Safety first! The impact of safety behaviour use and beliefs on cognitive, behavioural, and emotional responses during exposure for speech anxiety

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Thesis submitted to the University of Ottawa
in partial fulfillment of the requirements for the
degree of Doctor of Philosophy in Clinical Psychology

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ABSTRACT

Safety first! The impact of safety behaviour use and beliefs on cognitive, behavioural, and emotional responses during exposure for speech anxiety

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University of Ottawa, 2020

There is a debate among researchers and clinicians as to whether the judicious use of safety behaviours (SBs) during exposure therapy is helpful or detrimental. Central to this debate is the premise that SBs may interfere with one's ability to gather disconfirmatory evidence. However, no study to date has assessed: 1) how SB use may interact with cognitive mechanisms at play during an exposure-like task, or 2) whether it is SBs themselves, or rather, beliefs about SBs that are most important. The two studies outlined in this dissertation sought to investigate the cognitive, emotional, behavioural, and psychophysiological underpinnings and consequences of exposure with SBs. In Study 1, speech anxious participants (N = 111) were randomly assigned to deliver an evaluated speech with or without SBs. Self-reported anxiety ratings and psychophysiological arousal measures were recorded at baseline, in anticipation of the speech, and following the speech. Measures of working memory capacity, ability to gather disconfirmatory evidence, and speech task acceptability were administered. Results demonstrated no differences between conditions on most outcomes. However, condition did influence willingness to deliver future speeches, such that participants in the SB condition were less willing than those in the NoSB condition to deliver a future speech without SBs. In Study 2, speech anxious participants (N = 144) were given divergent information on the helpfulness of SBs. Participants were randomly assigned to one of three conditions and were told either that SBs are: helpful (decrease anxiety), unhelpful (counterproductive and increase anxiety), or were provided with no information on the anxiolytic effects of SBs (control condition). Self-reported

anxiety ratings were recorded at baseline, in anticipation of the speech, and following the speech. Similar to Study 1, measures of working memory capacity, ability to gather disconfirmatory evidence, and speech task acceptability were administered. Results demonstrated that participants in the helpful condition perceived the exposure as being more likely to succeed in helping them reduce their anxiety. Moreover, exposure expectancy mediated the relationship between the helpful condition (but not the unhelpful condition) and willingness to engage in future exposure exercises. There were no differences between conditions on most other outcomes. Taken together, these findings suggest that SB use may not necessarily be detrimental to outcomes on an exposure-like task, as individuals were able to gather disconfirmatory evidence (one of the proposed primary mechanisms underlying exposure success) across conditions in both studies. However, clients may believe SBs to be more helpful than they actually are, and clinicians should work collaboratively with clients to identify whether judicious SB use may be appropriate and helpful (or inappropriate and detrimental) in achieving their treatment goals. The current research program has the potential to improve our understanding of the consequences of SB use and identify the ways in which cognitive behavioural therapies could be improved.

ACKNOWLEDGMENTS

This program of research was supported by the Canadian Institute of Health Research and the Fonds de Recherche du Quebec Santé. I am very grateful to these funding agencies for the financial support to conduct and complete this program of research.

I would like to extend my sincere, heartfelt thanks to my supervisor, Dr. Allison Jane Ouimet, who has been more instrumental in shaping my career than she is likely aware. As a second-year undergraduate student at Concordia University, I dreamed of being a clinical psychologist, but I was less enthusiastic about conducting the research that I knew would be required in order for me to achieve that goal. That changed entirely when I took a Mood & Anxiety Disorders course taught by Dr. Ouimet, who was a graduate student herself at the time. For the first time in my academic career, I felt truly excited by research—a credit to Dr. Ouimet's engaging, accessible, and thought-provoking teaching style. Dr. Ouimet continues to inspire me in our discussions about research today. Allison, thank you for your direction, support, empathy, and flexibility over the last five years. I consider myself incredibly fortunate to have had you as a mentor throughout this process—it no doubt would have been much more challenging, and much less inspiring, without your unwavering guidance and intellectual rigour.

I would also like to thank Dr. Andrea Ashbaugh, Dr. Charles Collin, and Dr. Cary Kogan for serving on my internal thesis committee. Your feedback was invaluable in shaping this program of research, and I am grateful to have had the opportunity to consult with each of you on your diverse areas of expertise.

I am incredibly grateful to my cohort: Amy Webb, Arthur Braaten, Daria Kolmogorova, Keera Fishman, Nancy Bahl, Natasha Korva, Noor Sharif, Robert Hill, and Rylee Oram. You have made my grad school experience exceptionally more meaningful and enjoyable ($p < .001$)

and it is because of you that Ottawa now feels like home to me. Thank you for the endless laughs, support, and the never ending WhatsApp messages that continue even five years later. I am lucky to have been able to go through this program with such a wonderful group of peers. You all make the world a better place. A special thank you to honorary cohort member Jonathan Samosh for being my unpaid therapist and cherished friend for the last three years.

I am also thankful for all members (past and current) of the Cognition and Anxiety Disorders Research Laboratory, who have provided much support and feedback to me over the years. Thanks to Titania Dixon-Luinenburg, Kelsey Bowie, Molly Rooyakkers, Midhula Kalpak, and Alex-Anne Lamoureux for helping with the data collection for my thesis. And to Cassandra Fehr and Ryan Ferguson for their friendship, for making travel to conferences all the more exciting, and for allowing me to bother them when we worked together in our shared office.

Thank you to all of the individuals who participated in my studies. This research would not have been possible without your participation, and I truly hope that it can be used to help inform our understanding of anxiety.

To Andy, thank you for your friendship. You were an indelible part of my grad school experience and I'm better for having known you.

To Veronica, Josee Anne, and Leah, thank you for the uncontrollable laughter, the Magog weekend trips, and the brunch dates, which provided much needed respite when I needed it. To Jenna, Alexandra, Diandra, Bianca, Sara, and the rest of the Montreal crew, thank you for growing up with me, sticking by me, and encouraging me for the last 20+ years.

Most of all, thank you to my wonderful parents, Frank and Gisele, and my sister, Melanie, for supporting me throughout grad school and throughout my life. Thank you for being

models of kindness, patience, and hard work. Your limitless belief in me has kept me going when things were difficult.

Finally, to my brilliant partner, Conall: thank you for always believing in me, for never being surprised at my successes even when I am, and for comforting me in my failures. Thank you for reading many drafts over the years—you may be as much of an expert in safety behaviours as I am now. I am so very lucky to have had you by my side throughout this journey.

DEDICATION

This thesis is dedicated to my loving grandmother, Ninfa Tutino, who did everything in her power to ensure that her children and grandchildren had access to the education she had desperately wished for herself.

CONTRIBUTION OF AUTHORS

The dissertation outlined in this document comprises two manuscripts:

Study 1 (Chapter 2): Tutino, J. S., Ouimet, A. J., & Ferguson, R. J. (2020). Exploring the impact of safety behaviour use on cognitive, psychophysiological, emotional and behavioural responses during a speech task. *Behavioural and Cognitive Psychotherapy*, 1-15.

Study 2 (Chapter 4): Tutino, J.S., & Ouimet, A. J. (under review, *Behaviour Research and Therapy*) Do words matter? Examining the influence of safety behaviour beliefs on speech task outcomes.

Overall, I developed the topic of this thesis, and I was responsible for the research design and methodology, under the supervision and guidance of my supervisor, Dr. Allison Ouimet. My thesis committee, including Dr. Andrea Ashbaugh, Dr. Charles Collin, and Dr. Cary Kogan, also contributed significantly to my research methodology through their helpful feedback on my initial research proposal. For Study 1 and Study 2, I was responsible for the submission of ethics, participant recruitment, testing of participants, data management, data analysis, data interpretation, and the writing of both journal articles and the larger thesis document. All of the aforementioned tasks were done in consultation with Dr. Ouimet, who was particularly instrumental in providing comments and feedback on my manuscripts.

For Study 1, Ryan Ferguson (graduate student) assisted significantly with the data extraction for electrodermal activity, and also contributed to manuscript revisions. Titania Dixon-Luinenburg (undergraduate honours thesis student), Kelsey Bowie (research coordinator), Alex-Anne Lamoureux (research volunteer), Midhula Kalpak (research volunteer), and Molly Rooyakkers (research volunteer) assisted greatly with data collection and data entry. Ariane

Gauthier, Danika Levesque, Sara-Emilie Mcintee, Ashley Ruest, and Bradley Quach completed the video coding. The manuscript was revised due to helpful comments and edits via peer-review at various journals.

For Study 2, Midhula Kalpak (undergraduate honours thesis student), Titania Dixon-Luinenburg (research coordinator), and Molly Rooyakkers (research volunteer) assisted significantly with data collection and data entry. Kanika Dewan, Jenna Lteif, Kristina Munelith-Souksanh, Sydney Slaunwhite-Hay, and Helen Thai completed the video coding.

The two manuscripts submitted for publication are virtually identical to those presented in Chapter 2 and Chapter 4 of this thesis. However, supplementary material for both manuscripts (including power analyses, procedural diagrams, and statistical tables) have been integrated into the dissertation. Additionally, small revisions were made to the Study 1 manuscript presented in the dissertation based on feedback from committee members. These include the addition of subheadings to the results section of Chapter 2 and minor wording changes in the discussion in order to clarify the interpretation of findings.

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CHAPTER 1:

GENERAL INTRODUCTION

Social anxiety is characterized by excessive fear of negative evaluation and elevated levels of distress during social encounters (American Psychiatric Association, 2013). A common social anxiety experience is speech anxiety, which can include fear and/or avoidance of public speaking. Whereas social anxiety disorder affects up to 13% of Canadians in their lifetime (Stein & Kean, 2000), speech anxiety (whether at clinical threshold or not) is much more common, affecting approximately 64% of undergraduate students (Ferreira Marinho et al., 2017). The most common evidence-based treatment for social and speech anxiety is Cognitive Behavioural Therapy (CBT; Chambless & Ollendick, 2001; Heimberg, 2002). The core components of CBT for anxiety disorders are cognitive restructuring, exposure exercises, and behavioural experiments, with the ultimate goal of targeting and diminishing unhelpful beliefs that perpetuate anxiety symptoms (e.g., Otte, 2011).

Although interventions for social anxiety are often successful at reducing symptomatology (Deacon & Abramowitz, 2004; Federoff & Taylor, 2001), a considerable number of individuals (i.e., 10-20%) terminate therapy prematurely (Hofmann & Suvak, 2006; Rodebaugh, Holaway & Heimberg, 2004). Early termination may be related to aspects of therapy that cause temporary increases in anxiety, such as exposure to feared situations. Indeed, attrition rates for exposure and response prevention treatment are even higher, ranging from 20-40% (Foa et al., 2005; Whittal, Thordarson, & McLean, 2005). Yet when completed, exposure exercises are a useful and effective therapeutic tool for fear extinction (e.g., Deacon & Abramowitz, 2004; Eddy, Dutra, Bradley & Westen, 2004), and are thus a central component in most variations of CBT for anxiety disorders (Heimberg, 2002). A meta-analysis on the efficacy of CBT for social

anxiety illustrated that exposure plus cognitive restructuring results in superior outcomes to placebo groups (Federoff & Taylor, 2011). In a typical exposure session, clients are systematically exposed to their feared stimulus (e.g., gradually approaching a snake over the course of a one-hour session) and given a cognitive rationale as to why exposure results in diminished anxiety symptoms. Over time, the strength of association between the stimulus and fear diminishes (Abramowitz, Franklin, Zoellner, & DiBernardo, 2002; Mowrer, 1939). In the case of social anxiety, a cognitive behavioural therapist may encourage their socially anxious client to initiate a conversation with a colleague at work. Ultimately, the goal is to help clients engage with their fears using a step-by-step graded process, so as to build an increased sense of mastery and confidence in tackling their *most* feared situations (Heimberg, 2002).

Despite the efficacy of exposure exercises, engaging in one's most feared scenario is daunting for many, and likely contributes to high attrition rates. Indeed, 21% of individuals who terminated CBT prematurely reported that it was due to fears of engaging in behavioural experiments or exposure (Mancebo, Eisen, Sibrava, Dyck, & Rasmussen, 2011). To maximize the impact of evidence-based treatments such as CBT, it is critical to pinpoint components of therapy that increase treatment acceptability and efficacy. Using multimethod assessment to examine anxious individuals' responses during exposure may facilitate our ability to identify efficacious treatment tools. The purpose of the current research project is to clarify the cognitive, psychophysiological, behavioural, and emotional factors underpinning exposure success and acceptability.

Exposure Therapy Over the Years: A Brief Overview

In order to identify mechanisms and targets for exposure success, it can be helpful to review the historical roots of exposure techniques, and how this form of therapy has evolved

over time. Indeed, exposure is one of the most widely used techniques in current cognitive behavioural-based treatments for anxiety (Abramowitz, Deacon, & Whiteside, 2019; Heimberg, 2002), yet the foundations of exposure therapy began in the 1950s. James Taylor, a British psychologist based in South Africa, is credited as the first experimental psychologist to use exposure techniques to treat anxiety (Abramowitz et al., 2019). Although Taylor did not publish his case studies with anxious clients, his work and consultation greatly influenced Joseph Wolpe, the founder of systematic desensitization (Wolpe, 1958).

Wolpe designed systematic desensitization as a gradual exposure to feared stimuli/situations, with the goal of experiencing a diminished fear response to the stimulus (or stimuli) over time. The theory behind systematic desensitization is that this weakened fear response occurs by pairing the feared stimuli with a physiological response that is incompatible with anxiety (i.e., relaxation, progressive muscle relaxation). This is done by creating a fear hierarchy, with feared situations ranked from least to most anxiety-provoking. The goal is for clients to confront these fears in a relaxed state and very gradually work their way up toward the top of the hierarchy (i.e., peak fear) using imaginal and in vivo exposure over the course of multiple sessions. Wolpe (1958) believed that an important feature of desensitization success was for this reduced association to generalize across a variety of contexts (e.g., inside *and* outside of the therapy office, with *and* without the therapist present). Moreover, tolerability and acceptability are important features of systematic desensitization—if anxiety becomes too high or intolerable, a stimulus (or imagined scenario) might be removed until a state of relaxation can be restored. Overall, systematic desensitization was both effective and efficacious in reducing anxiety (Abramowitz et al., 2019). Individuals with public speaking anxiety treated with systematic desensitization experienced a reduction in anxious symptoms in five sessions and had

better outcomes than individuals receiving alternative treatment (Paul, 1966). Although certain aspects of systematic desensitization have since been abandoned in understandings of exposure efficacy (i.e., relaxation training, creating an incompatible response), other features (e.g., graded approach, focus on tolerability, habituation theory) came to serve as the foundations for exposure therapy as we know it today.

Systematic desensitization gave rise to various iterations of exposure therapy, including flooding. Unlike systematic desensitization, flooding involves a non-graded response-prevention approach, with the presumption that habituation is the primary mechanism of change underlying fear reduction. These habituation-based models of exposure gave rise to theoretical models of exposure (i.e., emotional processing theory; Foa & Kozak, 1986—see Safety Behaviours During Exposure: Helpful or Hindering? section below for more information) and consequent clinical models and treatment manuals for anxiety (e.g., *Prolonged Exposure Therapy* by Foa, Hembree, and Rothbaum [2007]). Overall, the development of exposure-based therapies shifted the focus of psychological interventions for anxiety disorders, and gave rise to a movement of evidence-based interventions for a vast array of psychological concerns, including anxiety disorders, obsessive compulsive disorder, posttraumatic stress disorder, and eating disorders (Farrell et al., 2019; Foa & McLean, 2016).

More recently, there has been a shift away from habituation-only approaches to those focused on fear reduction. Indeed, findings from contemporary experimental research suggest that habituation is neither necessary, nor sufficient, to produce long-lasting, generalized reductions in anxiety (Craske et al., 2008). Instead, researchers have proposed that exposure therapy operates by reducing fear-based associations and strengthening safety-based associations. This process occurs primarily through expectancy violation—when engaging with

feared scenarios/stimuli, people learn that their feared outcome does not occur. This principle is also in line with cognitively-informed theoretical models of exposure (Salkovskis, 1991), which propose that exposure therapy functions through belief disconfirmation (e.g., "I did not actually need my cue cards to remember my speech").

Over the years, exposure therapy has maintained some of the same tenets as its predecessor, systematic desensitization. However, the field has shifted away from a habituation-only approach in favor of a belief change and expectancy violation understanding of exposure success (Abramowitz et al., 2019). This latter perspective is more in line with our current conceptualizations of cognitive behavioural models of anxiety, which underscore the bidirectional relationships between behaviours (e.g., engaging with feared stimulus), thoughts (e.g. "That wasn't as bad as I thought it would be!"), feelings (e.g., lessened anxiety), and physiological sensations (e.g., increased heart rate).

Safety Behaviour as a Maintaining Risk Factor for Anxiety

Cognitive behavioural models of social anxiety have highlighted the important role of safety behaviours (SBs) in the maintenance of anxiety (Clark & Wells, 1995). Anxious individuals perform these overt or covert behaviours to reduce anxiety in fear-provoking situations (Salkovskis, 1991). For example, individuals with social anxiety may mentally rehearse sentences prior to saying them out loud (covert behaviour), so as to diminish fears of social evaluation from their peers, or they may carry a water bottle with them at all times to mitigate anxiety symptoms such as dry mouth during a conversation (overt behaviour). Safety behaviour use is idiosyncratic—individuals with the same fears (e.g., fear of negative evaluation) may use different strategies to reduce their anxiety (Milosevic & Radomsky, 2008). Other common safety behaviours for social anxiety include keeping anxiolytic medication on hand,

using clothing or objects to hide body parts, and frequent use of electronics in public settings (Blakey & Abramowitz, 2016).

Although safety behaviour use is adaptive under certain circumstances (e.g., washing your hands after shaking hands with an individual who has the flu), it becomes maladaptive when people engage in them excessively and repeatedly (e.g., washing your hands after touching *any* door knob). Indeed, researchers have distinguished between safety behaviours (or "safety-seeking behaviours") and adaptive coping strategies (e.g., Salkovskis, 1991; Thwaites & Freeston, 2005). Thwaites and Freeston (2005) propose three factors that may be used to differentiate safety behaviours from adaptive coping strategies: 1) the topology of the behaviour, 2) the function or intention behind the behaviour, and 3) the consequences of the behaviour. The authors contend that topology in and of itself is not sufficient to differentiate between SBs and adaptive coping strategies. For example, avoidance behaviours are not inherently safety behaviours based on topology alone. Instead, Thwaites and Freeston (2005) contend that the function (e.g., to avoid having a panic attack) and the individual impact that the behaviour has on a person (e.g., maintained anxiety, impaired functioning, reduced social contact) must be taken into account. As such, SBs are nuanced and should be assessed on an individual basis for each client. Researchers have established clearly that safety behaviour use, compared to adaptive coping strategies, becomes pathological when people use them excessively in everyday life, as these behaviours contribute to the development and maintenance of anxiety disorders (e.g., Salkovskis, 1991; Sloan & Telch, 2002).

In part, pathological SB use occurs because anxious individuals who use such behaviours are unable to acquire disconfirmatory evidence about their fears and the (lack of) utility of their SBs (Clark & Wells, 1995). For example, if an individual grips the sides of a podium to prevent

themselves from trembling during an oral presentation, they are unlikely to learn that engaging in this behaviour actually *increases* the likelihood of trembling, due to muscular strain and tension (McManus, Sacadura, & Clark, 2008). Rather, they will likely continue to believe that they managed to get through the presentation *because* they held on to the podium, thereby perpetuating their symptoms, problematic beliefs, and maladaptive behaviours. Indeed, SB use becomes a reinforced process—if someone with contamination fear continuously uses hand sanitizer after touching perceived contaminants (e.g., door handles), they will interpret their lack of sickness as evidence that their safety behaviour is keeping them safe from their feared outcome (i.e., contamination and disease). This rationale is consistent with the *post-hoc* fallacy, a common error of attributing a cause and effect to sequential events (e.g., "Since I did not get sick after washing my hands, washing my hands must have resulted in my lack of illness"; Pinto, 2001).

Safety Behaviours During Exposure: Helpful or Hindering?

Although CBT researchers and clinicians agree almost universally about the deleterious effects of safety behaviour use on everyday anxiety (e.g., Wells et al., 1996; Deacon & Maack, 2008; Olatunji, Etzel, Tomarken, Ciesielski, & Deacon, 2011; Salkovskis, Clark, Hackmann, Wells, & Gelder, 1999), they disagree strongly about SB use within the therapeutic context. Some assert that permitting SBs at *any* stage of exposure prevents individuals from learning that they will overcome their anxiety without this behaviour (Abramowitz & Moore, 2007; Foa & Kozak, 1986; Sloan & Telch, 2002). At the center of this perspective is emotional processing theory (originally introduced by Rachman, 1980, and then elaborated by Foa & Kozak, 1986), which asserts that clients must be in a highly anxious state during exposure therapy in order to reap the critical benefit of reduced fear over the course of the exposure. According to the theory,

fear responses are resistant to real change and habituation unless that fear is fully activated prior to extinction. Thus, in exposure therapy, clients interact with their feared stimulus, and over time, the fear they experience when facing the phobic stimulus will substantially diminish, and extinction occurs through within and between-session habituation. Moreover, individuals will be able to gather disconfirmatory evidence about their feared outcome, which further overrides their maladaptive beliefs about the feared stimulus or situation. According to emotional processing theory, introducing safety behaviours into exposure therapy will result in diminished activation of the fear network. Consequently, the effect of exposure on fear reduction will not be as strong as exposure and response prevention without safety behaviour use.

A number of findings support the notion that safety behaviour use during exposure has no incremental benefit over standard exposure and response prevention, and may actually be detrimental to treatment success (e.g., Deacon & Maack, 2008; Engelhard, van Uijen, van Seters, & Velu, 2015; Gangemi, Mancini & van den Hout, 2012; Kim, 2005). Salkovskis et al. (1999) tested the effect of safety behaviour use on exposure efficacy in a sample of individuals with panic disorder and agoraphobia. Participants engaged in an individualized anxiety-provoking exposure task (e.g., going to the mall, going for a walk outside one's home) and were asked to either continue to use their idiosyncratic safety behaviours or to terminate them. Participants asked to withhold from using their safety behaviours demonstrated decreases in catastrophic cognitions and self-reported anxiety compared to participants who continued to use their safety behaviours. In a study conducted by Wells et al. (1995), socially anxious individuals permitted to use SBs (e.g., avoiding eye contact) during exposure had less positive outcomes than individuals who were not permitted to use SBs. Similarly, Sloan and Telch (2002) demonstrated that, compared to individuals who received exposure only, individuals who were encouraged to use

safety behaviour during exposure demonstrated greater fear and threat-related cognitions at a two-week follow up. Additionally, in a study conducted by Abramowitz and Moore (2007), participants with health anxiety who used SBs during exposure demonstrated decreased self-reported anxiety during exposure compared to those who did not use SBs. However, the researchers observed a gradual decline in anxiety in the no-SB condition, which they suspected produced longer lasting changes in anxiety and cognitions.

Conversely, other researchers have raised the question of whether safety behaviour is necessarily detrimental to exposure efficacy. Some contend that allowing clients to use safety behaviours *judiciously* during the initial stages of exposure therapy– and then gradually diminishing these behaviours – may reduce state anxiety during exposure, increase treatment acceptability, and thus, decrease attrition rates (Levy & Radomsky, 2014; Sartory, Master, & Rachman, 1989; van den Hout, Engelhard, Toffolo, & van Uijen, 2011). Judicious use occurs when people gradually reduce their SB use over time (e.g., over the course of completing an exposure hierarchy), such that they eventually face their feared stimuli without SBs (Rachman et al., 2008). Indeed, Levy, Senn, and Radomsky (2014) and Milosevic and Radomsky (2013b) found that, when given the option, undergraduate students rated the description of CBT with SB use as significantly more acceptable than standard CBT. Moreover, many researchers have been unable to replicate findings that demonstrate the deleterious effects of judicious safety behaviour use during exposure (e.g., Hood, Antony, Koerner, Monson, 2010; Rachman, Shafran, Radomsky, & Zysk, 2011; van den Hout, Reininghaus, van der Stap, & Engelhard, 2012). Deacon, Sy, Lickel, and Nelson (2010) recruited individuals with high levels of claustrophobia to participate in an exposure exercise with or without SBs. They found no differences between conditions on behavioural approach, fear reduction, or anxious cognitions. Indeed, participants

across conditions demonstrated improvement. In a recent study, healthy participants were exposed to a contaminant and were randomly assigned to an exposure and response prevention condition, an exposure plus safety behaviour condition, or a control condition (van Uijen, van den Hout, Schiphorst, Knol, & Engelhard, 2017). Findings revealed significant decreases in feelings of contamination, fear of contamination, danger, and disgust in both experimental groups compared to the control group. No differences were found on any measures between the two experimental groups. Most notably, Meulders, Van Daele, Volders, and Vlaeyen (2016) conducted a meta-analysis that included 20 empirical studies involving SBs. The authors concluded that there is currently not enough evidence that SBs either enhance or detract from exposure outcomes.

Other findings from experimental studies on exposure therapy provide evidence for the *added benefit* of judicious SB use; in a study conducted by Sy, Dixon, Lickel, Nelson and Deacon (2011), claustrophobic participants who used SBs during an exposure session demonstrated elevated self-efficacy and reduced maladaptive claustrophobic cognitions compared to individuals who did not use safety behaviours or had safety behaviours available to them if they wished to use them. In a study conducted by Rachman, Craske, Tallman, and Solyom (1986), participants with agoraphobic avoidance engaged in eight sessions of exposure, and were either permitted or discouraged from escaping when their anxiety ratings were above 70 out of 100. Their results demonstrated that benefits were observed in both groups at 3-month follow-up. Notably, the escape condition reported reduced anxiety and greater perceived control than the no-escape condition. Studies supporting (or at least not opposing) the inclusion of judicious safety behaviour use during exposure have primarily used samples of undergraduate students (e.g., Levy & Radomsky, 2014), people with specific phobia (e.g., Hood, Antony,

Koerner, & Monson, 2010), and people with obsessive compulsive disorder (e.g., Rachman, Safran, Radomsky, & Zysk, 2011).

Although the inclusion of safety behaviour in exposure therapy is in direct conflict with emotional processing theory (Foa & Kozak, 1986; Rachman, 1980), inhibitory learning theory (Craske et al., 2008) proposes a different explanation for exposure efficacy, which may allow for the inclusion of safety behaviours. Unlike emotional processing theory, which states that fear associations become extinct over successive exposure trials, Craske et al. (2008) maintain that during successful exposure, the original fear associations in memory remain intact, but new associations about the feared stimulus are also formed. The stimulus is therefore encapsulated by two opposing associations: the original stimulus-fear association (e.g., "people are laughing at me", and the new stimulus-safety association (e.g. "people are laughing about something else"). If exposure therapy is successful, clients will develop a new cognitive association between the initial threatening stimulus and safety, and this association will be activated more often than the initial fear-based association.

In a recent article, Blakey and Abramowitz (2019) highlight the role of safety behaviour use in exposure therapy, as explained by principles of inhibitory learning. They argue that SBs are in direct violation of inhibitory learning principles (and thus, exposure success), as SBs prevent people from gathering disconfirmatory evidence and consequently generalizing inhibitory associations (i.e., violating expectations repeatedly and across multiple contexts). Consequently, permitting SBs does not allow for optimal learning conditions during exposure, according to Blakey and Abramowitz. I contend that although pathological SB use in everyday life directly interferes with inhibitory learning, the influence of judicious SB use over the course of treatment is less clear and conclusive. Including judicious SBs during exposure may not

detract from the formation of new safety-based associations, as long as: 1) the SBs are reduced over time, and 2) new associations become more salient. Research investigating these cognitive processes more directly is lacking.

Given these divergent findings, the evidence supporting or discrediting the use of safety behaviours during exposure therapy is far from conclusive and further research is needed to elucidate why these discrepancies exist. Numerous factors may explain the inconsistencies of these findings, including unselected samples, research design (e.g., a focus on internal vs. external validity, single-session designs, follow-ups, qualitative surveys vs. experimental studies), outcomes of interest, and small sample sizes. Indeed, some researchers who have found no statistically significant difference between standard exposure and response prevention and exposure with safety behaviour employed small sample sizes (N = 30-62) and thus may have been underpowered (e.g., Deacon et al., 2010; Milosevic & Radomsky, 2008; Morgan & Raffle, 1999).

Although there is quite a bit of research on SB use in OCD and specific phobia, research on the repercussions of SB use in social anxiety disorder is minimal, despite evidence to suggest that socially anxious individuals frequently employ SBs in their everyday lives (e.g., McManus et al., 2008; Wells et al., 1996). Socially anxious individuals commonly employ SB strategies such as rehearsing sentences before speaking, shortening speech duration, speaking in a low voice, avoiding eye contact, wearing a jacket to conceal sweating, or keeping a cellphone close by to avoid speaking with others (Blakey & Abramowitz, 2019; Kocovski et al., 2016). As such, a focus on SB use in social anxiety – and in its treatment – is warranted to clarify the impact of these safety behaviours on the lives of socially anxious individuals.

Improving Exposure Efficacy: Exploring Potential Cognitive Mechanisms

Given the deleterious consequences that can arise from social anxiety, as well as the discrepant findings on the efficacy of exposure with or without safety behaviour use, it is important to identify whether judicious SB use in therapy does in fact influence treatment outcomes for this population, and if so, through what mechanism(s)? Some researchers interested in safety behaviours have proposed theories to attempt to explain their effect on treatment outcomes. In a study examining behaviour modeling and self-efficacy in specific phobias, participants with snake phobia were asked to engage in various exposure tasks (e.g., looking at the snake, touching the snake) after it was modeled for them by an experimenter (Bandura, Jeffery, & Wright, 1974). If participants were unable to model the behaviour, they were given 'response induction aids' (e.g., gloves), which were removed once participants were able to successfully engage in the exposure task. Results demonstrated that participants who used moderate or high levels of response aids performed significantly better and had markedly reduced fear compared to those who used low levels of response aids. The researchers postulated that those who used moderate or high levels of the response aids had increased perceived mastery and control over their anxiety and their treatment progress (Bandura, Jeffery, & Wright, 1974). For example, an individual may feel more confident, in control, less anxious, and thus, more motivated to succeed in therapy if they are permitted to use their chosen SB. Although theories such as this one are helpful in identifying potential avenues by which SBs exert their effects, empirical research in this field is lacking. Rachman, Radomsky, and Shafran (2008) noted the necessity for researchers to begin focusing on the cognitive mechanisms associated with safety behaviour use. Although SBs have been well studied, we still know very little about

how and *why* they work within a therapeutic context and what the resulting cognitive, behavioural, emotional, and psychophysiological repercussions are for anxious individuals.

Extant literature on the association between cognition and anxiety points to working memory as a possible link between safety behaviour and clinical outcomes. Working memory involves complex executive functioning, and refers to the ability to temporarily store, process, and manipulate information (Baddeley, 2000; Baddeley & Hitch, 1974). The predominant model of working memory is composed of several components: the central executive, the phonological loop, the visuospatial sketchpad, and the episodic buffer. The phonological loop and the visuospatial sketchpad are responsible for storing, manipulating, and retrieving auditory and visual/spatial information, respectively. The episodic buffer integrates and coordinates information between working memory systems and long-term memory systems. The central executive acts less as a storage system and more so as a control of the two sub-systems (i.e., the sketchpad and the loop). Indeed, the primary role of the central executive is to selectively attend to the most important information when divergent sources of information are present, while filtering out irrelevant details. Working memory has a limited capacity, however, and competing internal or external stimuli can reduce the cognitive resources needed to hold and process information (Baddeley & Hitch, 1974).

Notably, when state anxiety is high, working memory performance may suffer because cognitive resources are consumed by attention to the anxiety-provoking stimulus (Eysenck, Derakshan, Santos, & Calvo, 2007). Consequently, when an individual is highly anxious, they may not process, retain, or learn important information (Eysenck et al., 2007). Compared to a neutral mood group, people who underwent a negative mood induction demonstrated a decrease in working memory capacity (Vieillard & Bougeant, 2005). Moreover, men who underwent a

psychosocial stress task involving a video-recorded evaluated speech demonstrated restricted performance on a working memory task compared to a control condition (Schoofs, Preuss, & Wolf, 2008). When people focus either inwardly on their own anxiety or outwardly on the feared stimulus, they are less able to focus attention elsewhere or to process and retain the information being presented. Indeed, researchers demonstrated that cognitive load (e.g., asking people to do mental calculation during a task) moderates attentional biases in social anxiety, such that high cognitive load was associated with difficulty disengaging attention from threat-relevant social stimuli (Judah, Grant, Lechner, & Mills, 2013). Similarly, individuals with claustrophobia exhibited less fear reduction during exposure when they simultaneously completed a taxing cognitive task that consumed attentional resources (Kamphius & Telch, 2000).

In a clinical context, the role of working memory may have vast implications. Poor state working memory capacity is associated with reduced information processing, learning, and comprehension (Nation, Adams, Bowyer-Crane, & Snowling, 1999). According to cognitive models of exposure (Salkovskis, 1991), the primary mechanism underlying exposure success is belief disconfirmation. As such, one goal of exposure therapy is to challenge unhelpful or unlikely beliefs (e.g., "I didn't actually have a heart attack when I gave that speech in front of two people"). If individuals are unable to focus, process, and learn from this type of hypothesis testing because their high state anxiety is reducing their working memory capacity, their maladaptive beliefs may persist, thereby disrupting the process of cognitive restructuring. Indeed, Heimberg states "Exposure techniques are designed to help patients face the situations they fear and *stay psychologically engaged* so that the natural conditioning processes involved in fear reduction (habituation and extinction) can occur" (*pp*. 101-102, 2002). Within the framework of the inhibitory learning theory of exposure (Craske et al., 2008), the effect of

anxiety on working memory capacity may have large implications. Indeed, according to this model, treatment success depends on expectation violation (e.g., "Nobody actually laughed at me when I gave my speech") and belief change (e.g., "Maybe my presentation wasn't as embarrassing as I thought it was going to be"), both of which depend on executive functioning and cognitive processing (i.e., the central executive). Consequently, it is important to explore whether working memory capacity may be compromised when individuals engage in exposures while highly anxious.

In social anxiety, state anxiety is high not only during exposure, but also prior to exposure, such that even the threat of an exposure task causes substantial increases in state anxiety (Price & Anderson, 2011). Elevated anxiety prior to exposure is due to a process called anticipatory anxiety (Clark & Wells, 1995); prior to an impending social encounter, people with social anxiety attempt to predict their own social performance during this interaction. People engage in negative self-talk (e.g., "I'm horrible at public speaking, I'm going to make a fool out of myself") and remember past failed encounters to predict the likelihood of their future success (e.g., "The last time I gave a speech, I couldn't stop stuttering and made a fool of myself—I'm just going to make the same mistakes again!"; Dodge, Hope, Heimberg, & Becker, 1988).

Anticipatory anxiety may have repercussions for therapeutic gains and treatment efficacy. If state anxiety decreases working memory capacity, it may not only impact ability to learn *during* exposure, but also prior to in-session exposure, during psychoeducation with the clinician. This phase prior to exposure is important, because clinicians often brief their clients during this time on the nature of exposure and what clients can expect from engaging in this type of exposure. If their state anxiety is already elevated during this phase, they may not retain as much information, further perpetuating their pathological anxiety. Is it possible then, that

relieving some of this anxiety prior to and during exposure by allowing SB use would result in an increased capacity to learn and retain information disconfirming their maladaptive beliefs in the moment?

