard deviations.

Anxiety During the 'Getting to Know You' Task

There were significant differences between conditions on anxiety ratings during the 'getting to know you' task, $F(2, 90) = 5.99$, $p = .004$, $\eta_p^2 = 0.12$. As expected, participants in the alcohol condition reported significantly greater anxiety during the social interaction, relative to those in the control condition, $t(51.04) = -2.59$, $p = .01$, $d = 0.66$. Participants in the placebo condition also reported significantly greater anxiety during the interaction, relative to those in the control condition, $t(49.32) = -3.54$, $p = .001$, $d = 0.90$. Finally, as hypothesized, there were no significant differences on anxiety ratings during the interaction between the alcohol and placebo conditions, $t(60) = -0.81$, $p = .38$, $d = 0.23$. Please see Figure 12 for a visual representation of these results and Table 8 for means and standard deviations.

Subjective First Impression

There were significant differences between conditions on ratings of subjective first impression, $F(2, 90) = 5.32$, $p = .01$, $\eta_p^2 = 0.11$. As expected, participants in the placebo condition reported making a significantly poorer first impression, relative to those in the control condition, $t(51.59) = -0.81$, $p = .01$, $d = 0.70$. However, contrary to our hypothesis, participants in the placebo condition also reported making a significantly poorer first impression, relative to

those in the alcohol condition, $t(60) = 2.56$, $p = .01$, $d = 0.65$. Also, contrary to our hypothesis, there were no significant differences on subjective first impression between the alcohol and control conditions, $t(60) = 0.10$, $p = .92$, $d = 0.03$. Please see Figure 13 for a visual representation of these results and Table 8 for means and standard deviations.

Post-Event Processing

There were significant differences between conditions on PEPQ-R scores when measured 24 hours after the laboratory session, $F(2, 90) = 4.44$, $p = .02$, $\eta_p^2 = 0.09$. As expected, participants in the alcohol condition reported engaging in significantly more post-event processing, relative to those in the control condition, $t(60) = -2.57$, $p = .01$, $d = 0.65$. Participants in the placebo condition also reported engaging in significantly more post-event processing, relative to those in the control condition, $t(47.81) = -2.77$, $p = .001$, $d = 0.70$. Finally, as hypothesized, there were no significant differences on PEPQ-R scores between the alcohol and placebo conditions, $t(60) = -0.64$, $p = .53$, $d = 0.16$. Please see Figure 14 for a visual representation of these results and Table 8 for means and standard deviations.

Speaking Time

As determined by a one-way ANOVA, there were significant differences between conditions on speaking time during the 'getting to know you' task, $F(2, 90) = 5.90$, $p = .004$, $\eta_p^2 = 0.17$. Participants in the alcohol condition spoke for a significantly longer time during the social interaction, relative to those in the placebo condition, $t(60) = 3.62$, $p = .001$, $d = 0.92$. Similarly, participants in the control condition spoke for a longer time (at trend level), relative to those in the placebo condition, $t(50.14) = 2.25$, $p = .03$, $d = 0.57$. There were no significant differences on speaking time between the alcohol and control conditions, $t(60) = -1.19$, $p = .24$, $d = 0.30$. Please see Figure 15 for a visual representation of these results and Table 8 for means and standard deviations.

Discussion

Some models of social anxiety propose that beliefs about losing control over one's anxiety response are a core aspect of its development and maintenance (e.g., Hofmann, 2005). However, it appears that negative beliefs about the likelihood and consequences of losing control over one's behaviour (e.g., embarrassment) may be involved in experiences associated with social anxiety as well (e.g., Clark & Wells, 1995). This is also in line with the proposal that some individuals with social anxiety avoid drinking alcohol as they believe it might lead to

behavioural impairment and embarrassment (e.g., Eggleston et al., 2004). As such, the current experiment aimed to manipulate beliefs about losing control over one's behaviour by using three beverage assignments to examine their impact on symptoms and processes associated with social anxiety.

Results demonstrated that participants in the alcohol and placebo conditions did report significantly greater anxiety prior to the 'getting to know you' task, as compared to those in the control condition. But contrary to our hypothesis, those in the placebo condition experienced significantly greater anxiety relative to those in the alcohol condition. These results support the idea that negative beliefs about losing control over one's behaviour may play a role in the development of anticipatory anxiety—a phenomenon associated with social anxiety. Clark and Wells (1995) proposed that some individuals with social anxiety review what they think might happen prior to a social situation and that this anticipatory processing often includes negative self-images. Believing that one is likely to lose control and embarrass themselves may negatively bias these self-images and increase anticipatory anxiety. However, it appears that we neglected the anxiolytic effects of alcohol when generating our hypotheses—as proposed by tension reduction theory (Conger, 1951, 1956). Indeed, for those in the alcohol condition, the impact of beliefs about losing control on anticipatory anxiety was present but significantly alleviated compared to the placebo condition. An alternative explanation to tension reduction theory is offered by the appraisal-disruption model (Sayette, 1993). It suggests that alcohol weakens connections between information in long-term memory and new information. In this way, intoxicated individuals are less likely to associate past social failures to the current situation, which in turn prevents the current situation from being appraised as highly threatening.

A similar (but slightly different) pattern of results emerged with perceived social competence and reliance on safety behaviour. On the one hand, participants in the alcohol condition reported making a first impression that was as good as those in the control condition. On the other hand, participants in the placebo condition perceived themselves as making a significantly poorer first impression compared to the two other conditions. Likewise, it appeared that participants in the placebo condition 'held back' and spent less time speaking during the 'getting to know you' task relative to the two other conditions (i.e., at significance level compared to the alcohol condition and at trend level compared to the control condition). This behavioural inhibition is commonly seen in individuals who experience social anxiety (e.g.,

Voncken & Bögels, 2008). There were also no significant differences on speaking time between the alcohol and control conditions. In these cases, too, it could be that alcohol expectancies pertaining to losing control had a negative impact on perceived social competence and made participants rely on safety behaviour to a greater extent. Again, the anxiolytic effects of alcohol may have attenuated the effect of these negative expectancies on subjective first impression and safety behaviour. Still, Battista and colleagues (2012) found that administering alcohol (versus orange juice) to socially anxious individuals resulted in significantly longer speaking times. It would be interesting to examine whether it was the belief manipulation that prevented replication of this finding, such that participants in the alcohol condition might have been affected by some behavioural inhibition as well (i.e., it could be that the anxiolytic effects of alcohol did not fully attenuate the impact of beliefs about losing control, as with anticipatory anxiety). Of note, Battista and colleagues used a sample of socially anxious individuals whereas the current study relied on an undergraduate (non-clinical) sample—this may explain the difference in findings.

In their cognitive model, Clark and Wells (1995) discuss the possibility of experiencing anxiety-induced performance deficits. Therefore, participants in the placebo condition may have been accurate in rating their subjective first impression as poorer: they experienced greater anticipatory anxiety and ended up speaking for a shorter amount of time. Still, it is unclear whether such performance deficits could be observed in undergraduate and community (versus clinical) samples. Interestingly though, participants in the alcohol and placebo conditions reported being as anxious during the 'getting to know you' task and as being more anxious than those in the control condition. Although this finding is consistent with our hypothesis, it goes against the current pattern of results showing how participants in the alcohol (versus placebo) condition may have 'benefited' from the anxiolytic effects of vodka. It may be that the 'getting to know you' task was too anxiety-provoking[6] (e.g., neutral conversational partner; video recorded) and prevented us from observing the phenomenon as it would occur in naturalistic conversations. Similar effects have been noted in other experiments on social anxiety (e.g., Moscovitch & Hofmann, 2007). Nonetheless, participants in the alcohol condition may have interpreted that anxiety differently than those in the placebo condition (e.g., less

[6] In support of this suggestion, a paired samples *t*-test showed that participants in the control condition experienced a significant increase in anxiety when comparing their scores of anticipatory anxiety (M = 14.87, SD = 20.81) and anxiety during the 'getting to know you' task (M = 25.16, SD = 19.04), $t(30)$ = -3.37, p = .002.

catastrophically), which perhaps resulted in less performance deficits (e.g., talking more) and greater perceived social competence (e.g., better subjective first impression). For instance, it has been proposed that participants who fully believe they have been administered alcohol can 'blame' their performance deficits on their intoxication level (e.g., Himle et al., 1999). Another explanation is offered by the self-awareness model of alcohol use (Hull, 1981). It claims that alcohol interferes with the encoding of self-relevant information, which in turn decreases self-awareness and negative self-evaluation.

Finally, results demonstrated no significant differences on post-event processing 24 hours following the laboratory session between the alcohol and placebo conditions. As expected, participants in both of these conditions engaged in significantly more post-event processing relative to those in the control condition. This finding matches the overall pattern of results supporting the impact of negative alcohol expectancies pertaining to losing control on phenomena associated with social anxiety. Here, participants in the alcohol condition were no longer intoxicated and perhaps had a similar experience to those in the placebo condition—hence the full impact of the belief manipulation on this cognitive process. The positive relationship between social anxiety and post-event processing following non-drinking events is well-documented (Brozovich & Heimberg, 2008), but this association in the context of drinking events is more complex and appears to be moderated by variables like gender and drinking habits (e.g., Battista, Pencer, & Stewart, 2014). Beliefs about losing control over one's behaviour may be another variable to consider when examining the relationship between social anxiety and post-event processing following alcohol consumption.

However, the current experiment has limitations. First, this study was conducted using an undergraduate sample that was mostly female and symptoms of SAD were not assessed at baseline nor at any point during the protocol. Although symptoms associated with social anxiety fall on a continuum, more nuanced (and sometimes different) effects can be obtained with clinical samples and/or groups of participants with higher versus lower social anxiety scores (e.g., Battista, Stewart, & Ham, 2010). In this way, the current findings are limited and exclusively pertain to anxiety in the context of a social interaction as experienced by undergraduate students. Also, important gender differences have been observed across many experiments on social anxiety and alcohol use (e.g., Battista et al., 2010), hence the need for a more balanced sample. Second, the 'getting to know you' task lacked ecological validity and

may have been quite anxiety-provoking. Thus, it is unclear whether participants in the alcohol condition would have been as anxious in the context of a more naturalistic conversation. Third, including other measures of anxiety during the 'getting to know you' task (e.g., heart rate) would have provided a more complex and possibly more accurate picture of participants' emotional state. In this study, a self-report assessment of their anxiety was completed immediately after the task, and retrospective assessments can be flawed. Fourth, the current design prevents us from knowing whether participants in the placebo condition did in fact make a poorer first impression. Researchers should consider collecting data from conversational partners and/or coders, given Clark and Wells' (1995) proposal that real performance deficits can be observed. Fifth, participants in the placebo (versus control) condition endorsed significantly more body sensations associated with alcohol intake. We cannot eliminate the possibility that this different physiological experience played a role in the results, beyond the belief manipulation. Still, this 'perceived intoxication' was expected and can enhance the believability of the manipulation (e.g., Abbey et al., 2005). Sixth, participants in the placebo condition were told that their drinks were a placebo at the end of the session (because of our university ethics board guidelines). This is an important limitation which may have impacted the extent to which participants engaged in post-event processing. For instance, knowing about the presence of a placebo may have led participants to ruminate about how naive they were to believe they actually drank alcohol (i.e., more post-event processing in this example). Seventh, all anxiety-related measures were single-item ratings, which prevented us from evaluating the reliability of such assessments. Nonetheless, state anxiety is often measured using the Subjective Units of Distress Scale (Wolpe, 1958) in laboratory and clinical settings and provides quick and useful information about how individuals feel in the moment. Eighth, the idea that shorter speaking times represent a greater reliance on safety behaviour assumes that participants were holding themselves back to prevent feared consequences from happening (e.g., Battista et al., 2012). Participants' motivation for speaking more versus less should have been assessed and would have allowed us to draw firmer conclusions regarding safety behaviour.

Future researchers should consider investigating the impact of negative beliefs about losing control over one's behaviour on symptoms of social anxiety outside of the alcohol context (e.g., Kelly-Turner & Radomsky, 2020). It would be relevant to know whether these beliefs play a role in the maintenance of social anxiety in general. If so, these beliefs could explain why

individuals with social anxiety avoid a broad range of social situations, even when alcohol is not involved and behavioural impairment is rationally unlikely. Moreover, future work may want to assess the longitudinal effects of the current findings. It would be interesting to examine whether the several 'advantages' of drinking alcohol (e.g., lower anticipatory anxiety) motivated those in the alcohol condition to drink again prior to a following social interaction—which could then provide insight into the detrimental effects of drinking in social anxiety. Investigating whether individuals with elevated beliefs about losing control (using self-report measures; e.g., Radomsky & Gagné, 2020) are more likely to avoid drinking alcohol would also be relevant. Further, evaluating the mechanisms through which alcohol alleviated the effects of the belief manipulation would be highly important (e.g., decreased anxiety versus self-awareness). Replicating the current experiment in a setting where it is ethically appropriate to hide the presence of a placebo condition (even after participants have left the laboratory) is warranted to adequately assess post-event processing with limited bias. Finally, investigating the current research questions with a number of different samples is a natural next step. These include, of course, a sample of individuals diagnosed with SAD. Conducting a similar experiment with a clinical sample would allow us to draw stronger conclusions and make more precise recommendations for theoretical models of and psychological treatments for SAD. It could be that beliefs about losing control interact with core beliefs that are typically seen in SAD (e.g., "I am socially incompetent") and lead to even higher anxiety during a social interaction. Using samples of participants with higher versus lower levels of social anxiety symptoms and/or of beliefs about losing control—by screening participants based on these variables prior to the laboratory session—is also relevant to examine how an everyday prime (e.g., consuming alcohol in this case) can interact with such pre-existing symptoms and/or beliefs and impact feelings of anxiety in social situations. Similarly, the current participants (i.e., university students/young adults) may have come into the laboratory with beliefs about alcohol that were specific to their group (e.g., Thombs, Ray-Tomasek, Osborn, & Olds, 2005), hence the need for replication with other samples.

In terms of theoretical implications, results from the placebo condition provided support for the relevance of beliefs about the likelihood and consequence of losing control over one's behaviour in the development of symptoms and processes associated with social anxiety. These findings contrast with previous work showing how participants in a placebo condition typically

experience lower anxiety during a social interaction compared to those in a control condition (i.e., the expectancy effect; e.g., Wilson & Abrams, 1977), highlighting the pivotal role of the 'losing control' prime. Results from the alcohol condition painted a more complex picture and showed how other factors could possibly mitigate the effects of these beliefs (e.g., tension reduction). Cognitive models emphasize three primary belief domains in the maintenance of social anxiety: unconditional beliefs about the self, conditional beliefs about social evaluation, and high standards for social performance (e.g., Clark & Wells, 1995). Other work also suggests that perceived anxiety control plays a critical role in social anxiety (e.g., Hofmann, 2005). With additional evidence from experiments with clinical samples, it could be eventually proposed that perceived anxiety and behavioural control should be considered as an additional belief domain involved in experiences related to social anxiety.

In terms of clinical implications, experiments with clinical samples and intervention studies are necessary prior to making definitive recommendations. Still, some preliminary ideas can be generated based on the current findings. For instance, using behavioural experiments to target negative beliefs about losing control over one's behaviour may be a potential avenue in cognitive-behaviour therapy for social anxiety. Clients/patients could videotape themselves during a social interaction and compare the number of times they actually 'lost control' to their predicted number. Guided discovery can also be used to critically evaluate one's perceived consequences of losing control in front of others (e.g., embarrassment). Finally, providing clients/patients with psychoeducation about the detrimental effects of alcohol in the maintenance of social anxiety symptoms may be relevant. With the current study, we now have information that is perhaps more specific to those with elevated beliefs about losing control (e.g., alcohol will reduce anticipatory anxiety but will likely lead to post-event processing later). Again, these suggestions would be best subjected to empirical testing (e.g., clinical trials).

Table 7

Means and Standard Deviations of Breath Alcohol Concentration (gm%) for Participants in the Alcohol Condition[a].

Timepoint	*M*	*SD*
Baseline	0.00	0.00
End of absorption period	0.07	0.01
Before GTKY task	0.08	0.02
After GTKY task	0.08	0.02
Peak concentration	0.09	0.02

Note. For participants in the alcohol condition, breath alcohol concentration was measured at baseline, at the end of the 20-minute absorption period, and then after every 10-minute window (i.e., one measure took place before the 'getting to know you' task and one after the task) until peak concentration was determined. For participants in the placebo condition, breath alcohol concentration (i.e., 0.00 gm%) was also measured at the same timepoints to make the procedure believable. For participants in the control condition, breath alcohol concentration was only measured at baseline (i.e., 0.00 gm%). GTKY task = 'getting to know you' task.

[a]$n = 31$.

Table 8

Means and Standard Deviations of Experimental Variables by Condition

Variable	Alcohol[a]		Placebo[a]		Control[a]				
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η_p^2
Physiological experience	103.87	50.00	43.29	33.58	18.19	13.42	47.38	< .001	0.51
Beliefs about losing control	66.29	24.46	52.26	39.09	10.81	25.40	27.93	< .001	0.38
Credibility (alcohol)	94.16	15.21	57.68	38.03	0.32	1.80	123.82	< .001	0.73
Credibility (purpose)	70.29	25.42	71.77	30.76	64.84	26.03	0.55	.58	0.01
Anticipatory anxiety	30.55	27.29	48.23	25.74	14.87	20.81	14.07	< .001	0.24
Anxiety during GTKY task	41.61	29.75	48.55	31.52	25.16	19.04	5.99	.004	0.12
Subjective first impression	63.23	16.91	50.19	22.73	63.64	14.82	5.32	.01	0.11
Post-event processing	412.39	168.31	444.74	227.71	314.00	130.60	4.44	.02	0.09
Speaking time	372.13	100.69	295.81	60.50	342.16	97.43	5.90	.004	0.17

Note. "Physiological experience" represents participants' scores on the Sensation Scale (Maisto, Connors, Tucker, McCollam, & Adesso, 1980). "Post-event processing" represents participants' scores on the Post-Event Processing Questionnaire—Revised (McEvoy & Kingsep, 2006; adapted from Rachman, Grüter-Andrew, & Shafran, 2000); they were asked to complete the measure 24 hours after the end of the protocol. "Speaking time" represents the duration of the 'getting to know you task' (in seconds). "Speaking time" was taken as an index of safety behaviour: shorter speaking times (i.e., talking less) are associated with a higher reliance on safety behaviour. GTKY task = 'getting to know you' task.

[a]$n = 31$.

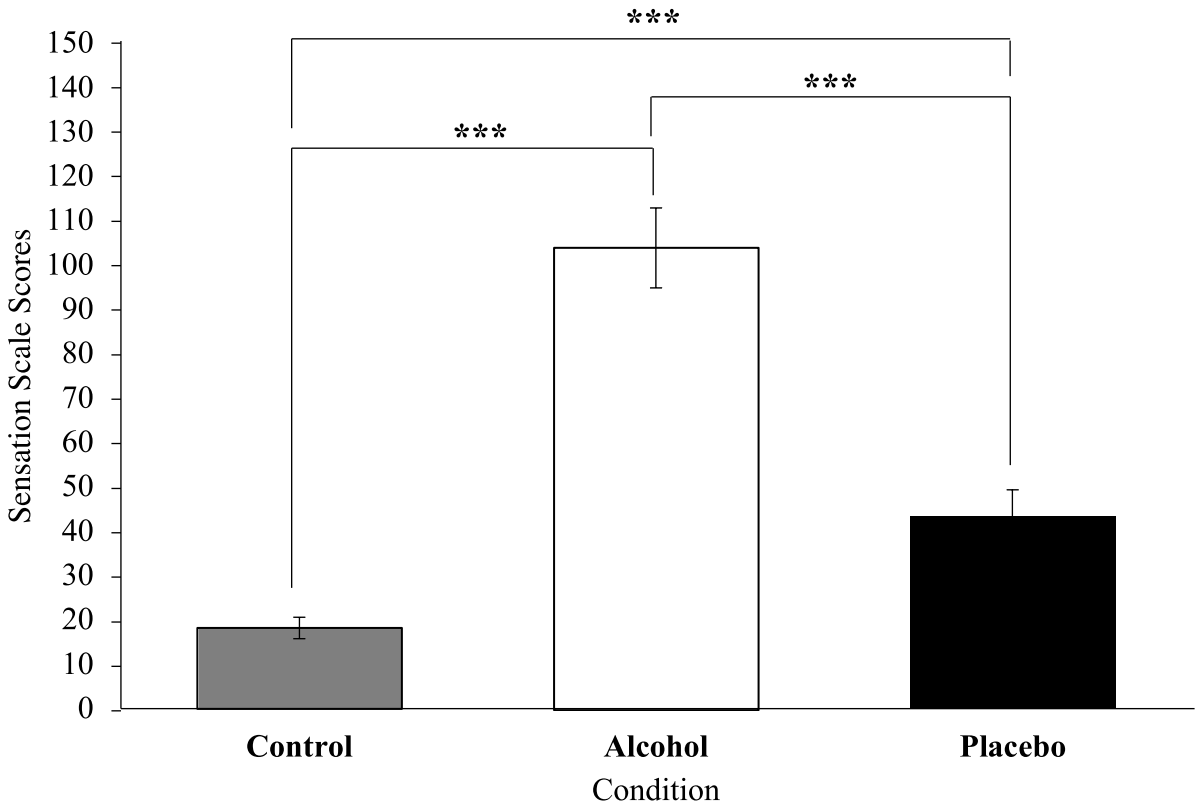

Figure 8. Mean ratings of subjective physiological experience (i.e., manipulation check) as assessed by the Sensation Scale (Maisto, Connors, Tucker, McCollam, & Adesso, 1980) by condition.

***$p < .001$.

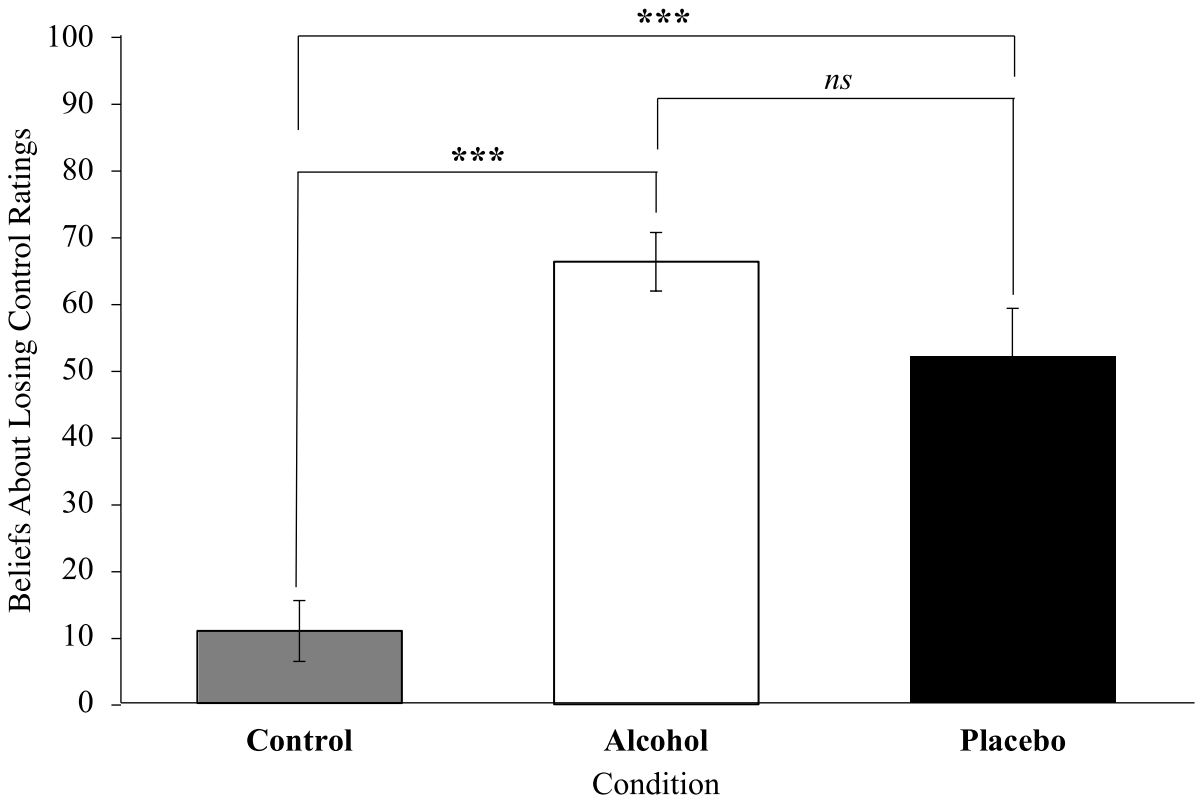

Figure 9. Mean ratings of beliefs about losing control (i.e., manipulation check) by condition. ***$p < .001$.