Improving Exposure Efficacy: Exploring the Role of Beliefs and Exposure Expectancy

Another potentially fruitful area to explore is the role of beliefs and expectancy (related to both safety behaviour use and treatment more generally) on exposure success. Research in the medical field has demonstrated robust associations between positive treatment expectancy and treatment outcomes (e.g., Colloca, Sigaudo, & Benedetti, 2008; Haanstra et al., 2012). Although client expectations of treatment have long been conceptualized as a therapeutic common factor across modalities (e.g., Greenberg, Constantino, & Bruce, 2006), this has seldom been investigated experimentally in CBT research. Given that many cognitive behavioural therapists have their own beliefs and/or biases regarding judicious SB use in exposure, these beliefs may be directly or indirectly communicated to clients, who then internalize this information. It is therefore surprising that this area of research has been almost entirely neglected in the investigation of SBs. Yet, researchers have stated that clinician word choice can have a powerful impact on client expectations of treatment, which then influence outcomes (Finiss & Benedetti, 2004). Some preliminary studies have highlighted the role that treatment expectancy may have on outcomes. For example, increases in treatment expectancy over time predict symptom reduction in OCD (Vorstenbosch & Laposa, 2015), generalized anxiety disorder (Newman & Fisher, 2010), public speaking anxiety (Price & Anderson, 2012), and fear of flying (Price, Anderson, Henrich, & Rothbaum, 2008). A small number of studies have focused specifically on the impact of client perceptions of treatment credibility and expectancy on CBT outcomes for social anxiety (Chambless, Tran, & Glass, 1997; Kirsch & Henry, 1997; Kirsch & Henry, 1999),

showing that expectancy is positively associated with outcomes. Despite these robust associations, there has been little research to update this literature in the past two decades. Yet these studies may have vast implications for clinical practice and treatment outcomes for social anxiety and anxiety disorders more broadly. The way in which clinicians describe facets of treatments to their clients may have more of an impact on outcomes than is currently understood.

In the case of SBs, if a clinician is skeptical about the use of SBs during exposure, this may influence clients' expectations of exposure success. Moreover, if there are potential therapeutic benefits of employing SBs during exposure, this effect may be negated by negative expectancies adopted by the client. However, if a clinician expresses optimism and explains to the client that using SBs during exposure may reduce their anxiety and make exposure more tolerable so that they can better pay attention to disconfirmatory evidence, this reassurance and projected expectation of treatment success may similarly be more important than the act of using the safety behaviour. To date, there is no research examining the potential effects of expectancy of the helpfulness of safety behaviour use during exposure and how this might consequently shape exposure outcomes.

Exploring Emotional and Psychophysiological Mechanisms during Exposure

In addition to identifying the impact of SBs on cognition during exposure, it is equally pertinent to assess their impact on psychophysiological arousal, as it serves as an objective measure of anxious arousal (e.g., Davidson, 2003). As people become emotionally aroused (e.g., fear, anxiety), the sympathetic nervous system responds accordingly (Cacioppo, Tassinary, & Berntson, 2007). Typical responses to these emotions include increased heart rate, rapid breathing, and increased activity of the eccrine glands (i.e., sweating).

Given the direct link between emotional states (e.g., anxiety) and physiological arousal, individuals permitted to use SB during exposure may experience different levels of physiological arousal compared to those forbidden from doing so. Compared to standard exposure, individuals reported decreased anxiety during exposure with judicious SB (Rachman et al., 1986), as measured by the Subjective Units of Distress Scale (SUDS; Wolpe, 1958). Researchers demonstrated that SUDS scores correlate highly with physiological arousal (i.e., left and right hand temperature; Thyer, Papsdorf, Davids, & Vallecorsa, 1984), yet researchers have not directly assessed people's physiological responses during exposure therapy with SB versus without SB use. However, stressful or exposure-like tasks are associated with increased physiological arousal (e.g., Beatty & Behnke, 1991; Beidel, Turner, Jacob, & Cooley, 1989). This has been most notably studied using the Trier Social Stress Test, which typically involves the following components: an anticipatory phase and a stress task phase (Kirschbaum, Pirke, & Hellhammer, 1993). During the stress task phase, participants are asked to perform a mental arithmetic task and to deliver a speech in front of an audience. The Trier Social Stress Test has reliably elicited moderate to high levels of stress and anxiety in unselected samples, which is accompanied by increases in physiological arousal (e.g., Kelly et al., 2007; Similarly, Carrillo et al. (2001) demonstrated that a public speaking task elicited strong electrodermal activity responses in an unselected undergraduate sample. Moreover, Croft, Gonzalves, Gander, Lechem, and Barry (2004) found that a sample of non-clinical undergraduate students exhibited increased heart rate and skin conductance responses prior to and during a speech task.

The influence of physiological arousal during a speech task may be even more salient in those with social or speech anxiety. Socially anxious individuals are highly attuned to their physiological responses (e.g., rapid heartbeat, blushing, sweating), as they interpret these

symptoms as indicators of anxiety and poor social performance (e.g., Beidel, Turner, & Dancu, 1985). Moreover, the cognitive-physiological model of speech anxiety (Behnke & Beatty, 1981) highlights the important role of psychophysiological arousal in public speaking. According to this model, individuals who are speech anxious are more likely to label and interpret arousal as state anxiety, whereas a non-anxious individual might interpret the arousal differently. Indeed, individuals with social anxiety are more accurate in their *perceptions* of bodily sensations (i.e., can more accurately predict their heart rate compared to individuals with low social anxiety), but are less accurate in their *interpretations* of bodily sensations (i.e., understanding bodily sensations as symptoms of anxiety or danger; Stevens et al., 2011). In light of these findings, could permitting SB use reduce both self-reported anxiety and psychophysiological arousal, such that individuals may believe they have performed better on a social task? Investigations into whether SB versus no SB result in differential EDA responses are warranted. Given this theoretical framework, exposure without judicious use of SB may heighten state anxiety, heighten physiological arousal, diminish working memory capacity, and consequently reduce treatment acceptability, adherence, and efficacy.

Current Studies

I designed the current studies to explore the mechanisms that underlie SB use during exposure-like tasks. In study 1, I tested an analog process that is less focused on what exactly is happening during exposure therapy *per se*, and more so on understanding what happens when speech anxious people use SBs during a social stress task at a mechanistic level. Socially anxious participants ($N = 111$) were randomly assigned to deliver a speech (i.e., an exposure-like task) with or without SBs. State anxiety ratings and psychophysiological arousal recordings were measured at baseline, in anticipation of the speech, and during the speech. Measures of cognition

(i.e., working memory capacity and pre-to-post speech predictions) were measured at baseline and in anticipation of the speech. Behavioural outcomes included subjective and objective evaluations of speech performance, as well as recorded speech duration. I hypothesized that, compared to individuals in the no-SB condition, individuals in the SB condition would experience less state anxiety, and would therefore similarly exhibit decreased psychophysiological arousal, less taxation on working memory capacity, an improved ability to gather disconfirmatory evidence, more confidence in their speech, and reports of the speech task as more tolerable and less distressing.

I designed Study 2, in part to replicate and expand on Study 1, but also to approach SB and exposure outcomes from the lens of beliefs and expectancy, which have been largely ignored in the existing literature. I aimed to help identify whether it is safety behaviour use in and of itself, or potentially beliefs about safety behaviour use, that influence treatment outcomes. This distinction could have important therapeutic consequences—the ways in which clinicians explain safety behaviour use to their clients could have an impact on their treatment expectancies. Clients who are given encouraging information on judicious safety behaviour use during the initial stages of exposure may feel more hopeful and engaged in therapy. Consequently, they may experience larger gains from treatment than those who are given skeptical or discouraging information on the utility of safety behaviour during exposure – especially if they have difficulty dropping their safety behaviours. As such, socially anxious participants ($N = 144$) delivered a speech using idiosyncratic SBs. Expectations about SB helpfulness were manipulated experimentally, such that participants were told either that SBs are helpful, unhelpful, or were provided with no information on the helpfulness of SBs. Similar to Study 1, state anxiety ratings were measured at baseline, in anticipation of the speech, and during the speech. Measures of

cognition (i.e., working memory capacity and pre-to-post speech predictions) were measured at baseline and in anticipation of the speech. Behavioural outcomes included subjective and objective evaluations of speech performance, as well as recorded speech duration, and willingness to participate in future exposure exercises. I hypothesized that, compared to individuals in the unhelpful and control conditions, individuals in the helpful condition would evaluate the exposure exercise as more successful and credible, and would exhibit decreased state anxiety, less taxation on working memory capacity, an improved ability to gather disconfirmatory evidence, more confidence in their speech, and report the speech task as being more tolerable and less distressing.

CHAPTER 2:

Exploring the Impact of Safety Behaviour Use on Cognitive, Psychophysiological, Emotional, and Behavioural Responses during a Speech Task

Safety behaviours (SBs) are overt or covert behaviours people use to reduce anxiety in fear-provoking situations (Salkovskis, 1991). Although SBs are adaptive under certain circumstances (e.g., washing your hands after shaking hands with someone who has the flu), they become maladaptive when people engage use them excessively and repeatedly (e.g., washing your hands after touching *any* door knob). These behaviours can contribute to the development and maintenance of anxiety disorders (Salkovskis, 1991; Sloan & Telch, 2002); because anxious individuals who use SBs are unable to acquire disconfirmatory evidence about their fears and the utility of their SBs, adaptive belief change may not occur (Clark & Wells, 1995).

Safety Behaviour During Exposure: Helpful or Hindering?

Although cognitive behavioural therapy (CBT) researchers and clinicians agree almost universally about the deleterious effects of SB use for everyday anxiety (e.g., Deacon & Maack, 2008), they disagree about SB use within the therapeutic context. Over the last two decades, a debate has grown about the role of SBs in exposure therapy. Some assert that permitting SBs at *any* stage of exposure prevents individuals from learning that they can overcome their anxiety without this behaviour (e.g., Abramowitz & Moore, 2007; Deacon & Maack, 2008). Conversely, some contend that allowing the *judicious* use of SBs during initial exposures (i.e., permitting SBs as needed, and gradually diminishing these behaviours over time) may reduce anxiety during exposure, increase treatment acceptability, and thus, decrease attrition rates (e.g., Levy & Radomsky, 2014; van den Hout, Engelhard, Toffolo, & van Uijen, 2011).

Although exposure therapy for anxiety disorders is efficacious (Foa et al., 2005), some people find it too anxiety-provoking, which may contribute to high attrition rates. Mancedo, Eisen, Subrava, Dyck, and Rasmussen (2011) found that more than 25% of participants who terminated CBT prematurely reported that it was due to fears of engaging in treatment activities (e.g., behavioural experiments, exposure). Participants viewed CBT with judicious SB as significantly more acceptable than standard CBT (Levy Radomsky, 2014; Milosevic & Radomsky, 2013) and many researchers have been unable to replicate findings that judicious SB use has deleterious effects during exposure therapy (Rachman, Craske, Tallman, & Solyom, 1986; van Uijen, van den Hout, Schiphorst, Knol, & Engelhard, 2017; but see Abramowitz & Moore, 2007; Sloan & Telch, 2002).

Various mechanisms of change have been proposed to explain treatment success in CBT (Olantuji, Cisler & Deacon, 2010). Inhibitory learning theory (Craske et al., 2008; Craske et al., 2014) posits that during successful exposure, people develop new safety-related associations with the feared stimulus, which are more readily activated than the original threat-related association. The proposed mechanisms of change underlying inhibitory learning are expectancy violation and fear extinction processes. Although researchers suggest SB use detracts from these processes and interfere with optimal inhibitory learning conditions (e.g., Craske et al., 2014; Blakey & Abramowitz, 2019), it is possible that as long as clients and therapists work to reduce them gradually over time, judicious use of SBs may not detract from forming new safety-based associations.

Belief change is another primary mechanism of change in the successful treatment of anxiety. People with anxiety often hold maladaptive beliefs that maintain anxiety and perpetuate avoidance behaviours (e.g., “It would be catastrophic if I stutter during my speech”, “People will

think I'm stupid if I forget my words", "I'll feel more prepared if I read off of my cue cards"). The goal in CBT is to test and alter these unhelpful beliefs through psychoeducation, cognitive restructuring, and engagement with feared stimuli using exposure and/or behavioural experiments (e.g., Clark & Beck, 2011). Research has supported the benefits of using a belief change rationale when addressing exposure therapy and SB use with clients (e.g., Milosevic & Radomsky, 2013; Ouimet & Ashbaugh, 2017). Preliminary studies on belief change versus extinction rationales for exposure suggest that belief change exercises, such as behavioural experiments, may have advantages over extinction-based exposure therapy (McMillan & Lee, 2010). Ultimately, researchers propose that a combination of cognitive and behavioural techniques should be used to enhance outcomes for anxiety (Olantuji et al., 2010).

Exploring Potential Mechanisms Underlying Safety Behaviour Use

We still know very little about what the resulting cognitive, behavioural, emotional, and psychophysiological repercussions are for anxious individuals who use SBs in the moment. Moreover, it remains unclear *why* these repercussions occur (i.e., by what cognitive mechanisms). Although researchers have long agreed that SBs maintain anxiety, research findings are equivocal on whether they facilitate or impair treatment efficacy. Understanding the underlying processes during anxiety-provoking situations with or without SBs is critical to refining existing interventions. Working memory and ability to gather disconfirmatory evidence may be particularly fruitful candidates.

Working memory is a multicomponent system that is responsible for temporarily storing, processing, manipulating, and retrieving information. Current models of working memory break down executive functioning into the following systems: the central executive, the phonological loop, the visuospatial sketchpad, and the episodic buffer (Baddeley, 2000; Baddeley & Hitch,

1974). The central executive serves primarily as an attentional process that attends to the phonological loop (dedicated to storing and manipulating auditory information) and visuospatial sketchpad (dedicated to storing and manipulating visuo-spatial information) as needed, and filters out irrelevant information. Given the limited capacity of working memory, competing internal or external stimuli can reduce the cognitive resources needed to hold and process information (Baddeley, 2000; Baddeley & Hitch, 1974). When anxiety is high, working memory capacity (WMC) suffers because cognitive resources are consumed by attention to the anxiety-provoking stimulus (Eysenck, Derakshan, Santos, & Calvo, 2007). Consequently, they may not process, retain, or learn important information (Ashcraft & Kirk, 2001; Eysenck et al., 2007). This selective attention is controlled by the central executive—when two activities come into conflict, the central executive directs attention and prioritizes certain activities. Indeed, researchers demonstrated that cognitive load (e.g., asking people to do mental calculation during a task) moderates attentional biases in social anxiety, such that people with social anxiety have greater difficulty avoiding or disengaging from threat-relevant social stimuli when cognitive load is high (Judah, Grant, Lechner, & Mills, 2013). Moreover, according to a recent meta-analysis, anxious individuals (and those with other mental health difficulties) exhibit WMC deficits when affective material is presented (Schweizer et al., 2019). Another meta-analysis demonstrated that people with high state or trait anxiety exhibit decreased WMC on complex (e.g., *o*-span), simple (e.g., digit span), and dynamic span (e.g., *N*-back) tasks (Moran, 2016).

There are several measures of working memory capacity, including simple, complex, and dynamic span tasks that measure varying aspects of working memory. Complex span tasks, such as the o-span include both the processing (e.g., equation) and storage (e.g., letters to be recalled) of information (Oswald et al., 2014). Moreover, complex span tasks (such as the *o*-span) have

better psychometric properties (e.g., reliability, validity) than dynamic span tasks (such as the *n*-back); dynamic span tasks may map more closely onto short-term memory capacity, rather than overall working memory capacity (Conway et al., 2005). We propose that engaging in an exposure exercise to elicit therapeutic change requires the processing and storage of information—clients must process what is being observed (e.g., are expectations being violated?) and store it. Thus, a complex span task is likely to be most appropriate to capture working memory capacity relevant to exposure.

The effect of anxiety on WMC may have implications for the cognitive processes implicated during exposure tasks. Exposure success likely depends on *both* expectancy violation (e.g., "Nobody actually laughed at me when I gave my speech") and belief change (e.g., "Maybe my presentation wasn't as embarrassing as I thought it was going to be"), both of which depend on executive functioning and cognitive processing. If high state anxiety reduces WMC, individuals may struggle to disconfirm their initial predictions, and their maladaptive beliefs may persist. Consequently, we wonder whether using SBs during exposure may maintain WMC and facilitate disconfirmatory learning. Indeed, researchers have found equivalent levels of fear reduction, belief change, and ability to gather disconfirmatory evidence between SB and no SB conditions (Salkovskis et al., 1999; Milosevic & Radomsky, 2008).

In social anxiety, even the threat of an exposure task causes substantial increases in anxiety (Price & Anderson, 2011) and psychophysiological arousal (Carrillo et al., 2001). This anticipatory anxiety occurs when people hold negative predictions for their upcoming social performance. If state anxiety decreases WMC, it may not only impact one's ability to learn *during* exposure, but also *prior to* in-session exposure (i.e., psychoeducation).

State Anxiety During Exposure Therapy with and without Safety Behaviours

Compared to standard exposure, individuals report decreased anxiety during exposure with judicious SB (Rachman et al., 1986), as measured by the Subjective Units of Distress Scale (SUDS; Wolpe, 1958). Researchers have shown that SUDS scores correlate highly with physiological arousal (i.e., hand temperature; Thyer, Papsdorf, Davids, & Vallecorsa, 1984), yet few studies have directly assessed people's physiological responses during exposure with versus without SB.

The role of physiological arousal during a speech task may be particularly salient in social anxiety. Socially anxious individuals are highly attuned to their physiological responses (e.g., sweating), which they interpret as indicators of anxiety and poor social performance (e.g., Clark & Wells, 1995). Social (but not general) anxiety correlated with increased physiological reactivity in anticipation of a speech task (Cornwell, Johnson, Berardi, & Grillon, 2006). Socially anxious participants who reported more SB use were evaluated more poorly by objective speech raters (Rowa et al., 2015). The effects of SBs on people's subjective and objective performance remain unclear.

Current Study

We tested the effects of SB (vs. NoSB) use on features of responding to an exposure-like task among people with high speech anxiety. Our primary goal was to understand the effect of SB use on cognitive processes implicated during an anxiety-provoking task—specifically WMC and ability to gather disconfirmatory evidence. Our secondary goal was to understand the impact of SB use on multiple speech anxiety outcomes, including subjective state anxiety, psychophysiological arousal, subjective (self-rated) and objective (other-rated) speech performance, speech duration, and willingness to engage in another speech task. In sum, we

aimed to better understand the cognitive mechanisms underlying whether SBs are helpful or harmful during an anxiety-provoking speech task, and to examine additional outcomes (e.g., willingness to engage in additional exposure-like exercises) that may help to inform future research on exposure therapy.

Given the premise that SBs may reduce state anxiety, and thus exposure exercises would be less taxing on WMC, we hypothesized that, compared to the NoSB condition, participants in the SB condition would:

1. Demonstrate less restricted WMC during the anticipatory anxiety phase.
2. Gather more disconfirmatory evidence about their feared predictions, demonstrated by greater changes in pre-to-post comparisons of speech predictions.
3. Report lower anxiety during the anticipatory and speech task phases.
4. Display lower psychophysiological arousal (i.e., EDA) during the anticipatory and speech task phases.

Recent findings suggest that individuals with high social anxiety use more SBs than non-anxious individuals (Vassilopoulos, 2009). However, people who use more SBs also receive less favorable speech evaluations by objective observers (Rowa et al., 2015). Thus, we hypothesized that, compared to the NoSB condition, participants in the SB condition would:

5. Speak longer during the speech task.
6. Report better perceived speech performance following the speech.
7. Demonstrate poorer speech performance, as rated by objective observers.

Finally, as people have rated CBT including judicious SB as more acceptable than standard CBT (Levy Radomsky, 2014; Milosevic & Radomsky, 2013), we hypothesized that participants in the SB condition, compared to the NoSB condition would:

8. Endorse greater exposure acceptability (i.e., lower distress and greater tolerability) and greater willingness to deliver another speech.

Method

Participants

Following institutional review board approval, undergraduate students (N = 111) ages 17 to 24 years (M = 18.85, SD = 1.27) were recruited through a Canadian university's participant pool for course credit (see Power Analysis section below). Participants were eligible if they scored five or greater on two questions on a pre-screener questionnaire: On a scale of 1 ("not at all") to 7 ("extremely"), how much do you: 1) fear public speaking? 2) avoid public speaking? Participants were unaware that their responses determined their eligibility for this study. Our overall sample endorsed high levels of social anxiety (*Min = 7, Max = 53, M* = 27.70, SD = 11.34), with 74.8% (N = 83) of participants reporting social anxiety symptoms at or above the clinical threshold of 19 on the SPIN (Connor et al., 2000). Whereas 25.2% of the sample reported symptoms below the clinical cut-off, everyone reported some social anxiety symptoms (*Min* = 7, *Max* = 18; M = 13.25, SD = 3.32). For self-reported sociodemographic characteristics, see Table 1.

Self-Report Measures

Exposure Distress and Tolerability Scale (EDTS). The EDTS is a four-item measure created for this study to assess the acceptability of the exposure-like task. Using a 5-point Likert-type scale (0 = "not at all" 4 = "extremely"), participants rated how distressing and tolerable they found the speech, and how willing they were to deliver another speech both with and without SBs.

Table 1

Sociodemographic Characteristics by Condition

Variable	*n*			*%*		
Gender	Total	SB	NoSB	Total	SB	NoSB
Women	90	44	46	81.1%	83.0%	79.3%
Men	20	8	12	18.0%	15.1%	20.7%
Transgender	1	1	0	0.9%	1.9%	0.0%
Ethnicity / Race						
White	59	30	29	53.2%	56.6%	50.0%
Asian	18	6	12	16.2%	11.3%	20.7%
Middle Eastern	15	7	8	13.5%	13.2%	13.8%
South Asian	10	7	3	9.0%	13.2%	5.2%
Black	6	1	5	5.4%	1.9%	8.6%
Not listed	3	2	1	2.7%	3.8%	1.7%
Relationship Status						
Committed relationship	22	10	12	19.8%	18.9%	20.7%
Single	86	42	44	77.5%	79.2%	75.9%
Living Together	3	1	2	2.7%	1.9%	3.4%
Self-Reported Previous Psychological Diagnosis						
Yes	16	9	7	14.4%	17.0%	12.0%
No	95	43	52	85.6%	81.1%	89.7%

Notes. $N = 111$.

The Performance Questionnaire (PQ; Rapee & Lim, 1992). The PQ is a 17-item self-report measure of perceived public speaking performance, which can be completed by a speaker and/or an objective observer. We used it to assess subjective (i.e., completed by the participant; PQ-S) and objective (e.g., completed by five fully blinded research assistants using the video recordings of each speech; PQ-O). People rated specific (e.g., "Kept eye contact with audience") and global (e.g., "Kept audience interested") performance items on a 5-point scale (0 = "not at all", 4 = "very much"). See Table 2 for internal consistency in our samples for all measures.

Personal Report of Confidence as a Speaker-Short Form (PRCS-12; Hook, Smith, & Valentiner, 2008). The PRCS-12 is a 12-item, true-false, self-report measure of public speaking self-confidence, which we used to assess participants' baseline ratings of their public speaking self-confidence. Sample items include "I am terrified at the thought of speaking before a group of people" and "I feel disgusted with myself after trying to address a group of people."

Social Phobia Inventory (SPIN; Connor et al., 2000). The SPIN is a 17-item self-report measure of social anxiety, which we used to assess participants' baseline social anxiety symptoms. People rated items related to fear (e.g., "Being criticized scares me a lot"), avoidance (e.g., "I avoid talking to people I don't know"), and physiological arousal (e.g., "I am bothered by blushing in front of people") on a 5-point Likert-type scale (0 = "not at all" and 4 = "extremely").

The Speech Anxiety Thoughts Inventory (SATI; Cho, Smits, & Telch, 2004). The SATI is a 23-item measure that assesses maladaptive beliefs related to speech anxiety, which we used to assess participants' predictions about their impending speech performance (SATI-1). People rated items related to predictions of poor performance (e.g., "My speech will be incoherent") and fear of negative evaluation by the audience (e.g., "If I make a mistake the

audience will think I'm stupid") on a 5-point scale (0 = "I do not believe the statement at all" and 4 = "I completely believe the statement"). We added two items to facilitate measuring speech predictions and learning: "My anxiety will last the whole speech" and "I will shake, tremble, or blush noticeably when I give my speech."

Additionally, we modified the SATI (SATI-2) to measure belief change related to speech-performance following the exposure-like task (SATI-2). All items in the SATI are future-oriented (e.g., "I'll get tongue-tied). In this modified version, we changed all items to the past tense (e.g., "I got tongue-tied") to assess participants' ability to gather disconfirmatory evidence.

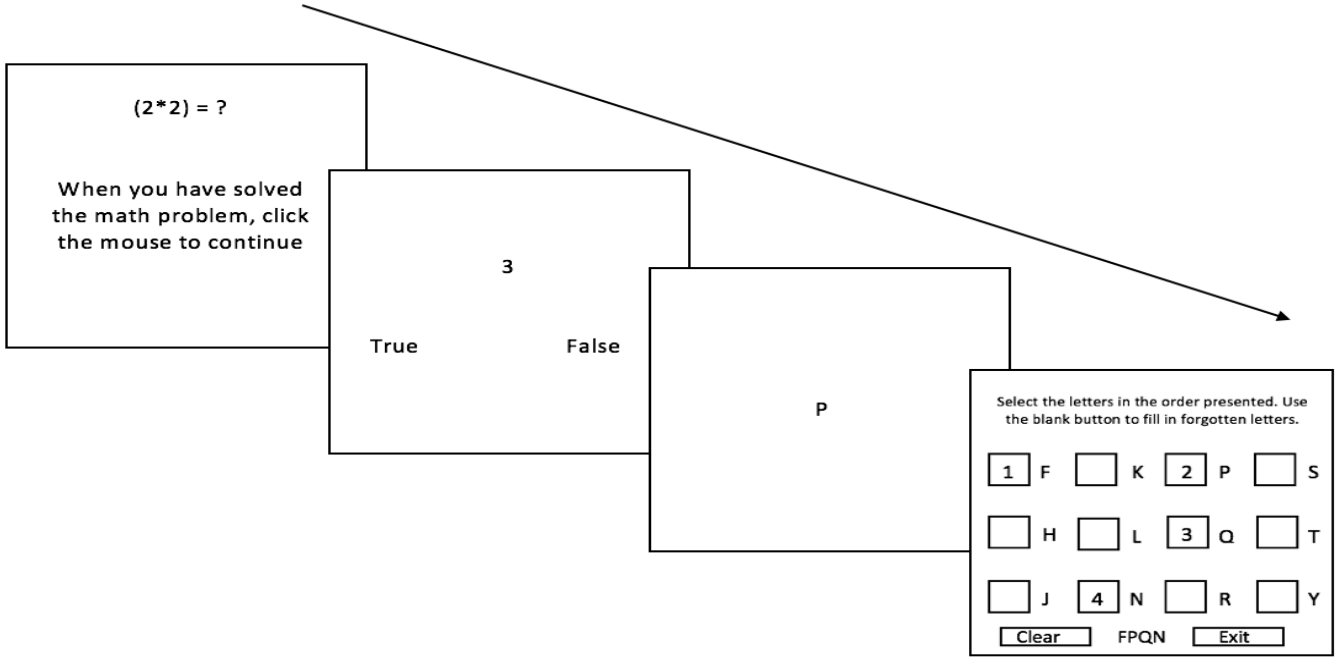
Subjective Units of Distress Scale (SUDS; Wolpe, 1958). We used the SUDS to assess participants' self-reported anxiety during baseline, anticipatory, and speech phases. People rated the extent to which they felt anxious on a scale from 0 ("not at all anxious") to 100 ("the worst anxiety you can imagine").

The Subtle Avoidance Frequency Examination (SAFE; Cumming et al., 2009). The SAFE is a 32-item self-report measure of SB use related to social anxiety, which we used to assess the degree to which participants typically used SBs. People rated items that measure active SB use (e.g., "Avoid eye contact"), subtle restriction of behaviour (e.g. "Rehearse sentences in your mind"), and concealment behaviour (e.g. "Wear clothes or makeup to hide blushing") on a 5-point Likert-type scale (1 = "never" and 5 = "always").

Computerized Tasks

Operation Span Task (o-span; Oswald, McAbee, Redick, & Hamrick, 2014). The shortened *o*-span is a computerized task that measures current WMC (see Oswald et al., 2014 for complete details). Participants solve a series of simple mathematical equations, each of which is

Figure 1



Notes. Illustration of the shortened o-span.

followed by a letter they must remember in the correct order (see Figure 1 for an illustration of the shortened *o*-span). Upon completion of the task, participants receive two scores: absolute scores (i.e., number of trials in which all elements are recalled in the correct order without error) and partial scores (i.e., the proportion of elements recalled correctly in each trial, with error incorporated). There is high test-retest reliability at a mean 13-day interval (r = .77 for absolute score, r = .83 for partial score; Unsworth et al., 2005). The *o*-span has excellent internal consistency (α = .80 for absolute score, α = .86 for partial score; Kane et al., 2004). We used an E-Prime template (Psychology Software Tools, 2016) available at http://englelab.gatech.edu/shortenedtasks.html to be identical to that used by Oswald et al. (2014).

The computerized task was completed on a 19-inch desktop computer. The task was run on E-Prime 3.0. Participants sat approximately 45cm away from the screen. The background screen was white grey and stimuli were presented in black size 24 font.

Behavioural Tasks

Behavioural Speech Task. Participants were asked to present a speech in front of a judge wearing a lab coat and carrying a clipboard, who they were told would evaluate the content and quality of their performance. Participants were also informed that their speech will be videotaped for further analysis by a group of psychologists, who would rate their speech on clarity, accuracy, interest, content, poise, and style. They had five minutes to prepare and were encouraged to speak for 10 minutes. Participants were asked to choose up to three topics from a list ten (e.g., terrorism, obesity, gun control). To end the speech, participants held up a "STOP" card. Similar speech task paradigms have elicited strong anxiety and physiological arousal responses (e.g., Larson, Ader, & Moynihan, 2001).

Apparatus

Electrodermal Activity Recording (EDA). EDA measures eccrine sweat gland activity (i.e., skin conductance). Changes in emotional reactivity and arousal directly impact sweat gland reactivity (Cacciopo et al., 2007). Two electrodes were placed on the thenar and hypothenar eminences of the non-dominant hand. Data was collected using Biopac TSD203 transducers.

Respiration Rate Recording. Respiration rate was recorded using a MindWare Belt for Transducer, placed around participants' sternums, as per recommendations by Schmidt & Walach (2000), to reduce the likelihood of artefacts in the EDA data caused by breathing. Both the respiration belt and the electrodermal transducers were connected to a MindWare Mobile Recorder ambulatory device.

Procedure

See Figure 2 for a procedural diagram. Participants were informed that they were participating in a study testing new measures of cognition and attention related to academic achievement. After informed consent, participants completed an online baseline questionnaire package including a demographic questionnaire, followed by the SPIN, PCRS-12, and SAFE in a randomized order. These questionnaires were administered for the purposes of characterizing our sample at baseline. Participants then rated their current anxiety using the SUDS. Participants completed the *o*-span as a baseline measure of their WMC. A research assistant applied two electrodes to the palm of the participant's non-dominant hand; participants placed the respiration belt around their sternums. Participants then rested, closed their eyes, and stayed seated for three minutes to assess their baseline EDA.

Participants were informed of the speech, and were then given a hard copy of the SATI to complete. They were then randomly assigned to one of two conditions: SB or no SB. Participants

Figure 2

Procedure Diagram

in the SB condition received the following instructions:

> *We know that people tend to get really anxious right before and during a speech. Different people manage their anxiety in different ways, and will often use different tools or strategies to help them reduce their anxiety while they are giving a speech. There are many strategies that people can use, but the most common include standing behind a podium so that you can hide your body, holding onto a stress ball, having a bottle of water, sitting down, and taking small breaks to engage in deep breathing. You have been assigned to the condition that gets to use one of these tools.*

Participants in the no SB condition received identical instructions, but were told: *You have been assigned to the condition that doesn't get to use one of these tools.*

Once participants identified their preferred SB, they were given five minutes to prepare for their speech while their EDA was recorded. After the five minutes passed, the judge entered the room and began to set up the video camera. Participants were informed that the speech was about to start, and were asked to rate their anticipatory anxiety using the SUDS. The researcher then ran hurriedly back into the room and informed the participant that the computerized task they completed did not record properly, and noted that it was very important to have this data prior to the speech task. This was done to assess WMC immediately prior to speech, when anxiety levels would be elevated and to reduce the likelihood that participants would suspect that we were measuring changes in WMC. Participants completed the *o*-span a second time. Participants then delivered their speech in front of the judge while their EDA was being recorded. Following the speech, participants retrospectively rated their peak anxiety during the speech, using the SUDS. Speech duration was recorded.

Participants were then given their original, completed copy of the SATI-1 and a blank

copy of the modified SATI-2. Participants were asked to review their original copy of the SATI-1, and to fill out the SATI-2 by rating what they believed actually happened during their speech. Our goal was to mimic the process typically used for behavioural experiments during CBT (i.e., writing down predictions prior to engaging in an anxiety-provoking situation and re-evaluating the results afterward). Participants then completed the EDS, PQ, and a brief interview to assess whether they used any additional strategies to reduce their anxiety during the speech (i.e., covert SBs, such as mental distraction). Electrodes were removed, and participants were fully and thoroughly debriefed. Research assistants assessed participants' level of distress and ensured that no participant left the laboratory feeling distressed or anxious. Moreover, all participants were provided with a list of resources outlining various psychological services.

Power Analysis

A priori power analyses were conducted using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). The most complex analysis of the current study was a 2 (condition) x 3 (time) ANOVA, repeated measures within-between interaction. In order to determine the appropriate sample size for the study, power was set to .80 and alpha was set to .05, to abide by statistical standards recommended by Tabachnik and Fidell (2007). The entered number of groups and measurements were 2 (SB or no SB) and 3 (baseline, anticipatory, speech), respectively. Researchers examining anticipatory and peak SUDS differences between SB groups have found large effect sizes (e.g., η^2 = .23-.55; Levy & Radomsky; Milosevic & Radomsky, 2013b). Effect sizes of SB condition x time interactions on behavioural approach tasks are small to moderate, however, as studies are often underpowered to see larger effects (e.g., η^2 = .07; Hood et al., 2010). No data is currently available on the impact of SB conditions on psychophysiological arousal or working memory. As such, the effect size was set to f = .10 (a small effect) in order to

be conservative. The correlation among repeated measures was entered as $r = .7$, based on the assumption that SUDS and EDA scores should correlate strongly over time (Thyer et al., 1984). The estimated required sample size based on this information was 49 participants per group, for a total of 98 participants. Given that some data may be lost for a variety of reasons (e.g., significant noise in EDA data), a total of 111 participants were recruited.

Data Analysis

Of 111 participants, 12 withdrew after learning about the speech task (6 SB; 6 NoSB). Thus, 11% of total scores are missing for post-speech measures. The data set was visually scanned for impossible values; none were identified. All variables fell in the normal range of skewness and kurtosis (i.e., no values above 2.0 or below -2.0), with the exception of *o*-span scores for both groups at both time points, which were platykurtic. See Table 2 for descriptive statistics and Table 3 for bivariate correlations. There were no pre-existing statistically significant between-condition differences for any baseline measures; (all $t < .92$; all $p > .36$).

Manipulation Check

All participants in the SB condition used their chosen SB during their speech. Although participants chose from five different SBs, an overwhelming majority (75%) chose to sit down or to use the podium. CBT models of social anxiety focus on beliefs about physiological symptoms and observable anxiety signs (e.g., Clark & Wells, 1995; Moscovitch, 2009). These two SBs were the options most likely to reduce focus on the participants' bodily sensations. Thus, it appears that people chose the SB they thought would be most helpful/anxiety-reducing.

Table 2

Descriptive Statistics by Condition for All Variables of Interest

Variable	*Mean*		*SD*		*Min*		*Max*		α
	SB	*NoSB*	*SB*	*NoSB*	*SB*	*NoSB*	*SB*	*NoSB*	
SPIN	27.23	28.21	11.10	11.57	7	8	51	53	.88
SAFE	76.30	75.98	20.43	17.48	42	37	128	113	.91
PCRS-12	7.51	7.80	2.75	2.81	0	0	12	12	.76
SATI1	63.80	62.61	17.61	18.61	27	18	100	99	.94
SATI2	59.49	54.10	21.73	24.06	21	6	94	96	.97
PQ-S	30.33	28.19	7.27	6.05	16	12	46	44	.55
PQ-O	27.66	27.35	3.04	3.33	20	20	34	34	.75
Tolerable	1.98	1.88	1.07	1.01	0	0	4	4	-
Distress	2.04	2.16	1.10	1.12	0	0	4	4	-
Will NoSB	1.22	1.73	1.17	1.19	0	0	4	4	-
Will SB	2.1	2.34	1.21	1.09	0	0	4	4	-
SUDS1	25.23	28.57	25.29	22.01	0	2	70	75	-
SUDS2	73.65	69.86	20.48	21.14	10	15	100	100	-
SUDS3	73.92	70.92	23.62	25.46	10	10	100	100	-
SD	218.02	233.69	137.75	167.24	0	0	595	600	-
Ospan1	22.40	23.34	4.92	5.89	3	5	30	30	-
Ospan2	23.73	25.33	6.57	5.12	3	5	30	30	-
EDA1	7.34	6.56	3.78	4.81	1.22	.58	22.07	21.68	-
EDA2	12.64	12.67	5.70	7.75	3.51	1.87	34.34	37.20	-
EDA3	15.65	14.76	5.91	7.45	4.96	3.74	37.40	33.15	-

Notes. SPIN = Social Phobia Inventory; SAFE = Subtle Avoidance Frequency Examination; PRCS-12 = Personal Report of Confidence as a Speaker – Short Form; SATI1 = Speech Anxiety Thoughts Inventory, First Administration; SATI2 = Speech Anxiety Thoughts Inventory, Second Administration; PQ-S = The Performance Questionnaire-Self Report; PQ-O = The Performance Questionnaire-Other Report; Tolerable = Exposure Distress and Tolerability Scale, Tolerability; Distress = Exposure Distress and Tolerability Scale, Distress; Will SB = Exposure Distress and Tolerability Scale, Willingness with SBs; Will NoSB = Exposure Distress and Tolerability Scale, Willingness without SBs; SUDS1 = Subjective Units of Distress Scale, Baseline; SUDS2 = Subjective Units of Distress Scale, Anticipatory; SUDS3 = Subjective Units of Distress Scale, Peak during speech; SD = Speech Duration (in seconds—a score of 0 indicates the participant did not complete the speech task); Ospan1 = Operation Span Partial Score, First Administration; Ospan2 = Operation Span Partial Score, Second Administration; EDA1 = Electrodermal Activity, Baseline Phase; EDA2 = Electrodermal Activity, Anticipatory Phase; EDA3 = Electrodermal Activity, Speech Phase.

Table 3

Correlation Matrix for all Baseline Measures

Variable	1.	2.	3.	4.	5.	6.	7.
1. SPIN	-	.66**	.55**	.45**	.43**	-.06	-.17
2. SAFE		-	.46**	.36**	.43**	-.10	-.17
3. PRCS-12			-	.47**	.27**	-.06	-.09
4. SATI1				-	.33**	-.11	-.07
5. SUDS1					-	.02	-.01
6. Ospan1						-	-.01
7.EDA1							-

Notes. $N = 111$. SPIN = Social Phobia Inventory; SAFE = Subtle Avoidance Frequency Examination; PRCS-12 = Personal Report of Confidence as a Speaker – Short Form; SATI1 = Speech Anxiety Thoughts Inventory, First Administration; SUDS1 = Subjective Units of Distress Scale, First Administration; Ospan1 = Operation Span Partial Score, First Administration; EDA1 = Electrodermal Activity, Baseline Phase. $^{**}p < .01$.

Hypothesis Testing

To test if condition affected WMC (H1), a 2 (condition) x 2 (time) mixed ANOVA was conducted. Partial scores were used as the outcome measure (Oswald et al., 2014). To assess if condition impacted gathering disconfirmatory evidence (H2; SATI), a 2 (condition) x 2 (time: pre-speech, post-speech) mixed ANOVA was conducted. To test whether condition affected self-reported state anxiety (H3; SUDS), a 2 (condition) x 3 (time: baseline, anticipatory, speech) mixed ANOVA was conducted. To assess whether condition impacted psychophysiological arousal (H4; EDA), a 2 (condition) x 3 (time: baseline, anticipatory, speech) mixed ANOVA was conducted.

To test whether speech duration (in seconds) differed between groups (H5), a one-way ANOVA was conducted. To test whether subjective speech performance (PQ-S) differed between groups (H6), a one-way ANOVAs was conducted.

An intraclass correlation coefficient (ICC) was calculated to determine inter-rater reliability and consistency in PQ-O scores between the five video coders. Consistent with Rowa et al. (2015), the ICC for global scores on the PQ was .76. To test whether perceptions of objective speech success differed between groups (H7), a one-way ANOVA was conducted, with an average of PQ-O scores across each rater as the dependent variable.

To test whether participants' willingness to complete another speech and participants' perceptions of exposure task tolerability and distress differed between groups (H8), four one-way ANOVAs were conducted for each of the items on the EDTS.

Results

Cognitive Outcomes

There were no significant effects of condition on WMC or ability to gather

Table 4

Non-Significant Main Effect and Interaction Estimates for Working Memory, Disconfirmatory Evidence, Self-reported Anxiety, and Psychophysiological Arousal

	F	*df*	*p*	η_p^2
Working memory				
Main effect condition	1.83	1, 95	.18	.02
Interaction by time	.12	1, 95	.73	.00
Disconfirmatory evidence				
Main effect condition	.73	1, 92	.40	.01
Interaction by time	.80	1, 92	.38	.01
Self-reported anxiety				
Main effect condition	.05	1, 95	.83	.00
Interaction by time	1.25	2, 190	.29	.02
Psychophysiological arousal				
Main effect condition	.11	1, 94	.75	.00
Interaction by time	1.15	2, 188	.33	.03

Note. Statistics for significant effects are available in the main text.

disconfirmatory evidence (see Table 4). There were significant and large main effects of time on WMC and ability to gather disconfirmatory evidence. Participants' scores on the *o*-span improved over time, $F(1, 95) = 9.64$, $p = .003$, $\eta_p^2 = .10$[1]. Participants' post-speech beliefs were less negative than their pre-speech predictions, $F(1, 92) = 10.35$, $p = .002$, $\eta_p^2 = .10$.

Emotional and Psychophysiological Outcomes

There were no significant effects of condition on self-reported anxiety, psychophysiological arousal, or speech tolerability and distress (see Tables 4 & 5). There were significant and large main effects of time on state anxiety and psychophysiological arousal. Participants' state anxiety increased over time, $F(2, 190) = 259.08$, $p < .001$, $\eta_p^2 = .79$. Pairwise comparisons revealed that anticipatory and peak SUDS scores were both greater than baseline SUDS scores; there was no significant difference between anticipatory and peak SUDS scores. Participant's psychophysiological arousal increased over time, $F(2, 188) = 228.54$, $p < .001$, $\eta_p^2 = .81$. Pairwise comparisons revealed significant within-group differences between all three EDA time points (baseline, anticipatory, during speech).

Behavioural Outcomes

There were no significant effects of condition on subjective and objective speech performance, speech duration, or and willingness to deliver a speech with SBs (see Table 5). However, participants in the SB condition reported significantly lower willingness than those in the NoSB condition to deliver a speech without SBs, $F(1, 98) = 4.74$, $p = .03$, $d = .22$, which was a small effect.

[1] This is likely accounted for by practice effects, as the task was re-administered in close succession.

Table 5

Non-Significant One-way ANOVA estimates for Speech Duration, Subjective and Objective Speech Performance, Tolerability, Distress, and Willingness to Deliver Another Speech with SBs

	F	*df*	*p*	*d*
Speech duration	.28	1, 108	.60	.10
Subjective speech performance	1.39	1, 92	.24	.32
Objective speech performance	.47	1, 85	.50	.15
Tolerability	.24	1, 98	.63	.11
Distress	.37	1, 98	.59	.11
Willingness with SBs	1.13	1, 98	.29	.43

Note. Statistics for significant effects are available in the main text.

Table 6

Between Conditions Planned Comparisons for Primary Hypotheses

	t	*df*	*p*	*d*
Ospan2	1.34	95	.18	.27
SATI2	1.28	95	.21	.29
SUDS2	.92	100	.36	.17
SUDS3	.50	95	.55	.09
EDA2	.02	100	.98	.00
EDA3	.65	95	.52	.13

Notes. Ospan2 = Operation Span Partial Score, Second Administration; SATI2 = Speech Anxiety Thoughts Inventory, Second Administration; SUDS2 = Subjective Unites of Distress Scale, Second Administration; SUDS3 = Subjective Unites of Distress Scale, Third Administration; EDA2 = Electrodermal Activity, Anticipatory Phase; EDA3 = Electrodermal Activity, Speech Phase.

Table 7

Estimates of the Effects of Condition and Time on Cognitive, Subjective, and Psychophysiological Outcomes, While Controlling for Baseline Safety Behaviour Use (SAFE)

	F	*df*	*p*	η_p^2
Working memory				
Main effect condition	1.65	1, 97	.20	.02
Main effect time	.14	1, 97	.71	.00
Interaction by time	.19	1, 97	.66	.00
Disconfirmatory evidence				
Main effect condition	.87	1, 91	.36	.01
Main effect time	.43	1, 91	.52	.01
Interaction by time	.79	1, 91	.38	.01
Self-reported anxiety				
Main effect condition	.03	1, 94	.86	.00
Main effect time	25.24	2, 188	.00	.21
Interaction by time	1.29	2, 188	.28	.01
Psychophysiological arousal				
Main effect condition	.11	1, 93	.75	.00
Main effect time	10.23	2, 186	.00	.10
Interaction by time	1.11	2, 186	.33	.01

Note. Statistics for significant effects are available in the main text.

Table 8

Effects of Condition on Speech Outcomes, While Controlling for Baseline Safety Behaviour Use (SAFE)

	F	*df*	*p*	η_p^2
Speech duration	.26	1,105	.61	.00
Subjective speech performance	2.71	1,93	.10	.03
Objective speech performance	.49	1,82	.49	.01
Tolerability	.23	1,95	.63	.00
Distress	.30	1,95	.58	.00
Willingness with SBs	2.86	1,95	.09	.03

Note. Statistics for significant effects are available in the main text.

Exploratory Analyses

We also conducted post-hoc exploratory analyses to examine potential moderating effects of baseline SB on outcomes of interest (see Tables 7 & 8). We re-conducted each of our hypothesis tests, while entering SAFE scores as a covariate (i.e., ANCOVAs). The majority of the effects were largely unchanged when controlling for baseline SAFE scores. However, the main effect of time on both WMC and SATI scores became non-significant.

Discussion

We explored the cognitive, physiological, emotional, and behavioural consequences of SB use during an exposure-like task. Our primary aim was to understand the processes underlying anxiety-provoking tasks, by testing whether people who used SB would demonstrate less restricted WMC performance and ability to gather disconfirmatory evidence compared to those who did not. Our secondary aim was to test whether people who used SB (compared to NoSB) would demonstrate reduced anxiety (both self-report and psychophysiologically); increased subjective, but decreased objective speech performance; longer speech duration, and increased willingness to engage in additional exposure exercises. Ultimately, we sought to better understand what happens when individuals use SBs during a speech and how this may relate to and inform exposure therapy for future research.

Overall, we found no differences between groups on emotional, cognitive, or performance outcomes. In fact, the most important implication of our findings is that there were almost no differences across the board on any measure between conditions. We did not observe a detrimental impact of SB use on ability to gather disconfirmatory evidence or on speech performance. We hypothesized that SB use would influence working memory specifically through its impact on state anxiety, such that as state anxiety decreases with SB use, working

memory would be less taxed. It is relevant to note that while some SBs may be less taxing on working memory capacity, others may have the opposite effect. For example, a commonly used SB in speech anxiety is to prepare notes and rehearse or memorize sentences prior to saying them. If participants in the SB condition had been permitted to bring notes with them into their speech as an SB, they may also have experienced less taxation on their working memory because they would not need to rehearse mentally as much as people in the NoSB condition (who would not have notes). Conversely, standing behind a podium or sitting down likely has minimal impact on WMC directly, but rather may reduce WMC indirectly *via* its impact on anxiety. To reduce potentially confounding explanations for SB use effects on WMC, we selected SBs that we believed would have high anxiolytic, but low cognitive impact.

These findings are consistent with several other studies that failed to replicate the findings that SB use significantly interfered with exposure success (e.g., Milosevic & Radomsky, 2008; Sy, Dixon, Lickel, Nelson, & Deacon, 2011). They also extend past findings by showing a similar impact of SB use not only on anxiety, but on cognitive processes likely related to potential changes in anxiety. As such, although clients may think SBs are helpful for them in the moment, they may not actually have any impact on reducing anxiety or improving performance.

Despite the lack of statistically significant differences between conditions, we nonetheless observed small effect sizes for some of our analyses, in the hypothesized directions (main effect of condition on WMC and disconfirmatory evidence; interaction of condition and time on SUDS scores, psychophysiological arousal, subjective speech performance, and willingness to deliver another speech with SBs). However, given that the effects were small, statistical significance may not imply *clinical* significance. Rather, our findings support a lack of impact of SB use on multiple features of responding to an exposure-like task.

Not surprisingly, participants became more anxious as they learned about and then participated in the speech task, regardless of whether they were allowed to use SBs. Yet, they still demonstrated the ability to gather disconfirmatory evidence during their speech, as evidenced by a decrease in their pre-to-post speech assessments. This finding contradicts the notion that complete immediate elimination of SBs is required to gather disconfirmatory evidence during exposure (Salkovskis, 1991). There is little evidence to suggest that SBs necessarily interfere with gathering disconfirmatory evidence (Rachman, Radomsky, & Shafran, 2008). A notable finding here is that individuals in both SB and NoSB conditions reported an increased willingness to deliver a future speech if it included SBs (compared to a future speech without SBs). Taken together with our disconfirmatory evidence findings, individuals who are permitted to use SBs may be willing to engage in exposure exercises, and may still benefit (i.e., gather disconfirmatory evidence) just as much as those who are encouraged to drop SBs.

On the other hand, individuals in the NoSB condition were more willing to deliver a second speech without SBs than the SB group. This finding has important implications for CBT and the acceptability of exposure interventions, as it suggests that once individuals are permitted to use SBs, it may be more difficult to reduce them over time. This difference would likely be even more exaggerated with a clinically anxious sample that routinely use idiosyncratic SBs. Indeed, it is notable that even after one exposure-like experience with SBs, participants were less willing to give them up. Clinically, this suggests that once clients are permitted to judiciously use SBs, they may have more reservations about reducing and eliminating them at a subsequent session. For this reason, it is critical that clinicians spend appropriate time on psychoeducation, particularly as it relates to mechanisms of exposure and how SBs interfere with these mechanisms if not eliminated completely.

We offered our participants five pre-determined SBs to increase internal validity. However, external validity may have suffered as a result. This is a difficult balance when designing research protocols investigating SB use. Safety behaviours are idiosyncratic (Salkovskis, 1991); individuals in either condition may have used SBs other than those offered; we were not able to measure the effects of these SBs on any of our outcome variables. We did assess SB use informally during debriefing. Many participants reported using strategies to help them reduce their anxiety during the speech—most commonly avoiding eye contact with the judge. Consequently, the differences between our two groups may have been diluted (or augmented). Unlike the NoSB condition, however, the SB condition had access to clear, physical, salient SBs that allowed them to largely hide their anxiety symptoms (e.g., by hiding their bodies). Even if participants across both conditions used additional covert SBs, having one very salient SB that helped to mask anxiety symptoms likely created an important imbalance between the two conditions. We conducted exploratory analyses by controlling for baseline safety behaviour use. Overall, it appears that baseline safety behaviour use had limited impact on our manipulation; however, these findings support our previous suggestion that people may have used other SBs during the task. Given the exploratory nature of these analyses, we hesitate to interpret these results beyond this suggestion. Although a limitation is the lack of a formal manipulation check, researchers have demonstrated that just the *availability* of safety behaviours can be sufficient to impact emotions and beliefs (e.g., Powers, Smits, & Telch, 2004). As such, we contend that the need to check how participants used their safety behaviours may not be absolutely vital, given that people in the safety behaviour condition in our study were informed about the availability of the safety behaviours and were actively encouraged to choose one.

Given that our sample consisted largely of White undergraduate women with speech anxiety, our results may not generalize to a more diverse or clinical population. This is a limitation of our study, given that we are exploring processes at play during an exposure-like task with the hopes of informing clinical research on exposure therapy with anxious samples. However, our sample was highly speech anxious and mean scores on the SPIN indicated elevated levels of social anxiety. Moreover, we were interested in understanding the underpinnings of SB use during a speech task (i.e., at a particular moment in time). The purpose of this study was to understand how SBs impact relevant cognitive, behavioural, emotional, and psychophysiological outcomes during a social stress task as a precursor to understanding the processes at play during exposure therapy. This was an exploratory study that served to act as a snapshot of the mechanisms at play during an exposure-like task. Future researchers who wish to extend these findings to exposure therapy would benefit from including multiple exposure sessions over time to assess whether SB use influences belief change, anxiety, and willingness to engage in additional exposure exercises at a subsequent visit.

This was the first study to explicitly test cognitive mechanisms that could explain effects of SB use (vs. NoSB use) during exposure-like tasks. We took an experimental multimethod approach, incorporating self-report, cognitive, psychophysiological, and behavioural measures, to allow us to explore potential causal, rather than corollary, effects of safety behaviour use. Moreover, research on SB in exposure to social and speech anxiety is minimal, despite that socially anxious individuals frequently use SBs in their everyday lives (e.g., McManus et al., 2008). A continued focus on SB use in social and speech anxiety—and in its treatment—is warranted to clarify the impact of SBs on the lives of socially anxious individuals. We hope that

our findings may inspire future researchers to explore similar outcomes in a formally assessed clinical sample.

References

Abramowitz, J. S., & Moore, E. (2007). An experimental analysis of hypochondriasis. *Behaviour Research and Therapy*, *45*, 413-424. https://dx.doi.org/10.1016/j.brat.2006.04.005

Ashcraft, M. H., & Kirk, E. P. (2001). The relationships among working memory, math anxiety, and performance. *Journal of Experimental Psychology: General, 130*, 224-237. https://dx.doi.org10.1037/0096-3445.130.2.224

Baddeley, A. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences*, *4*, 417-423. https://doi.org/10.1016/S1364-6613(00)01538-2

Baddeley, A. D., & Hitch, G. (1974). Working memory. *Psychology of Learning and Motivation*, *8*, 47-89. https://doi.org/10.1016/S0079-7421(08)60452-1

Blakey, S. M., & Abramowitz, J. S. (2019). Dropping safety aids and maximizing retrieval cues: Two keys to optimizing inhibitory learning during exposure therapy. *Cognitive and Behavioral Practice*, *26*(1), 166-175.

Connor, K. M., Davidson, J. R., Churchill, L. E., Sherwood, A., Weisler, R. H., & Foa, E. (2000). Psychometric properties of the Social Phobia Inventory (SPIN): New self-rating scale. *The British Journal of Psychiatry*, *176*(4), 379-386

Carrillo, E., Moya-Albiol, L., González-Bono, E., Salvador, A., Ricarte, J., & Gómez-Amor, J. (2001). Gender differences in cardiovascular and electrodermal responses to public speaking task: The role of anxiety and mood states. *International Journal of Psychophysiology*, *42*, 253-264. https://doi.org/10.1016/S0167-8760(01)00147-7

Cho, Y., Smits, J. A., & Telch, M. J. (2004). The Speech Anxiety Thoughts Inventory: Scale development and preliminary psychometric data. *Behaviour Research and Therapy*, *42*, 13-25. https://doi.org/10.1016/S0005-7967(03)00067-6

Clark, D. A., & Beck, A. T. (2011). *Cognitive Therapy of Anxiety Disorders: Science and Practice*. New York: The Guilford Press.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. G. Heimberg, M. R. Liebowitz, D. A. Hope, & F. R. Schneier (Eds.), *Social phobia: Diagnosis, assessment, and treatment* (pp. 69–93). New York, NY: Guilford Press.

Connor, K. M., Davidson, J. R., Churchill, L. E., Sherwood, A., Weisler, R. H., & Foa, E. (2000). Psychometric properties of the Social Phobia Inventory (SPIN): New self-rating scale. *The British Journal of Psychiatry*, *176*(4), 379-386

Conway, A. R., Kane, M. J., Bunting, M. F., Hambrick, D. Z., Wilhelm, O., & Engle, R. W. (2005). Working memory span tasks: A methodological review and user's guide. *Psychonomic Bulletin & Review*, *12*(5), 769-786.

Cornwell, B. R., Johnson, L., Berardi, L., & Grillon, C. (2006). Anticipation of public speaking in virtual reality reveals a relationship between trait social anxiety and startle reactivity. *Biological Psychiatry, 59*, 664-666. https://dx.doi.org/10.1016/j.biopsych.2005.09.015

Craske, M. G., Kircanski, K., Zelikowsky, M., Mystkowski, J., Chowdhury, N., & Baker, A. (2008). Optimizing inhibitory learning during exposure therapy. *Behaviour Research and Therapy*, *46*(1), 5-27. https://doi.org/10.1016/j.brat.2007.10.003https://doi.org/10.1016/j.brat.2007.10.003

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: an inhibitory learning approach. *Behaviour Research and Taherapy*, *58*, 10-23.

Cumming, S., Rapee, R. M., Kemp, N., Abbott, M. J., Peters, L., & Gaston, J. E. (2009). A self-report measure of subtle avoidance and safety behaviors relevant to social anxiety: Development and psychometric properties. *Journal of Anxiety Disorders*, *23*, 879-883. https://doi.org/10.1016/j.janxdis.2009.05.002

Deacon, B., & Maack, D. J. (2008). The effects of safety behaviors on the fear of contamination: An experimental investigation. *Behaviour Research and Therapy*, *46*, 537-547. https://dx.doi.org/10.1016/j.brat.2008.01.010

E-Prime (Version 2.0.8.22) [Computer software]. Pittsburgh, PA: Psychology Software Tools.

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, *7*, 336-346. https://dx.doi.org/10.1037/1528-3542.7.2.336

Foa, E. B., Liebowitz, M. R., Kozak, M. J., Davies, S., Campeas, R., Franklin, M. E., ... & Simpson, H. B. (2005). Randomized, placebo-controlled trial of exposure and ritual prevention, clomipramine, and their combination in the treatment of obsessive-compulsive disorder. *American Journal of Psychiatry*, *162*(1), 151-161

Hook, J. N., Smith, C. A., & Valentiner, D. P. (2008). A short-form of the Personal Report of Confidence as a Speaker. *Personality and Individual Differences*, *44*, 1306-1313. https://doi.org/10.1016/j.paid.2007.11.021

Judah, M. R., Grant, D. M., Lechner, W. V., & Mills, A. C. (2013). Working memory load moderates late attentional bias in social anxiety. *Cognition & Emotion*, *27*(3), 502-511.

Larson, M. R., Ader, R., & Moynihan, J. A. (2001). Heart rate, neuroendocrine, and immunological reactivity in response to an acute laboratory stressor. *Psychosomatic Medicine*, *63*, 493-501. https://dx.doi.org/10.1097/00006842-200105000-00020

Levy, H. C., & Radomsky, A. S. (2014). Safety behaviour enhances the acceptability of exposure. *Cognitive Behaviour Therapy*, *43*, 83-92. https://dx.doi.org/10.1080/16506073.2013.819376

Mancebo, M. C., Eisen, J. L., Sibrava, N. J., Dyck, I. R., & Rasmussen, S. A. (2011). Patient utilization of cognitive-behavioral therapy for OCD. *Behavior Therapy*, *42*(3), 399-412

McManus, F., Sacadura, C., & Clark, D. M. (2008). Why social anxiety persists: An experimental investigation of the role of safety behaviours as a maintaining factor. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*, 147-161. https://doi.org/10.1016/j.jbtep.2006.12.002

McMillan, D., & Lee, R. (2010). A systematic review of behavioral experiments vs. exposure alone in the treatment of anxiety disorders: A case of exposure while wearing the emperor's new clothes?. *Clinical psychology review*, *30*(5), 467-478

Milosevic, I., & Radomsky, A. S. (2008). Safety behaviour does not necessarily interfere with exposure therapy. *Behaviour Research and Therapy*, *46*, 1111-1118. https://doi.org/10.1016/j.brat.2008.05.011

Milosevic, I., & Radomsky, A. S. (2013). Incorporating the judicious use of safety behavior into exposure-based treatments for anxiety disorders: A study of treatment acceptability. *Journal of Cognitive Psychotherapy*, *27*, 155-174. https://dx.doi.org/10.1891/0889-8391.27.2.155

Moran, T. P. (2016). Anxiety and working memory capacity: A meta-analysis and narrative review. *Psychological Bulletin, 142*, 831-864. https://dx.doi.org/10.1037/bul0000051

Moscovitch, D. A. (2009). What is the core fear in social phobia? A new model to facilitate individualized case conceptualization and treatment. *Cognitive and Behavioral Practice*, *16*(2), 123-134.

Olatunji, B. O., Cisler, J. M., & Deacon, B. J. (2010). Efficacy of cognitive behavioral therapy for anxiety disorders: a review of meta-analytic findings. *Psychiatric Clinics*, *33*(3), 557-577

Ouimet A. J., Ashbaugh A. R. Anxiety. In: O'Donohue W, ; James L, ; Snipes C, editors. Practical strategies and tools to promote treatment engagement. Springer International Publishing; Switzerland; 2017. p. 253–275.

Oswald, F. L., McAbee, S. T., Redick, T. S., & Hambrick, D. Z. (2015). The development of a short domain-general measure of working memory capacity. *Behavior Research Methods*, *47*, 1343-1355. https://dx.doi.org/10.3758/s13428-014-0543-2

Powers, M. B., Smits, J. A., & Telch, M. J. (2004). Disentangling the effects of safety-behavior utilization and safety-behavior availability during exposure-based treatment: a placebo-controlled trial. *Journal of Consulting and Clinical Psychology*, *72*(3), 448.

Price, M., & Anderson, P. L. (2011). Latent growth curve analysis of fear during a speech task before and after treatment for social phobia. *Behaviour Research and Therapy, 49*, 763-770. https://dx.doi.org/10.1016/j.brat.2011.08.004

Rachman, S., Craske, M., Tallman, K., & Solyom, C. (1986). Does escape behavior strengthen agoraphobic avoidance? A replication. *Behavior Therapy*, *17*, 366-384. https://doi.org/10.1016/S0005-7894(86)80069-7

Rachman, S., Radomsky, A. S., & Shafran, R. (2008). Safety behaviour: A reconsideration. *Behaviour research and therapy*, *46*(2), 163-173

Rapee, R. M., & Lim, L. (1992). Discrepancy between self-and observer ratings of performance in social phobics. *Journal of Abnormal Psychology*, *101*, 728-738. https://dx.doi.org/10.1037/0021-843X.101.4.728

Rowa, K., Paulitzki, J. R., Ierullo, M. D., Chiang, B., Antony, M. M., Mccabe, R. E., & Moscovitch, D. A. (2015). A false sense of security: Safety behaviors erode objective speech performance in individuals with social anxiety disorder. *Behavior Therapy, 46*, 304-314. https://dx.doi.org/10.1016/j.beth.2014.11.004

Salkovskis, P. M. (1991). The importance of behavior in the maintenance of anxiety and panic: A cognitive account. *Behavioural Psychotherapy*, *19*, 6-19. https://dx.doi.org/10.1017/S0141347300011472

Salkovskis, P. M., Clark, D. M., Hackmann, A., Wells, A., & Gelder, M. G. (1999). An experimental investigation of the role of safety-seeking behaviours in the maintenance of panic disorder with agoraphobia. *Behaviour Research and Therapy*, *37*, 559-574.

Schmidt, S., & Walach, H. (2000). Electrodermal activity (EDA)-State-of-the-art measurement and techniques for parapsychological purposes. *Journal of Parapsychology*, *64*(2), 139-164.

Schweizer, S., Satpute, A. B., Atzil, S., Field, A., Feldman-Barrett, L., & Dalgleish, T. (2019). The impact of affective information on working memory: A pair of meta-analytic reviews of behavioral and neuroimaging evidence. *Psychological Bulletin.*

Sloan, T., & Telch, M. J. (2002). The effects of safety-seeking behavior and guided threat reappraisal on fear reduction during exposure: An experimental investigation. *Behaviour Research and Therapy*, *40*, 235-251. https://dx.doi.org/10.1016/s0005-7967(01)00007-9

Sy, J. T., Dixon, L. J., Lickel, J. J., Nelson, E. A., & Deacon, B. J. (2011). Failure to replicate the

deleterious effects of safety behaviors in exposure therapy. *Behaviour Research and Therapy*, *49*, 305-314. https://doi.org/10.1016/j.brat.2011.02.005

Thyer, B., Papsdorf, J., Davis, R., & Vallecorsa, S. (1984). Autonomic correlates of the subjective anxiety scale. *Journal of Behavior Therapy & Psychiatry*, *15*, 3-7. https://dx.doi.org/10.1016/0005-7916(84)90115-0

van den Hout, M. A., Engelhard, I. M., Toffolo, M. B., & van Uijen, S. L. (2011). Exposure plus response prevention versus exposure plus safety behaviours in reducing feelings of contamination, fear, danger and disgust. An extended replication of Rachman, Shafran, Radomsky & Zysk (2011). *Journal of Behavior Therapy and Experimental Psychiatry*, *42*, 364-370. https://doi.org/10.1016/j.jbtep.2011.02.009

van Uijen, S. L., van den Hout, M. A., Schiphorst, A. T. K., Knol, E. S., & Engelhard, I. M. (2017). Disconfirming contamination-related threat beliefs by exposure plus safety behavior. *Journal of Behavior Therapy and Experimental Psychiatry*, *55*, 25-32. https://doi.org/10.1016/j.jbtep.2016.11.005

Vassilopoulos, S. P. (2009). Interpretations for safety behaviours in high and low socially anxious individuals. *Behavioural and Cognitive Psychotherapy*, *37*(2), 167-178.

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition*. Oxford, UK: Stanford University Press.

CHAPTER 3

BRIDGE

Given the divide in the existing literature on the role of judicious safety behaviours (SBs) during exposure therapy, Study 1 was designed to shed some light on this debate. I sought to do this by investigating the underlying cognitive, behavioural, emotional, and psychophysiological mechanisms that I suspected may be at play during exposure therapy. Speech anxious undergraduate students ($N = 111$) delivered a speech with or without SBs in front of a judge while psychophysiological, emotional, cognitive, and behavioural outcomes were measured. There was no impact of condition on the majority of our measured outcomes. However, participants across conditions did demonstrate changes in their pre-to-post speech predictions. Moreover, participants in the no-safety behaviour condition were more willing to deliver another speech without the use of safety behaviours compared to participants in the safety behaviour condition. Taken together, these findings suggested that: 1) individuals who have delivered a speech without SBs may be more willing to drop them during future exposures, and 2) safety behaviours in and of themselves may be less impactful on exposure outcomes than is currently understood.

This gave rise to the question of whether it is safety behaviour use in and of itself, or rather, beliefs about SB use that may be most influential on exposure outcomes. Research from the field of medicine supports the critical role of patient expectations (as influenced by physician word choice) on health outcomes (Benedetti, 2008; Colloca & Miller, 2011; Uhlenhuth et al., 1966). The role of language and beliefs on expectations has seldom been examined in CBT research, yet this may be an important factor underlying treatment (and exposure) success. Given the contentious nature of SBs in CBT-based clinical and research communities, it may be that the

way in which clinicians present SBs to clients influences their treatment expectancies, and consequently, their exposure outcomes.

Consequently, I designed Study 2 to explore the impact of word choice on SB beliefs and exposure outcomes. Speech anxious undergraduate students ($N = 144$) were recruited to participate in a similar protocol as that designed for Study 1. However, all participants were provided with psychoeducation on exposure, and all participants were permitted to use SBs during their speech. Participants were given divergent instructions on the helpfulness of SBs. They were either told that: SBs are helpful in reducing anxiety during a speech, SBs are unhelpful and actually increase anxiety during a speech, or were provided with no information on the anxiolytic effects of SBs (control condition). Similar to Study 1, I measured cognitive (e.g., working memory capacity, pre-to-post speech predictions), behavioural (e.g., speech duration, subjective and objective speech performance, willingness to participate in future exposures), and emotional (e.g., SUDS scores, measures of exposure acceptability) outcomes. Participants also completed a one-week follow-up questionnaire, as a proxy behavioural measure to assess participants' willingness to engage in future exposure exercises.

There are some noteworthy methodological changes between Study 1 and Study 2 that I outlined below:

1) In order to increase ecological validity, I changed the methodology so that it focused on participants' individualized use of SBs. Rather than choosing from 5 available SBs (as in Study 1), participants completed the Subtle Avoidance Frequency Examination at baseline, which is a self-report questionnaire assessing safety behaviour use specific to social anxiety. Upon being informed about the speech, participants were reminded of their most commonly used SBs according to their answers on the

questionnaire. This allowed participants to choose idiosyncratic safety behaviours during their speech, and they were not restricted to using only one safety behaviour.

2) In Study 1, participants completed the automated *o*-span (a 15-minute computerized working memory task) at baseline, and again after they had been informed about the speech task. All participants performed better on the task the second time, suggesting practice effects may be strong with this task given the short test-retest timeframe. More importantly, however, I was concerned that such a long working memory task might serve as a distraction from anxiety. As a result, I changed the working memory task from the *o*-span to the backward digit span task. The backward digit span task is shorter to administer, and may be less susceptible to practice effects.
3) I also aimed to improve the degree to which our methodology resembled real world exposure therapy. Thus, I was more direct about the nature of the study with participants. Instead of framing the study as a measure of academic achievement (Study 1), we explained to participants that they would be participating in an exposure task and provided them with psychoeducation on how and why exposure is used in the treatment of anxiety.
4) I included a follow-up behavioural measure of acceptability and willingness to deliver another speech by sending out a brief questionnaire one week following their participation, asking participants whether or not they would be willing to come in to deliver another speech. Participants also completed the Speech Anxiety Thoughts Inventory at this time, allowing me to assess for enduring changes in speech beliefs.
5) Measures of psychophysiological arousal were removed for Study 2. This was done to facilitate the timely completion of this research project, as the ambulatory device

used to record electrodermal activity broke and would have taken several months to replace.