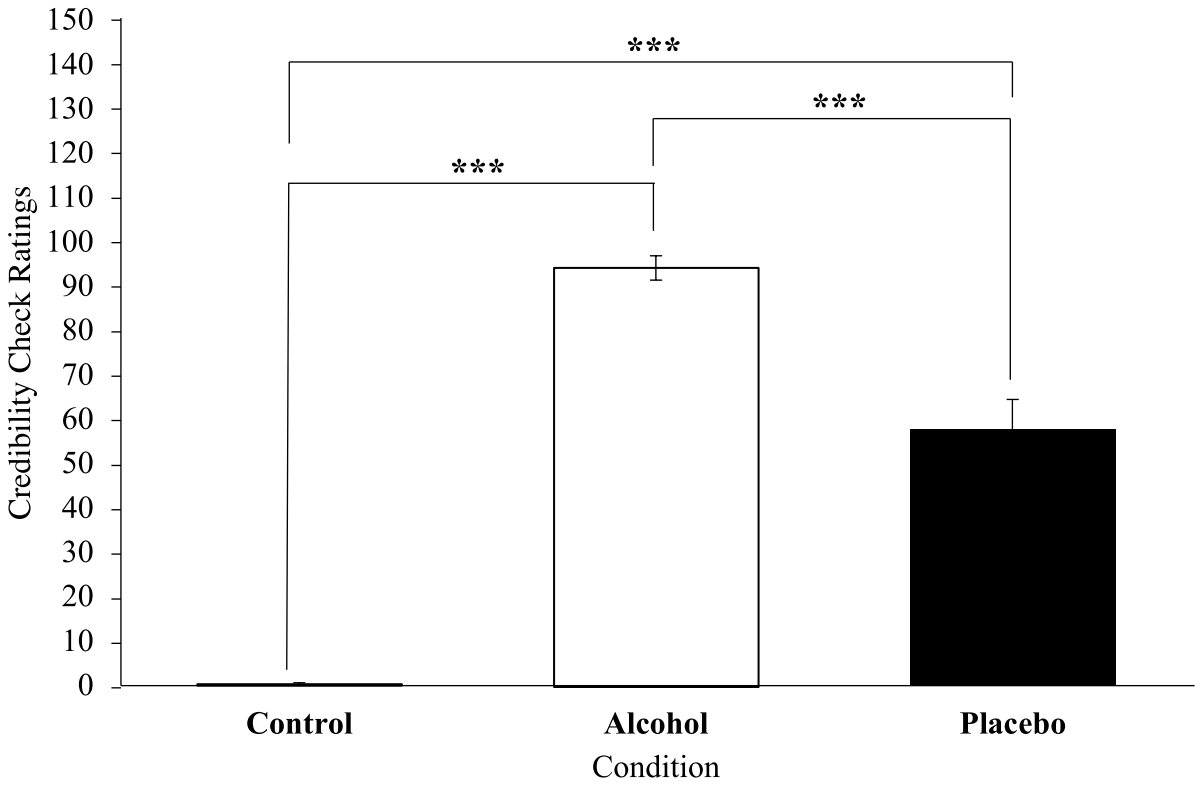

Figure 10. Mean ratings of credibility check (i.e., the extent to which participants believed they consumed alcohol) by condition.

***$p < .001$.

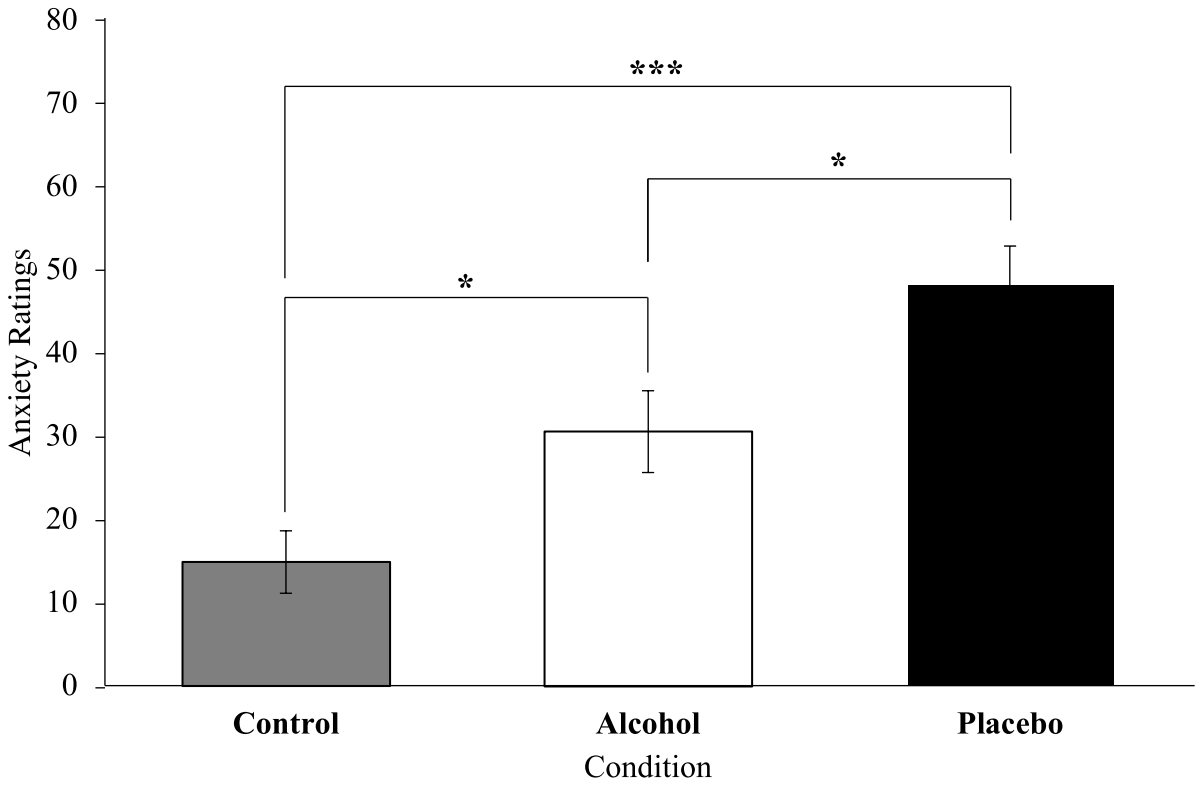

Figure 11. Mean ratings of anxiety prior to meeting the research assistant for the 'getting to know you' task (i.e., anticipatory anxiety) by condition.

*$p < .02$, ***$p < .001$.

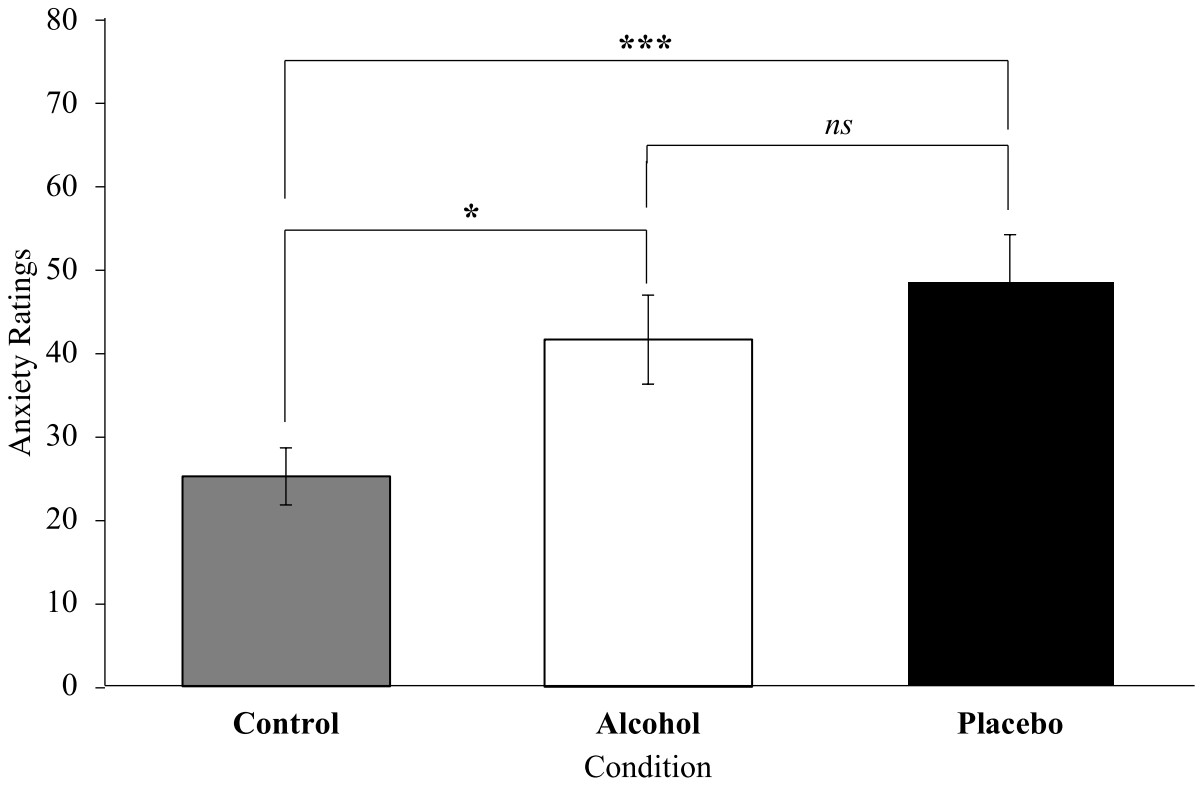

Figure 12. Mean ratings of anxiety during the 'getting to know you' task by condition. Ratings were recorded right after the task.

*$p < .02$, ***$p < .001$.

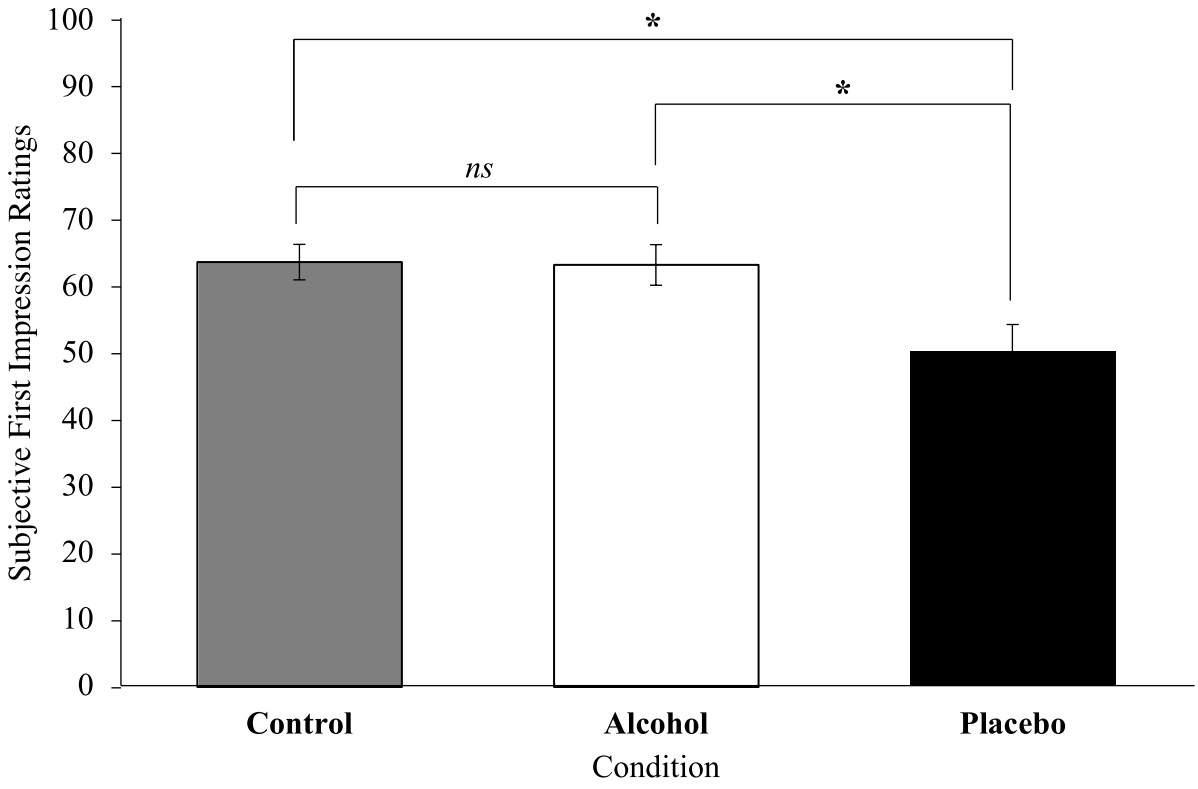

Figure 13. Mean ratings of subjective first impression during the 'getting to know you' task by condition. Ratings were recorded right after the task.

*$p < .02$.

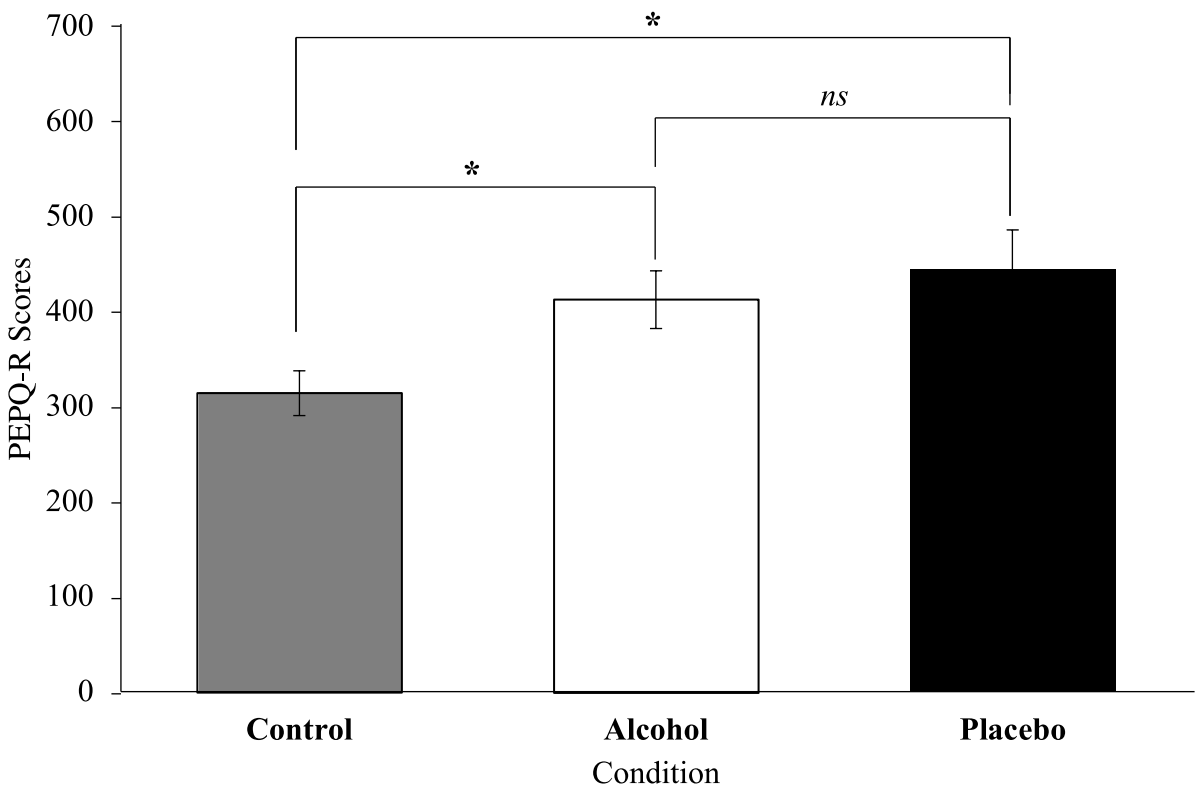

Figure 14. Mean scores of post-event processing as assessed by the Post-Event Processing Questionnaire—Revised (PEPQ-R; McEvoy & Kingsep, 2006; adapted from Rachman, Grüter-Andrew, & Shafran, 2000) by condition. Participants completed the PEPQ-R 24 hours after the end of the protocol.

*$p < .02$.

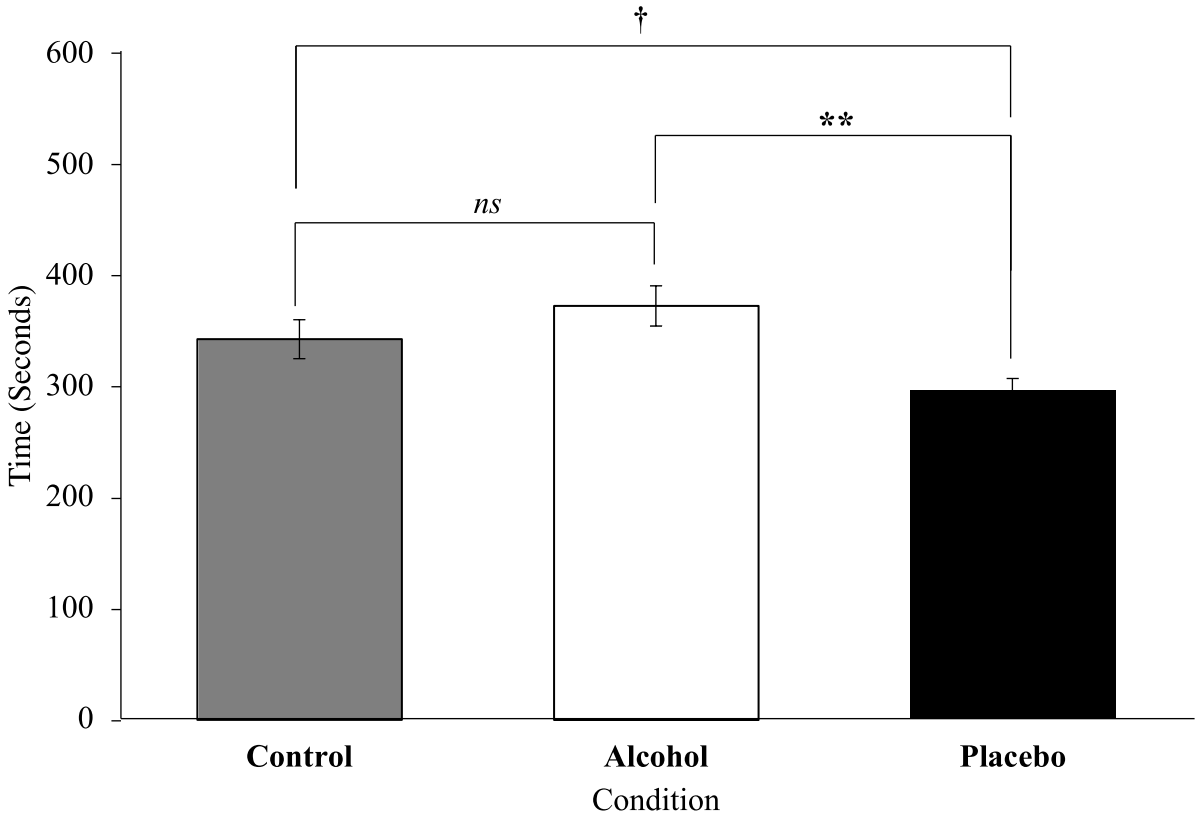

Figure 15. Mean duration (in seconds) of the 'getting to know you' task by condition. This measure was taken as an index of safety behaviour: differences in mean duration times reflect differences in participants' speaking times, and shorter speaking times (i.e., talking less) are associated with a higher reliance on safety behaviour.

$^{**}p < .01$, †$p = .03$.

CHAPTER 7

General Discussion

The current program of research was designed to enhance our ability to assess maladaptive beliefs about losing control as they pertain to OCD and related problems in a reliable and valid manner, and to increase our understanding of the causal relationships between these beliefs and pathological phenomena observed in two anxiety-related problems, namely OCD and SAD. Clinical reports emphasize a fear of losing control over one's thoughts, behaviour, emotions, and body/bodily functions in several anxiety-related problems (e.g., Clark, 2004), but investigations have been primarily limited to beliefs about the importance of controlling one's thoughts in OCD (e.g., OCCWG, 2005) and to perceived control over one's anxiety in SAD (e.g., Hofmann, 2005). Recent psychometric (Froreich et al., 2016) and experimental (Gagné & Radomsky, 2017) research suggests that beliefs about losing control may play a role in the development and maintenance of OCD, and this program of research aimed to further advance this work and to also extend it to SAD.

Study 1 comprised the development and validation of a novel self-report measure of maladaptive beliefs about losing control over one's thoughts, behaviour, emotions, and body/bodily functions: the BALCI. Specifically, the BALCI aimed to measure the extent to which one fears losing control over these several domains, the meaning and perceived negative consequences of a loss of control, and beliefs about the importance of staying in control. Then, Study 2 employed an experimental design to examine the impact of beliefs about losing control over one's behaviour on emotional, cognitive, and behavioural phenomena observed in OCD: elevated anxiety, intrusive thoughts/urges, and cautious behaviour around threatening stimuli (i.e., kitchen knives and scissors). Finally, Study 3 was designed to experimentally manipulate negative alcohol expectancies pertaining to losing control over one's behaviour to assess the impact of such beliefs on symptoms and processes of SAD: anticipatory anxiety, anxiety during a social interaction, perceived social competence, and post-event processing.

Summary of Findings

Study 1. Psychometric analyses were performed using data from a sample of undergraduate students ($N = 491$) to assess the factor structure, reliability, and validity of the BALCI. An exploratory factor analysis (EFA) revealed three underlying factors: beliefs about losing control over one's Thoughts, Behaviour, and Emotions (TBE; Factor 1), about the

Importance of Staying in Control (ISC; Factor 2), and about losing control over one's Body and Bodily Functions (BBF; Factor 3). The final BALCI had 21 items and was found to have excellent internal consistency and adequate retest reliability. The TBE subscale had excellent internal consistency, the ISC subscale had good internal consistency, and the BBF subscale had fair internal consistency. The BALCI subscores (i.e., TBE, ISC, and BBF) were shown to provide relevant information over and above a single total score, suggesting that there is value in reporting individual subscale scores (Reise et al., 2013). In terms of convergent and divergent validity, it was found that the associations between the BALCI and measures of obsessive beliefs, anxiety sensitivity, and perceived control over anxiety-provoking events were significantly stronger than the association between the BALCI and a measure of general desire for control. Finally, it was demonstrated that the BALCI explained a significant amount of variance in OCD symptoms, above and beyond already established obsessive beliefs. Similarly, beliefs about losing control over one's thoughts, behaviour, and emotions (TBE subscale) and over one's body and bodily functions (BBF subscale) were positively and significantly associated with all OCD subtypes (i.e., contamination, checking, obsessions, "just right" experiences, hoarding, and indecisiveness), above and beyond beliefs about the importance of and control over thoughts. Of note, this was not the case for beliefs about the importance of staying in control (ISC subscale).

Study 2. In this experiment, 128 undergraduate students were randomly assigned to a higher (HLC) or lower (LLC) beliefs about losing control condition. As part of the experimental manipulation, those in the HLC condition were told that having intrusive thoughts means that they are more likely to lose control over their behaviour; those in the LLC condition were told that intrusive thoughts are normal and that having them does not mean that they are more likely to lose control over their behaviour. Participants in the HLC (versus LLC) condition experienced significantly increasing anxiety while approaching sharp knives and scissors during a behavioural approach test (BAT). They also reported significantly higher anxiety at every step of the BAT. Exploratory analyses revealed that those in the HLC (versus LLC) condition perceived themselves as significantly less cautious while interacting with the stimuli during a knife sorting task and that they remembered experiencing significantly more intrusive thoughts about losing control at the end of the protocol. However, the time taken to complete the knife sorting task—or the time taken to sort the stimuli in a knife block—did not significantly differ between

conditions. Similarly, the number of intrusive thoughts reported throughout the protocol—as measured by the number of clicks on a tally counter—also did not significantly differ between conditions. As such, results pertaining to these more "objective" measures of behaviour and thoughts contrasted with the purely subjective measures.

Study 3. In this experiment, 93 undergraduate students were randomly assigned to drinking vodka with orange juice (alcohol condition), alcohol-free vodka with orange juice (placebo condition), or orange juice only (control condition). To prime negative alcohol expectancies, participants were 'informed' that alcohol can make people lose control over their actions/speech and that this can lead to embarrassment in front of others. Participants then interacted with a research assistant (i.e., a stranger) during a 'getting to know you' task. Results demonstrated that participants in the placebo and alcohol (versus control) conditions experienced greater anxiety before and during the social interaction and engaged in more post-event processing 24 hours later. However, it appears that the pharmacological effects of alcohol mitigated the impact of beliefs about losing control: those in the alcohol (versus placebo) condition experienced lower anticipatory anxiety, perceived themselves as making a better first impression (i.e., to a similar extent as those in the control condition), and demonstrated a lower reliance on safety behaviour (i.e., they talked for as long as those in the control condition).

Limitations and Future Directions

For all three studies included in this program of research, data were collected from samples of undergraduate students, which may have impacted the external validity of this work. Indeed, the generalizability of the results may be limited and stronger effects may well be expected with clinical samples. Nonetheless, reviews and meta-analyses have consistently shown that obsessive beliefs and other psychopathological constructs can be reliably examined using analogue samples (e.g., Abramowitz et al., 2014; De Putter et al., 2017; Gagné et al., 2018; Gibbs, 1996). Actually, analogue samples are often preferred with novel belief domains as they allow for quicker initial investigations and these can then set the stage for more complex investigations with clinical samples (e.g., Gagné et al., 2018). Another advantage of such samples is that participants typically do not show symptoms; manipulating a key belief domain and seeing the emergence of symptoms (e.g., repetitive behaviour) in the laboratory can provide relevant information about the development of a disorder (e.g., Gagné et al., 2018).