CHAPTER 4

Do Words Matter? Examining the Influence of Safety Behaviour Beliefs on Exposure Outcomes

In a commentary on communicating with severely ill patients, Dr. Steven Pantilat stated, "Words matter. What clinicians say and how they say it hugely affects patients" (*pp*. 1279, 2009). A wealth of empirical data in the field of medicine suggests that the way in which doctors communicate with their patients may subsequently influence patients' beliefs about treatment, which subsequently impact mood and health outcomes (e.g., Lienard et al., 2006; Schoefield et al., 2003). One of the greatest predictors of treatment success in the medical field is client beliefs and expectations of treatment efficacy (Benedetti, 2008; Colloca & Miller, 2011). In one of the first studies conducted on this topic, Uhlenhuth et al. (1966) found that a doctor's choice of words (i.e., optimistic versus skeptical) interacted with treatment condition (i.e., medication versus placebo), such that patients in the treatment condition who received optimistic feedback reported better outcomes compared to those in the placebo condition who received the same optimistic feedback. Conversely, patients in the treatment condition who received skeptical feedback reported poorer outcomes compared to those in the placebo condition. This effect was observed at only one of three clinical locations, however, suggesting either a replicability issue or that rapport between client and health care professional can be quite variable (i.e., rapport may have been stronger at the setting in which this effect was observed). As such, effects such as the one found by Uhlenhuth et al. (1966) may be most pronounced when the relationship between client and healthcare professional is strong.

The importance of word choice and delivery can be extended to mental health clinicians conducting cognitive behavioural therapy. Cognitive behavioural therapy (CBT) is a form of talk

therapy, and it is the therapeutic modality with the largest evidence-base in the treatment of social anxiety disorder (National Institute for Health and Care Excellence [NICE], 2013). CBT is a shorter-term, goal-directed therapy whose primary mechanisms of change are cognitive restructuring and behavioural change (Hollon & Beck, 2013). The goal is to work collaboratively with clients to transform unhelpful cognitions and behaviours through conversations and activities, such as thought records, exposure therapy, and behavioural experiments. Proponents of CBT suggest collaborative empiricism as a primary mechanism of change in CBT (Tee & Kazantzis, 2011). Psychoeducation provided by the clinician plays a crucial role throughout therapy, as clinicians and clients work together to develop and agree to the goals and purposes of the treatment plan. Thus, it stands to reason that during psychoeducation, the words clinicians choose may be of great significance to how the client understands and reacts to the treatment plan. Consequently, a clinician's explanations may inform the client's expectations and beliefs about treatment success. This is an ignored topic in the CBT literature, yet this research can have far reaching implications that transcend CBT to highlight how clinicians use language. It is vital to begin to investigate the role of language and beliefs to optimize therapeutic outcomes, particularly given that not everybody experiences therapeutic benefits.

Similar—though limited—findings support the impact of treatment expectancy on treatment outcomes in mental health settings. For example, people with OCD whose treatment expectancy increased from pre-treatment to the fourth CBT session also demonstrated the greatest reductions in symptoms post-treatment (Vorstenbosch & Laposa, 2015). Treatment expectancy for both group CBT and individual virtual reality therapy predicted symptom reduction in individuals with public speaking anxiety (Price & Anderson, 2012). Moreover, client expectations are positively related to treatment outcomes and the therapeutic alliance (Dew

& Bickman, 2005). Given these limited, but promising findings, there has been a call for researchers to focus more on the influence of client beliefs and expectations on treatment outcomes, with the suggestion that these factors may play a much larger role in treatment success than is currently understood (Greenberg, Constantino, & Bruce, 2006; Westra, Aviram, Barnes, & Angus, 2010). Given that client treatment expectations may have major implications for CBT efficacy, the paucity of research related to the potential influence of clinician language is stark and problematic. What *are* clinicians saying during exposure, behavioural experiments, and cognitive restructuring?

Clinician language may be particularly important when it comes to safety behaviour (SB) use during CBT for anxiety. Safety behaviours are overt or covert strategies that people use to attempt to reduce their anxiety in the moment. For example, an individual with speech anxiety may read from cue cards during a speech to avoid forgetting their words, and thus to potentially make them feel less anxious. When used frequently and excessively, SBs contribute to the development and maintenance of anxiety (Salkovskis, 1991; Sloan & Telch, 2002) by inhibiting people's ability to gather disconfirmatory evidence. By using cue cards regularly, people will have limited opportunities to learn that they can deliver a speech without forgetting their words, that forgetting their words does not end in catastrophe, or in fact that they would likely deliver a better speech without the cue cards. As such, researchers agree widely that people seeking treatment for anxiety and related concerns will benefit most if they can ultimately eliminate their use of SBs (e.g., Milosevic & Radomsky, 2008; Deacon, Sy, Lickel, & Nelson, 2010).

Although research robustly demonstrates that SBs are maladaptive in everyday life, the judicious use of SBs within the context of exposure therapy is a contentious topic amongst researchers and clinicians. Some researchers contend that SB use at any stage of therapy

interferes with disconfirmatory learning, and should be eliminated immediately (e.g., Abramowitz & Moore, 2007). Others highlight that clients with severe anxiety may be hesitant to eliminate SBs immediately, and suggest a gradual removal of SBs over the course of completing an exposure hierarchy (e.g., Levy & Radomsky, 2014; van den Hout, Engelhard, Toffolo, & van Uijen, 2011). Indeed, people attempting to complete CBT have high attrition as a result of fears of engaging in anxiety-provoking exercises (Mancebo, Eisen, Subrava, Dyck, & Rasmussen, 2011). Judicious removal of SBs may reduce early attrition rates and help clients to feel a greater sense of mastery and control (Bandura, Jeffery, & Wright, 1974). A meta-analysis exploring the impact of SB use on exposure outcomes was inconclusive—results were too mixed to determine whether there was any helpful or detrimental effect of SBs on fear reduction (Meulders et al., 2016). We need to better understand what mechanisms are at play during exposure with and without safety behaviour use.

Given this divide in the literature, clinicians tend to also hold strong beliefs about the role of SBs during treatment (Deacon & Farrell, 2013; Deacon et al., 2013), which are likely communicated to the client. Response bias research demonstrates that experimenters can unconsciously influence participant responses simply by being aware of the study hypotheses (Rosenthal & Fode, 1963). Clinicians are no less susceptible to this type of bias, and consequently, clinician beliefs about SB use during exposure therapy (as helpful or not) may unconsciously influence clients' expectations of exposure success. Indeed, therapists who hold more negative beliefs about exposure therapy also use more cautious language in their exposure psychoeducation (Deacon & Farrell, 2013). Although that study highlights how clinician beliefs can bleed into the therapy session, much more research is needed on how they impact clients. If indeed there are potential therapeutic benefits of incorporating SBs judiciously (and not

gratuitously) during exposure, this effect may be negated by negative expectancies adopted by the client. These effects would likely be even more prominent when clinicians explicitly present their beliefs about SBs. To date, there is no research examining the potential interacting effects of expectancy on the efficacy of safety behaviour use during exposure with the true effects of utilizing safety behaviours. Thus, the question arises: are words as important as actions?

Very little information exists on which mechanisms and/or outcomes may be impacted by word choice and beliefs in CBT. From a CBT perspective, anxiety consists of cognitive, behavioural, and emotional components. Consequently, we want to understand the cognitive, emotional, and behavioural processes at play when people use SBs, particularly since the research is equivocal on whether SBs should be dropped right away during exposure therapy (e.g., Milosevic & Radomsky, 2008; Rachman, Radomsky, & Shafran, 2008; Sy, Dixon, Lickel, Nelson, & Deacon, 2013). We thus focused on variables that have been shown or proposed to be impacted by anxiety. In terms of cognitive outcomes, we chose to investigate working memory capacity (WMC) and pre-to-post speech predictions as a proxy for ability to gather disconfirmatory evidence. Working memory capacity is limited and encompasses the ability to hold and manipulate information for brief periods of time (Baddeley, 2000; Baddeley & Hitch, 1974). A recent meta-analysis robustly demonstrates the impact of working memory on anxiety (Moran, 2016). As anxiety increases, working memory is taxed (e.g., poorer performance on the digit span) and information is less likely to be stored and remembered (Moran, 2016). Given that state anxiety increases during exposure therapy and that a goal of exposure is to gather new disconfirmatory evidence, it stands to reason that these cognitive processes are impacted. Safety behaviour use (or beliefs about the helpfulness of safety behaviours) may mitigate anxiety and consequently, may increase the cognitive resources available to individuals during exposure

tasks. As such, people who use SBs, but are told they are unhelpful, may experience elevated anxiety, and thus, a decreased ability to gather disconfirmatory evidence.

We measured participants' emotional reactions using subjective measures. Specifically, we assessed state ratings of anxiety and experiences of having delivered the speech (i.e., tolerability, distress). If individuals use SBs and believe them to be helpful (as opposed to using them and believing they are unhelpful), they may feel a greater sense of preparedness (false though it may be), and consequently less anxiety prior to and during their speech. As a result, they may find the speech more tolerable and less distressing.

Our behavioural outcomes included speech duration, speech performance (both objective and subjective), and willingness to deliver future speeches. Objectively, people who use more SBs during a speech are perceived by others as less prepared and more anxious (Rowa et al., 2015). Subjectively, however, individuals who are told that SBs are helpful may have an increased sense of confidence if they are permitted to use them during their speech (under the false presumption that they will make them feel more prepared and in control of their anxiety during a speech). They may consequently speak for longer periods of time and feel more willing to deliver future speeches.

In our previous study (Tutino, Ouimet, & Ferguson, revision requested), we found no effect of SB vs. no-SB use conditions on working memory capacity, pre-to-post speech predictions, psychophysiological arousal, subjective anxiety, or objective or subjective performance among a sample of speech anxious participants who engaged in a stressful speech task. The only difference found was that individuals in the no-SB condition were more willing to deliver an additional speech without the SBs compared to the SB condition. Moreover, we found that regardless of condition, individuals' speech predictions improved over time, suggesting that

individuals were able to gather similar amounts of disconfirmatory evidence regardless of SB use. In that study, people in both conditions (SB and no-SB) may have held similar beliefs about SBs, as participants were not provided with psychoeducation on SBs. In this study, we explored the same exposure-like outcomes, to understand whether it is SB use in and of itself, or rather, beliefs about SBs that may be more impactful on outcomes.

Current Study

The method, hypotheses, and analyses of the current study were preregistered on the Center for Open Science two months into data collection, but prior to any data analysis [https://osf.io/dkgr3/?view_only=af6b542bf2e647cd853faf3c0f72fa17].[2] Our overarching goal was to better understand whether word choice—i.e., manipulating beliefs about the utility of SBs—would influence exposure outcomes for speech anxiety. We tested the effects of word choice on beliefs about safety behaviour use (as helpful, unhelpful, or with no specific instructions) among people with high speech anxiety during an exposure-like speech task on: working memory capacity, pre-to-post speech predictions, subjective state anxiety, subjective (self-rated) and objective (other-rated) speech performance, speech duration, speech acceptability, and willingness to engage in another speech task (measured at a one-week follow-up). We hypothesized that, compared to the Unhelpful and Control conditions, participants in the Helpful condition would:

1. Demonstrate less restricted WMC during the anticipatory anxiety phase.
2. Gather more disconfirmatory evidence about their feared predictions and demonstrate greater changes in pre-to-post comparisons of speech predictions.
3. Report lower anxiety during the anticipatory and speech task phases.

[2] A justification of deviations from our pre-registration can be found in Appendix G

4. Report higher levels of treatment credibility and treatment expectancy.
5. Speak longer during the speech task.
6. Report better perceived speech performance following the speech.
7. Demonstrate equivalent speech performance, as rated by objective observers.
8. Endorse greater exposure acceptability (i.e., lower distress and greater tolerability) and greater willingness to deliver another speech at a one-week follow-up.

Method

Participants

Following institutional review board approval, we recruited undergraduate students with high self-reported speech anxiety ($N = 144$) aged 17 to 42 years ($M = 19.46$, $SD = 2.61$) through the University of Ottawa's participant pool website (see Power Analysis section below). Participants were eligible if they reported a score of four or greater on the following question on a pre-screener questionnaire: On a scale of 1 ("not at all") to 5 ("extremely"), how much do you fear public speaking? Participants were unaware that their responses determined their eligibility for this study, and were compensated with course credit. For self-reported sociodemographic characteristics, see Table 1.

Self-Report Measures

Demographic questionnaire. Participants provided information regarding their age, sex, gender, first language, highest level of education, student status, and ethnicity. Participants also provided information regarding any prior or current mental health diagnoses, as well as past or current treatment (both psychological and pharmacological).

Exposure Distress and Tolerability Scale (EDTS). The EDTS is a four-item measure created by Tutino et al. (revision requested). Participants rated how distressing they found the

Table 1

Sociodemographic Characteristics by Condition

Variable	*n*				*%*			
Gender	Total	Helpful	Unhelpful	Control	Total	Helpful	Unhelpful	Con
Women	126	47	42	37	87.5	90.4	89.4	82
Men	18	5	5	8	12.5	9.6	10.6	17
Ethnicity / Race								
White	74	19	26	29	51.4	76.0	55.3	64
Asian	19	10	5	4	13.2	19.2	10.6	8.
Black	14	10	3	1	9.7	19.2	6.4	2.
Middle Eastern	14	5	6	3	9.7	9.6	12.8	6.
South Asian	6	0	4	2	4.2	0.0	8.5	4.
Hispanic	7	2	3	2	4.9	3.8	6.4	4.
Not listed	10	6	0	4	6.9	11.5	0.0	8.
Relationship Status								
Long-term	34	10	12	12	23.6	19.2	25.5	26
Single	110	42	35	33	76.4	80.8	74.5	73
Psychological Diagnosis								
Yes	42	13	12	17	29.2	25.0	25.5	37
No	102	39	35	28	70.8	75.0	75.5	62

Notes. $N = 144$.

speech, how tolerable they found the speech, how willing they were to deliver another speech with SBs, and how willing they were to deliver another speech without SBs. People rated each statement on a scale from 0 ("not at all") to 4 ("extremely"). The internal consistency for the present sample for all measures is presented in Table 2.

The Credibility and Expectancy Questionnaire (CEQ; Devilly & Borkovec, 2000). The CEQ is a 6-item self-report measure of treatment credibility (e.g., "How logical does the treatment offered to you seem?") and expectancy ("How much improvement in your symptoms do you really *feel* will occur?"). Participants rated each item on either a 9-point scale (where 1 = "not at all" and 9 = "very") or an 11-point scale (beginning at 0% and going up to 100% in 10% increments). The CEQ has demonstrated good internal consistency ($\alpha = .85$) and test-retest reliability ($r = .75$-$.82$; Devilly & Borkovec, 2000).

Manipulation Check. To verify whether participants viewed SBs as helpful or unhelpful, we asked participants "To what extent do you believe that using safety behaviours during a speech is helpful in a) reducing anxiety, and b) improving speech performance?" These two items were rated on a 5-point scale (where 1 = "very unhelpful" and 5 = "very helpful") following the completion of the speech task.

The Performance Questionnaire (PQ; Rapee & Lim, 1992). The PQ is a 17-item self-report measure of perceived public speaking performance. This measure can be completed by both the speaker and an objective observer. For the current study, it was completed by the speaker and five research assistants who viewed a video recording of each speech. The five research assistants were unaware of the study goals, conditions, and hypotheses. Five video coders were selected to increase variability and reliability for the score of objective participant performance. People rated each item on a 5-point scale (where 0 = "not at all" and 4 = "very

much"). It comprises specific performance items (e.g., "Kept eye contact with audience") and global performance items (e.g., "Kept audience interested"). The PQ demonstrated good internal consistency (α = .89) and good interrater reliability (*r* = .86-.93; Rodebaugh & Chambless, 2000).

Personal Report of Confidence as a Speaker-Short Form (PRCS-12; Hook, Smith, & Valentiner, 2008). The PRCS-12 is a 12-item self-report measure of public speaking self-confidence. People rated each item as being either true or false. Sample items include "I am terrified at the thought of speaking before a group of people" and "I feel disgusted with myself after trying to address a group of people." The PRCS-12 demonstrated good internal consistency (α = .85), convergent validity with other public speaking measures, and discriminant validity with mood state questionnaires (Hook et al., 2008).

Social Phobia Inventory (SPIN; Connor et al., 2000). The SPIN is a 17-item self-report measure of social anxiety. It includes three subscales, which measure dimensions of fear (e.g., "Being criticized scares me a lot"), avoidance (e.g., "I avoid talking to people I don't know"), and physiological arousal (e.g., "I am bothered by blushing in front of people"). People rated each item on a 5-point Likert-type scale (0 = "not at all" and 4 = "extremely"). The SPIN demonstrated excellent internal consistency (α = .92), good test-retest reliability at 1 to 3 week intervals (*r* = .86), and good convergent and discriminant validity with related and unrelated measures, respectively (Anthony, Coons, McCabe, Ashbaugh, & Swinson, 2006).

The Speech Anxiety Thoughts Inventory (SATI; Cho, Smits, & Telch, 2004). The SATI is a 23-item measure that assesses maladaptive beliefs related to speech anxiety. It is composed of two subscales, which assess cognitions related to predictions of poor performance (e.g., "My speech will be incoherent") and fear of negative evaluation by the audience (e.g., "If I

make a mistake the audience will think I'm stupid"). People rated each item on a 5-point scale (where 0 = "I do not believe the statement at all" and 4 = "I completely believe the statement"). The SATI demonstrated excellent internal consistency (α = .95), acceptable test-retest reliability after a four-week period (*r* = .71), good convergent and discriminant validity with related and unrelated measures, respectively (Cho et al., 2004). Similar to Tutino et al. (2020) and for the purposes of this study, we added two items to the SATI to facilitate measuring speech predictions and learning: "My anxiety will last the whole speech" and "I will shake, tremble, or blush noticeably when I give my speech."

In addition, we used a second modified version of the SATI. All items in the SATI are future-oriented (e.g., "I'll get tongue-tied). In this modified version, all items were modified to the past tense (e.g., "I got tongue-tied"). In our previous study (Tutino et al., 2020), modified SATI scores demonstrated excellent internal consistency at time 1 (α = .94 and time 2; α = .97)

Subjective Units of Distress Scale (SUDS; Wolpe, 1958). The SUDS is a measure of subjective state distress. People rate the extent to which they feel distress on a scale from 0 ("not at all distressed") to 100 ("the worst distress you can imagine"). For the purposes of this project, participants rated the extent to which they felt anxious, rather than distressed.

The Subtle Avoidance Frequency Examination (SAFE; Cuming et al., 2009). The SAFE is a 32-item self-report measure of SB use related to social anxiety. It is composed of three subscales, which measure active SB use (e.g., "Avoid eye contact"), subtle restriction of behaviour (e.g. "Rehearse sentences in your mind"), and concealment behaviour (e.g. "Wear clothes or makeup to hide blushing"). People rated each item on a 5-point Likert-type scale (1 = "never" and 5 = "always"). The SAFE demonstrated excellent internal consistency (α = .91) and good discriminant validity between individuals with and without social anxiety disorder

(Cumming et al., 2009). For the purposes of this study, five items were added to the SAFE to provide additional SBs that participants could have access to during their speeches: sitting down, hiding their bodies behind a podium, holding onto a stress ball or small object, having a bottle of water on hand, or engaging in deep breathing. After completing the SAFE (at Time 1 only), participants were asked to review all of their answers and to select the five SBs that they use most frequently in everyday life.

Follow-Up Questionnaire. We created a survey to measure participants' willingness to engage in future exposure exercises. One week after the in-laboratory visit, participants were sent an online questionnaire informing them that our laboratory would be looking to recruit volunteers to participate in additional exposure exercises for our research. Participants were asked: 1) whether or not they would be willing to participate in future exposures [yes/no]; 2) whether we could contact them to engage in future exposures [yes/no]; 3) how willing they would be to participate in future exposures on a scale from 0-10; and 4) if no, to explain their reasoning for not wanting to engage in future exposure exercises. Participants were also sent a linked survey of the SATI to complete to measure their speech beliefs one week after completing the speech task.

Cognitive Tasks

Backward Digit Span (Weschler, 2008). The backward digit span task is a simple measure of working memory capacity. A research assistant reads a string of numbers aloud and participants are asked to repeat these numbers in reverse order. There are eight blocks, each of which consist of two strings of numbers. A number is added to each string so that the difficulty increases progressively in each block. Administration stops after participants incorrectly recall two number strings within the same block. Total score and longest span score were recorded.

Given that the digit span was administered at two time points, the numbers were swapped during the second administration (e.g., all 2s became 9s) to reduce potential practice effects.

Behavioural Tasks

Behavioural Speech Task. Participants were informed that their speech would be video recorded, and that the content of their speech would be evaluated by a group of researchers for clarity, accuracy, content, poise, and style. These instructions are designed to elicit anxiety during the speech task. In actuality, the content of the videotaped speeches was viewed by five research assistants, who were unaware of the study goals, design, and hypotheses, who coded for specific and global performance using the Performance Questionnaire (PQ; Rapee & Lim, 1992). Participants were given five minutes to prepare and were encouraged to speak for five minutes. After describing the procedure, participants were given a list of 10 controversial topics and were asked to choose up to three. The 10 topics included: global warming, terrorism, migrant and refugee crises, television violence and censorship, obesity epidemic, capital punishment, gun control, euthanasia, legalization of marijuana, and animal testing. To end the speech, participants said 'Stop' or raised their hand to signal the end of the speech. Similar speech task paradigms have been used in previous studies (e.g., Larson, Ader, & Moynihan, 2001), and elicit strong anxiety and physiological arousal responses (Larson et al., 2001).

Apparatus

Video Recording. The speech task was recorded using a Sony Handycam CX455 HD Flash Memory Camcorder with a micro SD Sony 128GB 70MB/s memory card. The video recorder was mounted on a Sony VCT-R640 tripod.

Procedure

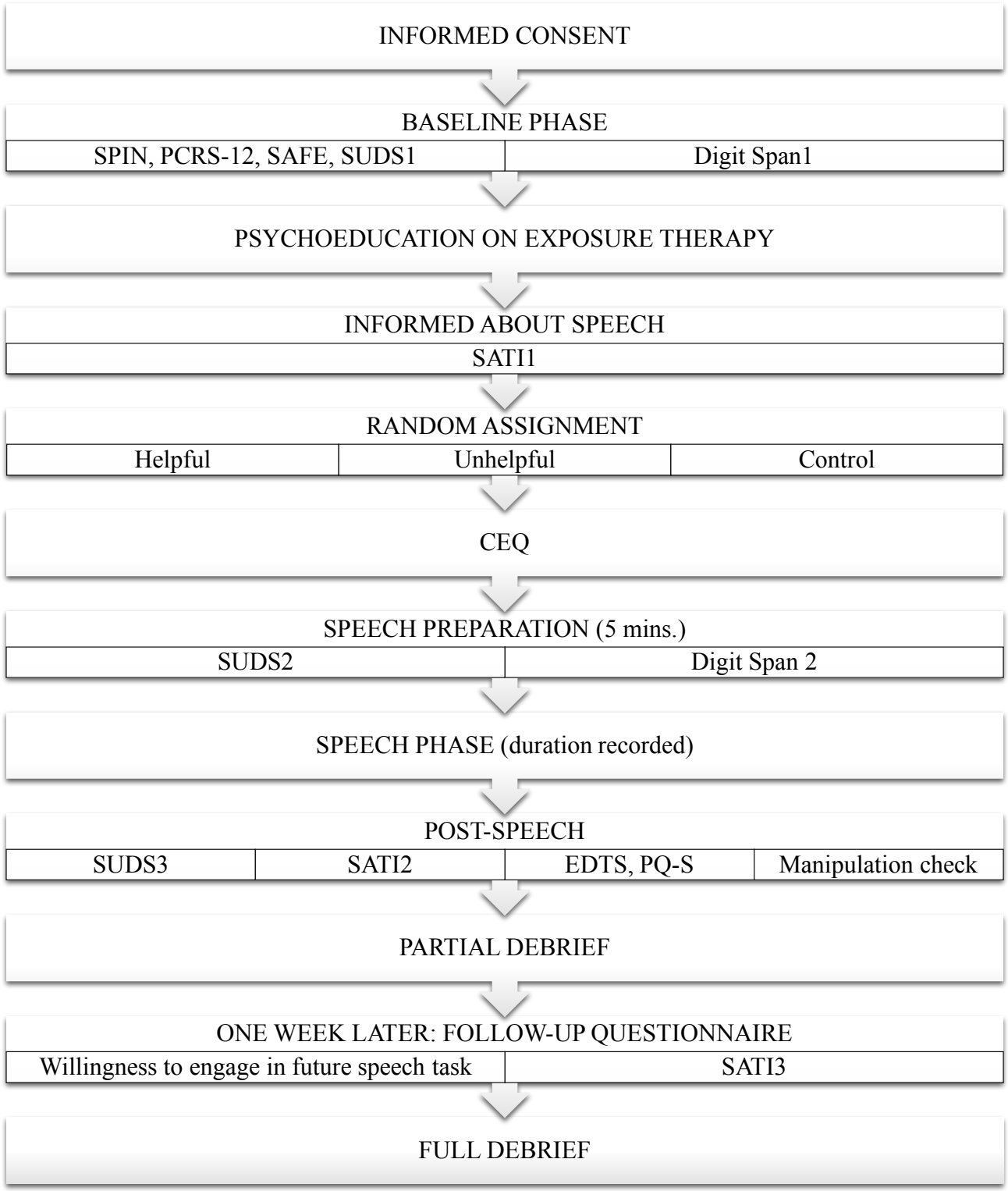
See Figure 1 for a procedural diagram. Upon arriving at the laboratory for the in-person portion of the study, participants were informed that they were participating in a two-part study (one in-person session and one follow-up online questionnaire) aiming to better understand anxiety and stress in undergraduate students, with the goal of testing different components of treatment. Participants were provided with a consent form that detailed the study goals, tasks, and potential positive and negative consequences, which they signed, indicating their informed consent. Participants were not informed of the specific study goals (e.g., whether manipulating beliefs about safety behaviours influences working memory and speech outcomes, self-reported anxiety and psychophysiology, and exposure acceptability). Moreover, participants were told that they would be asked to engage in cognitive and behavioural tasks as part of the study procedures, but the specific nature of the behavioural task (i.e., a speech task) was not specified. These omissions were necessary to preserve participants' baseline scores and to reduce the likelihood of response bias attributable to participants' awareness of the study goals.

After informed consent, participants completed an initial SUDS rating, the sociodemographic questionnaire, and a questionnaire package including: The Subtle Avoidance Frequency Examination (SAFE; Cumming et al., 2009), the Social Phobia Inventory (SPIN; Connor et al., 2000), and the Personal Report of Confidence as a Speaker-Short Form (PRCS-12; Hook, Smith, & Valentiner, 2008). These questionnaires were presented in a completely randomized order on Qualtrics™ Research Suite (Qualtrics, Provo, Utah), an online questionnaire server. A trained research assistant then verbally administered the backward digit span task as a baseline measure of working memory capacity.

Then, participants were provided with psychoeducation about exposure therapy where

Figure 1

Procedural Diagram



they were informed that exposure is an effective component of treatment for anxiety[3]. They were then informed about the exposure exercise for the current study (i.e., the speech task).

Prior to preparing their speech, participants completed a paper and pencil copy of the Speech Anxiety Thoughts Inventory (SATI; Cho, Smits, & Telch, 2004). They were then randomly assigned to one of three conditions: SBs helpful, SBs unhelpful, or control condition. Participants in the SBs helpful condition were given the following instructions:

> *We know that people tend to get really anxious right before and during a speech. Research tells us that using different tools and strategies during a speech can help to reduce anxiety, and help people to feel more in control of how they feel during a speech. We call these tools safety behaviours. When you first came in, you completed a questionnaire that measures common safety behaviours. You said that you sometimes like to use (top 5 listed SBs were verbally recited to the participant) when you feel anxious in social situations. You can use as many of these strategies as you would like during your speech today. Remember that this can help to increase how comfortable you feel during your speech.*

Participants in the SBs unhelpful condition were given the following instructions:

> *We know that people tend to get really anxious right before and during a speech. Research tells us that using different tools and strategies during a speech can actually be counterproductive and increase anxiety, and cause people to feel less in control of how they feel during a speech. We call these tools safety behaviours. When you first came in, you completed a questionnaire that measures common safety behaviours. You said that you sometimes like to you use (top 5 listed SBs were verbally recited to the participant)*

[3] See Appendix E for psychoeducation script.

when you feel anxious in social situations. You can use as many of these strategies as you would like during your speech today. Remember that this can decrease how comfortable you feel during your speech.

Participants in the control condition were given the following instructions:

We know that people tend to get really anxious right before and during a speech. When you first came in, you completed a questionnaire that measures tools and strategies you sometimes use when you feel anxious in social situations. We call these tools safety behaviours. You said that you sometimes like to you use (top 5 listed SBs were verbally recited to the participant) when you feel anxious in social situations. You can use as many of these strategies as you would like during your speech today.

Participants then completed the Credibility and Expectancy Questionnaire (Devilly & Borkovec, 2000) to assess the extent to which they viewed the exposure exercise as credible and expected the exposure to be successful in helping to reduce their anxiety. They were then told: "You have five minutes to prepare your speech. You can speak for as long as you would like, but please try to speak for a minimum of five minutes." After the five minutes passed, the research assistant re-entered the room with the video camera, and participants were informed that the speech was about to start. They were asked to rate their anticipatory anxiety using the SUDS and the research assistant re-administered the backward digit span task (modified version). Participants then delivered their speech and were asked to retrospectively rate their peak anxiety during the speech, using the SUDS. Moreover, speech duration was recorded.

Participants were then told: "Prior to your speech, you completed a questionnaire that asked you to rate what you thought would happen during your speech. Here is what you thought would happen before your speech (participants were handed their original copy of the SATI).

Here is a blank version of the same questionnaire (participants were handed the modified SATI). Please rate what you feel actually happened during the speech you just gave." Participants completed the modified SATI, the EDTS, a manipulation check assessing participants' beliefs about the utility of SBs, The Performance Questionnaire (PQ; Rapee & Lim, 1992), and a second copy of the SAFE to identify which specific SBs participants used during their speech.

Participants were partially debriefed and the research assistant assessed participants' levels of distress to ensure that no participant left the laboratory feeling distressed or anxious. One week later, participants completed the second portion of the study online. Upon completing the follow-up survey, participants were provided with a full debriefing form outlining information regarding study goals and hypotheses. All participants were provided with a list of resources, including psychological services, self-help books, informational websites, and scientific article references.

Power Analysis

A priori power analyses were conducted using G*Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). The most complex analysis of the current study was a 2 (condition) x 3 (time) ANOVA, repeated measures within-between interaction. In order to determine the appropriate sample size for the study, power was set to .80 and alpha was set to .05, to abide by statistical standards recommended by Tabachnik and Fidell (2007). The entered number of groups and measurements were 3 (helpful, unhelpful, control) and 3 (anticipatory, speech, post-speech), respectively. Researchers examining anticipatory and peak SUDS differences between SB groups have found large effect sizes (e.g., η^2 = .23-.55; Levy & Radomsky; Milosevic & Radomsky, 2013b). Effect sizes of SB condition x time interactions on behavioural approach tasks are small to moderate, however, as studies are often underpowered to see larger effects

(e.g., $\eta^2 = .07$; Hood et al., 2010). No data is currently available on the impact of SB beliefs on working memory. As such, the effect size was set to f = .10 (a small effect) in order to be conservative. The correlation among repeated measures was entered as $r = .7$, based on the assumption that SUDS scores should correlate strongly over time (Thyer et al., 1984). The estimated required sample size based on this information was 41 participants per group, for a total of 123 participants.

Data Cleaning and Analysis

Although we recruited 144 participants, 12 participants ($n = 5$ in the unhelpful condition, $n = 4$ in the helpful condition, $n = 3$ in the control condition) terminated the study prematurely upon learning that they would be asked to deliver a speech (i.e., post-manipulation). Consequently, these individuals have missing data for measures and outcomes collected post-speech, but were still given the opportunity to complete the one-week follow-up questionnaire. There were otherwise no missing data values. The dataset was analyzed for impossible values, and none were found. We calculated skewness and kurtosis indices for all outcome measures; all values fell within the normal distribution. We conducted independent samples *t*-tests to identify any pre-existing differences on SPIN, SAFE, and PCRS-12 scores between the three conditions. Our sample scored within the clinical range observed in other studies on the SPIN (Connor et al., 2000) and SAFE (Cuming et al., 2009), indicating an overall highly speech anxious sample. No statistically significant differences between conditions were found (all $t < 1.60$, all $p > .11$). For descriptive statistics, see Table 2.

Table 2

Descriptive Statistics by Condition for All Variables of Interest

Variable	*Mean (SD)*			*Range*			*α*
	Helpful	*Unhelpful*	*Control*	*Helpful*	*Unhelpful*	*Control*	
SPIN	33.63 (15.00)	37.34 (13.55)	35.36 (13.27)	2-66	10-56	4-60	.92
SAFE1	97.69 (23.37)	103.81 (22.75)	101.76 (24.60)	59-151	57-141	58-152	.92
SAFE2	82.21 (20.39)	83.00 (22.30)	85.32 (18.76)	45-141	45-150	54-135	.89
PCRS-12	8.12 (2.63)	8.89 (2.24)	8.91 (2.30)	2-12	2-12	4-12	.71
SATI1	61.84 (20.04)	65.28 (17.75)	65.88 (18.8)	1-94	25-96	25-96	.95
SATI2	53.85 (23.68)	55.05 (23.07)	58.65 (23.27)	8-95	11-96	15-91	.96
SATI3	80.71 (20.77)	83.40 (22.43)	83.07 (23.07)	46-120	27-120	32-120	.97
Cred	18.10 (4.40)	17.66 (3.74)	17.88 (4.43)	5-27	7-24	10-25	.75
Expect	69.24 (36.79)	54.91 (31.46)	52.08 (35.36)	1-167	1-137	1-129	.68
PQ-S	30.63 (7.82)	32.41 (6.22)	29.57 (6.78)	13-52	18-50	16-46	.60
PQ-O	23.20 (3.26)	24.26 (3.38)	23.82 (4.23)	14-31	16.6-31.8	14.8-32	.84
Tolerate	2.63 (1.02)	2.78 (.99)	2.68 (.98)	1-4	1-5	1-5	-
Distress	3.67 (.99)	3.98 (.96)	3.64 (.99)	1-5	2-5	2-5	-
SB	3.08 (1.05)	2.73 (1.12)	2.68 (1.24)	1-5	1-5	1-5	-
NoSB	2.46 (1.20)	2.20 (1.27)	2.20 (1.37)	1-5	1-5	1-5	-
Willing	4.57 (2.69)	3.58 (2.57)	3.41 (2.65)	0-10	0-9	0-10	-
SUDS1	36.04 (25.26)	41.72 (25.16)	41.69 (27.10)	0-85	0-95	0-100	-
SUDS2	69.10 (23.21)	71.61 (17.30)	72.02 (22.555)	15-100	25-100	7-100	-
SUDS3	76.88 (20.45)	79.71 (14.11)	75.00 (24.37)	20-100	45-100	8-100	-
SD	146.00 (80.60)	158.66 (90.61)	185.13 (120.00)	0-325	0-320	0-720	-
Long1	4.39 (1.27)	4.55 (1.14)	4.6 (1.23)	2-8	3-8	2-7	-
Long2	4.44 (1.07)	4.38 (1.36)	4.72 (1.39)	3-8	3-7	3-8	-
Total1	7.82 (1.99)	8.06 (2.16)	8.38 (2.14)	4-14	4-16	4-14	-
Total2	7.88 (2.05)	8.49 (2.19)	8.49 (2.19)	4-16	4-14	5-14	-

Notes. SPIN = Social Phobia Inventory; SAFE1 = Subtle Avoidance Frequency Examination, First Administration; SAFE2 = Subtle Avoidance Frequency Examination, Second Administration PRCS-12 = Personal Report of Confidence as a Speaker – Short Form; SATI1 = Speech Anxiety Thoughts Inventory, First Administration; SATI2 = Speech Anxiety Thoughts Inventory, Second Administration; SATI3 = Speech Anxiety Thoughts Inventory, Third Administration PQ-S = The Performance Questionnaire-Self Report; PQ-O = The Performance Questionnaire-Other Report; Tolerate = Exposure Distress and Tolerability Scale, Tolerability; Distress = Exposure Distress and Tolerability Scale, Distress; SB = Exposure Distress and Tolerability Scale, Willingness with SBs; NoSB = Exposure Distress and Tolerability Scale, Willingness without SBs; Willing = Willingness to Deliver Future Speech; SUDS1 = Subjective Units of Distress Scale, Baseline; SUDS2 = Subjective Units of Distress Scale, Anticipatory; SUDS3 = Subjective Units of Distress Scale, Peak during speech; SD = Speech Duration (in seconds—a score of 0 indicates the participant did not complete the speech task); Long1 = Digit Span Longest Score, First Administration; Long2 = Digit Span Longest Score, Second Administration; Total1 = Digit Span Total Score, First Administration; Total2 = Digit Span Total Score, First Administration

Hypothesis Testing

Cognitive Outcomes

We conducted two 3 (condition) x 2 (time) mixed ANOVAs to test the hypothesis that condition would have an effect on working memory capacity. We entered digit span total scores and digit span longest span scores as the respective outcome variables. We conducted a 3 (condition) x 3 (time) mixed ANOVA to assess the effect of condition on learning disconfirmatory evidence (i.e., changes in speech predictions). We analyzed the effect of condition on learning at three phases: pre-speech, post-speech, and one-week follow-up. SATI and modified SATI scores were entered as the outcome variables.