Regarding Study 1, it might be important to refine the BALCI prior to conducting further investigations with clinical samples. For example, researchers may want to remove the ISC subscale given that items associated with this factor did not predict OCD subtypes above and beyond beliefs about the importance of and control over thoughts. Therefore, this factor appears to be somehow redundant with the third subscale of the OBQ-44 and does not seem to capture beliefs about losing control per se. Examining a novel version of the BALCI with clinical samples representing various disorders would also be helpful. New items could be added prior to these investigations as a way to tap into maladaptive cognitions that are more specific to other anxiety-related problems, including panic disorder (e.g., "I fear losing control over my heart rate), SAD (e.g., "If I lose control in front of people, I will embarrass myself"), eating disorders (e.g., "If I don't control my weight or food intake, I will lose control over my life"), and trauma-related experiences (e.g., "If I lose control over my body, I will freeze and dissociate").

Replicating Study 2 with a sample of individuals with OCD might provide more information on behavioural outcomes in particular. For instance, the current design focused on anxiety ratings throughout the BAT as it was expected that participants would complete all steps of the task—and in fact they all did. A clinical sample could possibly allow to examine avoidance of kitchen knives and scissors in more detail and actual hesitation/caution might be more likely to be observed during a similar BAT and/or knife sorting task.

Regarding Study 3, it is unclear whether the pharmacological effects of alcohol would have mitigated the impact of the beliefs about losing control manipulation to the same extent with a clinical sample. Perhaps individuals suffering from SAD (or individuals with high levels of SAD symptoms on self-report measures) would have been affected to a greater extent by the experimental manipulation. Stronger effects would however be expected in the placebo condition with a sample of individuals with SAD.

In the same vein, the samples from the current program of research would have benefited from a more balanced distribution in terms of gender, especially for Study 3. Research examining social anxiety and alcohol use has shown that gender is often a key moderator. For example, Battista and colleagues (2014) have demonstrated that the relationship between social anxiety and post-event processing following a drinking (versus non-drinking) event is moderated by gender, with males engaging in more post-event processing.

Another limitation that is more specific to Study 1 includes the absence of a confirmatory factor analysis (CFA). Still, given the abovementioned information, it might be relevant to refine the BALCI with a clinical sample and reassess its factor structure with another EFA, prior to conducting a CFA. The current development and validation study of the BALCI was thus an important first step that will hopefully inspire researchers to further investigate the assessment of maladaptive beliefs about losing control in the laboratory and clinic.

Although the manipulation check provided support for the efficacy of the beliefs about losing control manipulation in Study 2, it is unclear whether other maladaptive beliefs were indirectly manipulated and impacted ratings of anxiety, intrusive thoughts, and/or perceived caution. This limitation/concern is often raised in experimental work focusing on obsessive beliefs (e.g., Gagné & Radomsky, 2017). For Study 2 specifically, a link between thought and behaviour was insinuated during the experimental manipulation procedure. Indeed, participants were told that individuals who experience intrusive thoughts about losing control are more likely to lose control over their behaviour. This link between thought and behaviour overlaps with the metacognitive domain of beliefs about the importance of thoughts—precisely, thought-action fusion (likelihood type). This cognitive bias is linked to the belief that thinking about a misfortune increases the likelihood of that misfortune happening (OCCWG, 1997). In the current design, it would have been relevant to assess this cognitive bias after the manipulation and to compare ratings between conditions. Future researchers may wish to proceed with caution when drafting the script associated with the experimental manipulation to minimize the risk of priming other beliefs/constructs. To isolate beliefs about losing control over one's behaviour from other cognitive biases, a potential next step might be to have participants perform a behavioural task in the laboratory and to provide them with false feedback about their likelihood of losing control over their behaviour in general.

Other avenues for future work in relation to Study 2 include assessing the salience, vividness, and personal significance of intrusive thoughts experienced during the protocol. Results from Study 2 revealed a contrast between more 'objective' and 'subjective' measures of intrusive thoughts. On the one hand, participants in the HLC and LLC conditions reported a similar number of intrusive thoughts about losing control as they were going through the protocol (i.e., number of clicks on the tally counter). On the other hand, participants in the HLC (versus LLC) condition remembered experiencing more intrusive thoughts about losing control

when asked to list the content of their thoughts at the end of the protocol. Investigating the primary factors underlying this contrast would be highly relevant from a cognitive perspective, given that cognitive models of OCD emphasize the salience and personal meaningfulness of intrusive thoughts rather than their content or frequency (e.g., Rachman, 1997, 1998, 2002; Salkovskis, 1985, 1999). Moreover, including and contrasting different measures of intrusive thoughts appears to be helpful for the field. Past research on obsessions and thought suppression has revealed inconsistent pattern of results, in part because of methodological differences and difficulties (e.g., Janeck & Calamari, 1999; Purdon & Clark, 2001; Tolin et al., 2002). Measures have included clicking a tally counter when participants experience a thought, saying the content of the thoughts aloud as they experience them, writing down the content of the thoughts at the end of the protocol, providing an estimate of the number of thoughts they experienced at the end of the protocol, etc. In addition, it would be important to determine how to better assess behavioural aspects of caution in the laboratory. In Study 2, time taken to complete the knife sorting task was taken as an 'objective' measure of caution. Coding participants' hesitation/caution may be a more accurate representation of the phenomenon, for instance.

Regarding Study 3, it appears that the 'getting to know you' task with the research assistant lacked ecological validity—despite taking place in a laboratory space designed to look like a contemporary bar. The research assistant followed a script and responded in a neutral manner. Also, the interaction was video recorded and participants could see the equipment. This lack of naturalistic behaviour from a conversational partner may have influenced results pertaining to anxiety during the 'getting to know you' task. Indeed, participants in the alcohol condition appeared to 'benefit' from the pharmacological effects of alcohol prior to the social interaction (i.e., lower anticipatory anxiety compared to those in the placebo condition) but not during the interaction. This finding also goes against the pattern of results that was observed for subjective first impression and safety behaviour: participants in the alcohol condition were as anxious as those in the placebo condition during the social interaction but nonetheless rated themselves as making a better first impression and did not rely on safety behaviour to the same extent. Utilizing a 'getting to know you' task that more closely resembles everyday conversations in future research may shed light on such results and may lead to a more accurate representation of SAD-related phenomena. Furthermore, in the current design, no objective measures of participants' first impression were included. It is therefore impossible to assess

whether actual performance deficits were observed—although those in the placebo condition did spend less time talking during the social interaction. Future work may benefit from conversational partners' ratings of participants' first impression and/or coding of video recordings of the 'getting to know you' task. Finally, the longitudinal effects of the current findings remain unknown. It would be relevant to examine whether the pharmacological effects of alcohol (e.g., lower anticipatory anxiety) encouraged participants to consume alcohol again during a following social event, or whether experiencing elevated post-event processing (for example) motivated participants to avoid alcohol in the future.

Overall, experimental work pertaining to both OCD and SAD could benefit from examining the impact of beliefs about losing control (over one's thoughts, behaviour, emotions, and body/bodily functions) on a range of symptoms beyond the ones investigated in this program of research—for example, contamination and "just right" experiences in OCD and self-focused attention in SAD. Research on beliefs about losing control could emphasize symptoms of other disorders as well, such as panic disorder (e.g., Chambless et al., 1984; Hedley et al., 2001) and eating disorders (e.g., Froreich et al., 2016). Ultimately, investigating the mechanisms underlying the relationships between beliefs about losing control and symptoms of psychopathology may shed light on the inner workings of anxiety-related problems.

Theoretical Implications

This program of research was primarily based on contemporary cognitive formulations of OCD (e.g., Clark, 2004; Rachman, 1997, 1998, 2002; Salkovskis, 1985, 1999) and SAD (e.g., Beck & Emery, 1985; Clark & Wells, 1995; Leary, 2001; Rapee & Heimberg, 1997), in which maladaptive beliefs and misinterpretations (of intrusive thoughts and social situations, respectively) play a role in the development and maintenance of symptoms. As such, all three studies could have implications for these cognitive models and beyond.

Study 1 provided insight into the phenomenology of and overarching themes associated with beliefs about losing control. Specifically, the factor structure of the BALCI demonstrates how individuals may fear losing control over several psychological functions simultaneously: thoughts, behaviour, and emotions (i.e., TBE subscale). This finding resonates with basic cognitive-behavioural formulations of psychopathology which emphasize relationships among thoughts, feelings, and behaviour (e.g., Beck, 2011) and with Clark's (2004) proposal that individuals may fear losing control over their behaviour because they have difficulty controlling

other psychological functions (e.g., thoughts and emotions). It appears however that beliefs about losing control over one's body and bodily functions (i.e., BBF subscale) emerged as a separate domain. This may be because fears of losing control over one's body sensations are more tightly related to panic disorder (e.g., Chambless et al., 1984; Hedley et al., 2001), as compared to other anxiety-related problems. This suggestion could be examined by validating the BALCI (following some modifications and additions, as mentioned above) with clinical samples representing various primary diagnoses of anxiety-related disorders.

Studies 1 and 2 both provided support for a broadening of our conceptualization of beliefs about control in contemporary cognitive models of OCD, by incorporating elements of losing control as well. On the one hand, Study 1 demonstrated a correlational association between beliefs about losing control and OCD symptoms, over and above already established maladaptive beliefs. This suggests that, psychometrically, beliefs about losing control stand as their own belief domain in relation to OCD symptomatology. Beliefs about losing control over one's thoughts, behaviour, and emotions (i.e., TBE subscale) and over one's body and bodily functions (i.e., BBF subscale) appear to be psychometrically different from beliefs about the importance of and control over thoughts, as they uniquely predicted all OCD symptom subtypes (i.e., contamination, checking, obsessions, "just right" experiences, hoarding, and indecisiveness). From a correlational perspective, one might expect these beliefs to be involved in most aspects of OCD symptomatology. On the other hand, Study 2 demonstrated a causal association between beliefs about losing control (i.e., the belief that losing control over one's behaviour is likely) and phenomena observed in OCD, beyond repetitive checking (Gagné & Radomsky, 2017). More precisely, it appears that beliefs about losing control may be involved in the development of anxiety pertaining to stimuli that are often feared in OCD (i.e., kitchen knives and scissors) and that these beliefs may also lead to the exacerbation of anxiety as the level of threat increases. In addition, beliefs about losing control may increase the memorability or salience of unwanted intrusive thoughts and may lead to perceiving oneself as less cautious while interacting with threatening stimuli. Taken together, it could be that beliefs about losing control over one's behaviour contribute to the misinterpretation of harm-related intrusive thoughts/urges as personally meaningful and/or catastrophic, which may lead to elevated anxiety and perceived 'dangerous' behaviour around kitchen knives and scissors. Exploring this cascade of cognitive and emotional events in the laboratory could be highly informative.

Contemporary cognitive models of OCD propose that maladaptive beliefs can interact with each other and lead to misappraisals of intrusive thoughts (e.g., OCCWG, 1997; Rachman, 1997, 1998). They also specify however that endorsing a single belief domain is enough to activate the OCD system (e.g., Salkovskis, 1985). Accordingly, beliefs about losing control could interact with metacognitive beliefs (e.g., "My thoughts about harming others mean that I am dangerous, and I believe I can lose control over my behaviour") and cause the escalation of intrusive thoughts into obsessions. Still, beliefs about losing control could lead to misinterpreting (harm-related) intrusive thoughts or urges on their own. In his cognitive control theory of obsessions, Clark (2004) explains that two layers of misappraisals are necessary to launch the OCD system. First, individuals with OCD misappraise an intrusive thought due to various maladaptive beliefs (e.g., about themselves or their personal responsibility). Second, individuals try to control their intrusive thoughts (e.g., thought suppression) but then misappraise their failed attempts at controlling their thoughts (e.g., "If I can't control my thoughts, I will go crazy"). Therefore, according to Clark, beliefs about control over thoughts act independently and are responsible for "secondary appraisals of control". Based on the findings above, it is proposed that beliefs about losing control are different from beliefs about control over thoughts, such that beliefs about losing control may play a role at the level of "primary appraisals of intrusion" instead, like other maladaptive beliefs (e.g., inflated responsibility).