Emotional Outcomes

We conducted a 3 (condition) x 3 (time) mixed ANOVA to assess the effect of condition on self-reported state anxiety (SUDS). We analyzed the effect of condition on state anxiety at three phases: baseline phase, anticipatory phase, and exposure phase. Individual SUDS ratings at each time point were entered as the outcome variables.

We conducted independent samples *t*-tests to test whether exposure credibility, exposure expectancy, and perceptions of treatment acceptability differed between conditions.

Behavioural Outcomes

We conducted independent samples *t*-tests to test whether speech duration, perceptions of speech success, and willingness to participate in additional exercises differed between conditions. Inter-rater reliability was calculated using intraclass correlation coefficients to assess whether the five coders are similarly scoring participant performance using the PQ.

Mediation Analyses

We conducted two bootstrapped (5000 samples) mediation analyses using *PROCESS* (Hayes, 2018) to assess whether the relationship between condition and willingness to deliver additional speeches was mediated by exposure credibility or exposure expectancy. Although we did not make specific hypotheses related to these analyses, we did pre-register these exploratory analyses on the Centre for Open Science at the same time as our other analyses. As per recommendations by Hayes (2018) for antecedent multicategorical predictors, condition was dummy coded, with the control condition set as the intercept (i.e., both the helpful and unhelpful conditions were compared to the control condition).

Results

Manipulation Check

Because we were interested in the impact of beliefs about SBs on our outcome measures, we conducted independent samples *t*-tests to verify whether participants in the helpful condition perceived SBs as being more helpful in reducing anxiety and improving speech performance compared to those in the unhelpful and control conditions. There were no statistically significant differences between conditions on their perceptions of SB helpfulness in terms of anxiety or speech performance (all $p > .21$). Given that the manipulation check was conducted after the speech, rather than after the manipulation instructions, it is possible that these results were diluted by participants' personal experiences of having used the SBs during their speech. Despite these findings, we proceeded with our hypothesis testing, as our manipulation did not change explicit beliefs, but may still have impacted implicit beliefs or expectations, and may have important implications nonetheless for word choice during psychoeducation.

Cognitive Outcomes

We found no main effect of condition on digit span total scores, $F(1,127) = 1.95$, $p = .15$, $\eta_p^2 = .03$, digit span longest scores $F(1,127) = .86$, $p = .42$, $\eta_p^2 = .01$, or pre-to-post speech predictions $F(2,123) = .25$, $p = .78$, $\eta_p^2 = .04$. Similarly, we found no statistically significant interaction between condition and time for any of these outcome variables (all Fs < 1.53; all ps > .22; all $\eta_p^{2'}$s < .02). No main effect of time was found on digit span total $F(1,127) = .00$, $p = .95$, $\eta_p^2 = .00$, or longest span scores $F(1,127) = .11$, $p = .74$, $\eta_p^2 = .00$.There was a main effect of time on pre-to-post speech predictions, $F(2, 246) = 138.91$, $p < .001$, $\eta_p^2 = .53$, such that individuals' actual experiences of the speech were more positive than their predictions prior to the speech, $t(129) = 4.95$, $p < .001$, $d = .40$. Conversely, participants' speech predictions were most negative at one-week follow-up, $t(125) = -17.93$, $p < .001$, $d = 1.16$.

Emotional Outcomes

We found no main effect of condition on self-reported state anxiety, $F(2,126) = 1.95$, $p = .82$, $\eta_p^2 = .00$, and no statistically significant interaction between condition and time on self-reported anxiety, $F(4,252) = 1.14$, $p = .33$, $\eta_p^2 = .02$. There was a main effect of time on self-reported anxiety $F(2, 252) = 243.09$, $p < .001$, $\eta_p^2 = .67$, such that SUDS scores increased significantly from baseline to anticipatory, $t(136) = -16.58$, $p < .001$, $d = 1.36$, and from anticipatory to peak speech $t(131) = -4.74$, $p < .001$, $d = .34$. Moreover, we found no statistically significant differences between the helpful and unhelpful conditions on perceptions of exposure credibility $F(2, 132) = .13$, $p = .88$, willingness to deliver another speech with SBs $F(2, 132) = 1.72$, $p = .18$, willingness to deliver another speech without SBs $F(2, 132) = .61$, $p = .55$, exposure tolerability $F(2, 132) = .27$, $p = .76$, or exposure distress $F(2, 132) = 1.54$, $p = .22$. People in the helpful condition perceived the exposure exercises as more likely to succeed than

those in the unhelpful condition, $t(92) = 1.96$, $p = .05$, $d = .42$ or control condition, $t(86) = 2.28$, $p = .03$, $d = .48$. Moreover, people in the helpful condition were more willing to deliver future speeches than were those in the control condition, $t(76) = 1.99$, $p = .05$, $d = .44$. See Table 4 for all non-significant *t*-test statistics.

Behavioural Outcomes

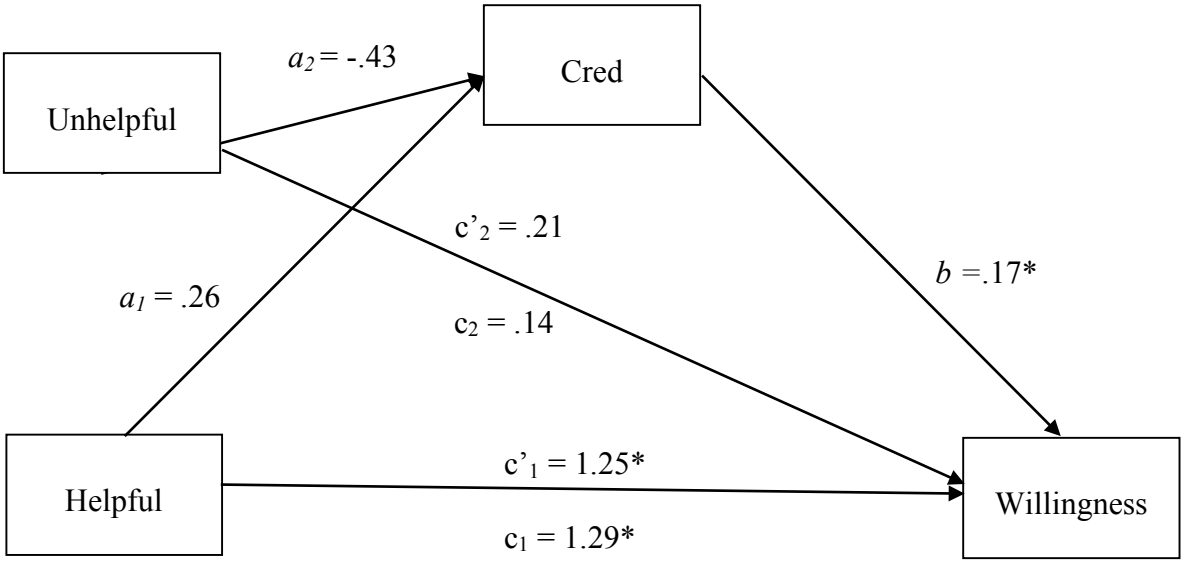
An intraclass correlation coefficient demonstrated high agreement between the five video coders on objective performance ($r = .82$). We found no statistically significant differences between conditions on speech duration $F(2, 143) = 1.39$, $p = .25$, or objective speech performance $F(2, 121) = .86$, $p = .43$. However, individuals in the unhelpful condition rated their own performances more favorably than did those in the control condition (but not the helpful condition) on subjective speech performance, $t(83) = 2.01$, $p = .05$, $d = .44$.

Mediation Models

In the first mediation model, condition was entered as the predictor variable, and the credibility subscale scores of the CEQ were entered as the mediator (see Figure 2). Willingness to engage in future exposure exercises was entered as the outcome variable. Neither the helpful ($a_1 = .26$, 95% CI = -1.64—2.16) nor unhelpful ($a_2 = -.43$, 95% CI = -2.37—1.51) condition predicted credibility scores compared to the control condition. Credibility did predict willingness to deliver another speech ($b = .17$, 95% CI = .05-.29). There was a significant total ($c_1 = 1.29$, 95% CI = .10-2.48) and direct ($c'_1 = 1.25$, 95% CI = .09 -2.40) effect of the helpful condition on willingness to deliver another speech, but no significant indirect effect ($a_1b = .04$, 95% CI = -.32-.39). There was no significant total ($c_2 = .14$, 95% CI = -1.08—1.36), indirect ($a_2b = -.07$, 95% CI = -.48-.24), or direct effect ($c'_2 = .21$, 95% CI = -.97-1.39) for the unhelpful condition. This model explained 22.71% of the variability in willingness to deliver another speech.

Figure 2

The Mediating Effect of Credibility on the Association between Condition and Willingness to Deliver a Follow-Up Speech



Note. * $p < .01$; a_n = effects of IV on mediator; b = effects of mediator on DV; c_n = total effect of IV on DV; c'_n = direct effect of IV on DV; Unhelpful = Unhelpful condition; Helpful = Helpful condition; Cred = The Credibility and Expectancy Questionnaire, Credibility subscale; Willingness = Willingness to deliver a speech at one-week follow-up.

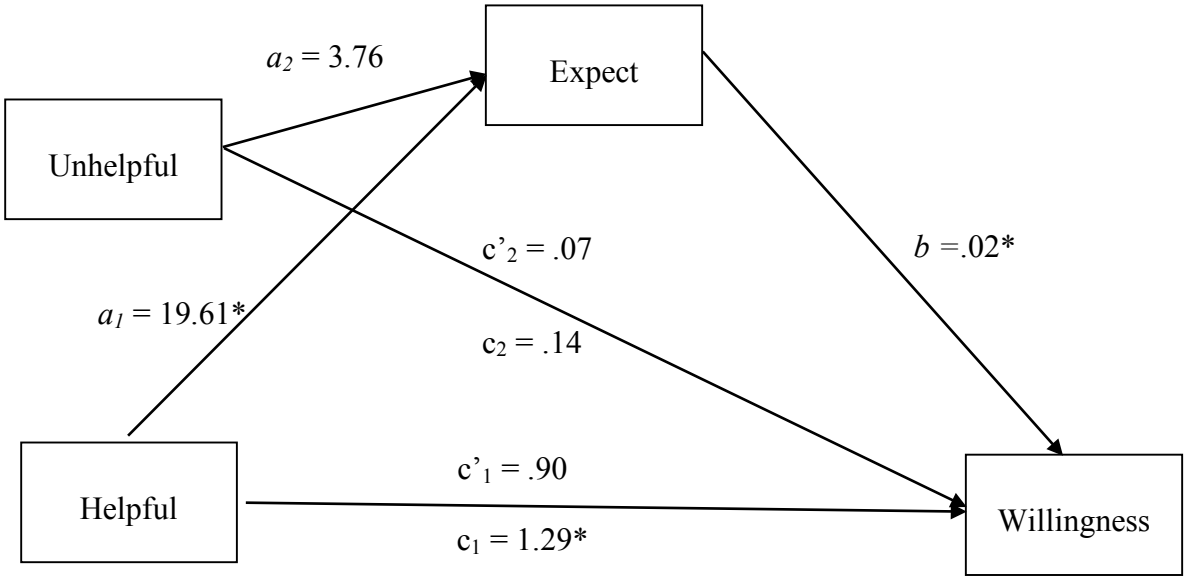
In the second mediation model, condition was entered as the predictor variable, and the expectancy subscale scores of the CEQ were entered as the mediator (see Figure 3). Willingness to engage in future exposure exercises was entered as the outcome variable. The helpful condition (a_1 = 19.61, 95% CI = 2.97-36.24) predicted expectancy scores compared to the control condition, but the unhelpful condition did not (a_2 = 3.76, 95% CI = -13.25-20.77). Expectancy did predict willingness to deliver another speech (b = .02, 95% CI = .01-.03). There was a significant total effect (c_1 = 1.29, 95% CI = .10—2.48) and indirect effect (a_1b = .39, 95% CI = .03-.87), but not a significant direct effect (c'_1 = .90, 95% CI = -.28 -2.08) of helpful condition on willingness to deliver another speech. In other words, people in the helpful condition also reported greater willingness to deliver another speech, and this relationship was accounted for by the degree to which they expected using SBs to be helpful. There was no significant total (c_2 = .14, 95% CI = -1.08—1.36), indirect (a_2b_2 = .07, 95% CI = -.30-.42) or direct effect (c'_2 = .07, 95% CI = -1.11 —1.25) for the unhelpful condition. This model explained 22.71% of the variability in willingness to deliver another speech.

Discussion

The primary goal of this study was to investigate whether manipulating beliefs about safety behaviours through word choice (as being helpful, unhelpful, or without any specific information regarding helpfulness) impacts cognitive, behavioural, and emotional outcomes related to an exposure-like exercise. Treatment expectations are a predictor of outcomes in the field of medicine (Lienard et al., 2006; Schoefield et al., 2003), yet few studies have examined the role of expectancy in CBT. This study was designed to be a proxy for the ways clinicians may directly or indirectly influence client perceptions of exposure with or without judicious SB use, given the contentious nature of judicious use in our field. To our knowledge, this is the first

Figure 3

The Mediating Effect of Expectancy on the Association between Condition and Willingness to Deliver a Follow-Up Speech



Note. * $p < .01$; a_n = effects of IV on mediator; b = effects of mediator on DV; c_n = total effect of IV on DV; c'_n = direct effect of IV on DV; Unhelpful = Unhelpful condition; Helpful = Helpful condition; Expect = The Credibility and Expectancy Questionnaire, Expectancy subscale; Willingness = Willingness to deliver a speech at one-week follow-up.

experimental study to explore the influence that language and beliefs may have on participant experiences of SB use and exposure.

Contrary to many of our hypotheses, we did not find a significant influence of word choice and SB beliefs on working memory, pre-to-post speech predictions, speech duration, exposure credibility, or measures of exposure acceptability. These null findings should be interpreted with caution, as our manipulation check demonstrated no statistically significant differences between groups. There were, however, some notable differences between the helpful, unhelpful, and control conditions.

After receiving psychoeducation on exposure therapy and SB use, people in the helpful condition rated the exposure as being more likely to be successful (i.e., exposure expectancy) than did people in either the unhelpful or control conditions. Furthermore, individuals in the helpful condition were more willing to deliver a future speech when asked at the one-week follow-up compared to the control condition. However, this difference was relatively small, with individuals in the helpful condition being only approximately 10% more willing (on a scale from 1 to 10) to engage in future exposures.

These results were supported by our mediation analyses, which demonstrated that expectancy mediated the relationship between the helpful condition (but not the unhelpful condition) and willingness to deliver future speeches. This mediation represents the chronology of our study—people first received the manipulation instructions on the helpfulness of SBs, then rated their expectancy, and then one week later rated their willingness to engage in future exposure exercises. Thus, it appears that SBs presented as helpful increased people's expectancies related to how helpful an exposure task could be, which further increased their willingness to engage in future exposures. Clinically, this finding may be particularly relevant to

reducing early attrition rates often observed in CBT and exposure therapy (Fernandez, Salem, Swift, & Ramtahal, 2015; Salmoiraghi & Sambi, 2010). SBs presented as helpful for a given task (when warranted by the case conceptualization) may be more in line with participants' pre-existing beliefs about the usefulness of SBs. Thus, people may be more confident that completing the exposure exercise with the SBs would help reduce their anxiety. We must note here that we are discussing specifically *judicious* SB use—i.e., using a SB for a specific exposure exercise when an individual would be unlikely to otherwise complete the task, with the ultimate goal of eliminating that SB use over time (Rachman et al., 2008).

There were no differences between the helpful and unhelpful conditions on any other outcomes. This lack of difference is notable – it suggests that while participants may have held beliefs about the SBs as helpful or unhelpful, they appeared to have limited impact on experiential (e.g., emotional, cognitive, or behavioural) levels. Therefore, it may not be so much about exactly *how* we prepare clients for exposure therapy, but rather, what the experience is *actually like* for them. Consistent with our previous suggestion (Tutino, et al., revision requested), we contend that people believe that SBs are more helpful than they actually experience them to be. Conversely, researchers previously found that individuals with high social anxiety may indeed be aware that SBs are counterproductive, and worry that others (i.e., audience members) evaluate them negatively as a result (Vassilopoulos, 2009). Nonetheless, people with high social anxiety use more SBs than those with lower social anxiety (McManus, Sacadura, & Clark, 2008), likely because they believe that the potential repercussions of delivering a speech without SBs (e.g., forgetting words and looking stupid) outweigh those of delivering a speech with SBs. If people deliver a speech without SBs (or after being told that SBs are unhelpful), they may have more confidence in their ability to deliver a speech without SBs

and feel more comfortable dropping them over time. This may explain why individuals in the unhelpful condition evaluated their speeches more favourably than individuals in the control condition (but not the helpful condition). For clients, it can be empowering to complete an activity they did not believe they could do due to their anxiety. This scenario also creates the optimal condition for expectancy violation, a proposed core mechanism of effective exposure therapy (Craske et al., 2008; Craske et al., 2014). For example, a client who is told "you can use these cue cards during your speech, but we know that people tend to feel even *more* anxious when they use them" might be less inclined to use the cue cards during their speech, realize that they do not need to use cue cards to successfully complete their speech, and may consequently feel more confident in their performance. We note here that although the significant findings between groups were marginally significant, effect sizes were small to medium. Additionally, non-significant findings had much larger *p*-values and much smaller effect sizes, so we are confident that the marginal significance likely illustrates a true difference between groups.

Overall, these findings are consistent with those of our previous study (Tutino et al., revision requested), which found no impact of SB (vs. no SB) use on the majority of cognitive, behavioural, or emotional outcomes, but did find an impact of time on anxiety and pre-to-post speech predictions. In both studies, participants experienced an increase in state anxiety from baseline to anticipatory and speech phases. In addition to SUDS scores increasing over time, the inverse pattern was observed with pre-to-post speech evaluation scores. Pre-speech evaluations were more negative than post-speech evaluations, suggesting that individuals catastrophized prior to completing their speech, and were able to gather some disconfirmatory evidence during their speech. In the current study, participants also completed the SATI at a one-week follow-up to explore their cognitions and emotions related to delivering a future speech. We developed this

survey as a proxy behavioural outcome—because this follow-up questionnaire was framed as being a part of an upcoming study, participants were more likely to indicate their willingness to participate only if they truly were willing to engage in additional exposures. However, participants were largely unwilling to come back in (with a mean score under 5 on a scale from 1 to 10). The majority of participants reported they did not want to complete additional exposure exercises due to the discomfort of the first exposure (e.g., feeling insecure, anxious). This highlights that regardless of word choice, beliefs, and expectancies, in the current study, the experience of engaging in a single exposure exercise was anxiety-provoking enough that participants were not highly willing to engage in future exposures.

Indeed, SATI scores were highest at the one-week follow-up, suggesting that participants' predictions about their speech performance abilities were even more negative than they were on Day 1 of the study. This was true not only for the helpful and unhelpful conditions, but also for the control condition who were given no information about the helpfulness of SBs. This phenomenon may be accounted for by post-event processing commonly experienced by individuals with social anxiety (Rachman, Grüter-Andrew, & Shafran, 2000). Despite experiencing a decrease in negative expectations from pre-to-post speech, participants may have selectively attended to aspects of their performance they interpreted as most negative and ruminated about their speech between completing their speech and the follow-up questionnaire. Post-event processing is higher after speeches compared to other social situations (e.g., conversations; Makkar & Grisham, 2011), likely due to the fact that speeches are ambiguous (i.e., no direct feedback is given), and thus, negative self-perceptions increase over time. This has important clinical implications for exposure therapy and its high attrition rates. The majority (64.6%) of participants did not want to come back for a follow-up exposure exercise, with the

most commonly cited reason being the anxiety-provoking nature of the speech. Providing psychoeducation following exposure exercises on post-event processing and planning for more frequent sessions during the *in vivo* phases of exposure therapy may help mitigate early drop out.

There is another important possible explanation for the increased SATI scores at follow-up. All participants were permitted to use SBs, and thus, participants may have attributed any perceived exposure success to the SBs. Research findings suggest that SB use interferes with the optimal conditions necessary for inhibitory learning, expectancy violation, and belief change to occur (e.g., Blakey & Abramowitz, 2016; Craske et al., 2014); it is possible that SB use interfered with the consolidation of longer term learning that may have been observed in a no-SB condition. Further research in this area is warranted to identify whether SB use has a benign (as our findings suggest) or harmful impact on long term learning.

Taken together, these between- and within-condition effects (and lack thereof) suggest that beliefs about safety behaviour may not have a significant influence on exposure outcomes. Our goal for this study was to better understand how language and beliefs influence exposure outcomes. Clients may be more likely to believe that SBs are helpful than unhelpful, yet we have no evidence that suggests that clinicians should *encourage* clients to use SBs, particularly when, experientially, SBs do not make the experience of a speech more tolerable. Conversely, research findings do not support SBs as being solely unhelpful. Presenting SBs from a more nuanced perspective using psychoeducation and approaching their role in exposure on a case by case basis may be most beneficial. For example, a client who is unwilling to begin exposure therapy without a particular safety behaviour may benefit from using that behaviour initially, while building confidence and gathering disconfirmatory evidence to allow them to complete it again later without the safety behaviour (e.g., Rachman et al., 2008). Our current findings, in tandem

with previous findings (Milosevic & Radomsky, 2013; Tutino et al., revision requested) suggest that participants are able to gather disconfirmatory evidence (at least temporarily) regardless of SB use or beliefs. Thus, what might be most important in exposure therapy is the cognitive and emotional work following the exposure to reduce post-event processing and consolidate disconfirmatory learning.

Our study implications must be addressed within the context of our limitations. Although we recruited participants based on high reported speech anxiety, we did not conduct a formal clinical interview. Consequently, this study serves as a proxy for processes that may be at play during exposure therapy for people with clinically-diagnosed anxiety disorders, but we limit our interpretation of our results to its laboratory context. Moreover, the manipulation check presents challenges related to the interpretation of our findings. There were no statistically differences between groups on their perceptions of SBs as being helpful or unhelpful in reducing anxiety or improving speech performance. It is unclear whether there was no difference between the groups because the manipulation was not effective, or if these results were muddled by the fact that the manipulation check was completed after people completed the speech. Statistically significant differences between conditions on their perceptions of exposure success (immediately following the manipulation instructions) suggests that the manipulation did work as intended, but that participants' experiences of delivering the speech were anxiety-provoking regardless of SB beliefs, thus also impacting their beliefs post-speech.

This is a novel study and the first of its kind to explore the effects of word choice and beliefs about SBs on cognitive, behavioural, and emotional outcomes related to an exposure-like task. Despite the limitations described above, the study also had considerable strengths. We used an experimental design with a one-week follow-up among a relatively large sample of high

speech anxious participants, which enabled us to investigate causal relationships between condition and various outcomes. By using multimethod data collection (e.g., self-report questionnaires, cognitive tasks, video recording) we explored multiple, relevant outcomes that are important for exposure research and theory. Additionally, we pre-registered our design and analyses, and did not conduct any exploratory analyses outside of our initial plan. A challenge in the design of studies exploring safety behaviour use is the decision whether to provide limited or unlimited safety behaviour options, thus either limiting internal or external validity respectively. To increase the ecological validity of the study, and to increase the likelihood that participants use idiosyncratic SBs that are most helpful and relevant to them (Levy & Radomsky, 2013), participants in this study were permitted to use any and all SBs that they believed would be most helpful to them.

Thus, we return to our original question: do words matter? Our preliminary analyses on this important yet understudied topic in the field of CBT suggests that words may be particularly important in influencing initial client beliefs and expectancies, which then may be overridden personal experience completing an exposure activity. Future researchers may benefit from exploring word choice, beliefs about SBs, and SB use within a clinical context, as these differences may be more exaggerated and outcomes may be differentially impacted within a clinically diagnosed sample. Overall, research on safety behaviours has increased significantly over the years, yet findings on the impact of SB use on exposure outcomes remain mixed and unclear. Continued investigation of the individual differences, contextual factors, and mechanisms that underlie the impact of safety behaviours on treatment outcomes is warranted.

References

Abramowitz, J. S., & Moore, E. L. (2007). An experimental analysis of hypochondriasis. *Behaviour Research and Therapy*, *45*(3), 413-424.

Antony, M. M., Coons, M. J., McCabe, R. E., Ashbaugh, A., & Swinson, R. P. (2006). Psychometric properties of the social phobia inventory: Further evaluation. *Behaviour Research and Therapy*, *44*(8), 1177-1185.

Baddeley, A. (2000). The episodic buffer: a new component of working memory? *Trends in Cognitive Sciences*, *4*, 417-423.

Baddeley, A. D., & Hitch, G. (1974). Working memory. *Psychology of Learning and Motivation*, *8*, 47-89.

Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive therapy and research*, *1*(4), 287-310

Bandura, A., Jeffery, R. W., & Wright, C. L. (1974). Efficacy of participant modeling as a function of response induction aids. *Journal of abnormal psychology*, *83*(1), 56.

Benedetti, F. (2008). Mechanisms of placebo and placebo-related effects across diseases and treatments. *Annu. Rev. Pharmacol. Toxicol.*, *48*, 33-60.

Cho, Y., Smits, J. A., & Telch, M. J. (2004). The Speech Anxiety Thoughts Inventory: scale development and preliminary psychometric data. *Behaviour Research and Therapy*, *42*(1), 13-25.

Colloca, L., & Miller, F. G. (2011). Role of expectations in health. *Current opinion in psychiatry*, *24*(2), 149-155.

Connor, K. M., Davidson, J. R., Churchill, L. E., Sherwood, A., Weisler, R. H., & Foa, E. (2000). Psychometric properties of the Social Phobia Inventory (SPIN): New self-rating

scale. *The British Journal of Psychiatry*, *176*(4), 379-386.

Cuming, S., Rapee, R. M., Kemp, N., Abbott, M. J., Peters, L., & Gaston, J. E. (2009). A self-report measure of subtle avoidance and safety behaviors relevant to social anxiety: Development and psychometric properties. *Journal of Anxiety Disorders*, *23*(7), 879-883

Deacon, B. J., & Farrell, N. R. (2013). Therapist barriers to the dissemination of exposure therapy. In *Handbook of treating variants and complications in anxiety disorders* (pp. 363-373). Springer, New York, NY.

Deacon, B. J., Farrell, N. R., Kemp, J. J., Dixon, L. J., Sy, J. T., Zhang, A. R., & McGrath, P. B. (2013). Assessing therapist reservations about exposure therapy for anxiety disorders: The Therapist Beliefs about Exposure Scale. *Journal of Anxiety Disorders*, *27*(8), 772-780

Deacon, B. J., Sy, J. T., Lickel, J. J., & Nelson, E. A. (2010). Does the judicious use of safety behaviors improve the efficacy and acceptability of exposure therapy for claustrophobic fear?. *Journal of Behavior Therapy and Experimental Psychiatry*, *41*(1), 71-80

Devilly, G. J., & Borkovec, T. D. (2000). Psychometric properties of the credibility/expectancy questionnaire. *Journal of behavior therapy and experimental psychiatry*, *31*(2), 73-86.

Dew, S. E., & Bickman, L. (2005). Client expectancies about therapy. *Mental Health Services Research*, *7*(1), 21-33.

Fernandez, E., Salem, D., Swift, J. K., & Ramtahal, N. (2015). Meta-analysis of dropout from cognitive behavioral therapy: Magnitude, timing, and moderators. *Journal of Consulting and Clinical Psychology*, *83*(6), 1108

Greenberg, R. P., Constantino, M. J., & Bruce, N. (2006). Are patient expectations still relevant for psychotherapy process and outcome?. *Clinical psychology review*, *26*(6), 657-678

Hook, J. N., Smith, C. A., & Valentiner, D. P. (2008). A short-form of the Personal Report of Confidence as a Speaker. *Personality and Individual Differences*, *44*(6), 1306-1313.

Larson, M. R., Ader, R., & Moynihan, J. A. (2001). Heart rate, neuroendocrine, and immunological reactivity in response to an acute laboratory stressor. *Psychosomatic Medicine*, *63*(3), 493-501.

Levy, H. C., & Radomsky, A. S. (2014). Safety behaviour enhances the acceptability of exposure. *Cognitive Behaviour Therapy*, *43*(1), 83-92.

Liénard, A., Merckaert, I., Libert, Y., Delvaux, N., Marchal, S., Boniver, J., ... & Slachmuylder, J. L. (2006). Factors that influence cancer patients' anxiety following a medical consultation: impact of a communication skills training programme for physicians. *Annals of oncology*, *17*(9), 1450-1458.

Makkar, S. R., & Grisham, J. R. (2011). The predictors and contents of post-event processing in social anxiety. *Cognitive Therapy and Research*, *35*(2), 118-133.

Mancebo, M. C., Eisen, J. L., Sibrava, N. J., Dyck, I. R., & Rasmussen, S. A. (2011). Patient utilization of cognitive-behavioral therapy for OCD. *Behavior therapy*, *42*(3), 399-412

McManus, F., Sacadura, C., & Clark, D. M. (2008). Why social anxiety persists: An experimental investigation of the role of safety behaviours as a maintaining factor. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*(2), 147-161.

Meulders, A., Van Daele, T., Volders, S., & Vlaeyen, J. W. (2016). The use of safety-seeking behavior in exposure-based treatments for fear and anxiety: Benefit or burden? A meta-analytic review. *Clinical psychology review*, *45*, 144-156.

Milosevic, I., & Radomsky, A. S. (2008). Safety behaviour does not necessarily interfere with exposure therapy. *Behaviour Research and Therapy*, *46*(10), 1111-1118.

Milosevic, I., & Radomsky, A. S. (2013). Keep your eye on the target: Safety behavior reduces targeted threat beliefs following a behavioral experiment. *Cognitive Therapy and Research*, *37*(3), 557-571.

Moran, T. P. (2016). Anxiety and working memory capacity: A meta-analysis and narrative review. *Psychological Bulletin*, *142*(8), 831

Pantilat, S. Z. (2009). Communicating with seriously ill patients: better words to say. *JAMA*, *301*(12), 1279-1281.

Price, M., & Anderson, P. L. (2012). Outcome expectancy as a predictor of treatment response in cognitive behavioral therapy for public speaking fears within social anxiety disorder. *Psychotherapy*, *49*(2), 173.

Rachman, S., Grüter-Andrew, J., & Shafran, R. (2000). Post-event processing in social anxiety. *Behaviour Research and Therapy*, *38*(6), 611-617

Rachman, S., Radomsky, A. S., & Shafran, R. (2008). Safety behaviour: A reconsideration. *Behaviour research and therapy*, *46*(2), 163-173.

Rapee, R. M., & Lim, L. (1992). Discrepancy between self-and observer ratings of performance in social phobics. *Journal of abnormal psychology*, *101*(4), 728.

Rosenthal, R. (1963). On the social psychology of the psychological experiment: 1, 2 the experimenter's hypothesis as unintended determinant of experimental results. *American Scientist*, *51*(2), 268-283.

Rowa, K., Paulitzki, J. R., Ierullo, M. D., Chiang, B., Antony, M. M., McCabe, R. E., & Moscovitch, D. A. (2015). A false sense of security: Safety behaviors erode objective speech performance in individuals with social anxiety disorder. *Behavior therapy*, *46*(3), 304-314.

Salkovskis, P. M. (1991). The importance of behaviour in the maintenance of anxiety and panic: A cognitive account. *Behavioural and Cognitive Psychotherapy*, *19*(1), 6-19.

Salmoiraghi, A., & Sambhi, R. (2010). Early termination of cognitive-behavioural interventions: literature review. *The Psychiatrist*, *34*(12), 529-532

Schofield, P. E., Butow, P. N., Thompson, J. F., Tattersall, M. H. N., Beeney, L. J., & Dunn, S. M. (2003). Psychological responses of patients receiving a diagnosis of cancer. *Annals of oncology*, *14*(1), 48-56.

Sloan, T., & Telch, M. J. (2002). The effects of safety-seeking behavior and guided threat reappraisal on fear reduction during exposure: An experimental investigation. *Behaviour research and therapy*, *40*(3), 235-251.

Sy, J. T., Dixon, L. J., Lickel, J. J., Nelson, E. A., & Deacon, B. J. (2011). Failure to replicate the deleterious effects of safety behaviors in exposure therapy. *Behaviour research and therapy*, *49*(5), 305-314.

Tee, J., & Kazantzis, N. (2011). Collaborative empiricism in cognitive therapy: A definition and theory for the relationship construct. *Clinical Psychology: Science and Practice*, *18*(1), 47-61.

Tutino, J. S., Ouimet, A. J., & Ferguson, R. J. (2020). Exploring the impact of safety behaviour use on cognitive, psychophysiological, emotional and behavioural responses during a speech task. *Behavioural and Cognitive Psychotherapy*, 1-15.

Uhlenhuth, E. H., Rickels, K., Fisher, S., Park, L. C., Lipman, R. S., & Mock, J. (1966). Drug, doctor's verbal attitude and clinic setting in the symptomatic response to pharmacotherapy. *Psychopharmacologia*, *9*(5), 392-418

van den Hout, M. A., Engelhard, I. M., Toffolo, M. B., & van Uijen, S. L. (2011). Exposure plus

response prevention versus exposure plus safety behaviours in reducing feelings of contamination, fear, danger and disgust. An extended replication of Rachman, Shafran, Radomsky & Zysk (2011). *Journal of Behavior Therapy and Experimental Psychiatry*, *42*(3), 364-370.

Vassilopoulos, S. P. (2009). Interpretations for safety behaviours in high and low socially anxious individuals. *Behavioural and cognitive psychotherapy*, *37*(2), 167-178.

Vorstenbosch, V., & Laposa, J. M. (2015). Treatment expectancy for anxiety change and response to cognitive behavioral therapy for OCD. *Journal of Obsessive-Compulsive and Related Disorders*, *5*, 55-60

Wechsler, D. (2008). Wechsler adult intelligence scale–Fourth Edition (WAIS–IV). *San Antonio, TX: NCS Pearson*, *22*, 498.