Study 3 provided insight into contemporary cognitive models of SAD (e.g., Beck & Emery, 1985; Clark & Wells, 1995; Leary, 2001; Rapee & Heimberg, 1997). For example, Clark and Wells propose that three belief domains underlie perceptions of threat in social situations: unconditional beliefs about the self (e.g., "I'm odd"), conditional beliefs about social evaluation (e.g., "If I disagree with someone, they'll reject me"), and high standards for social performance (e.g., "I can't show any signs of anxiety"). Perceiving social situations as threatening ultimately leads to negative emotional experiences (e.g., anxiety) and maladaptive cognitive-behavioural processes like anticipatory and post-event processing and safety behaviour—which in turn prevent belief disconfirmation. Results from Study 3 suggest that beliefs about losing control over one's behaviour may play a role in the development of anxiety (both before and during a social interaction), poor perceived social competence, safety behaviour, and post-event processing. Because past work has shown that perceived anxiety control (i.e., the extent to which one believes they have control over their anxiety) plays a central role in SAD (e.g., Hofmann,

2005; Hofmann & Barlow, 2002), it is proposed here that a fourth belief domain of perceived emotional and behavioural control could potentially be considered in cognitive models of SAD.

As explained above however, the pattern of results of Study 3 may have been influenced by the pharmacological effects of alcohol. Specifically, participants in the alcohol (versus placebo) condition experienced lower anxiety prior to meeting the research assistant, which may provide support for tension reduction theory (Conger, 1951, 1956). This hypothesis proposes that alcohol allows individuals to better manage their anxiety by dampening physiological reactions associated with stress. The anxiolytic effects of alcohol may have had a broader impact, given that participants in the alcohol (versus placebo) condition also perceived themselves as having made a better first impression and demonstrated a lower reliance on safety behaviour. Still, participants in the alcohol condition experienced as much anxiety as those in the placebo condition during the social interaction with the research assistant. As such, other mechanisms should be considered as well. Another potential explanation is that participants in the alcohol condition interpreted their feelings of anxiety less catastrophically than those in the placebo condition, which in turn may have allowed them to speak longer and perceive themselves as having made a better first impression. This is consistent with the hypothesis that individuals who strongly believe they have consumed alcohol often blame their impulsive behaviour on their intoxication level (Himle et al., 1999). Data from Study 3 did show that participants in the alcohol (versus placebo) condition scored significantly higher on the credibility check assessing the believability of the drinks consumed. Another explanation that more strongly relates to the higher ratings of subjective first impression is offered by the self-awareness model of alcohol use (Hull, 1981). This theory proposes that alcohol prevents full encoding of self-relevant information, thereby reducing self-awareness and negative self-evaluation. Of course, the longer speaking times (i.e., lower reliance on safety behaviour) observed in the alcohol (versus placebo) condition could be entirely due to the disinhibiting properties of alcohol (e.g., Hofmann, Friese, & Strack, 2009). Nonetheless, the overall pattern of results suggests that this proposed reduction in self-control was not interpreted in a catastrophic manner by participants in the alcohol condition—given the higher ratings of subjective first impression, for instance.

Clinical Implications

Cognitive-behaviour therapy (CBT) with an emphasis on exposure and response prevention (ERP)—the behavioural component of CBT—is currently recognized as the gold

standard intervention for OCD (National Institute for Health and Clinical Excellence, 2005). Essentially, individuals are asked to face their fears (e.g., to hold a knife) and prevent themselves from engaging in any form of compulsive behaviour (e.g., checking for dead bodies; Foa et al., 2012). Exposure therapy is also commonly used to treat SAD by having individuals face social situations that make them anxious and, sometimes, by engaging in embarrassing behaviour (e.g., Hofmann & Otto, 2008). As part of this treatment as well, individuals are asked to refrain themselves from engaging in any anxiety-reducing behaviour (e.g., avoiding eye contact). Unfortunately, exposure therapy can be quite challenging and has been associated with significant dropout rates (e.g., Foa et al., 2005) and other concerns about acceptability (Levy, Senn, & Radomsky, 2014; Neal & Radomsky, 2019). Also, efficacy trials of ERP have shown that symptoms persist in 40-50% of participants post-treatment (e.g., Fisher & Wells, 2005).

As mentioned above, randomized controlled trials have shown that changes in maladaptive beliefs during CBT predict reductions in OCD (e.g., Anholt et al., 2010; Diedrich et al., 2016; O'Connor et al., 2005; Woody et al., 2011) and SAD (e.g., Nordahl, Nordahl, Hjemdal, & Wells, 2017) symptoms. Accordingly, several interventions have been designed to directly target maladaptive beliefs that maintain OCD symptoms (e.g., Clark, 2004; Rachman, 2003; Radomsky, Shafran, Coughtrey, & Rachman, 2010). Similar interventions have been applied to other disorders as well (e.g., Bennett-Levy et al., 2004), including SAD (e.g., Warnock-Parkes et al., 2017). Treatment strategies that target maladaptive beliefs (instead of targeting symptoms) are typically cognitive in nature and are known to be perceived as more acceptable by clients and patients, as compared to exposure therapy (e.g., Levy et al., 2014; Neal & Radomsky, 2019). These strategies often include behavioural experiments in which a specific belief is tested by gathering personally relevant information (e.g., Bennett-Levy et al., 2004; Radomsky et al., 2010) and Socratic dialogue during which a specific belief is thoroughly and critically discussed with a therapist (e.g., Carey & Mullan, 2004). The efficacy of cognitive therapy is comparable to the efficacy of exposure therapy (e.g., Olatunji, Davis, Powers, & Smits, 2013; Öst et al., 2015; Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa, & Marín-Martínez, 2008), although a recent mega-analysis suggests that cognitive therapy for OCD is associated with greater clinically significant change (i.e., post-treatment scores show reliable change and are below clinical levels) compared to ERP alone (Steketee, Siev, Yovel, Lit, & Wilhelm, 2019).

In light of the results from Study 2, it appears that targeting beliefs about losing control over one's behaviour in CBT may be relevant to alleviate symptoms that emerge when exposed to threatening stimuli. Behavioural experiments could be designed to target idiosyncratic beliefs about losing control. For instance, clients/patients could be asked to try to "lose control" in the therapy office to concretely evaluate whether losing control is even possible and/or whether the consequences are as catastrophic as predicted. Clients and patients could also be asked to assess whether they are more likely to hurt a loved one when walking around with (versus without) a small knife in their pocket. Socratic dialogue can be useful to critically discuss with a therapist the meaning of losing control and one's perceived consequences of losing control. Past perceived "losses of control" can also be discussed to assess whether clients and patients had actually lost control over their behaviour.

Based on the results from Study 3, similar interventions could be helpful to alleviate symptoms of SAD (e.g., anticipatory anxiety). Of course, an idiosyncratic case formulation would help inform the specific beliefs that would need to be targeted with behavioural experiments and Socratic dialogue (among other strategies). Interestingly, recent clinical advances propose that video feedback can be a relevant tool to test beliefs and predictions in SAD (e.g., Warnock-Parkes et al., 2017). For example, clients and patients could be asked to concretely describe what "losing control" would look like for them during a presentation (e.g., shouting something nonsensical) and to elaborate on their perceived consequences (e.g., hearing people laughing). The presentation could be video recorded and their predictions could be tested against the evidence, thus allowing them to verify the accuracy of their beliefs about losing control. These recommendations would naturally benefit from empirical support by conducting intervention studies and randomized controlled trials.

Targeting predictors of change such as maladaptive beliefs is important in CBT but ensuring that reductions in these predictors occurs throughout treatment is also key. Frequently monitoring symptoms and mechanisms/predictors of change in therapy has been shown to be associated with better treatment outcomes (e.g., Lambert et al., 2002). The BALCI can thus be a relevant measure to help clinicians assess the extent to which their clients and patients endorse maladaptive beliefs about losing control (at baseline) but also to monitor changes in such beliefs as they are being targeted in CBT. In this way, refining the BALCI by implementing the above

recommendations and extending the current findings to clinical samples of various anxiety-related disorders may be beneficial.

Conclusions

Clinical reports have documented fears of losing control over one's thoughts, behaviour, emotions, and body/bodily functions in anxiety-related problems including OCD (e.g., Clark, 2004) and SAD (e.g., Hofmann, 2005), but the beliefs associated with such concerns have been little explored (e.g., Gagné & Radomsky, 2017). The current program of research has shown that beliefs about losing control (as they pertain to OCD) can be assessed in a reliable and valid manner and that, psychometrically, they stand as a unique belief domain. Experimental studies from this program of research have demonstrated that beliefs about losing control can lead to the development of symptoms and processes that have been observed in both OCD (e.g., anxiety around threatening stimuli) and SAD (e.g., anxiety during a social interaction). It is hoped that this work has set the stage for broader investigations of whether and how beliefs about losing control may impact various aspects of psychopathology, and whether there may be benefits associated with targeting them in the clinic.

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Appendix A.

Final 21-Item BALCI (Study 1)

Beliefs About Losing Control Inventory (BALCI)

Please rate each statement by selecting the number that best describes how much the statement is true of you. Please answer every item, without spending too much time on any particular item.

How much is each of the following statements true of you?	***Not at all***	***A little***	***Some***	***Much***	***Very Much***
1. I'm afraid that I might not be able to keep my emotions in check	0	1	2	3	4
2. If I have too many thoughts, or if they're too intense, I could lose control of my mind	0	1	2	3	4
3. Strong emotions can be dangerous because you might lose control	0	1	2	3	4
4. I am afraid of losing control of my mind	0	1	2	3	4
5. If I can't keep my mind on a task, it means that I am losing control	0	1	2	3	4
6. I am afraid of losing control of my bladder and/or bowels	0	1	2	3	4
7. I am afraid of getting hiccups or of sneezing because I might not be able to stop	0	1	2	3	4
8. I am afraid of losing control of my thoughts	0	1	2	3	4
9. I'm concerned about my ability to handle my emotions	0	1	2	3	4
10. I'm afraid I might do something inappropriate or embarrassing	0	1	2	3	4
11. If I get too upset or anxious, I will lose control	0	1	2	3	4
12. Strong emotions can be a sign that I'm losing control	0	1	2	3	4
13. If I get too emotional, I worry that I might never calm down	0	1	2	3	4
14. It's important for me to stay in control of my thoughts	0	1	2	3	4
15. Staying in control is an important priority for me	0	1	2	3	4
16. I am afraid of losing control of my emotions	0	1	2	3	4
17. If I don't manage the thoughts, images or impulses in my mind, I will lose control	0	1	2	3	4
18. If I lose control over an urge or impulse, I will act on it even if I don't want to	0	1	2	3	4
19. It's important for me to keep my emotions from spiraling out of control	0	1	2	3	4
20. If I lost control, I would throw up	0	1	2	3	4
21. I am afraid of losing control of my body or of my bodily function(s)	0	1	2	3	4

Appendix B.

List of Intrusive Thoughts (Study 2)

Please highlight all of the **intrusive thoughts, images, urges, and/or impulses** you have ever experienced in your life. These are **NOT** things that you have done necessarily but could be thoughts you have had, even if briefly.

- Throwing myself in front of a car, train, metro/subway train, and/or bike.
- Pushing someone in front of a car, train, metro/subway train, and/or bike.
- Jumping off a balcony, a bridge, a cliff, and/or a building.
- Pushing someone off a balcony, a bridge, a cliff, and/or a building.
- Driving my car and/or my bike into someone, something, and/or an animal.
- Hurting and/or stabbing yourself with a knife and/or scissors.
- Hurting and/or stabbing someone and/or an animal with a knife and/or scissors.
- Saying something mean or inappropriate to a family member, partner, friend, boss, stranger, etc.
- Screaming/yelling at a family member, partner, boss, stranger, etc.
- Shouting something inappropriate in public (e.g., in a store, at church, in the street).
- Engaging in inappropriate sexual behaviour with someone and/or an animal.
- Kissing someone inappropriately.
- Stealing something and/or others' belongings (e.g., in a store, at someone's house).
- Physically hurting myself with an object (e.g., paper clip).
- Physically hurting someone and/or an animal with an object (e.g., paper clip).
- Throwing an object at someone that could hurt them.
- Slapping, shoving, hitting, choking, and/or kicking someone and/or an animal.
- Pushing people in a crowd.
- Bumping into someone or many individuals.
- Tearing off my clothes in public.
- Breaking or damaging my belongings or others' belongings.
- Throwing myself down a staircase.
- Pushing someone down a staircase.
- Stepping in front of incoming traffic.
- Smashing expensive/fragile objects or throwing them on the floor.

Have you experienced other intrusive thoughts, images, urges, and/or impulses that relate to losing control over your behaviour? If yes, please write them below:

Appendix C.

Bogus Brochure (Study 3)

WHAT HAPPENS WHEN YOU DRINK ALCOHOL?

Alcohol is known to negatively impact our **behaviour** – but why?

Consuming alcohol lowers our **inhibitory capacities,** also known as our "self-control" (e.g., Fillmore, Ostling, Martin, & Kelly). Inhibitory functions are essential to stay in control of our behaviour and to stop ourselves from performing certain actions. For example, research by Hofmann, Friese, and Strack (2009) shows that alcohol intoxication leads to strong impulsive behaviour. This means that consuming alcohol can make you do and say things around other people that you would not necessarily do or say when sober.

In this way, alcohol can make you **lose control** over what you do and what you say around other individuals. Often, this takes the form of doing or saying something embarrassing at a bar, at a party, or in a nightclub that others later remember. Unfortunately, such impulsive behaviour has led to the creation of websites showcasing "embarrassing nightclub photos".

Research has allowed health organizations to establish clear and strict criteria pertaining to alcohol consumption for both males and females to prevent loss of control over one's behaviour.

****

WHAT HAPPENS WHEN YOU DON'T DRINK ALCOHOL?

Not consuming alcohol is a **protective factor** from all negative consequences mentioned above.

Specifically, not consuming alcohol allows us to make full use of our inhibitory capacities and to have complete **self-control** (e.g., Hofmann et al., 2009). In other words, when we abstain from drinking alcohol, we have full control over what we do and what we say around other people.

Individuals who do not drink are therefore **less likely** to lose control over their behaviour according to research (e.g., Baumeister, Heatherton, & Tice, 1994), which also prevents embarrassing actions around others.

<u>Further Readings</u>

Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). Losing control: How and why people fail at self-regulation. San Diego, CA: Academic Press.

Fillmore, M. T., Ostling, E. W., Martin, C. A., & Kelly, T. H. (2009). Acute effects of alcohol on inhibitory control and information processing in high and low sensation-seekers. *Drug and Alcohol Dependence, 100*, 91-99

Hofmann, W. Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science, 4*, 162-176.

Appendix D.

'Getting to Know You' Task Script (Study 3)

1. Given the choice of anyone in the world, whom would you want as a dinner guest?

[participant answers]

2. Would you like to be famous? In what way?

Well, I don't think I'd wanna be a movie star or anything like that because I wouldn't want the paparazzi following me around or anything. But I guess I'd like to be "well known" so I could use my position to give back to society in some way.

3. For what in your life do you feel most grateful?

[participant answers]

4. If you could wake up tomorrow having gained any one quality or ability, what would it be?

Um, probably the ability to fly. That way I could just go wherever I want, whenever I want.

5. What do you value most in a friendship?

[participant answers]

6. What, if anything, is too serious to be joked about?

Um…oh…definitely mental illness.

7. Your house, containing everything you own, catches fire. After saving your loved ones and pets, you have time to safely make a final dash to save any one item. What would it be? Why?

[participant answers]

8. Complete this sentence: "I wish I had someone with whom I could share _____"

Ahhh, I don't know…a laugh? It's all I can think of.

9. If you knew that in one year you would die suddenly, would you change anything about the way you are now living? Why?

[participant answers]

10. If you were able to live to the age of 90 and retain either the mind or body of a 30-year-old for the last 60 years of your life, which would you want?

Um, I think I'd pick body. I'd want to be able to still get around and do all the things that I'm used to doing. And as long as my mind aged normally, so like, not getting dementia or Alzheimer's, then I think I'd still be ok with having my mind get older cause you'd gain a lot of wisdom and experience.

11. What would constitute a "perfect" day for you?

[participant answers]

12. If a crystal ball could tell you the truth about yourself, your life, the future, or anything else, what would you want to know?

I don't think I'd wanna know anything about *my* life cause that might change how I live my life. But I guess I'd wanna know the winning lottery numbers, that way I wouldn't have to worry about money ever again.

13. Is there something that you've dreamed of doing for a long time? Why haven't you done it?

[participant answers]

14. What does friendship mean to you?

I guess when I think about friendship I think about good times, good memories. You know, those kinds of things.

15. If you were going to become a close friend with your partner, please share what would be important for him or her to know?

[participant answers]

Appendix E.

Ethical Approval Certificates

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant:	Dr. Adam Radomsky
Department:	Faculty of Arts and Science\Psychology
Agency:	Social Sciences & Humanities Research Council Concordia University
Title of Project:	The Fear of Losing Control - Measure Development
Certification Number:	30003402

Valid From: August 15, 2017 To: August 14, 2018

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Dr. James Pfaus, Chair, University Human Research Ethics Committee

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant:	Dr. Adam Radomsky
Department:	Faculty of Arts and Science\Psychology
Agency:	Social Sciences & Humanities Research Council Concordia University
Title of Project:	The Fear of Losing Control - Measure Development
Certification Number:	30003402

Valid From: November 06, 2018 To: November 05, 2019

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Dr. Shannon Hebblethwaite, Vice Chair, University Human Research Ethics Committee

UNIVERSITÉ Concordia UNIVERSITY

CERTIFICATION OF ETHICAL ACCEPTABILITY FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant:	Dr. Adam Radomsky
Department:	Faculty of Arts and Science\Psychology
Agency:	Social Sciences & Humanities Research Council Concordia University
Title of Project:	The Fear of Losing Control - Measure Development
Certification Number:	30003402

Valid From: April 23, 2018 To: April 22, 2019

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Dr. James Pfaus, Chair, University Human Research Ethics Committee

Appendix F.

Study Consent Forms

Study 1

CONSENT FORM TO PARTICIPATE IN RESEARCH

By clicking on the "Next Page" button below, I confirm that I agree to participate in a program of research being conducted by Adam S. Radomsky, Ph.D., in the Psychology Department of Concordia University.

A. PURPOSE

I have been informed that the purpose of this study is to examine psychological factors that are associated with fear, anxiety and related behaviour.

B. PROCEDURES

If I agree to participate in this study, I will be asked to complete one questionnaire package. The study should take approximately 60-90 minutes to complete and be completed online. These questionnaires ask no questions regarding my name and they will not be connected in any way with my contact details. I am aware that the data collected from these questionnaires will be hosted on a Concordia University server, but none of my identifying information will be linked to the questionnaires or hosted on the server. Finally, I will be fully debriefed about the purpose of the study as well as the hypotheses. For my participation, I will receive (i) 1 course credit if I am part of the undergraduate participant pool at Concordia University (if you are eligible), OR (ii) entry into a draw for cash prizes.

C. CONDITIONS OF PARTICIPATION

I understand that I am free to withdraw my consent and discontinue my participation in this study at any time, without any negative consequences whatsoever. I understand that all information obtained will be kept strictly confidential and will be stored under lock and key for a period of seven years after which they will be shredded. Access to this information will be made available only to restricted members of Dr. Radomsky's research team. I understand that to ensure my confidentiality all data will be coded by number only and will be kept separate from my name. I understand that data from this study may be published, but that no identifying information will be released.

If you have any questions or concerns, please feel free to contact our lab at 514-848-2424, ext. 2199.

Adam S. Radomsky, Ph.D., Professor
Stefanie Lavoie, B.A., Research Assistant
Edmine Sérulien, B.Sc., Research Assistant

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT. I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

NAME (please print) _____ DATE_____

SIGNATURE _____ WITNESS SIGNATURE _____

If at any time you have questions about your rights as a research participant, please contact the Manager, Research Ethics, Concordia University, at 514-848-2424, ext. 7481, oor.ethics@concordia.ca.

INFORMATION AND CONSENT FORM

Study Title: Study on the characteristics of impulsive individuals
Researcher: Stefanie Lavoie
Researcher's Contact Information: stefanie.lavoie@concordia.ca
Faculty Supervisor: Adam S. Radomsky
Faculty Supervisor's Contact Information: adam.radomsky@concordia.ca
Source of funding for the study: SSHRC

You are being invited to participate in the research study mentioned above. This form provides information about what participating would mean. Please read it carefully before deciding if you want to participate or not. If there is anything you do not understand, or if you want more information, please ask the researcher.

A. PURPOSE

The purpose of the research is to examine the characteristics of impulsive individuals.

B. PROCEDURES

If you participate, you will be asked to 1) read and sign this consent form; 2) read through a list of thoughts and select the ones you have experienced; 3) complete a behavioural approach test; 4) complete a sorting task; 5) provide several ratings; and 6) complete questionnaires. These questionnaires ask no questions regarding your name and they will not be connected in any way with your contact details. The data collected from these questionnaires will be hosted on a Concordia University server, but none of your identifying information will be linked to the questionnaires or hosted on the server. Finally, you will be fully debriefed about the purpose of the study as well as the hypotheses.

In total, participating in this study will take approximately 60-90 minutes.

C. RISKS AND BENEFITS

To the best of our knowledge, there are no risks associated with this study. If you experience distress at any point during testing, please let us know immediately. For example, some of the items in the questionnaires pertain to sensitive issues, and as such, you may feel some mild discomfort in answering.

You might or might not personally benefit from participating in this research. You will receive 1.5 participant pool credits OR a ballot entry in a cash draw to be held in August for participating.

Other potential benefits include understanding how psychological research is conducted and helping us increase scientific knowledge.

D. CONFIDENTIALITY

We will gather the following information as part of this research: Your informed consent, age, ethnicity, sex, gender, years of completed education (including primary, secondary, CEGEP, and university), and any information from questionnaires that we will ask you to complete (e.g., symptoms you may be experiencing related to stress, anxiety, and depression).

By participating, you agree to let the researchers have access to information including your name, demographic information, and symptoms you may be experiencing (e.g., related to stress, anxiety, depression). This information will be obtained from questionnaires that we will ask you to complete.

We will not allow anyone to access the information, except people directly involved in conducting the research. We will only use the information for the purposes of the research described in this form.

To verify that the research is being conducted properly, regulatory authorities might examine the information gathered. By participating, you agree to let these authorities have access to the information.

The information gathered will be confidential. That means that the research team will know your real identity, but it will not be disclosed.

The information gathered will be coded. That means that the information will be identified by a code. The researcher will have a list that links the code to your name.

We will protect the information by storing all hard copy documents under lock and key in the laboratory and password protecting all electronic data. Your data will be accessible by knowledge of password(s) used for digital encryption or the physical keys used to lock cabinets containing all paper documents. The only people with access will be Professor Radomsky, and/or research assistants who work on the study. Completed questionnaires will be associated with your participant ID only, and your personal identifying information will not be included in any posters, reports, presentations, or any other publications that result from this study. Your personal identifying information will be stored separately from your questionnaires, also under lock and key for a period of seven years after publication of the results, after which all identifying information will be destroyed and all other data will be archived indefinitely.

We intend to publish the results of the research. However, it will not be possible to identify you in the published results.

We will destroy all identifying information seven years after the results are published, while all other data will be archived indefinitely.

In certain situations, we might be legally required to disclose the information that you provide. This includes situations where you disclose intentions to harm yourself or others, or knowledge of child abuse/neglect, or a subpoena or related court order is issued for the data being collected in this study. If this kind of situation arises, we will disclose the information as required by law, despite what is written in this form.

E. CONDITIONS OF PARTICIPATION

You do not have to participate in this research. It is purely your decision. If you do participate, you can stop at any time. You can also ask that the information you provided not be used, and your choice will be respected. If you decide that you don't want us to use your information, you must tell the researcher within 24 hours of the end of your study participation.

As a compensatory indemnity for participating in this research, you will receive 1.5 participant pool credits OR a ballot entry in a cash draw to be held in August for participating.

To make sure that research money is being spent properly, auditors from Concordia or outside will have access to a coded list of participants. It will not be possible to identify you from this list.

There are no negative consequences for not participating, stopping in the middle, or asking us not to use your information.

F. PARTICIPANT'S DECLARATION

I have read and understood this form. I have had the chance to ask questions and any questions have been answered. I agree to participate in this research under the conditions described.

NAME (please print) _____

SIGNATURE _____

DATE _____

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page 1. You may also contact their faculty supervisor.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Study 2 (Post-Debriefing Consent Form)

Post Debrief Acknowledgement

Study on the Characteristics of Impulsive Individuals

I have been informed that deceptive information was necessarily provided to me in this study in order to simulate conditions wherein beliefs about losing control may occur. I have been informed of the study's true purpose, and have also been informed that participants were randomly assigned to receive one of two types of information related to beliefs about losing control: individuals with such thoughts are at risk of losing control over their behaviour (i.e., false feedback), or that these thoughts are very common and normal. I have been informed that such intrusive thoughts are, in reality, quite common and normal.

By signing below, I am hereby indicating that I have been informed of this minor deception and am allowing my results to be included in the analyses for this study. Given the nature of the deception, I acknowledge that I have been asked to refrain from talking about specific details of this study with friends and/or classmates.