Westra, H. A., Aviram, A., Barnes, M., & Angus, L. (2010). Therapy was not what I expected: A preliminary qualitative analysis of concordance between client expectations and experience of cognitive–behavioural therapy. *Psychotherapy Research*, *20*(4), 436-446

Wolpe, J., & Lang, P. J. (1974). A fear survey schedule for use in behavior therapy. *Behavior modification procedure: A sourcebook*, 228-232

CHAPTER 5

GENERAL DISCUSSION

My overarching goal in this program of research was to investigate the cognitive, behavioural, emotional, and psychophysiological mechanisms underlying the effects of safety behaviour use during exposure to a speech task. Research on the effects of safety behaviours began nearly forty years ago (e.g., Hodgson & Rachman, 1972), and for several decades, the narrative was that SBs are detrimental not only to everyday anxiety, but also to exposure success. In 2008, however, Rachman et al. (2008)'s seminal paper called for a reconsideration of SBs by illustrating the equivocal nature of the SB research findings and highlighting the potential benefits of *judicious* SB use in early treatment. Over a decade after the publication of this paper, findings are still ambiguous as to whether judicious safety behaviour use is helpful, harmful, or benign in its contributions to exposure outcomes. I sought to clarify these mixed findings and contribute to the extant literature on safety behaviours (and to the field of CBT more broadly) by exploring the mechanisms underlying SB use during an exposure-like task, and highlighting the possible role of SBs beliefs and expectancies. In other words, rather than asking "are safety behaviours harmful or helpful?", I tried to investigate "*why* and *how* are safety behaviours harmful or helpful?". In this general discussion, I will summarize the findings from both of my research studies, and address how these results contribute to the existing knowledge on exposure therapy from a theoretical standpoint. Moreover, I will discuss how this program of research can be used to inform clinical practice for speech and social anxiety, and provide recommendations for future research in order to continue to advance this literature. In the discussions of Study 1 and Study 2, I outlined the direct implications of my research findings. By comparison, in this general discussion, I would like to extend beyond the specific research findings of my two

studies to the context of the broader literature related to CBT, speech/social anxiety, and safety behaviour use. It is important to note that although I cannot extend the implications of my research beyond what I specifically tested, the goal of discussing these findings within a broader context is to encourage research that *can* address therapeutic efficacy and acceptability using replication and clinical samples.

Summary of Findings

Study 1. In order to assess the impact of safety behaviour use on cognitive, emotional, psychophysiological, and behavioural outcomes prior to and during a speech task, 111 speech anxious individuals were recruited to deliver a speech with or without safety behaviours. Overall, there were no statistically significant differences between the safety behaviour and no safety behaviour conditions on working memory, state anxiety, objective or subjective speech performance, and most measures of speech acceptability. It is most notable that no differences were observed between groups on ability to gather disconfirmatory evidence, as this is proposed to be one of the primary mechanisms of change underlying exposure success (e.g., Craske et al., 2008; Salkovskis, 1991). The lack of statistical difference between conditions on the majority of measures suggests that SB use may be less detrimental to outcomes during an exposure-like task than was originally believed. However, individuals in the NoSB conditioned reported greater willingness to deliver future speeches without SBs compared to the SB group. This implies that once individuals are permitted to use SBs, it may be more difficult to reduce them over time.

Study 2. To assess whether it is SBs themselves, or rather, beliefs about SBs that contribute to exposure outcomes, 144 speech anxious participants were recruited to deliver a speech with SBs, but were told either that SBs are helpful, unhelpful, or were provided with no information on the helpfulness of SBs. Results demonstrated that individuals in the helpful

condition perceived the exposure as being more likely to succeed than individuals in either the unhelpful or control condition. Moreover, individuals in the helpful condition were more willing to deliver a future speech compared to individuals in the control condition. Exposure expectancy (i.e., perceptions of exposure success) mediated the relationship between the helpful condition (but not the unhelpful condition) and willingness to deliver future speeches, as measured at a one-week follow-up. Additionally, individuals in the unhelpful condition reported more self-confidence in their speech performance compared to individuals in the control condition. However, there were no differences between groups on other cognitive, behavioural, or emotional outcomes. This suggests that while the manipulation was successful at altering people's perceptions of the exposure, the experience of engaging in the speech was anxiety-provoking enough that differences were no longer present. Consistent with Study 1, participants across conditions were able to gather disconfirmatory evidence, suggesting that SBs and SB beliefs may not be detrimental to exposure outcomes. However, participants' thoughts about the speech were most negative at a one-week follow up, indicating that important processes (e.g., post-event processing, negative self-focused attention, attentional bias) likely occurred between the speech and the one-week follow-up.

Implications for Theories of Exposure Therapy

Several theories and mechanisms have been proposed to account for the success of exposure therapy. The three primary extant models are emotional processing theory (Foa & Kozak, 1986), inhibitory learning theory (Craske et al., 2008; Craske et al., 2014), and belief disconfirmation (Salkovskis, 1991; Salkovskis, Hackmann, Wells, Gelder, & Clark, 2006).

Emotional Processing Theory. As mentioned previously, emotional processing theory proposes that exposure works through: 1) initial fear activation, 2) within-session habituation,

and 3) between-session habituation. During within-session habituation, there is an initial peak activation of fear, which subsides over the course of a session. This is then complemented by between-session habituation, in which fear diminishes from one exposure to the next. According to this theory, safety behaviours interfere with exposure success by blocking the full initial activation of fear. We found that state anxiety scores were equivalent between the SB and NoSB conditions in our first study, suggesting that this hypothesis may not be accurate. It appears that regardless of SB condition or SB beliefs, participants across both studies and all conditions experienced very elevated state anxiety in anticipation of and during the speech. However, it is important to note that the methodology of my two studies were not designed to test potential habituation effects over time. Studies 1 and 2 were both designed as single-session exposures, and thus, it is impossible to test between-session habituation. Moreover, the exposure activities in both studies were brief, lasting a maximum of ten minutes (but approximately 3 to 4 minutes on average), and thus, within-session habituation is very unlikely to occur in that brief timeframe. In clinical practice, exposure exercises last typically between 30 to 90 minutes (Blakey & Abramowitz, 2016), allowing for the reduction of anxiety over time.

Although influential in its contributions to understanding mechanisms of exposure success, there is not enough evidence to support the habituation approach on its own. Within-session habituation does not predict exposure success (Craske et al., 2008). In fact, Baker et al. (2010) showed that none of the three proposed mechanisms of habituation (i.e., initial fear activation, within-session habituation, and between-session habituation) predicted exposure outcomes for individuals with high agoraphobic concerns. Salkovskis et al. (2006) demonstrated that cognitive approaches (i.e., belief disconfirmation) had superior outcomes in the reduction of agoraphobic concerns compared to habituation-based exposure. Moreover, emotional processing

theory fails to account for spontaneous recovery (fear return after a period of time), renewal (fear return after a change in contexts), or reinstatement (partial fear return after a reintroduction of the stimulus; Blakey & Abramowitz, 2016).

Inhibitory Learning Theory. Given this limited evidence for the key tenets of emotional processing theory, inhibitory learning has largely taken over (though perhaps prematurely) as the currently-accepted theory explaining exposure success (Blakey & Abramowitz, 2016). Craske et al. (2008) propose that rather than through habituation, exposure functions through the reduction of strength in conditioned fear associations, which are replaced by new, less threatening associations. The original conditioned stimulus response (e.g., speech-fear) does not become extinct, as emotional processing theory might suggest, but rather, a new conditioned stimulus response develops (e.g., speech-tolerable), and becomes more readily activated in comparison to the old conditioned pairing. This model proposes that SBs influence exposure success through excitatory (i.e., fear) and inhibitory (i.e., safety) pathways, interfering with the optimal conditions in which new safety-based associations should occur. In the original inhibitory learning article, Craske et al. (2008) state that SBs should be gradually removed to reduce the risk of attrition in therapy, but note that immediate removal is preferred when possible, presumably to maximize expectancy violation.

Here again, I must note that I did not design my studies to specifically measure inhibitory learning processes or fear associations. The inhibitory learning approach is founded on basic learning science principles, and it is noteworthy that there is very little experimental research focused on clarifying these underlying cognitive processes in humans. Indeed, inhibitory learning theory is based largely on extinction learning and Pavlovian conditioning research from animal models (Craske et al., 2008), which suggest that the association between a conditioned

stimulus (CS) and an unconditioned stimulus (US) remain intact during extinction training (i.e., excitatory association). However, a new association is formed between the CS and the absence of the US (i.e., inhibitory association). The simultaneous existence of excitatory and inhibitory associations accounts for the phenomena of recovery, renewal, and reinstatement that emotional processing could not. During spontaneous recovery, the CS-US excitatory response returns after the passage of time (e.g., Rescolar, 2004; see Pavlov, 1927, who first observed this effect in dogs). During renewal, the CS-US excitatory response returns when the CS is presented in a new context (e.g., Bouton & King, 1983 observed this in rats). During reinstatement, the CS-US excitatory response returns when the US is presented alone, due to context-dependent learning (e.g., Rescolar & Heth, 1975; Westbrook, Iordanova, McNally, Richardson, & Harrison, 2002, who observed this in rats). Spontaneous recovery (e.g., Schiller et al. 2008), reinstatement (e.g., LaBar & Phelps, 2005), and renewal (e.g., Huff, Hernandez, Blanding, & LaBar, 2009) have also been observed in humans, but outside of a clinical context. Indeed, very few studies have explored either mechanisms that underlie exposure success or components that can be used to maximize exposure from an inhibitory learning perspective.

In this program of research, I sought to test relevant basic cognitive mechanisms to elucidate what is occurring prior to and during exposure on a cognitive level. Specifically, I tested the influence of SBs and SB beliefs on working memory capacity (a measure of executive functioning) and pre-to-post speech predictions (a proxy for the inhibitory learning principle of expectancy violation). Based on literature from cognitive science (Baddeley, 2000; Baddeley & Hitch, 1974), I proposed that the anxiolytic effects of SBs might result in less taxation on working memory capacity, thereby freeing up the cognitive resources needed to gather disconfirmatory evidence. However, in both studies, there were no differences found between

conditions on working memory capacity or pre-to-post speech predictions. During a single session exposure, SBs may have little to no influence on cognitive or emotional processes. More broadly (given the equivocal nature of the current data), SBs may also be less interfering with exposure processes than inhibitory learning theory posits.

More experimental clinical research is needed to test the cognitive mechanisms that underlie or optimize exposure success. This is particularly notable because clinical recommendations are being made about safety behaviours based on these existing theories. For example, the recently published second edition of *Exposure Therapy for Anxiety: Principles and Practice* by Abramowitz, Deacon, and Whiteside (2019) is based largely on principles of inhibitory learning, and yet, many of the constructs underlying this theory (e.g., strength of CS-US associations, renewal, recovery, reinstatement) have not been tested in isolation in a clinical context. We currently do not have enough evidence to suggest that SBs necessarily interact with any of these learning processes, as they simply have not been tested to date.

Belief Disconfirmation. Salkovskis (1991) also put forth a cognitive theory of exposure mechanisms. According to this theory, anxiety persists due to people's inability to gather disconfirmatory evidence. SBs interfere with this ability to gather disconfirmatory evidence, since people attribute the absence of a feared outcome (e.g., stuttering during a speech) to the presence of safety behaviours (e.g., memorizing or rehearsing sentences beforehand). Given that I directly measured belief change over time, our findings have potential implications for this cognitive theory. In Study 1, I measured belief change and ability to gather disconfirmatory evidence by assessing thoughts about the speech at two time points: immediately prior to the speech and immediately following the speech. In Study 2, I measured thoughts about the speech at the same aforementioned time points, and also measured them at a one-week follow-up.

One of the most meaningful findings of this program of research is that belief change did occur across conditions and across studies. In Study 1, individuals in the SB and NoSB conditions demonstrated more positive thoughts about their performance immediately following the speech than in anticipation of the speech. This was a statistically significant ($p < .001$) with a medium effect size ($\eta_p^2 = .10$). In Study 2, all individuals used SBs; regardless of their (manipulated) beliefs about SBs, participants across conditions similarly demonstrated more positive thoughts about their performance immediately following the speech than in anticipation of the speech. This was statistically significant ($p < .001$), with a large effect size ($\eta_p^2 = .53$), indicating clinical and meaningful differences over time. Taken together, these findings suggest that expectancy violation and/or an ability to gather disconfirmatory evidence occurred from pre-speech to immediately post-speech. Indeed, prior to the speech, participants largely made negative predictions about their performance, which they subsequently evaluated as more positive post-speech. For example, prior to the speech, a participant may have responded "I completely believe the statement" in response to "My speech will be incoherent" in anticipation of their speech, and then changed this to "I do not believe the statement at all" following their speech. Overall, these findings imply that SB use and SB beliefs do not interfere with belief disconfirmation during a single-session exposure.

However, this belief change did not withstand time—participants' thoughts about their performance were *most* negative at the one-week follow-up (Study 2), even more so than their thoughts in anticipation of the speech. It is critical to note that all participants in Study 2 used SBs, and thus, it is possible that SB use accounted for the more negative speech thoughts reported at one-week follow-up. Perhaps SB use actually interfered with cognitive, attentional, and/or memory processes that were not measured in the current study, which consequently

prevented the consolidation of belief disconfirmation over time. Given that we did not include a follow-up in Study 1, it is uncertain whether the same effect would have been observed in the NoSB condition. Future researchers would benefit from measuring speech thoughts over time (including at follow-up) for SB versus NoSB use (or judicious use versus NoSB conditions in a more clinically-oriented study) conditions.

Conversely, findings from Study 2 may instead indicate that SBs did not interfere with belief disconfirmation at all, but rather that alternative mechanisms were activated post-exposure that interfered with belief change between sessions. Future researchers should explore possible factors that contribute to the increase in negative speech beliefs over time; fruitful avenues could include post-event processing (Kocovski, Endler, Rector, & Flett, 2005; Rachman, Grüter-Andrew, & Shafran, 2000), attentional biases (Pineles & Mineka, 2005; Pishyar, Harris, & Menzies, 2004), and memory biases (Cody & Teachman, 2010).

Post-event processing may be particularly important to measure for exposure studies using speech or socially anxious samples. Mellings and Alden (2000) explored three cognitive mechanisms believed to underlie judgment and memory biases in social anxiety: self-focused attention, anticipatory processing, and post-event processing. They found that post-event processing in participants with high social anxiety lead to more negative recall and memory bias about a social interaction. Post-event processing, attentional processes, short-term memory, and long-term memory were not measured in the current program of research, but the inclusion of these cognitive mechanisms could lead to an enhanced understanding SB use and exposure success in individuals with speech and/or social anxiety.

Beliefs and Treatment Expectations. Are principles of emotional processing, inhibitory learning, and belief disconfirmation critical to treatment efficacy? Perhaps what matters most are

explicit and/or implicit beliefs about safety behaviours and how individuals consequently perceive treatment. Research from the medical field on placebo effects suggests that expectancy and beliefs can be as potent as active ingredients (e.g., Benedetti et al., 2005; Colloca & Miller, 2011). Findings from Study 2 suggest at the very least that beliefs impact initial perceptions of exposure success, which may consequently influence some behavioural outcomes, such as willingness to continue to engage in exposures. This finding is consistent with preliminary research from clinical studies that show a positive association between treatment expectancy and treatment outcomes (e.g., Price & Anderson, 2012) Given that Study 2 was the first of its kind to explore the effects of word choice and beliefs on SBs, more research is needed to expand on these findings.

Implications for Clinical Practice

Social Anxiety. The most influential model of social anxiety proposed by Clark and Wells (1995) cites safety behaviours as one of the four factors that contribute to the development and persistence of pathological social anxiety. People with high social anxiety use more SBs, use SBs more frequently, and use SBs across more situations in comparison to their non-anxious counterparts (McManus, Sacadura, & Clark, 2008). Moreover, according to Wells et al. (1995), SB use is one of several factors that interfere with exposure success for individuals with social anxiety. Despite frequent SB use observed in socially anxious samples and the emphasis of SBs in cognitive models of social anxiety, there is significantly less research specific to SB use within the context of social anxiety compared to OCD (e.g., Rachman et al., 2011; Levy & Radomsky, 2016; Abramowitz, 2006) and other anxiety disorders, such as specific phobias (e.g., Milosevic & Radomsky, 2008) and panic disorder (e.g., Salkovskis, Clark, Hackmann, Wells, & Gelder, 1999; Salkovskis, Hackmann, Wells, Gelder, & Clark, 2007).

This program of research explored the impact of SBs and SB beliefs in a high speech anxious sample, with the goal of informing current understanding of SB use in people with social anxiety. Although neither study recruited a clinical sample of people diagnosed with social anxiety disorder, participants from both studies overall fell above the clinical cutoff scores on the Social Phobia Inventory (Connor et al., 2000) and the Subtle Avoidance Frequency Examination (Cuming et al., 2009). Participants across studies and across conditions reported using multiple SBs at baseline and during their speech, some of which were overt (e.g., hiding behind a podium) and some covert (e.g. rehearsing sentences in mind). Researchers should continue to test experimentally the specific role and functions that SBs play in maintaining social anxiety. For example, there are divergent findings on how people with social anxiety perceive SBs. Research from Vassilopoulos (2009) suggests that people with social anxiety are aware that SBs might be counterproductive and make them appear more anxious. However, people continue to use them, likely because the feared outcomes associated with *not* using SBs exceed the feared outcomes associated *with* using SBs. Conversely, McManus, Sacadura, and Clark (2008) showed that people with both high and low social anxiety perceived SBs as being helpful during social interactions.

In line with the goals of my second study, further exploration into people's perceptions of the helpfulness of SBs is warranted. Moreover, some research has been conducted on the influence of SBs on performance during speeches (e.g., Rowa et al., 2015) and conversation tasks (Taylor & Alden, 2010) among individuals with social anxiety. Findings from these studies suggest that SBs might result in more negative subjective and objective evaluations of performance. Similarly, in Study 2, I found that participants in the unhelpful condition rated their subjective performance more positively than did participants in the control condition. In clinical

practice, the role of SBs in the maintenance of symptoms should therefore be taken into consideration during case conceptualization. A client with social anxiety who rehearses sentences in their mind before a date, avoids eye contact, and wears clothing and makeup to mask physiological signs of anxiety (e.g., blushing, sweating) will be more likely to experience negative social encounters and evaluations. As such, clinicians would benefit from assessing safety behaviour use in clients presenting with social anxiety concerns using instruments such as the Subtle Avoidance Frequency Examination (Cuming et al., 2009) or the Social Phobia Safety Behaviours Scale (Pinto-Gouveia, Cunha, & do Ceu Salvador, 2003).

CBT Broadly. Cognitive behavioural therapy is currently the most widely used psychosocial treatment for social and speech anxiety (e.g., Otte, 2011). It is clear that CBT and exposure and response prevention work well for social and speech anxiety (e.g., Anderson et al., 2013; Anderson, Zimand, Hodges, & Rothbaum, 2005; Finn, Sawyer, & Schrodt, 2009; Pull, 2005), yet questions remain about which elements of these therapies are necessary and/or sufficient to produce clinically meaningful change. There exists only a small number of clinical research studies exploring the mechanisms underlying the active components of CBT. For example, cognitive preparation has been shown to enhance the impact of video feedback interventions for social anxiety (Harvey, Clark, Ehlers, & Rapee, 2000; Kim, Lundh, & Harvey, 2002). Moreover, experimental research in the field of OCD suggests that manipulating beliefs about memory directly influences symptomatology (Alcolado & Radomsky, 2011), such that participants led to believe they have poorer memories are more likely to engage in checking behaviours. Studies such as these, which explore the underlying mechanisms of CBT, can provide meaningful information on ways to enhance treatment. Thus, I raise several questions: when engaging in cognitive restructuring, behavioural experiments, Socratic questioning, or

exposure, do we really understand what is occurring at a mechanistic level? How are cognitive, emotional, psychophysiological, and behavioural processes activated during these phases of treatment? What interpersonal and intrapersonal processes might contribute to or interfere with therapeutic change? In this program of research, I aimed to explore some of these questions, with the goal of understanding how we can improve the effectiveness and acceptability of cognitive behavioural therapies.

Findings from Study 1 and Study 2 suggest that SB use may not be detrimental to exposure outcomes. In fact, SB use had very little impact on any of the multiple outcomes that were measured in Study 1. Safety behaviours did not reduce state anxiety prior to or during the speech, did not reduce psychophysiological arousal, did not cause participants to engage in the exposure activity for longer, and did not result in greater tolerability or less distress during the speech. Of course, the lack of statistically significant differences between conditions across both studies may be due to the non-clinical nature of the studies. However, our findings are consistent with those of other studies that have similarly found no differences between SB and NoSB groups among both clinical (e.g., Rachman, Craske, Tallman, & Solyon, 1986; Milosevic & Radomsky, 2013) and undergraduate and/or community samples (e.g., De Silva & Rachman, 1984; Hood et al., 2010). Taken together, these findings suggest that there is perhaps more focus and contention surrounding the SB debate than is warranted, as SB use may be less impactful on exposure outcomes than is believed.

It is noteworthy that the current debate surrounding SBs during exposure are often framed as “SBs versus no SBs”, yet this dichotomy does not necessarily translate to clinical practice. The very premise of graded exposure and exposure hierarchies are to build a gradual sense of mastery when it comes to facing fears (Katerelos, Hawley, Antony, & McCabe, 2008;

Heimberg, 2002). Researchers have shown that safety behaviour use enhances clients' sense of self-efficacy in confronting fears (Bandura et al., 1974; Rachman et al., 2008). Judicious SB is analogous to a graded exposure hierarchy, whereas restricting all SBs would more closely resemble flooding, which is no longer common practice amongst CBT clinicians. With this in mind, researchers may need to shift their focus from judicious use versus no use of SBs to *how* judicious use can be incorporated into treatment plans to optimize outcomes. Indeed, an imperative question is *when* is the judicious use of SBs (in)appropriate? What information should clinicians use to determine this? Clinicians may benefit from taking several factors into account when making decisions about using and phasing out SBs over the course of treatment. Findings from this program of research suggest that this can be done in several ways: 1) using thoughtful language and word choice to shape beliefs and expectancies about SBs and treatment generally, 2) developing a comprehensive case conceptualization to understand the specific role that SBs serve for an individual client, and 3) providing nuanced psychoeducation on the role of SBs in the development and maintenance of anxiety.

In this program of research, I also sought to explore whether SB use and SB beliefs influence perceptions of exposure acceptability, as treatment acceptability can mitigate the likelihood of the early attrition rates observed in exposure and CBT (Whittal, Thordarson, & McLean, 2005). Research from Levy and Radomsky (2014), Levy, Senn, and Radomsky (2014), and Milosevic and Radomsky (2013) has illustrated that participants evaluate exposure with judicious SB as significantly more acceptable than exposure without SBs. Some, but not all, of our results support these previous findings. Across both studies, individuals rated the exposure exercises as being equally tolerable and distressing, regardless of SB use or SB beliefs. This is consistent with research by Deacon et al. (2010; 2012; 2013) that found no difference between

SB and NoSB conditions on measures of exposure acceptability or tolerability. However, in Study 1, individuals in the SB condition were less willing to engage in another exposure exercise without SBs compared to the NoSB group. This finding suggests that these participants viewed the exposure with SBs as more acceptable once they had the experience of using SBs.

Considering that anxious individuals who are seeking therapy likely will have had many experiences using SBs in everyday life, the SB condition more closely approximates the experiences of individuals in a clinical context. Moreover, in Study 2, individuals in the helpful condition were more willing to engage in future exposure exercises compared to the control condition, and exposure expectancy mediated the relationship between the helpful condition and willingness to engage in future exposures, but did not mediate this relationship for the unhelpful condition. This finding implies that when SBs are presented as helpful, clients may interpret them as more acceptable. However, again, I found no differences between conditions on exposure distress or tolerability. Thus, when SBs are presented as helpful, people may initially perceive exposure as being more acceptable. However, this effect may dissolve after participants or clients undergo the experience of engaging in an exposure exercise. Given that two of three of the aforementioned studies used vignettes (Levy, Senn, & Radomsky, 2014; Milosevic & Radomsky, 2013) prior to asking for ratings of exposure acceptability, there is not currently enough in-person experimental research to understand whether exposure therapy with judicious SB use is perceived as more acceptable than standard exposure even after having engaged in the exposure exercises.

In focusing on factors that contribute to therapeutic change, it may be important to look more globally at common factors (Grencavage & Norcross, 1990). There has been a growing movement in the broader therapeutic literature to focus less on modality-specific mechanisms

and more on common therapeutic factors. Client expectations of treatment are one such factor that has been highlighted in the psychotherapy literature (e.g., Dew & Bickman, 2005; Greenberg, Constantino, & Bruce, 2006). Finiss and Benedetti (2004) discuss the powerful impact of clinician word choice on client expectations of treatment and subsequent outcomes. The magnitude of this impact is influenced by the clinician, the client, as well as the clinician-client relationship. In therapy, when a strong therapeutic alliance is present, clinician word choice can be used as a meaningful tool to help clients feel hopeful and engaged in therapy.

Moreover, clinician word choice can be used as a therapeutic tool to modify behaviour toward a desired outcome. Calero-Elvira, Froján-Parga, Ruiz-Sancho, and Alpañéz-Freitag (2013) explored the influence of clinician word choice in Socratic questioning on client behaviour. They hypothesized that clinician approval or disapproval would function as reward and punishment, respectively, for the client, and thus, would shape their behaviour. Results supported their hypotheses, such that approval resulted in an increase in adaptive client behaviours whereas disapproval resulted in decreased client behaviours. In Study 2, I aimed to explore the potential influence of SB beliefs on exposure outcomes, questioning whether it is SB use in and of itself or SB beliefs that matter most. Although SB beliefs influenced only some outcomes (e.g., initial perceptions of exposure success, willingness to engage in future exposure exercises), it is noteworthy that these differences were found outside of a therapeutic context. Based on these findings, it could be that framing SBs as helpful in the initial phases of therapy leads clients to perceive therapy as more likely to succeed, helps clients to feel more invested in the therapy, and consequently, reduces the risk of attrition. This is a delicate balance, however, as clients should not be falsely informed that SBs are helpful in decreasing anxiety. However, providing a more nuanced perspective of SBs may be helpful in keeping clients motivated and

engaged in therapy long enough to feel confident in dropping SBs over time.

Limitations and Future Directions

There are several limitations of the current program of research that should be taken into account when discussing and interpreting the overall findings. An overarching goal was for these findings to be used to inform clinical research in an exposure therapy context. Across both studies, participants were speech anxious undergraduate participants whose scores largely fell above clinical cut offs for social anxiety (Connor et al., 2000); nonetheless, our findings may not generalize to a clinical sample (i.e., people with diagnosed social anxiety disorder). Moreover, I employed a single session design for Study 1 and a single session design for Study 2 with a one-week follow-up questionnaire. Consequently, I did not measure or test judicious use (i.e., gradual reduction over time) of SBs. Moreover, both studies included only a brief exposure exercise (i.e., under 10 minutes), which is consistent with the vast majority of research investigating the effects of SBs on outcomes (e.g., Powers et al., 2004; Levy & Radomsky, 2014), but brief in comparison to exposure exercises in therapy. As such, results from these studies may not translate to a clinical context in which individuals with diagnosed anxiety disorders engage in 12 to 16 weeks of repeated exposure therapy where SBs are diminished over time.

A challenge when designing any study related to SBs is balancing internal versus external validity. To manage this methodological challenge, I prioritized internal validity in Study 1 by offering participants only five SBs from which to choose, whereas in Study 2, I asked participants to use as many SBs as they wanted, whether overt or covert. Thus, the ecological validity of Study 1 may have been compromised by prioritizing internal validity, given the idiosyncratic nature of SBs, and the internal validity of Study 2 may have been compromised, given the large degree of variability in safety behaviours potentially used by the participants.

Some participants in Study 1 may have chosen SBs that they do not often use in everyday life. However, research by Levy & Radomsky (2016) indicates that the lack of idiosyncratic SBs may not necessarily have diluted our results. They investigated the impact of SB potency on exposure outcomes for individuals with obsessive compulsive disorder. Participants were offered often-used SBs, novel/never-used SBs, or no SBs. Participants in all conditions reported reduced contamination fears following the exposure. Those in the never-used SB condition reported the lowest contamination fears post-exposure and also reported greater acceptability of the exposure compared to both other conditions. This suggests that participants in Study 1 may not necessarily have been disadvantaged in using SBs that were not idiosyncratic, as their novel nature may have actually enhanced their potency.

This program of research also has many strengths and contributes to the existing literature in several ways. In light of the divergent findings on SB during exposure, there has been a call for research that takes a multimethod approach (Blakey & Abramowitz, 2016). This multimethod approach, including self-report measures, various behavioural outcomes (e.g., speech duration, willingness to sign up for an additional exposure, video coded performance), cognitive outcomes (e.g., use of the *o*-span, the digit span, and measures of belief change), and psychophysiological measures (e.g., electrodermal activity in Study 1) is a unique contribution of this program of research. Moreover, to my knowledge, this is the first study to experimentally manipulate word choice and beliefs as a proxy of how clinician beliefs about SBs may influence client perceptions of treatment.

Despite these contributions, there are several questions that remain to be answered in the safety behaviour literature. It remains unclear whether SB use in and of itself or mere availability of SBs is most impactful. Researchers have shown that safety behaviour availability is more

detrimental to fear reduction than is safety behaviour use (Powers, Smits, & Telch, 2004), but more research is needed on this topic to elucidate findings. Moreover, Goetz and Lee (2016) propose that one explanation for the mixed findings on SBs is that their function is poorly understood. The researchers offer two primary categories of SBs: those that are preventative and those that are restorative. They defined preventative SBs as those that diminish or reduce anxiety in anticipation of a feared stimulus (e.g., avoiding eye contact for fear of perceiving judgment in the facial expressions of others). Conversely, restorative SBs are those that restore a sense of safety following engagement with a feared stimulus (e.g., using hand sanitizer after touching a contaminant to return a feeling of safety and cleanliness). Preliminary research suggests that preventative SBs may be more detrimental than restorative SBs, as they are more likely to interfere with disconfirmatory learning (Goetz & Lee, 2015; Goetz & Lee, 2016). The distinction between preventative and restorative SBs may be less useful in the context of social and speech anxiety, however. The vast majority of SBs for social anxiety are preventative (e.g., avoiding eye contact, hiding body parts or symptoms of anxiety, rehearsing sentences). Therefore, SBs might be particularly detrimental for people with social anxiety. However, Plasencia, Alden, and Taylor (2011) a different classification system for the function of SBs in social anxiety: avoidance (e.g., avoiding eye contact) and impression management (e.g., wearing clothes that might hide sweating). These functional subtypes may differentially impact various outcomes for social anxiety and social anxiety-focused exposures. Continued research into the function of SBs, the availability of SBs, and beliefs surrounding SBs may be critical in improving exposure efficacy for individuals with social anxiety.

References

Abramowitz, J. S., Deacon, B. J., & Whiteside, S. P. (2019). *Exposure therapy for anxiety: Principles and practice*. Guilford Publications

Abramowitz, J. S., Franklin, M. E., Zoellner, L. A., & Dibernardo, C. L. (2002). Treatment compliance and outcome in obsessive-compulsive disorder. *Behavior Modification*, *26*(4), 447-463.

Abramowitz, J. S., & Moore, E. (2007). An experimental analysis of hypochondriasis. *Behaviour Research and Therapy*, *45*(3), 413-424.

Alcolado, G. M., & Radomsky, A. S. (2011). Believe in yourself: Manipulating beliefs about memory causes checking. *Behaviour research and therapy*, *49*(1), 42-49.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Anderson, P. L., Price, M., Edwards, S. M., Obasaju, M. A., Schmertz, S. K., Zimand, E., & Calamaras, M. R. (2013). Virtual reality exposure therapy for social anxiety disorder: A randomized controlled trial. *Journal of consulting and clinical psychology*, *81*(5), 751.

Anderson, P. L., Zimand, E., Hodges, L. F., & Rothbaum, B. O. (2005). Cognitive behavioral therapy for public-speaking anxiety using virtual reality for exposure. *Depression and anxiety*, *22*(3), 156-158.

Antony, M. M., Coons, M. J., McCabe, R. E., Ashbaugh, A., & Swinson, R. P. (2006). Psychometric properties of the social phobia inventory: Further evaluation. *Behaviour Research and Therapy*, *44*, 1177-1185.

Baddeley, A. (2000). The episodic buffer: a new component of working memory?. *Trends in Cognitive Sciences*, *4*, 417-423.

Baddeley, A. D., & Hitch, G. (1974). Working memory. *Psychology of Learning and Motivation*, *8*, 47-89

Baker, A., Mystkowski, J., Culver, N., Yi, R., Mortazavi, A., & Craske, M. G. (2010). Does habituation matter? Emotional processing theory and exposure therapy for acrophobia. *Behaviour Research and Therapy*, *48*(11), 1139-1143

Bandura, A., & Adams, N.E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research, 1*, 287-310.

Bandura, A., Jeffery, R. W., & Wright, C. L. (1974). Efficacy of participant modeling as a function of response induction aids. *Journal of Abnormal Psychology, 83*, 56-64.

Beidel, D. C., Turner, S. M., & Dancu, C. V. (1985). Physiological, cognitive and behavioral aspects of social anxiety. *Behaviour research and therapy*, *23*, 109-117.

Benedetti, F. (2008). Mechanisms of placebo and placebo-related effects across diseases and treatments. *Annu. Rev. Pharmacol. Toxicol.*, *48*, 33-60.

Benedetti, F., Mayberg, H. S., Wager, T. D., Stohler, C. S., & Zubieta, J. K. (2005). Neurobiological mechanisms of the placebo effect. *Journal of Neuroscience*, *25*(45), 10390-10402.

Blakey, S. M., & Abramowitz, J. S. (2016). The effects of safety behaviors during exposure therapy for anxiety: Critical analysis from an inhibitory learning perspective. *Clinical Psychology Review*, *49*, 1-15.

Blakey, S. M., & Abramowitz, J. S. (2019). Dropping safety aids and maximizing retrieval cues: Two keys to optimizing inhibitory learning during exposure therapy. *Cognitive and Behavioral Practice*, *26*(1), 166-175.

Bouton, M. E., & King, D. A. (1983). Contextual control of the extinction of conditioned fear: tests for the associative value of the context. *Journal of Experimental Psychology: Animal Behavior Processes*, *9*(3), 248.

Broadway, J. M., & Engle, R. W. (2010). Validating running memory span: Measurement of working memory capacity and links with fluid intelligence. *Behavior Research Methods*, *42*, 563-570.

Cacioppo, J. T., Tassinary, L. G., & Berntson, G. (Eds.). (2007). *Handbook of psychophysiology*. Cambridge, UK: Cambridge University Press.

Calero-Elvira, A., Froján-Parga, M. X., Ruiz-Sancho, E. M., & Alpañés-Freitag, M. (2013). Descriptive study of the Socratic method: Evidence for verbal shaping. *Behavior therapy*, *44*(4), 625-638.

Carrillo, E., Moya-Albiol, L., González-Bono, E., Salvador, A., Ricarte, J., & Gómez-Amor, J. (2001). Gender differences in cardiovascular and electrodermal responses to public speaking task: the role of anxiety and mood states. *International Journal of Psychophysiology*, *42*, 253-264.

Chambless, D. L., & Ollendick, T. H. (2001). Empirically supported psychological interventions: Controversies and evidence. *Annual Review of Psychology*, *52*, 685-716.