I acknowledge that I have been given the opportunity to ask the experimenter any questions I have about the study, and to voice any concerns I have stemming from my participation in this study. I understand that if I have any questions or concerns following the study, I may contact Jean-Philippe Gagné, Department of Psychology, by phone at 514-848-2424, x 2199 or by email at jean_ga@live.concordia.ca; or Dr. Adam Radomsky, Department of Psychology, by phone at 514-848-2424, x 2202, or by email at adam.radomsky@concordia.ca.

NAME (print) _____

SIGNATURE _____

DATE _____

WITNESS _____

If at any time you have questions about your rights as a research participant, please contact the Research Ethics and Compliance Advisor, Concordia University, 514-848-2424, x 7481, or email at oor.ethics@concordia.ca.

INFORMATION AND CONSENT FORM

Study Title: Alcohol and First Impressions
Researcher: Jean-Philippe Gagné, M.A.
Researcher's Contact Information: jean_ga@live.concordia.ca
Faculty Supervisor: Adam S. Radomsky, Ph.D.
Faculty Supervisor's Contact Information: adam.radomsky@concordia.ca
Source of funding for the study: SSHRC

You are being invited to participate in the research study mentioned above. This form provides information about what participating would mean. Please read it carefully before deciding if you want to participate or not. If there is anything you do not understand, or if you want more information, please ask the researcher.

A. PURPOSE

The purpose of the research is to examine the influence of alcohol on first impressions.

B. PROCEDURES

In order to take part in the study participants must meet the following inclusion criteria:

- **At least 18 years old (valid picture ID mandatory)**
- **Fluent in English**
- **Do not abstain from alcohol**
- **Consume at least 1 alcoholic drink/month**
- **Do not drink more than 35 drinks weekly**
- **Breath alcohol concentration (BrAC) must be at 0.00 gm% prior to starting the experiment**
- **Did not eat/drink anything other than water three hours before the study**
- **Did not drink alcohol or smoke cannabis twelve hours before the study**
- **Will not be driving when leaving the study (e.g., car, motorcycle, bike)**
- **Not pregnant or breastfeeding, or actively trying to get pregnant**
- **A doctor has not advised against drinking because of a medical condition**
- **A doctor has not advised against drinking because of medication use**
- **Do not have any of the following medical conditions:**
    - Diabetes
    - Liver disease
    - Epilepsy or other neurological
    - Disorders that would impair your ability to carry out the necessary tasks
    - Ulcers or other gastrointestinal problems

    - Pancreatitis
    - Physical impairments that limit psychomotor abilities
    - Have been hospitalized for psychiatric treatment
- **Do not take any of the following medications:**
    - Insulin or other drugs used to control diabetes (e.g., chlorpropamide [Diabinese] metformin [Glucophage], phenformin, or tolbutamide [Orinase])
    - MAO inhibitors (e.g., isocarboxazid [Marplan] or phenelzine [Nardil])
    - Antabuse
    - Anti-fungals (i.e., ketoconazole)
    - Antibiotics (e.g., flagyl)
    - Drugs used to control blood pressure (e.g., nifedipine or verapamil)
    - Drugs used for autoimmune disorders (e.g., methotrexate or procarbazine [Matulane])
    - Benzodiazepines (e.g., Valium or Librium)
    - Prescription pain medications

If you participate, you will be weighed to determine the amount of alcohol required for your breath alcohol concentration (BrAC) level to reach .08 gm %. Next, you will receive some information about alcohol and its effects, followed by consumption of an alcoholic beverage OR orange juice, depending on the condition to which you are randomly assigned. Following this, you will take part in a 'getting to know you' task during which you will be asked to interact with a research assistant by taking turns answering a list of questions that will be given to you. Given that this study involves alcohol consumption, to ensure your safety, you will be monitored via video camera during the study. In addition, the 'getting to know you' task will be video recorded to permit later analyses.

As a result of alcohol consumption, you may experience a slight impairment of balance, speech, or reaction time and a reduced sense of caution and reason. At the end of the study, you will be asked to wait in the lab until your breath alcohol concentration has decreased to 0.04 gm% such that it is safe for you to leave the lab (i.e., detoxification). You agree to not drive a motor vehicle, ride a bike, or operate dangerous equipment upon leaving the lab session. A breathalyzer device will be used to assess breath alcohol concentration throughout the study. During the wait/detoxification period, you will be provided with snacks, water, coffee, and tea, and will be permitted to read or do work. Please note that you will have to wait at least 1.5 hours at the end of the study even if you are assigned to the control condition (i.e., orange juice only). This is because you need to complete a questionnaire after this 1.5-hour waiting period. Participants in the alcohol condition will complete this questionnaire when their breath alcohol concentration has decreased to 0.04 gm%.

In total, participating in this study will take approximately 3.5 to 5 hours.

C. RISKS AND BENEFITS

You might face certain risks by participating in this research.

Consuming alcohol, even in small amounts, can present certain risks: (1) Women who are pregnant should not consume alcohol in any amount. Drinking during pregnancy puts the fetus at

risk for learning and behavioural problems and abnormal facial features, including risk for fetal alcohol syndrome (FAS) and fetal alcohol spectrum disorders (FASD). Drinking during pregnancy may also increase the risk for pre-term labour. (2) Individuals with certain familial and/or genetic backgrounds, including family history of alcohol dependence, are at higher risk for development of alcohol dependence. (3) There is risk associated with alcohol consumption by those who are taking medications (prescribed or over the counter) or have medical conditions that are contraindicated with alcohol use. (4) There is risk associated with alcohol consumption for those who have a history of adverse responses to alcohol.

As part of the study, you are asked to disclose information that is sensitive in nature, including your alcohol use, mood, and attitudes. Sometimes answering these types of questions raises concerns for people, because they self-reflect on their behaviour. As such, these questions may make some people uncomfortable. Further, some of the tasks in the experiment may cause some discomfort for some individuals. Last, risks and discomforts associated with alcohol consumption in the study are experiencing a headache, nausea, dizziness or change in behaviour due to alcohol consumption.

While you are asked to remain in the lab until your breath alcohol concentration falls to .04 gm%, at this level of alcohol intoxication, you may experience the following effects: mild impairments in speech, memory, attention, coordination, and balance, increased sense of relaxation and sleepiness.

For participating, you will receive either a) financial compensation ($10/hour); or b) ballot entries (1 ballot entry per hour) in a cash draw to be held in August (e.g., 5 hours = 5 ballot entries); or c) 4 participation pool credits and some ballot entries (1 ballot entry per extra hour) in a cash draw to be held in August, depending on the number of hours you will have stayed in the lab (e.g., 4 credits for the lab session + 3 ballot entries for 3 extra hours = 5 hours in the lab). Other potential benefits include understanding how psychological research is conducted and helping us increase scientific knowledge.

D. CONFIDENTIALITY

We will gather the following information as part of this research: Your informed consent, age, ethnicity, sex, gender, years of completed education (including primary, secondary, CEGEP, and university), and any information from questionnaires that we will ask you to complete (e.g., symptoms you may be experiencing related to stress, anxiety, depression), data during the 'getting to know you' task, and breath alcohol readings during the study.

We will not allow anyone to access the information, except people directly involved in conducting the research. We will only use the information for the purposes of the research described in this form.

The information gathered will be coded. That means that the information will be identified by a code. The researcher will have a list that links the code to your name. The video recordings from the 'getting to know you' task will be identified with the same ID code and stored on a password-

protected computer. The ID code will also be used to link the data you provide today with your Online Screening Questionnaire data.

We will protect the information by storing all hard copy documents under lock and key in the laboratory and password protecting all electronic data. Your data will be accessible by knowledge of password(s) used for digital encryption or the physical keys used to lock cabinets containing all paper documents. The only people with access will be Professor Radomsky, and/or research assistants who work on the study. Completed questionnaires will be associated with your participant ID only, and your personal identifying information will not be included in any posters, reports, presentations, or any other publications that result from this study. Your personal identifying information will be stored separately from your questionnaires, also under lock and key for a period of seven years after publication of the results, after which all identifying information will be destroyed and all other data will be archived indefinitely.

We intend to publish the results of the research. However, it will not be possible to identify you in the published results.

We will destroy all identifying information seven years after the results are published, while all other data will be archived indefinitely.

In certain situations, we might be legally required to disclose the information that you provide. This includes situations where you disclose intentions to harm yourself or others, or knowledge of child abuse/neglect, or a subpoena or related court order is issued for the data being collected in this study. If this kind of situation arises, we will disclose the information as required by law, despite what is written in this form.

E. CONDITIONS OF PARTICIPATION

You do not have to participate in this research. It is purely your decision. If you do participate, you can stop at any time. You can also ask that the information you provided not be used, and your choice will be respected. If you decide that you don't want us to use your information, you must tell the researcher within 24 hours of the end of your study participation.

As a compensatory indemnity for participating in this research, you will receive either a) financial compensation ($10/hour); or b) ballot entries (1 ballot entry per hour) in a cash draw to be held in August 2019 (e.g., 5 hours = 5 ballot entries); or c) 2 participation pool credits and ballot entries (1 ballot entry per extra hour) in a cash draw to be held in August, depending on the number of hours you will have stayed in the lab (e.g., 2 credits for 2 hours + 3 ballot entries for 3 extra hours = 5 hours in the lab).

If you feel ill as a result of consuming alcohol during the study, you will have access to security personnel, and you will have the option of being escorted to Concordia's health centre on the Loyola campus or calling a friend/family member to pick you up.

If you withdraw before the end of the research, you will be compensated for what you completed up until that point. Upon withdrawal from the study, you have the option of having your data (collected up until that point) deleted from the database. You may have your data removed by letting the researcher know at the time of withdrawal. If at the time of study withdrawal your

breath alcohol concentration is above 0.04 gm%, you understand that you will be asked to remain in the lab until your breath alcohol concentration is ≤ 0.04 gm%.

To make sure that research money is being spent properly, auditors from Concordia or outside will have access to a coded list of participants. It will not be possible to identify you from this list.

There are no negative consequences for not participating, stopping in the middle, or asking us not to use your information.

F. PARTICIPANT'S DECLARATION

I have read and understood this form. I have had the chance to ask questions and any questions have been answered. I agree to participate in this research under the conditions described.

BY SIGNING BELOW:
(a) I AM CERTIFYING THAT I AM 18 YEARS OLD OR OLDER, THUS OF LEGAL AGE TO CONSENT TO PARTICIPATE IN THIS STUDY AND TO CONSUME ALCOHOL.
(b) I AGREE THAT I had the opportunity to look over and make any necessary corrections to the answers I gave on the Online Screening Questionnaire.
(c) I AGREE (if assigned to the alcohol condition) that I will not drive myself, ride a bicycle, or operate dangerous equipment once I leave here today, and I understand that I will be asked to remain in the lab until my breath alcohol concentration is ≤ 0.04 gm%.

NAME (please print)_____

SIGNATURE _____

DATE _____

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page 1. You may also contact their faculty supervisor.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Study 3 (Post-Debriefing Consent Form)

Post Debrief Acknowledgment
Alcohol and First Impressions

I have been informed that deceptive information was necessarily provided to me in this study. I have been informed of the study's true purpose. Specifically, the researchers are interested in examining the role of alcohol (a disinhibiting substance) and alcohol expectancies (*believing* that a potential loss of control may occur because of alcohol use) on perceptions of threats in the context of social interactions. I have also been informed that participants were randomly assigned to one of three experimental conditions: alcohol (vodka and orange juice), placebo, or orange juice. I have been informed that in the placebo condition, participants were made to believe that they were consuming an alcoholic beverage. I have been informed that this information was false. If I had been aware of the true study goal, this might have influenced my behaviour (e.g., with the research assistant) and my ratings of the impression I made.

By signing below, I am hereby indicating that I have been informed of this minor deception and am allowing my results to be included in the analyses for this study. Given the nature of the deception, I acknowledge that I have been asked to refrain from talking about specific details of this study with friends and/or classmates.

I acknowledge that I have been given the opportunity to ask the experimenter any questions I have about the study and/or to voice any concerns I have stemming from my participation in this study. I understand that if I have any questions or concerns following the study, I may contact Jean-Philippe Gagné, Department of Psychology, by phone at 514-848-2424 ext. 5965 or by email at jean_ga@live.concordia.ca; or Dr. Adam Radomsky, Department of Psychology, by phone at 514-848-2424 ext. 2202, or by email at adam.radomsky@concordia.ca.

NAME (print) _____

SIGNATURE _____

DATE _____

WITNESS _____

If at any time you have questions about your rights as a research participant, please contact the Research Ethics and Compliance Advisor, Concordia University, 514.848.2424 ext. 7481, or email at oor.ethics@concordia.ca.