Cho, Y., Smits, J. A., & Telch, M. J. (2004). The Speech Anxiety Thoughts Inventory: Scale development and preliminary psychometric data. *Behaviour Research and Therapy*, *42*, 13-25.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. *Social phobia: Diagnosis, assessment, and treatment*, *41*, 69-89.

Cody, M. W., & Teachman, B. A. (2010). Post-event processing and memory bias for performance feedback in social anxiety. *Journal of anxiety disorders*, *24*(5), 468-479.

Collins, K. A., Westra, H. A., Dozois, D. J., & Burns, D. D. (2004). Gaps in accessing treatment for anxiety and depression: challenges for the delivery of care. *Clinical psychology review*, *24*(5), 583-616.

Colloca, L., & Miller, F. G. (2011). The nocebo effect and its relevance for clinical practice. *Psychosomatic medicine*, *73*(7), 598.

Connor, K. M., Davidson, J. R., Churchill, L. E., Sherwood, A., Weisler, R. H., & Foa, E. (2000). Psychometric properties of the Social Phobia Inventory (SPIN). *The British Journal of Psychiatry*, *176*, 379-386.

Craske, M. G., Kircanski, K., Zelikowsky, M., Mystkowski, J., Chowdhury, N., & Baker, A. (2008). Optimizing inhibitory learning during exposure therapy. *Behaviour research and therapy*, *46*(1), 5-27

Cumming, S., Rapee, R. M., Kemp, N., Abbott, M. J., Peters, L., & Gaston, J. E. (2009). A self-report measure of subtle avoidance and safety behaviors relevant to social anxiety: Development and psychometric properties. *Journal of Anxiety Disorders*, *23*, 879-883.

Daneman, M., & Carpenter, P. A. (1980). Individual differences in working memory and reading. *Journal of verbal learning and verbal behavior*, *19*, 450-466.

Davidson, R. J. (2003). Affective neuroscience and psychophysiology: Toward a synthesis. *Psychophysiology, 40,* 655-665.

Dawson, M. E., Schell, A. M., & Filion, D. L. (2007). The electrodermal system. In J. T. Cacioppo, G. Berntson, & L. G. Tassinary (3rd ed.) *Handbook of Psychophysiology* (pp. 123-159). Cambridge, UK: Cambridge University Press.

De Silva, P., & Rachman, S. (1984). Does escape behaviour strengthen agoraphobic avoidance? A preliminary study. *Behaviour Research and Therapy*, *22*(1), 87-91.

Deacon, B. J., & Abramowitz, J. S. (2004). Cognitive and behavioral treatments for anxiety disorders: A review of meta-analytic findings. *Journal of Clinical Psychology*, *60*, 429-441.

Deacon, B. J., Kemp, J., Dixon, L. J., Sy, J. T., Farrell, N. R., & Zhang, A. (2013). Maximizing the efficacy of IE by optimizing inhibitory learning: A randomized controlled trial. Behaviour Research and Therapy, 51, 588–596.

Deacon, B. J., Lickel, J. J., Possis, E. A., Abramowitz, J. S., Mahaffey, B., & Wolitzky-Taylor, K. (2012). Do cognitive reappraisal and diaphragmatic breathing augment IE for anxiety sensitivity? Journal of Cognitive Psychotherapy, 26, 257–269.

Deacon, B., & Maack, D. J. (2008). The effects of safety behaviors on the fear of contamination: An experimental investigation. *Behaviour Research and Therapy*, *46*, 537-547.

Deacon, B. J., Sy, J. T., Lickel, J. J., & Nelson, E. A. (2010). Does the judicious use of safety behaviors improve the efficacy and acceptability of exposure therapy for claustrophobic fear? *Journal of Behavior Therapy and Experimental Psychiatry*, *41*, 71-80.

Dew, S. E., & Bickman, L. (2005). Client expectancies about therapy. *Mental Health Services Research*, *7*(1), 21-33.

Dodge, C. S., Hope, D. A., Heimberg, R. G., & Becker, R. E. (1988). Evaluation of the Social Interaction Self-Statement Test with a social phobic population. *Cognitive Therapy and Research*, *12*, 211-222.

Eddy, K. T., Dutra, L., Bradley, R., & Westen, D. (2004). A multidimensional meta-analysis of psychotherapy and pharmacotherapy for obsessive-compulsive disorder. *Clinical Psychology Review, 24,* 1011–1030

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: attentional control theory. *Emotion*, *7*, 336-346.

Farrell, N. R., Bowie, O. R., Cimperman, M. M., Smith, B. E., Riemann, B. C., & Levinson, C. A. (2019). Exploring the preliminary effectiveness and acceptability of food-based exposure therapy for eating disorders: A case series of adult inpatients. *Journal of Experimental Psychopathology*, *10*(1), 2043808718824886.

Falsetti, S. A., & Resnick, H. S. (1997). Frequency and severity of panic attack symptoms in a treatment seeking sample of trauma victims. *Journal of Traumatic Stress*, *10*, 683-689.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior research methods*, *41*, 1149-1160.

Fedoroff, I. C., & Taylor, S. (2001). Psychological and pharmacological treatments of social phobia: a meta-analysis. *Journal of clinical psychopharmacology*, *21*(3), 311-324.

Finn, A. N., Sawyer, C. R., & Schrodt, P. (2009). Examining the effect of exposure therapy on public speaking state anxiety. *Communication Education*, *58*(1), 92-109

Finniss, D. G., & Benedetti, F. (2005). Mechanisms of the placebo response and their impact on clinical trials and clinical practice. *Pain*, *114*, 3-6.

Foa, E. B., Hembree, E., & Rothbaum, B. O. (2007). Prolonged exposure therapy for PTSD: Emotional processing of traumatic experiences therapist guide (Treatments that work) Oxford University Press. *New York*.

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological bulletin*, *99*, 20.

Foa, E. B., & McLean, C. P. (2016). The efficacy of exposure therapy for anxiety-related disorders and its underlying mechanisms: The case of OCD and PTSD. *Annual review of clinical psychology*, *12*, 1-28.

Goetz, A. R., & Lee, H. J. (2015). The effects of preventive and restorative safety behaviors on a single-session of exposure therapy for contamination fear. *Journal of behavior therapy and experimental psychiatry*, *46*, 151-157.

Goetz, A. R., Davine, T. P., Siwiec, S. G., & Lee, H. J. (2016). The functional value of preventive and restorative safety behaviors: A systematic review of the literature. *Clinical psychology review*, *44*, 112-124.

Greenberg, R. P., Constantino, M. J., & Bruce, N. (2006). Are patient expectations still relevant for psychotherapy process and outcome?. *Clinical psychology review*, *26*(6), 657-678.

Grencavage, L. M., & Norcross, J. C. (1990). Where are the commonalities among the therapeutic common factors?. *Professional Psychology: Research and Practice*, *21*(5), 372

Hodgson, R. J., & Rachman, S. (1972). The effects of contamination and washing in obsessional patients. *Behaviour Research and Therapy*, *10*(2), 111-117.

Hofmann, S. G., & Suvak, M. (2006). Treatment attrition during group therapy for social phobia. *Journal of Anxiety Disorders*, *20*, 961-972.

Hood, H. K., Antony, M. M., Koerner, N., & Monson, C. M. (2010). Effects of safety behaviors on fear reduction during exposure. *Behaviour Research and Therapy*, *48*, 1161-1169.

Hook, J. N., Smith, C. A., & Valentiner, D. P. (2008). A short-form of the Personal Report of Confidence as a Speaker. *Personality and Individual Differences*, *44*, 1306-1313.

Huff, N. C., Hernandez, J. A., Blanding, N. Q., & LaBar, K. S. (2009). Delayed extinction attenuates conditioned fear renewal and spontaneous recovery in humans. *Behavioral neuroscience*, *123*(4), 834.

Judah, M. R., Grant, D. M., Lechner, W. V., & Mills, A. C. (2013). Working memory load moderates late attentional bias in social anxiety. *Cognition and Emotion*, *27*, 502-511.

Kane, M. J., Hambrick, D. Z., Tuholski, S. W., Wilhelm, O., Payne, T. W., & Engle, R. W. (2004). The generality of working memory capacity: A latent-variable approach to verbal and visuo-spatial memory span and reasoning. *Journal of Experimental Psychology: General, 133,* 189-217.

Katerelos, M., Hawley, L. L., Antony, M. M., & McCabe, R. E. (2008). The exposure hierarchy as a measure of progress and efficacy in the treatment of social anxiety disorder. *Behavior Modification*, *32*(4), 504-518.

Kelly, M. M., Tyrka, A. R., Anderson, G. M., Price, L. H., & Carpenter, L. L. (2008). Sex differences in emotional and physiological responses to the Trier Social Stress Test. *Journal of behavior therapy and experimental psychiatry*, *39*(1), 87-98.

Kim, H. Y., Lundh, L. G., & Harvey, A. (2002). The enhancement of video feedback by cognitive preparation in the treatment of social anxiety. A single-session experiment. *Journal of Behavior Therapy and Experimental Psychiatry*, *33*(1), 19-37.

Kirschbaum, C., Pirke, K. M., & Hellhammer, D. H. (1993). The 'Trier Social Stress Test'–a tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, *28*(1-2), 76-81.

Kocovski, N. L., Endler, N. S., Rector, N. A., & Flett, G. L. (2005). Ruminative coping and post-event processing in social anxiety. *Behaviour Research and Therapy*, *43*(8), 971-984.

Kocovski, N. L., MacKenzie, M. B., Albiani, J. J., Battista, S. R., Noel, S., Fleming, J. E., & Antony, M. M. (2016). Safety behaviors and social anxiety: An examination of the Social Phobia Safety Behaviours Scale. *Journal of Psychopathology and Behavioral Assessment*, *38*, 87-100.

LaBar, K. S., & Phelps, E. A. (2005). Reinstatement of conditioned fear in humans is context dependent and impaired in amnesia. *Behavioral neuroscience*, *119*(3), 677.

Larson, M. R., Ader, R., & Moynihan, J. A. (2001). Heart rate, neuroendocrine, and immunological reactivity in response to an acute laboratory stressor. *Psychosomatic Medicine*, *63*, 493-501.

Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin*, *9*, 371-375.

Levy, H. C., & Radomsky, A. S. (2014). Safety behaviour enhances the acceptability of exposure. *Cognitive Behaviour Therapy*, *43*, 83-92.

Levy, H. C., Senn, J. M., & Radomsky, A. S. (2014). Further support for the acceptability-enhancing roles of safety behavior and a cognitive rationale in cognitive behavioral therapy for anxiety disorders. *Journal of Cognitive Psychotherapy*, *28*, 303-316

Lienard, A., Merckaert, I., Libert, Y., Delvaux, N., Marchal, S., Boniver, J., ... & Slachmuylder, J. L. (2006). Factors that influence cancer patients' anxiety following a medical consultation: Impact of a communication skills training programme for physicians. *Annals of Oncology*, *17*, 1450-1458.

Luborsky, L. (1994). Therapeutic alliances as predictors of psychotherapy outcomes: Factors explaining the predictive success. *The Working Alliance: Theory, Research, and Practice*, 38-50.

Mancebo, M. C., Eisen, J. L., Sibrava, N. J., Dyck, I. R., & Rasmussen, S. A. (2011). Patient utilization of cognitive-behavioral therapy for OCD. *Behavior Therapy*, *42*, 399-412.

Marinho, A. C. F., de Medeiros, A. M., Gama, A. C. C., & Teixeira, L. C. (2017). Fear of public speaking: Perception of college students and correlates. *Journal of Voice*, *31*(1), 127-e7.

McManus, F., Sacadura, C., & Clark, D. M. (2008). Why social anxiety persists: An experimental investigation of the role of safety behaviours as a maintaining factor. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*, 147-161.

Mellings, T. M., & Alden, L. E. (2000). Cognitive processes in social anxiety: The effects of self-focus, rumination and anticipatory processing. *Behaviour research and therapy*, *38*(3), 243-257

Meulders, A., Van Daele, T., Volders, S., & Vlaeyen, J. W. (2016). The use of safety-seeking behavior in exposure-based treatments for fear and anxiety: Benefit or burden? A meta-analytic review. *Clinical Psychology Review*, *45*, 144-156.

Milosevic, I., & Radomsky, A. S. (2008). Safety behaviour does not necessarily interfere with exposure therapy. *Behaviour Research and Therapy*, *46*, 1111-1118.

Milosevic, I., & Radomsky, A. S. (2013). Incorporating the judicious use of safety behavior into exposure-based treatments for anxiety disorders: A study of treatment acceptability. *Journal of Cognitive Psychotherapy*, *27*(2), 155-174.

Milosevic, I., & Radomsky, A. S. (2013). Keep your eye on the target: Safety behavior reduces targeted threat beliefs following a behavioral experiment. *Cognitive Therapy and*

Research, *37*, 557-571.

Morgan, H., & Raffle, C. (1999). Does reducing safety behaviours improve treatment response in patients with social phobia?. *Australian and New Zealand Journal of Psychiatry*, *33*(4), 503-510.

Mowrer, O. H. (1939). Stimulus response theory of anxiety. *Psychological Review, 46,* 553–565.

Nation, K., Adams, J. W., Bowyer-Crane, C. A., & Snowling, M. J. (1999). Working memory deficits in poor comprehenders reflect underlying language impairments. *Journal of experimental child psychology*, *73*(2), 139-158.

Olatunji, B. O., Etzel, E. N., Tomarken, A. J., Ciesielski, B. G., & Deacon, B. (2011). The effects of safety behaviors on health anxiety: An experimental investigation. *Behaviour research and therapy*, *49*, 719-728.

Oswald, F. L., McAbee, S. T., Redick, T. S., & Hambrick, D. Z. (2015). The development of a short domain-general measure of working memory capacity. *Behavior Research Methods*, *47*, 1343-1355.

Otte, C. (2011). Cognitive behavioral therapy in anxiety disorders: current state of the evidence. *Dialogues in clinical neuroscience*, *13*(4), 413.

Pantilat, S. Z. (2009). Communicating with seriously ill patients: better words to say. *Jama*, *301*, 1279-1281.

Pavlov, I. P. (1927). Conditional reflexes: an investigation of the physiological activity of the cerebral cortex

Pineles, S. L., & Mineka, S. (2005). Attentional biases to internal and external sources of potential threat in social anxiety. *Journal of abnormal psychology*, *114*(2), 314

Pinto, R. C. (2001). Post hoc, ergo propter hoc. In *Argument, Inference and Dialectic* (pp. 56-

63). Springer Netherlands.

Pinto-Gouveia, J., Cunha, M. I., & do Céu Salvador, M. (2003). Assessment of social phobia by self-report questionnaires: the social interaction and performance anxiety and avoidance scale and the social phobia safety behaviours scale. *Behavioural and Cognitive Psychotherapy*, *31*(3), 291-311.

Pishyar, R., Harris, L. M., & Menzies, R. G. (2004). Attentional bias for words and faces in social anxiety. *Anxiety, Stress & Coping*, *17*(1), 23-36

Plasencia, M. L., Alden, L. E., & Taylor, C. T. (2011). Differential effects of safety behaviour subtypes in social anxiety disorder. *Behaviour Research and Therapy*, *49*(10), 665-675.

Price, M., & Anderson, P. L. (2011). Latent growth curve analysis of fear during a speech task before and after treatment for social phobia. *Behaviour Research and Therapy, 49*, 763-770.

Price, M., & Anderson, P. L. (2012). Outcome expectancy as a predictor of treatment response in cognitive behavioral therapy for public speaking fears within social anxiety disorder. *Psychotherapy*, *49*, 173.Rachman, S. (1980). Emotional processing. *Behaviour Research and Therapy, 18*, 51– 60.

Powers, M. B., Smits, J. A., & Telch, M. J. (2004). Disentangling the effects of safety-behavior utilization and safety-behavior availability during exposure-based treatment: a placebo-controlled trial. *Journal of Consulting and Clinical Psychology*, *72*(3), 448.

Pull, C. B. (2005). Current status of virtual reality exposure therapy in anxiety disorders: editorial review. *Current Opinion in Psychiatry*, *18*(1), 7-14.

Rachman, S., Grüter-Andrew, J., & Shafran, R. (2000). Post-event processing in social anxiety. *Behaviour Research and Therapy*, *38*(6), 611-617.

Rachman, S., Craske, M., Tallman, K., & Solyom, C. (1986). Does escape behavior strengthen agoraphobic avoidance? A replication. *Behavior Therapy*, *17*, 366-384.

Rachman, S., Radomsky, A. S., & Shafran, R. (2008). Safety behaviour: A reconsideration. *Behaviour Research and Therapy, 46,* 163-173.

Rachman, S., Shafran, R., Radomsky, A. S., & Zysk, E. (2011). Reducing contamination by exposure plus safety behaviour. *Journal of Behavior Therapy and Experimental Psychiatry*, *42*, 397-404.

Rapee, R. M., Craske, M. G., Brown, T. A., & Barlow, D. H. (1996). Measurement of perceived control over anxiety-related events. *Behavior Therapy*, *27*, 279-293.

Rapee, R. M., & Lim, L. (1992). Discrepancy between self-and observer ratings of performance in social phobics. *Journal of Abnormal Psychology*, *101*, 728-738.

Redick, T. S., Broadway, J. M., Meier, M. E., Kuriakose, P. S., Unsworth, N., Kane, M. J., & Engle, R. W. (2012). Measuring working memory capacity with automated complex span tasks. *European Journal of Psychological Assessment*, *28*, 164-171.

Rescorla, R. A. (2004). Spontaneous recovery. *Learning & Memory*, *11*(5), 501-509

Rescorla, R. A., & Heth, C. D. (1975). Reinstatement of fear to an extinguished conditioned stimulus. *Journal of Experimental Psychology: Animal Behavior Processes*, *1*(1), 88.

Rodebaugh, T. L., & Chambless, D. L. (2002). The effects of video feedback on self-perception of performance: A replication and extension. *Cognitive Therapy and Research, 26,* 629-644.

Rodebaugh, T. L., Holaway, R. M., & Heimberg, R. G. (2004). The treatment of social anxiety disorder. *Clinical Psychology Review, 24,* 883-908.

Salkovskis, P. M. (1991). The importance of behavior in the maintenance of anxiety and panic: A cognitive account. *Behavioural Psychotherapy*, *19*, 6-19.

Salkovskis, P. M., Clark, D. M., Hackmann, A., Wells, A., & Gelder, M. G. (1999). An experimental investigation of the role of safety-seeking behaviours in the maintenance of panic disorder with agoraphobia. *Behaviour Research and Therapy*, *37*, 559-574.

Salkovskis, P. M., Hackmann, A., Wells, A., Gelder, M. G., & Clark, D. M. (2007). Belief disconfirmation versus habituation approaches to situational exposure in panic disorder with agoraphobia: A pilot study. *Behaviour research and therapy*, *45*(5), 877-885.

Sartory, G., Master, D., & Rachman, S. (1989). Safety-signal therapy in agoraphobics: A preliminary test. *Behaviour Research and Therapy*, *27*, 205-209.

Schell, A. M., Dawson, M. E., Nuechterlein, K. H., Subotnik, K. L., & Ventura, J. (2002). The temporal stability of electrodermal variables over a one-year period in patients with recent-onset schizophrenia and in normal subjects. *Psychophysiology*, *39*, 124-132.

Schofield, P. E., Butow, P. N., Thompson, J. F., Tattersall, M. H. N., Beeney, L. J., & Dunn, S. M. (2003). Psychological responses of patients receiving a diagnosis of cancer. *Annals of Oncology*, *14*, 48-56.

Schoofs, D., Preuß, D., & Wolf, O.T. (2008). Psychosocial stress induces working memory impairments in an *n*-back paradigm. *Psychoneuroendocrinology, 33,* 643-653.

Sloan, T., & Telch, M. J. (2002). The effects of safety-seeking behavior and guided threat reappraisal on fear reduction during exposure: An experimental investigation. *Behaviour Research and Therapy*, *40*, 235-251.

Stein, M. B. & Kean, Y. M. (2000). Disability and quality of life in social phobia: Epidemiologic findings. *American Journal of Psychiatry, 157,* 1606-1613.

Sy, J. T., Dixon, L. J., Lickel, J. J., Nelson, E. A., & Deacon, B. J. (2011). Failure to replicate the deleterious effects of safety behaviors in exposure therapy. *Behaviour research and therapy*, *49*(5), 305-314.

Tabachnick, B., & Fidell, L. (2007). *Experimental design using ANOVA*. Belmont, CA: Duxbury.

Tarrier, N., Liversidge, T., & Gregg, L. (2006). The acceptability and preference for the psychological treatment of PTSD. *Behaviour Research and Therapy*, *44*, 1643-1656.

Taylor, C. T., & Alden, L. E. (2010). Safety behaviors and judgmental biases in social anxiety disorder. *Behaviour Research and Therapy*, *48*(3), 226-237.

Thwaites, R., & Freeston, M. H. (2005). Safety-seeking behaviours: fact or function? How can we clinically differentiate between safety behaviours and adaptive coping strategies across anxiety disorders?. *Behavioural and Cognitive Psychotherapy*, *33*(2), 177-188.

Thyer, B., Papsdorf, J., Davis, R., & Vallecorsa, S. (1984). Autonomic correlates of the subjective anxiety scale. *Journal of Behavior Therapy & Psychiatry*, *15*, 3-7.

Turner, M. L., & Engle, R. W. (1989). Is working memory capacity task dependent? *Journal of Memory and Language*, *28*, 127-154.

Uhlenhuth, E. H., Rickels, K., Fisher, S., Park, L. C., Lipman, R. S., & Mock, J. (1966). Drug, doctor's verbal attitude and clinic setting in the symptomatic response to pharmacotherapy. *Psychopharmacologia*, *9*, 392-418.

Unsworth, N., Heitz, R. P., Schrock, J. C., & Engle, R. W. (2005). An automated version of the operation span task. *Behavior Research Methods*, *37*, 498-505.

Unsworth, N., Redick, T. S., Heitz, R. P., Broadway, J. M., & Engle, R. W. (2009). Complex working memory span tasks and higher-order cognition: A latent-variable analysis of the relationship between processing and storage. *Memory*, *17*, 635-654.

van den Hout, M. A., Engelhard, I. M., Toffolo, M. B., & van Uijen, S. L. (2011). Exposure plus response prevention versus exposure plus safety behaviours in reducing feelings of contamination, fear, danger and disgust. An extended replication of Rachman, Shafran, Radomsky & Zysk (2011). *Journal of Behavior Therapy and Experimental Psychiatry*, *42*, 364-370.

van Uijen, S. L., van den Hout, M. A., Schiphorst, A. T. K., Knol, E. S., & Engelhard, I. M. (2017). Disconfirming contamination-related threat beliefs by exposure plus safety behavior. *Journal of Behavior Therapy and Experimental Psychiatry*, *55*, 25-32.

Vieillard, S., & Bougeant, J. C. (2005). Effect of an induced negative emotion on working memory task performance: The moderating effect of emotional state on storage and executive processes. *Annee Psychologique*, *105*, 63-104.

Vorstenbosch, V., & Laposa, J. M. (2015). Treatment expectancy for anxiety change and response to cognitive behavioral therapy for OCD. *Journal of Obsessive-Compulsive and Related Disorders*, *5*, 55-60.

Wang, Y. J., & Minor, M. S. (2008). Validity, reliability, and applicability of psychophysiological techniques in marketing research. *Psychology & Marketing*, *25*, 197-232.

Wells, A., Clark, D. M., Salkovskis, P., Ludgate, J., Hackmann, A., & Gelder, M. (1996). Social phobia: The role of in-situation safety behaviors in maintaining anxiety and negative beliefs. *Behavior Therapy*, *26*, 153-161.

Westbrook, R. F., Iordanova, M., McNally, G., Richardson, R., & Harris, J. A. (2002). Reinstatement of fear to an extinguished conditioned stimulus: two roles for context. *Journal of Experimental Psychology: Animal Behavior Processes*, *28*(1), 97

Whittal, M. L., Thordarson, D. S., & McLean, P. D. (2005). Treatment of obsessive–compulsive disorder: Cognitive behavior therapy vs. exposure and response prevention. *Behaviour Research and Therapy*, *43*(12), 1559-1576

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition*. Oxford, UK: Stanford University Press.

APPENDIX A: RECRUITMENT TEXTS

STUDY 1: ISPR RECRUITMENT

Study Name: Do You Have What It Takes? Validating New Measures of Academic Achievement

Description: The aim of the study is to investigate the relationship between academic achievement and different ways of thinking, feeling, and behaving. Participants will be asked to complete a variety of questionnaires, computerized tasks, and a behavioural task. Participants will be asked to wear a respiration belt and two sensors on their non-dominant hand for the duration of the laboratory visit. This is an in-laboratory study that will take approximately seventy-five minutes to complete. Participants will be compensated with two course credits.

STUDY 2: ISPR RECRUITMENT

Study Name: Help Us Help You! Understanding Stress and Anxiety in Undergraduate Students

Description: The aim of the study is to better understand stress and anxiety in undergraduate students and to test different components of treatment. Participants will be asked to complete a variety of questionnaires, cognitive tasks, and a behavioural task. Participants will be asked to wear a respiration belt and two sensors on their non-dominant hand for a portion of the laboratory visit. The first part of this study is an in-laboratory study that will take approximately ninety minutes to complete. The second party of this study involves the completion of a brief online questionnaire at a one-week follow-up that will take approximately ten minutes to complete. Participants will be compensated with two course credits.

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APPENDIX B – CONSENT FORMS

STUDY 1: CONSENT FORM FOR RESEARCH PARTICIPATION

uOttawa

Title: Do You Have What It Takes? Validating New Measures of Academic Achievement

Researcher:

Jessica S. Tutino, B.A. (Hons.)
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[REDACTED]

Invitation to Participate: I am invited to participate in the abovementioned research study conducted by Jessica S. Tutino, graduate student in the School of Psychology, supervised by Dr. Allison J. Ouimet at University of Ottawa.

Purpose of the Study: The purpose of this study is to test and validate new ways of measuring cognition and academic achievement.

Participation: My participation will consist of attending one (1) in-person laboratory session. During this session, I will be asked to provide general information about myself, such as age, self-identified gender, and family income. I will be asked to complete questionnaires about my general styles of thinking and feeling, and academic achievement. I will also complete computerized and in-person cognitive and behavioural tasks assessing my academic aptitude.

Risks: My participation in this study will entail that I volunteer personal information about my thoughts, feelings, and actions. It is possible that I may experience some emotional discomfort when answering questionnaires or completing tasks related to my thoughts, feelings, and actions. Upon completion of or withdrawal from this study, all participants will be provided with a list of self-help and professional resources, should they be interested in receiving more information about emotional difficulties. These resources include, but are not limited to:

- http://www.cpa.ca/psychologyfactsheets/
- http://www.bps.org.uk/psychology-public/psychology-and-public
- Ottawa Distress Centre, 613-238-3311

- Tel-Aide Outaouais, 613-741-6433
- Centre d'Aide 24-7, 819-595-9999
- Ottawa Academy of Psychology, 613-235-2529
- University of Ottawa Student Academic Success Service, http://www.sass.uottawa.ca/about/mental-health-wellness.php

In addition, the online questionnaires that I will be asked to complete are hosted by Qualtrics, a USA company. As such, they are subject to USA laws such as the USA Patriotic Act and USA Freedom Act. These acts give authorities access to the records of Internet service providers. Your responses will be stored in the USA. The security and privacy policy for the web-survey company can be found at the following link: http://www.qualtrics.com/security-statement/. If you prefer to not submit your responses using Qualtrics, please do not give your consent.

Benefits: By participating in this study, I may develop a somewhat increased awareness of my own thoughts, feelings, and actions. Additionally, this experience may contribute to my understanding of psychological research. Finally, my participation will contribute to an advanced understanding of how cognition and academic achievement are related.

Confidentiality: I understand that the information I will share will remain strictly confidential and the information will be used strictly for research purposes. I understand that the data from this study may be used for student research projects. The only people who will have access to the research data are research personnel of Dr. Allison Ouimet at the University of Ottawa. Confidentiality is guaranteed because I am not being asked to provide my name or any other identifying information. The only identifying information of mine that will be kept is the video recording of my speech, which will only be viewed for data analysis purposes by research assistants in Dr. Ouimet's research team. Rather my data will be identified by a unique code that cannot be linked back to me. Results will be published in pooled (aggregate) format and presented at professional conferences and in academic journals. In order to minimize the risk of security breaches and to help ensure your confidentiality we recommend that you use standard safety measures such as signing out of your account, closing your browser and locking your screen or device when you have completed the study.

Conservation of data: The electronic data collected from the study will be kept in a secure manner. Specifically, all data derived from this study will be electronically password-protected. All participant information and data will be stored on password-protected computers and/or password-protected external hard drives in Dr. Allison Ouimet's office or laboratory space. Both of these spaces are physically locked at all times. Only members of Dr. Ouimet's research team will have access to the rooms, and only members of the research team working directly on this study will have the password to the relevant documents and/or datasets. Data will be stored in this manner for 5 years following publication of the findings, after which point it will be deleted permanently. What about the videos?

C**ompensation:** In return for my participation in this study, I will be compensated with two (2) course credits through ISPR, which will be assigned after my completion of the study. If I choose to withdraw from the study at any time, I will still receive this compensation.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be deleted permanently.

Contacts: If I have any questions about the study, I may contact the researcher:

Jessica S. Tutino
[REDACTED]

If I have any questions regarding my rights as a study participant, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5

Tel.: (613) 562-5387
E-mail: ethics@uottawa.ca

By signing your name below, I acknowledge that I have read this document and that the study has been explained clearly to me.

Signature: _____ Date: _____

STUDY 2: CONSENT FORM FOR RESEARCH PARTICIPATION

uOttawa
Faculté des sciences sociales
Faculty of Social Sciences

École de psychologie
School of Psychology

Title: Help Us Help You! Understanding Stress and Anxiety in Undergraduate Students

Researcher:

Jessica S. Tutino, B.A. (Hons.)
University of Ottawa
School of Psychology
136 Jean-Jacques Lussier
VNR 3082
Ottawa, ON K1N 6N5
[REDACTED]

Funding Declaration: This project has been funded by the Canadian Institutes of Health Research (CIHR) and the Natural Sciences and Engineering Council of Canada (NSERC).

Invitation to Participate: I am invited to participate in the abovementioned research study conducted by Jessica S. Tutino, PhD student in the School of Psychology, as part of her doctoral thesis. This project is supervised by Dr. Allison J. Ouimet at the University of Ottawa.

Purpose of the Study: The purpose of this study is to better understand anxiety and stress in undergraduate students and investigate ways to reduce anxiety.

Participation: My participation will consist of attending one (1) in-person laboratory session and completing one (1) brief online questionnaire at a one-week follow-up. During this session, I will be asked to provide general information about myself, such as age, self-identified gender, and family income. I will be asked to complete questionnaires about my general styles of thinking and feeling. I will also complete cognitive tasks and a videorecorded behavioural task.

Risks: My participation in this study will entail that I volunteer personal information about my thoughts, feelings, and actions. It is possible that I may experience some emotional discomfort when answering questionnaires or completing tasks related to my thoughts, feelings, and actions. Upon completion of or withdrawal from this study, all participants will be provided with a list of self-help and professional resources, should they be interested in receiving more information about emotional difficulties

Benefits: By participating in this study, I may develop a somewhat increased awareness of my own thoughts, feelings, and actions. Additionally, this experience may contribute to my understanding of psychological research. Finally, my participation will contribute to an advanced understanding of how thoughts, feelings, and behaviours are related.

Confidentiality: I understand that the information I will share will remain strictly confidential and the information will be used strictly for research purposes. I understand that the data from this study may be used for student research projects, including a doctoral thesis. The only people who will have access to the research data are research personnel of Dr. Allison Ouimet at the University of Ottawa. Confidentiality is guaranteed because I am not being asked to provide my name or any other identifying information. The only identifying information of mine that will be kept is the videorecording of my behavioural task, which will only be viewed for data analysis purposes by research assistants in Dr. Ouimet's research team. Rather, my data will be identified by a unique code that cannot be linked back to me. Results will be published in pooled (aggregate) format and presented at professional conferences and in academic journals.

Conservation of data: The electronic and paper data collected from the study will be kept in a secure manner. Specifically, all data derived from this study will be electronically password-protected or locked in secure filing cabinets. All participant information and data will be stored on password-protected computers and/or password-protected external hard drives in Dr. Allison Ouimet's office or laboratory space. Both of these spaces are physically locked at all times. Only members of Dr. Ouimet's research team will have access to the rooms, and only members of the research team working directly on this study will have the password to the relevant documents, video recordings and/or datasets. Data will be stored in this manner for 5 years following publication of the findings, after which point it will be deleted permanently.

C**ompensation:** In return for my participation in this study, I will be compensated with two (2) course credits through ISPR, which will be assigned after I completion the study. I will receive 1.5 credits after completing the in-person laboratory visit and 0.5 credits after completing the one-week follow-up questionnaire. If I choose to withdraw from the study at any time, I will still receive this compensation. However, if I do not complete the one-week follow-up questionnaire, I will not receive the additional 0.5 credits.

Voluntary Participation: I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be deleted permanently.

Contacts: If I have any questions about the study, I may contact the researcher(s):

Jessica S. Tutino
[REDACTED]

Dr. Allison J. Ouimet
[REDACTED]

If I have any questions regarding my rights as a study participant, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5

Tel.: (613) 562-5387
E-mail: ethics@uottawa.ca

There are two copies of the consent form, one of which is mine to keep.

By signing my name below, I acknowledge that I have read this document and that the study has been explained clearly to me.

Signature (Participant): _____

Date: _____

Signature (Research Assistant): _____

Date: _____

APPENDIX C: STUDY QUESTIONNAIRES

Sociodemographic Questionnaire

Age: _____

Please pick the option that best describes your gender?

- Male
- Female
- Transgender: male to female
- Transgender: female to male
- If you have another gender identity, please specify _____
- I prefer not to answer

Which ethnic or racial background(s) describes you most (check all that apply)?:

- White
- Black
- Hispanic
- Asian
- Native Canadian
- European
- Pacific Islander
- Other: _____
- I prefer not to answer

Marital Status (select one):

- Married
- Living Together
- Long-term relationship
- Separated
- Divorced
- Widowed
- Single
- I prefer not to answer

Number of children: _____

Household annual income before taxes:

- Less than 20,000$ CAD
- 20,000-40,000$ CAD
- 40,000-60,000$ CAD
- 60,000-80,000$ CAD
- + 80,000$ CAD
- I prefer not to answer

Current student status:

- Part-time student (less than 12 credits per semester)
- Full-time student (12 credits or more per semester)

Current occupational status:

Part-time employed (25 hours of paid work or less per week)
- Full-time employed (more than 25 hours of paid work per week)
- Not currently employed
- I prefer not to answer

Have you been diagnosed by a professional with a psychological disorder in the past?
- Yes _____
- No
- I prefer not to answer

Have you ever received psychotherapy for a mood or anxiety disorder?
- Yes, in the past: _____
- Yes, currently: _____
- Never
- I prefer not to answer

Did you ever take prescribed medication to treat the disorder(s)?
- Yes, in the past: _____
- Yes, currently: _____
- Never
- I prefer not to answer

What is your first language?
- English
- French
- Other : _____

How fluent do you consider yourself to be in English?
- I am a native speaker or am totally fluent (100%)
- I understand almost everything (>90%)
- I understand a lot (>80%)
- I understand about 70-80%
- I understand about 50-70%
- I understand less than 50%

Social Phobia Inventory (SPIN)*

Please indicate how much the following problems have bothered you **during the past week**. Select only one answer for each problem, and be sure to answer all items.

Response	0 Not at all	1 A little bit	2 Somewhat	3 Very much	4 Extremely
1) I am afraid of people in authority					
2) I am bothered by blushing in front of people					
3) Parties and social events scare me					
4) I avoid talking to people I don't know					
5) Being criticized scares me a lot					
6) Fear of embarrassment causes me to avoid doing things or speaking to people					
7) Sweating in front of people causes me distress					
8) I avoid going to parties					
9) I avoid activities in which I am the centre of attention					
10) Talking to strangers scares me					
11) I avoid having to give speeches					
12) I would do anything to avoid being criticized					
13) Heart palpitations bother me when I am around people					
14) I am afraid of doing things when people might be watching					
15) Being embarrassed or looking stupid is among my worst fears					
16) I avoid speaking to anyone in authority					
17) Trembling or shaking in front of others is distressing to me					

Personal Report of Confidence as a Speaker-Short Form (PRCS-12)*

The following questions refer specifically to how you might think, feel, or act when giving a speech of presentation to any audience (large or small). Please read each statement and indicate if it is true or false. There are no right or wrong answers. Do not spend too much time on any statement.

Response	True (1)	False (0)
1) My hands tremble when I try to handle objects on the platform.		
2) I am in constant fear of forgetting my speech.		
3) While preparing a speech I am in a constant state of anxiety.		
4) My thoughts become confused and jumbled when I speak before an audience.		
5) Although I talk fluently with friends I am at a loss for words on the platform.		
6) The faces of my audience are blurred when I look at them.		
7) I feel disgusted with myself after trying to address a group of people.		
8) I perspire and tremble just before getting up to speak.		
9) My posture feels strained and unnatural.		
10) I am fearful and tense all the while I am speaking before a group of people.		
11) It is difficult for me to search my mind calmly for the right words to express my thoughts.		
12) I am terrified at the thought of speaking before a group of people.		

Speech Anxiety Thoughts Inventory (SATI)*

This questionnaire is concerned with thoughts associated with public speaking. Please read each statement carefully and rate the degree to which you believe each statement on a scale from 1 ("I do not believe the statement at all") to 5 ("I completely believe the statement"). Base your ratings on what you typically think when you are in a public speaking situation.

Response	0 I do not believe the statement at all	1	2	3	4 I completely believe the statement
1) I'll get tongue-tied.					
2) My speech won't impress the audience.					
3) My speech will be incoherent.					
4) I won't be able to speak as well as others.					
5) When others are not paying attention to my speech, I worry that the audience is thinking poorly of me.					
6) If I perform poorly, then the audience will remember me negatively.					
7) It would be terrible if my voice will tremble.					
8) If I make a mistake, the audience will think I'm stupid.					
9) If I am anxious in this situation, the audience will not like me.					
10) I won't know what to say when I'm called on to make a speech.					
11) If I don't speak well, the audience will reject me.					
12) What I say will sound stupid.					
13) It would be terrible if others think I'm not intelligent.					

14) It would be terrible if I make a mistake during my speech.					
15) I will not be able to control my anxiety.					
16) It would be terrible if people notice that I'm anxious.					
17) My behavior will appear awkward to the audience.					
18) I will be unable to give a good speech.					
19) I won't be able to complete my speech.					
20) My mind will go blank.					
21) I must deliver a good speech in order to gain approval from the audience.					
22) I worry that I will be asked to give a speech.					
23) I won't be able to answer questions from the audience.					
24) My anxiety will last the whole speech					
25) I will shake, tremble, or blush noticeably when I give my speech					

Modified Speech Anxiety Thoughts Inventory (M-SATI)*

This questionnaire is concerned with thoughts associated with the speech you just gave. Please read each statement carefully and rate the degree to which you believe each statement on a scale from 1 ("I do not believe the statement at all") to 5 ("I completely believe the statement"). Base your ratings on what you think happened when you gave your speech.

Response	0 I do not believe the statement at all	1	2	3	4 I completely believe the statement
1) I got tongue-tied.					
2) My speech didn't impress the audience.					
3) My speech was incoherent.					
4) I wasn't be able to speak as well as others.					
5) If the judge wasn't paying attention to my speech, I worried that the judge was thinking poorly of me.					
6) If I performed poorly, then the judge will remember me negatively.					
7) It was terrible if my voice trembled.					
8) If I made a mistake, then the judge thought I was stupid.					
9) I was anxious and the judge did not like me					
10) I did not know what to say when I was called on to make a speech.					
11) If I didn't speak well, then the judge rejected me.					
12) What I said sounded stupid.					
13) It was terrible when others thought I was not intelligent.					
14) It was terrible when I made a mistake during my speech.					

15) I was not be able to control my anxiety.					
16) It was terrible if people noticed that I was anxious.					
17) My behavior appeared awkward to the judge.					
18) I was unable to give a good speech.					
19) I wasn't able to complete my speech.					
20) My mind went blank.					
21) I had to deliver a good speech in order to gain approval from the judge.					
22) I was worried when I was asked to give a speech.					
23) I wasn't able to answer questions from the judge.					
24) My anxiety lasted the whole speech					
25) I shook, trembled, or blushed noticeably when I gave my speech					

The Subtle Avoidance Frequency Examination (SAFE)*

Instructions: Some people do the following things when they feel anxious in social situations. Using the scale below (1-5), rate how often you would do these things when you are in a social situation.

In a social situation when you felt anxious how often would you:

Response	1 Never	2 Occasionally	3 Sometimes	4 Often	5 Always
1) Before you arrive, excessively rehearse what you might say or how you might behave					
2) Remain silent					
3) Try to keep tight control of your behaviour					
4) Speak softly					
5) Say “I’m not usually like this”					
6) Blank out or switch off mentally					
7) Hold your arms still					
8) Spend time thinking of good excuses for escaping					
9) Wear cool clothes to prevent sweating					
10) Avoid eye contact					
11) Wear clothes or makeup to hide blushing					
12) Say “it’s hot” to explain sweating or blushing					
13) Account for poor performance by saying that you didn’t have time to prepare					
14) Rehearse sentences in your mind					
15) Spend hours on grooming prior to the situation					
16) Wear clothes that will conceal sweating if it occurs					

17) Say that you are sick/unwell					
18) Look closely at other people and try to gauge their reactions to you					
19) Avoid asking questions					
20) Speak in short sentences					
21) Keep still to avoid drawing attention to yourself					
22) Hide your face					
23) Make excuses about your performance					
24) Check the redness of your face in a mirror					
25) Try to think about other things					
26) Try to think of reasons why the other person is inferior to you					
27) Avoid pauses in speech					
28) Position yourself so as to not be noticed					
29) Hold your cup or glass tightly					
30) Ask others about your performance					
31) Imagine you are somewhere else					
32) Be reserved about what you say					

Credibility and Expectancy Questionnaire (CEQ)*

We would like you to indicate below how much you believe right now that the exposure exercise that you are about to complete will help to reduce your anxiety about giving speeches. Belief usually has two aspects to it: 1) what one thinks will happen and 2) what one feels will happen sometimes these are similar; sometimes they are different. Please answer the questions below. In the first set, answer in terms of what you think. In the second set, answer in terms of what you really and truly feel.

Set I

1. At this point, how logical does the exposure exercise offered to you seem?

1	2	3	4	5	6	7	8	9
Not at all logical				Somewhat logical				Very logical

2. At this point, how successfully do you think this exposure exercise will be in reducing your anxiety when giving speeches?

1	2	3	4	5	6	7	8	9
Not at all useful				Somewhat useful				Very useful

3. How confident would you be in recommending this type of exposure exercise to a friend who experiences similar anxiety?

1	2	3	4	5	6	7	8	9
Not at all confident				Somewhat confident				Very confident

4. By the end of this exposure exercise, how much improvement in your anxiety do you think will occur?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

SEE SET II ON THE BACK.

Set II

For this set, close your eyes for a few moments, and try to identify what you really feel about the exposure exercise and its likely success. Then answer the following questions.

1. At this point, how much do you really feel that the exposure exercise will help you to reduce your anxiety?

1	2	3	4	5	6	7	8	9
Not at all				Somewhat				Very much

2. By the end of the exposure exercise, how much reduction in your anxiety do you think will really occur?

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Performance Rating Form – Self

We would like you to rate yourself during the speech you just gave on the features listed below. For each feature, please circle the appropriate number to indicate how you felt you actually performed. Please answer as honestly as you can - your evaluation will remain completely confidential.

Response	0 Not at all	1 Slightly	2 Moderately	3 Much	4 Very much
Content was understandable					
Kept eye contact with audience					
Stuttered					
Had long pauses (more than 5 seconds)					
Fidgeted					
“Um”ed and “Ah”ed					
Had a clear voice					
Seemed to tremble or shake					
Sweated					
Blushed					
Face twitched					
Voice quivered					
Appeared confident					
Appeared nervous					
Kept audience interested					
Generally spoke well					
Made a good impression					

Performance Rating Form – Other

We would like you to rate the speaker you just heard on the features listed below. For each feature, please circle the appropriate number to indicate how you felt they rated. Your evaluation will remain confidential.

Response	0 Not at all	1 Slightly	2 Moderately	3 Much	4 Very much
Content was understandable					
Kept eye contact with audience					
Stuttered					
Had long pauses (more than 5 seconds)					
Fidgeted					
“Um”ed and “Ah”ed					
Had a clear voice					
Seemed to tremble or shake					
Sweated					
Blushed					
Face twitched					
Voice quivered					
Appeared confident					
Appeared nervous					
Kept audience interested					
Generally spoke well					
Made a good impression					

Subjective Units of Distress Scale (SUDS)*

On a scale from 0 to 100, with 0 being not anxious at all and 100 being the most anxiety you can imagine, how anxious do you feel right now?

Rating: _____

*For all questionnaires, only the acronyms of the titles were used (e.g., SPIN, SAFE, SUDS) to avoid respondent bias.

APPENDIX D – SPEECH TASK SCRIPT (STUDY 1)

In this task, we would like you to give a 10-minute speech. You will have 5 minutes to prepare. I will give you a list of 10 topics and will be asked to choose up to three of these topics to present. I'll then ask you to present this speech in front of a judge, who will evaluate you on the following criteria: clarity, accuracy, interest, content, poise, and style. The speech will be video recorded so that a group of researchers can also rate your speech on the criteria mentioned. You can end the speech at any time, but it's better that you speak for as long as you can, preferably until the 5-minute time limit, so that the judge has enough information to evaluate. Here is a card that says "STOP" on it [Hand card to participant]. Whenever you want to end the speech, you can just hold up this card and I will stop the video camera right away. How does that sound? Do you have any questions? Are you ready? Here is a list of topics*. The evaluator _____ will come in five minutes and that's when you can start the speech! ***Experimenter leaves the room and starts the stopwatch.***

Evaluator enters the room five minutes later. Hi my name is _____ and I'm the research assistant who will be evaluating your speech today. I will be evaluating your speech on the following criteria: clarity, accuracy, interest, content, poise, and style. Before you start your speech, please complete this questionnaire. ***Evaluator hands the participant a hard copy of the Subjective Units of Distress Scale to fill out.*** I'll set up the camera in the meantime, so we'll be ready to start as soon as you're finished with the questionnaire.

Once the participant has completed the SUDS: Remember, it's better if you speak for as long as you can, preferably until the 5-minute deadline, so that I have enough information to evaluate. But you can end the speech at any time by holding up the "STOP" card. I will let you know when to start talking. Ready?

Evaluator starts the video recording and has a seat beside the camera. Begin!

Evaluator starts the stopwatch as soon as the participant begins the speech. During the speech, the evaluator fills out the evaluation sheet. Once participant holds up the index card – indicating that the speech is over—the evaluator records the duration of the speech on the speech duration sheet, and turns the camera off.

Thank you for completing the speech task. Here is another questionnaire to complete and then you're done! ***The evaluator then gives the participant another copy of the SUDS to fill out.***

***Speech Topics**: 1) Global Warming, 2) Terrorism, 3) Migrant and Refugee Crises, 4) Television violence and censorship, 5) Obesity epidemic, 6) Capital punishment, 7) Gun control, 8) Euthanasia, 9) Legalization of marijuana, 10) Animal testing

APPENDIX E: PSYCHOEDUCATION SCRIPT (STUDY 2)

I'd like to give you a bit more information now on our study. You were recruited for this study because you reported on the screening questionnaire that you have high levels of speech anxiety. Speech anxiety is *very* common in undergraduate students, and we would like to explore ways to reduce this anxiety. One really effective treatment for anxiety is called cognitive behavioural therapy, and one of the most effective components of cognitive behavioural therapy is called exposure therapy. During exposure therapy, people gradually confront their fears until their anxiety starts to go down. For example, if someone is afraid of dogs, they would gradually get closer to a dog until they realize that their fear that the dog will bite them will not come true, and their anxiety decreases. We would like you to participate in an exposure exercise to help us better understand ways to reduce speech anxiety. The exposure exercise is a speech. You will have 5 minutes to prepare for this speech. You will be given a list of 10 topics and will be asked to choose up to three of these topics to present. The speech will be videotaped for analysis by a group of researchers, who will evaluate you on the following criteria: clarity, accuracy, interest, content, poise, and style. You can end the speech at any time, but please try to speak for at least five minutes. To end the speech, you can hold up your hand to indicate that you would like to end the speech, and I will stop the camera. Do you have any questions?

APPENDIX F: WORKING MEMORY TASKS

STUDY 1: OPERATION SPAN TASK

In this experiment, you will try to memorize letters you see on the screen while you also solve simple math problems.

In the next few minutes, you will have some practice to get you familiar with how the experiment works.

We will begin by practicing the letter part of the experiment.

Click the mouse button to begin.

For this practice set, letters will appear on the screen one at a time. Try to remember each letter in the order presented.

After 2-3 letters have been shown, you will see a screen listing 12 possible letters. Your job is to select each letter in the order presented. To do this, use the mouse to select each letter.

The letters you select will appear at the bottom of the screen.

Click the mouse button to begin.

When you have selected all the letters and they are in the correct order, hit the EXIT box at the bottom right of the screen. If you make a mistake, hit the CLEAR box to start over. If you forgot one of the letters, click the BLANK box to mark the spot for the missing letter.

Remember, it is very important to get the letters in the same order as you see them. If you forget one, use the BLANK box to mark the position.

Do you have any questions so far?

When you're reading, click the mouse button to start the letter practice.

Now you will practice doing the math part of the experiment.

A math problem will appear on the screen, like this:

(2*1) + 1 = ?

As soon as you see the math problem, you should compute the correct answer. In the above problem, the answer 3 is correct.

When you know the correct answer, you will click the mouse button.

Click the mouse button to continue.

You will see a number displayed on the next screen along with a box marked TRUE and a box marked FALSE.

If the number on the screen is the correct answer to the math problem, click on the TRUE box with the mouse. If the number is not the correct answer, click on the FALSE box.

For example, if you see the problem

(2*2) + 1 = ?

and the number on the following screen is 5, click the TRUE box, because the answer is correct.

If you see the problem

(2*2) + 1 = ?

and the number on the screen is 6, click the FALSE box, because the correct answer is 5, not 6.

After you click on one of the boxes, the computer will tell you if you made the right choice.

Click the mouse button to continue.

It is VERY important that you get the math problems correct. It is also important that you try and solve the problems as quickly as you can.

Do you have any questions?

When you're ready, click the mouse button to begin some practice problems.

Now you will practice doing both parts of the experiment at the same time.

In the next practice set, you will be given one of the math problems. Once you make your decision about the math problem, a letter will appear on the screen. Try to remember the letter.

In the previous section where you only solved math problems, the computer computed your average time to solve the problems.

If you take longer than your average time, the computer will automatically move you onto the next letter part, thus skipping the True or False part and will count the problem as a math error.

Therefore it is VERY important to solve the problems as quickly and as accurately as possible.

Click the mouse button to continue.

After the letter goes away, another math problem will appear, and then another letter.

At the end of each set of letters and math problems, a recall screen will appear. Use the mouse to select the letters you just saw. Try your best to get the letters in the correct order.

It is important to work QUICKLY and ACCUREATELY on the math. Make sure you know the answer to the math problem before clicking to the next screen. You will not be told if your answer to the math problem is correct.

After the recall screen, you will be given feedback about your performance regarding both the number of letters recalled and the percent correct on the math problems.

Do you have any questions?

Click the mouse button to continue.

During the feedback, you will see a number in red in the top right of the screen. This indicates the percent correct for the math problems for the entire experiment.

It is VERY important for you to keep this at least at 85%. For our purposes, we can only use data where the participant was at least 85% accurate on the math.

Do you have any questions?

Click the mouse button to try some practice problems.

That is the end of the practice.

The real trials will look like the practice trials you just completed. First you will get a math problem to complete, then a letter to remember.

When you see the recall screen, select the letters in the order presented. If you forgot a letter, click the BLANK box to mark where it should go.

Some of the sets will have more math problems and letters than others.

It is important that you do your best on both the math problems and the letter recall parts of this experiment.

Remember for the math problems you must work as QUICKLY and ACCURATELY as possible. Also, remember to keep your sentence accuracy at 85% or above.

Do you have any questions?

If not, click the mouse button to begin the experiment.

STUDY 2: DIGIT SPAN TASKS

Digit Span Time 1

Now, I am going to say some numbers, but when I stop, I want you to say the numbers backward. If I say 7 – 1, what would you say?

Correct response: (1 – 7). That's right.
Incorrect response: That's not quite right. I said 7 – 1, so to say them backward, you should say 1 – 7. Let's try another one. Remember to say them backwards: 3 -4.
Correct response: (4 – 3). That's right. Let's try some more.

Trial		Correct Response	Correct?
1)	3 – 1 2 – 4	1 – 3 4 – 2	
2)	4 – 6 5 – 7	6 – 4 7 – 5	
3)	6 – 2 – 9 4 – 7 – 5	9 – 2 – 6 5 – 7 – 4	
4)	8 – 2 – 7 – 9 4 – 9 – 6 – 8	9 – 7 – 2 – 8 8 – 6 – 9 – 4	
5)	6 – 5 – 8 – 4 – 3 1 – 5 – 4 – 8 – 6	3 – 4 – 8 – 5 – 6 6 – 8 – 4 – 5 – 1	
6)	5 – 3 – 7 – 4 – 1 – 8 7 – 2 – 4 – 8 – 5 – 6	8 – 1 – 4 – 7 – 3 – 5 6 – 5 – 8 – 4 – 2 – 7	
7)	8 – 1 – 4 – 9 – 3 – 6 – 2 4 – 7 – 3 – 9 – 6 – 2 – 8	2 – 6 – 3 – 9 – 4 – 1 – 8 8 – 2 – 6 – 9 – 3 – 7 – 4	
8)	9 – 4 – 3 – 7 – 6 – 2 – 1 – 8 7 – 2 – 8 – 1 – 5 – 6 – 4 – 3	8 – 1 – 2 – 6 – 7 – 3 – 4 – 9 3 – 4 – 6 – 5 – 1 – 8 – 2 – 7	

Digit Span Time 2

Now, I am going to say some numbers, but when I stop, I want you to say the numbers backward. If I say 3 – 7, what would you say?

Correct response: (7 – 3). That's right.
Incorrect response: That's not quite right. I said 3 – 7, so to say them backward, you should say 7 – 3. Let's try another one. Remember to say them backwards: 9 -0.
Correct response: (0 – 9). That's right. Let's try some more.

Trial		Correct response	Correct?
1)	9 – 7 8 – 0	7 – 9 0 – 8	
2)	0 – 2 1 – 3	2 – 0 3 – 1	
3)	2 – 8 – 5 0 – 3 – 1	5 – 8 – 2 1 – 3 – 0	
4)	4 – 8 – 3 – 5 0 – 5 – 2 – 4	5 – 3 – 8 – 4 4 – 2 – 5 – 0	
5)	2 – 1 – 4 – 0 – 9 7 – 1 – 0 – 4 – 2	9 – 0 – 4 – 1 – 2 2 – 4 – 0 – 1 – 7	
6)	1 – 9 – 3 – 0 – 7 – 4 3 – 8 – 0 – 4 – 1 – 2	4 – 7 – 0 – 3 – 9 – 1 2 – 1 – 4 – 0 – 8 – 3	
7)	4 – 7 – 0 – 5 – 9 – 2 – 8 0 – 3 – 9 – 5 – 2 – 8 – 4	8 – 2 – 9 – 5 – 0 – 7 – 4 4 – 8 – 2 – 5 – 9 – 3 – 0	
8)	5 – 0 – 9 – 3 – 2 – 8 – 7 – 4 3 – 8 – 4 – 7 – 1 – 2 – 0 – 9	4 – 7 – 8 – 2 – 3 – 9 – 0 – 5 9 – 0 – 2 – 1 – 7 – 4 – 8 – 3	

APPENDIX G: DEVIATIONS FROM PRE-REGISTRATION (STUDY 2)

We registered the methods, hypotheses, and analyses for this study on February 22, 2019 on the Open Science Framework (see: https://osf.io/dkgr3/?view_only=af6b542bf2e647cd853faf3c0f72fa17). Please note that we submitted the pre-registration after data collection had started, but before we accessed any data.

1. Sample size

   In our pre-registration, we stated that we would recruit 150 speech anxious participants. However, after re-running our power analysis (see supplementary online material), we determined that a sample size of 123 was recommended to obtain sufficient power given our planned analyses. As such, we terminated data collection at $N = 144$.

2. Hypothesis about objective speech performance

   In our initial pre-registered hypothesis regarding objective speech performance, we stated that compared to those in the unhelpful and control conditions, participants in the helpful condition would "be rated more favorably in their speech performance by an objective audience." This hypothesis was initially in line with the rest of our hypotheses suggesting that those in the helpful condition would experience more favorable outcomes. However, upon further reading soon after our preregistration (and before any data analysis), we felt that it was more appropriate to suggest equivocal objective performance between conditions, given that safety behaviours have been shown to interfere with objective speech evaluations (Rowa et al., 2015).

APPENDIX H: DEBRIEFING FORMS

STUDY 1

uOttawa

DEBRIEFING FORM FOR RESEARCH PARTICIPATION

The Cognition and Anxiety Disorders Research (CADRe) Lab would like to thank you for participating in our research!

Title: Do You Have What It Takes? Validating New Measures of Academic Achievement

INVESTIGATORS AND INSTITUTION:
The study you just participated in is being conducted at the University of Ottawa by Jessica S. Tutino, B.A. (Hons.), under the supervision of Dr. Allison J. Ouimet, in the Cognition and Anxiety Disorders Research Laboratory (CADRe Lab).

STUDY PURPOSE AND IMPLICATIONS:
You were told that the purpose of our study was to test new measures of academic achievement and to better understand its relationship to different patterns of thinking, feeling, and acting. However, the goal of this study was not to investigate academic achievement. We are actually interested in understanding how using speech aids (or "safety behaviours") during a speech task influences speech performance, feelings of anxiety, psychophysiological responses, and working memory. In fact, you were invited to participate in this task because you indicated on the pre-screen questionnaire that you have relatively higher levels of anxiety in public speaking situations. We measured speech and social anxiety with some of the questionnaires you filled out before and after the speech task. We told you that your speech would be evaluated on a number of characteristics. In reality, your speech was not evaluated on any characteristics other than speech duration. In addition, the video we recorded of your speech will not be evaluated by other researchers for those same criteria. However, the content of the videotaped speeches will be viewed by research assistants in our lab and used to code for verbal and non-verbal indicators of anxiety, as well as for use of safety behaviour. We also didn't tell you the exact nature of the behavioural task – that it was a speech task – because we didn't want you to feel overly anxious throughout the experiment. These deceptions were intended to increase the possibility that you might feel speech-related anxiety only during the speech task. If you feel uncomfortable with the way that we obtained these data, please let us know, and we will permanently delete your data from the study if you prefer.

We are particularly interested in the way safety behaviours—the choice of three options offered to you (i.e., a water bottle, stress ball, or a podium)—are related to how you respond on behavioural tasks, self-report questionnaires, cognitive tasks, and physiologically. Those tasks that you completed on the computer give us a way to measure your working memory, and we hypothesize that people who were given the choice of using safety behaviours during their

speech task will show higher working memory capacity, lower self-reported anxiety, and less physiological arousal than those who were not given safety behaviours to use.

We hope that this study will be an important first step towards better understanding how safety behaviours may influence treatment success if individuals are allowed to use these behaviours during cognitive behavioural therapy. Ultimately, we hope our findings will contribute to developing and refining effective treatments for anxiety disorders.

Because this is any ongoing study, and some information you have learned could bias other people's responses if they knew it before the beginning of the study, we ask that you do not discuss the full content of the study to anyone. We appreciate your cooperation!

Thank you for your participation. If you are interested in finding out more about this study and its findings or if you have any concern or questions about the research itself, please contact Jessica Tutino, the Principal Investigator, at [REDACTED].

You may have participated in this study because you reported high levels of social anxiety. Here are some resources that you may find helpful for these types of symptoms:

1. Antony, M. (2004). *10 Simple Solutions to Shyness: How to Overcome Shyness, Social Anxiety, and Fear of Public Speaking*. New Harbinger Publications.
2. Butler, G. (2001). *Overcoming social anxiety and shyness: A self-help guide using cognitive behavioral techniques*. New York University Press.

If you would like to seek psychological services to help manage and treat your anxiety or other problems, below are some psychological clinics in the Ottawa area that offer cognitive-behavioural therapy and that you may find helpful:

- Ottawa Institute of Cognitive Behavioural Therapy (613-820-9931)
- Ottawa Centre for Cognitive Therapy (613-729-0801)
- Centre for Psychological Services and Research at the University of Ottawa (613-562-5761)

For further reading, if interested:

Levy, H. C., & Radomsky, A. S. (2014). Safety behaviour enhances the acceptability of exposure. *Cognitive Behaviour Therapy*, *43*, 83-92.

Ouimet, A. J., Gawronski, B., & Dozois, D. J. A. (2009). Cognitive vulnerability to anxiety: A review and an integrative model. *Clinical Psychology Review*, *29*(6), 459–470. doi:10.1016/j.cpr.2009.05.004

Craske, M. G., Kircanski, K., Zelikowsky, M., Mystkowski, J., Chowdhury, N., & Baker, A. (2008). Optimizing inhibitory learning during exposure therapy. *Behaviour research and therapy*, *46*(1), 5-27.

In the course of completing the questionnaires or the cognitive tasks, you may have noticed some emotional discomfort, or become aware of difficulties you are experiencing with anxiety or another type of mental health issue. You can find out more information about anxiety and other mental health problems at the following websites:

- http://www.cpa.ca/psychologyfactsheets/
- http://www.mooddisorderscanada.ca/page/resources
- http://www.bps.org.uk/psychology-public/psychology-and-public
- http://www.anxietycanada.ca/english/brochures.php
- http://www.cmha.ca/mental-health/mental-health-brochures/

If you would like to receive support or help for psychological problems in the Ottawa area, the following resources may be of use:

- Ottawa Distress Centre, 613-238-3311
- Tel-Aide Outaouais, 613-741-6433
- Centre d'Aide 24-7, 819-595-9999
- Ottawa Academy of Psychology, 613-235-2529
- University of Ottawa Student Academic Success Service, http://www.sass.uottawa.ca/about/mental-health-wellness.php

If you are interested in seeking self-help resources, the Association of Behavioral and Cognitive Therapies maintains a searchable database of recommended books for a series of concerns, which can be found online: http://www.abct.org/SHBooks/

If you have any questions or concerns related to this study, please contact the researchers:
Jessica S. Tutino
[REDACTED]

Allison J. Ouimet
[REDACTED]

If you have any questions relating to your rights as a research participant, please contact the Protocol Officer for Ethics Research at the University of Ottawa:
Tabaret Hall, 550 Cumberland Street
Room 154, Ottawa, ON K1N 6N5
Tel.: (613) 562-5387
E-mail: Ethics@uOttawa.ca

This debriefing form is for you to keep for future reference.

STUDY 2 PARTIAL DEBRIEFING FORM

uOttawa

DEBRIEFING FORM FOR RESEARCH PARTICIPATION

The Cognition and Anxiety Disorders Research (CADRe) Lab would like to thank you for participating in our research!

Title: Help Us Help You! Understanding Stress and Anxiety in Undergraduate Students

INVESTIGATORS AND INSTITUTION:
The study you just participated in is being conducted at the University of Ottawa by Jessica S. Tutino, Ph.D. Candidate, under the supervision of Dr. Allison J. Ouimet, in the Cognition and Anxiety Disorders Research Laboratory (CADRe Lab).

STUDY PURPOSE AND IMPLICATIONS:
You were told that the purpose of our study was to better understand anxiety and stress in undergraduate students and investigate ways to reduce anxiety. We told you that your speech would be evaluated on a number of characteristics by a group of researchers. In addition, the content of the videotaped speeches will be viewed by research assistants in our lab and used to code for verbal and non-verbal indicators of anxiety, as well as for use of safety behaviours. We also didn't tell you the exact nature of the behavioural task – that it was a speech task – when you initially signed up for the study, because we didn't want you to feel overly anxious throughout the experiment. These deceptions were intended to increase the possibility that you might feel speech-related anxiety only during the speech task. If you feel uncomfortable with the way that we obtained these data, please contact us at the emails listed below, and we will permanently delete your data from the study if you prefer.

Upon completion of the one-week follow-up questionnaire, you will be given a second debriefing form with additional information regarding our study.

Because this is an ongoing study, and some information you have learned could bias other people's responses if they knew it before the beginning of the study, we ask that you do not discuss the full content of the study to anyone. We appreciate your cooperation!

Thank you for your participation. If you are interested in finding out more about this study and its findings or if you have any concern or questions about the research itself, please contact Jessica Tutino, the Principal Investigator, at [REDACTED].

You may have participated in this study because you reported high levels of speech anxiety. Here are some resources that you may find helpful for these types of symptoms:

3. Antony, M. (2004). *10 Simple Solutions to Shyness: How to Overcome Shyness, Social Anxiety, and Fear of Public Speaking*. New Harbinger Publications.
4. Butler, G. (2001). *Overcoming social anxiety and shyness: A self-help guide using cognitive behavioral techniques*. New York University Press.

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- Ottawa Centre for Cognitive Therapy (613-729-0801)
- Centre for Psychological Services and Research at the University of Ottawa (613-562-5761)

In the course of completing the questionnaires or the cognitive tasks, you may have noticed some emotional discomfort, or become aware of difficulties you are experiencing with anxiety or another type of mental health issue. You can find out more information about anxiety and other mental health problems at the following websites:

- http://www.cpa.ca/psychologyfactsheets/
- http://www.mooddisorderscanada.ca/page/resources
- http://www.bps.org.uk/psychology-public/psychology-and-public
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- Centre for Psychological Services and Research, 613-562-5289 https://socialsciences.uottawa.ca/psychology/centre-psychological-services-research
- University of Ottawa Student Academic Success Service, http://www.sass.uottawa.ca/about/mental-health-wellness.php

If you are interested in seeking self-help resources, the Association of Behavioral and Cognitive Therapies maintains a searchable database of recommended books for a series of concerns, which can be found online: http://www.abct.org/SHBooks/

If you have any questions or concerns related to this study, please contact the researchers:
Jessica S. Tutino
[REDACTED]

Allison J. Ouimet
[REDACTED]

If you have any questions relating to your rights as a research participant, please contact the Protocol Officer for Ethics Research at the University of Ottawa:
Tabaret Hall, 550 Cumberland Street
Room 154, Ottawa, ON K1N 6N5
Tel.: (613) 562-5387
E-mail: Ethics@uOttawa.ca

Please save this debriefing form for future reference.

By signing this debriefing form, I consent to my data being used in this research study:

Name (Participant): _____

Name (Research Assistant): _____

STUDY 2 FULL DEBRIEFING FORM

uOttawa

DEBRIEFING FORM FOR RESEARCH PARTICIPATION

The Cognition and Anxiety Disorders Research (CADRe) Lab would like to thank you for participating in our research!

Title: Help Us Help You! Understanding Stress and Anxiety in Undergraduate Students

INVESTIGATORS AND INSTITUTION:
The study you just participated in is being conducted at the University of Ottawa by Jessica S. Tutino, Ph.D. Candidate, under the supervision of Dr. Allison J. Ouimet, in the Cognition and Anxiety Disorders Research Laboratory (CADRe Lab).

STUDY PURPOSE AND IMPLICATIONS:
You were told that the purpose of our study was to better understand anxiety and stress in undergraduate students and investigate ways to reduce anxiety. Specifically, we are interested in understanding how expectations about the benefits of using safety behaviours during a speech task influence speech performance, feelings of anxiety, psychophysiological responses, and working memory. In fact, you were invited to participate in this task because you indicated on the pre-screen questionnaire that you have relatively higher levels of anxiety in public speaking situations. We measured speech and social anxiety with some of the questionnaires you filled out before and after the speech task. We told you that your speech would be evaluated on a number of characteristics by a group of researchers. In reality, your speech will not be evaluated on any characteristics other than speech duration. In addition, the content of the videotaped speeches will be viewed by research assistants in our lab and used to code for verbal and non-verbal indicators of anxiety, as well as for use of safety behaviour. We also didn't tell you the exact nature of the behavioural task – that it was a speech task – when you initially signed up for the study, because we didn't want you to feel overly anxious throughout the experiment. These deceptions were intended to increase the possibility that you might feel speech-related anxiety only during the speech task. Finally, when you completed the one-week follow-up questionnaire, you were asked about your willingness to come back in for a second exposure exercise. There is in fact no second in-person exposure task. This was simply a measure of participants' willingness to come back in for a second exposure. If you feel uncomfortable with the way that we obtained these data, please contact us at the emails listed below, and we will permanently delete your data from the study if you prefer.

We are particularly interested in the way expectations about the usefulness of safety behaviours are related to how you respond on behavioural tasks, self-report questionnaires, cognitive tasks, and physiologically. The digit span tasks that you completed give us a way to measure your working memory, and we hypothesize that people who were told that safety behaviours are helpful to use during their speech task will show higher working memory capacity, lower self-reported anxiety, and less physiological arousal than those who were told that safety behaviours

are unhelpful, or were not given any specific instructions about the usefulness of safety behaviours.

We hope that this study will be an important first step towards better understanding how expectations about safety behaviour utility may influence treatment success if individuals are allowed to use these behaviours during cognitive behavioural therapy. Ultimately, we hope our findings will contribute to developing and refining effective treatments for anxiety disorders.

Because this is an ongoing study, and some information you have learned could bias other people's responses if they knew it before the beginning of the study, we ask that you do not discuss the full content of the study to anyone. We appreciate your cooperation!

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Sy, J. T., Dixon, L. J., Lickel, J. J., Nelson, E. A., & Deacon, B. J. (2011). Failure to replicate the deleterious effects of safety behaviors in exposure therapy. *Behaviour research and therapy*, *49*(5), 305-314.

In the course of completing the questionnaires or the cognitive tasks, you may have noticed some emotional discomfort, or become aware of difficulties you are experiencing with anxiety or another type of mental health issue. You can find out more information about anxiety and other mental health problems at the following websites:

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- Centre d'Aide 24-7, 819-595-9999
- Ottawa Academy of Psychology, 613-235-2529
- Centre for Psychological Services and Research, 613-562-5289 https://socialsciences.uottawa.ca/psychology/centre-psychological-services-research
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If you are interested in seeking self-help resources, the Association of Behavioral and Cognitive Therapies maintains a searchable database of recommended books for a series of concerns, which can be found online: http://www.abct.org/SHBooks/

If you have any questions or concerns related to this study, please contact the researchers:
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By clicking the button below, I consent to my data being used in this research study.

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